

# FOREWORD

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## 1. Foreword

### A: FOREWORD

These manuals are used when performing maintenance, repair or diagnosis of SUBARU TRIBECA.

Applicable model:  
2012MY WX\*\*\*\*\*

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

# HOW TO USE THIS MANUALS

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# How to Use This Manuals

## HOW TO USE THIS MANUALS

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### **1. How to Use This Manuals**

#### **A: HOW TO USE THIS MANUALS**

##### **1. STRUCTURE**

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 the diagnostic information has also been added where necessary.

##### **2. CONTENTS**

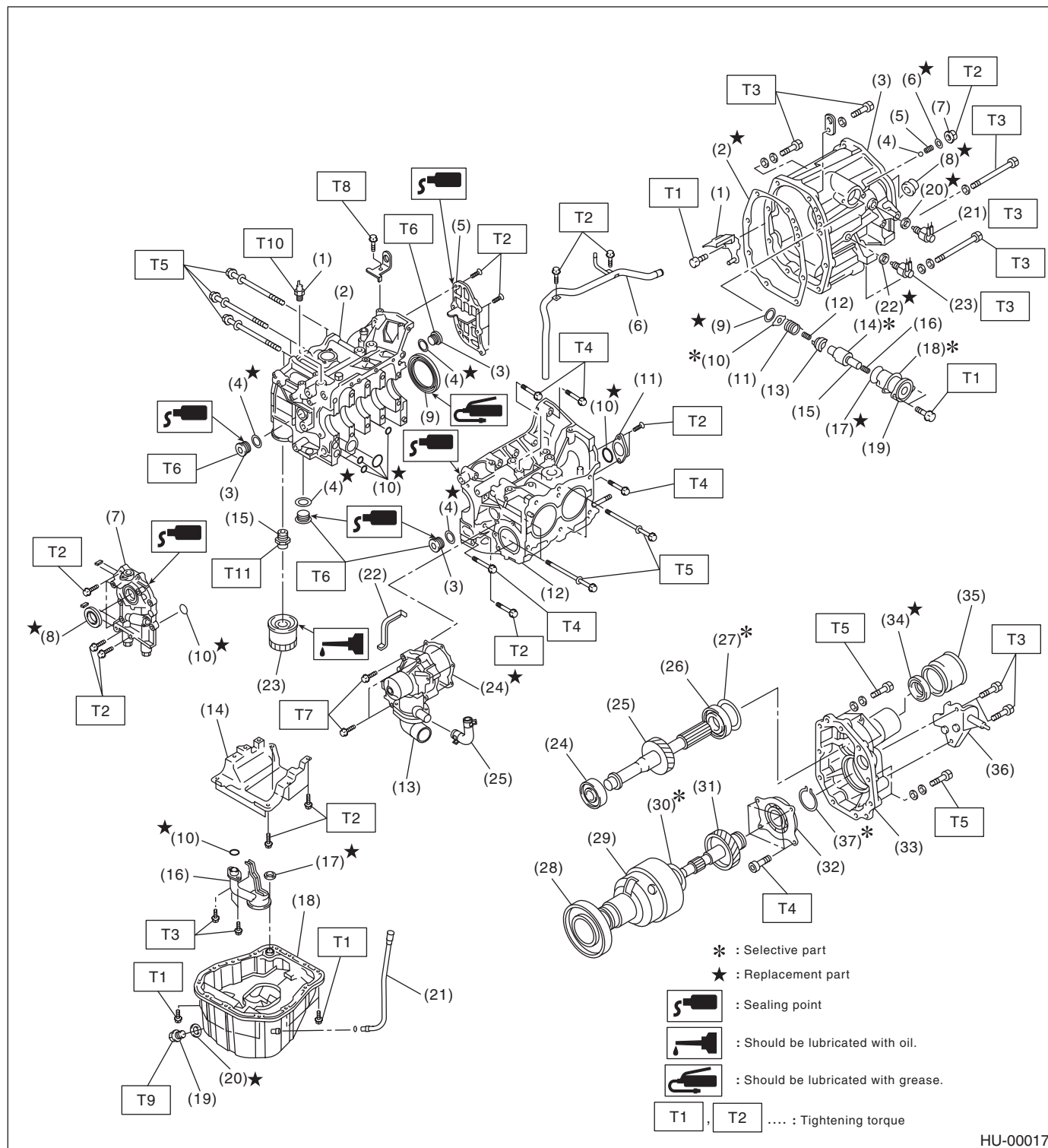
The first page has an index with tabs.

### 3. COMPONENT

Illustrations are provided for each component. The information necessary for repair work (tightening torque, grease up points, etc.) is described on these illustrations. Information is described using symbol.

To order parts, refer to parts catalogue.

**Example:**



HU-00017

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### **4. DEFINITIONS OF “NOTE”, “CAUTION” AND “WARNING”**

- **NOTE:**

Describes additional information to make works easier.

- **CAUTION:**

Describes prohibited matters to prevent vehicle or parts damage, or matters that requires special attention during work.

- **WARNING:**

Describes matters that may cause serious damage to the operator or other person, or that may cause damage or accident.

### **5. SPECIFICATION**

If necessary, specifications are also included.

### **6. INSPECTION**

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

## 7. MAINTENANCE

- Maintenance instructions for serviceable parts describe work area and detailed step with illustration. It also describes the use of special tool, tightening torque, caution for each procedure.
- If many serviceable parts are included in one service procedure, appropriate reference is provided for each parts.

### Example:

**15.Main Shaft** ← (A)

**A: REMOVAL** ← (B)

1) Remove the manual transmission assembly from vehicle. <Ref. to MT-33, REMOVAL, Manual Transmission Assembly.> ← (C)

11) Tighten the lock nuts to the specified torque using ST1 and ST2.

**NOTE:** ← (D)

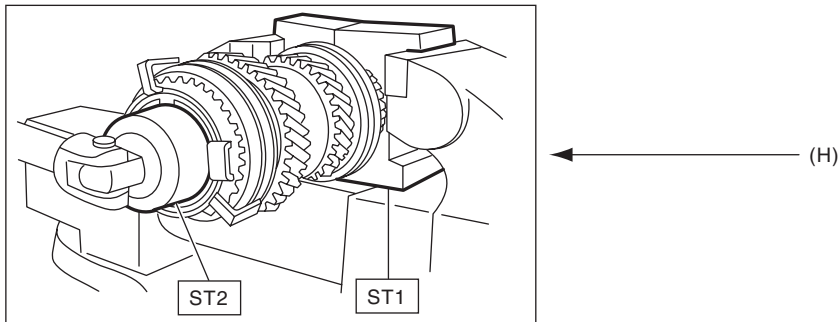
Secure the lock nuts in two places after tightening.

ST1 498937000 TRANSMISSION HOLDER

ST2 499987003<sup>(E)</sup> SOCKET WRENCH (35)<sup>(F)</sup>

**Tightening torque:**

**118 N·m (12.0 kgf-m, 86.8 ft-lb)** ← (G)



HU-00020

(A) Component

(B) Process

(C) Reference

(D) Cautions

(E) Tool number of special tool

(F) Name of special tool

(G) Tightening torque

(H) Illustration

## 8. DIAGNOSIS

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

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### 9. SI UNITS

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

**Example:**

***Tightening torque:***

***44 N·m (4.5 kgf·m, 33 ft·lb)***

Item	SI units	Conventional unit	Remarks
Force	N (Newton)	kgf	1 kgf = 9.80655 N
Mass (Weight)	kg, g	kg, g	
Capacity	ℓ, mℓ or cm <sup>3</sup>	ℓ or cc	1 cc = 1 cm <sup>3</sup> = 1 mℓ
Torque	N·m	kgf·m, kgf·cm	1 kgf·m = 9.80655 N·m
Rotating speed	rpm	rpm	
Pressure	kPa (kilopascal)	kgf/cm <sup>2</sup>	1 kgf/cm <sup>2</sup> = 98.0655 kPa
		mmHg	1 mmHg = 0.133322 kPa
Power	W	PS	1 PS = 0.735499 kW
Calorie	W·h	cal	1 kcal = 1.16279 W·h
Fuel consumption rate	g/kW·h	g/PS·h	1 g/PS·h = 1.3596 g/kW·h

The figure used in these manuals are described in the SI units and conventional units are described in ( ).



## 10.EXPLANATION OF TERMINOLOGY

AAI	: Air Assist Injection	H/L	: Headlight
A/B	: Airbag	H/U	: Hydraulic Unit
ABS	: Anti-lock Brake System	I/F	: Interface
A/C	: Air Conditioner	I/O	: Input/Output
ACC	: Accessory	IG	: Ignition
A/F	: Air Fuel Ratio	INT	: Intermittent
ALT	: Generator	ISC	: Idle Speed Control
ASSY	: Assembly	LCD	: Liquid Crystal Display
AT	: Automatic Transmission	LH	: LH (Left Hand)
ATF	: Automatic Transmission Fluid	LSD	: Limited Slip Differential
AUX	: Auxiliary	M/B	: Main Fuse & Relay Box
AUX	: Auxiliary Storage Unit	MFI	: Multi-Point Fuel Injection
AWD	: All Wheel Drive	MT	: Manual Transmission
BATT	: Battery	NA	: Natural Aspiration
CAN	: Controller Area Network	OP	: Option Parts
CD	: Compact Disc	P/W	: Power Window
CPU	: Central Processing Unit	PCV	: Positive Crankcase Ventilation
DOHC	: Double Overhead Camshaft	PTJ	: Pillow Tripod Joint
DOJ	: Double Offset Joint	RH	: RH (Right Hand)
DTC	: Diagnostic Trouble Code	ROM	: Read Only Memory
DVD	: Digital Versatile Disc	Rr	: Rear
EBJ	: High-efficiency Compact Ball Fixed Joint	SOHC	: Single Overhead Camshaft
ECM	: Engine Control Module	SRS	: Supplemental Restraint System
EDJ	: High-efficiency Compact Double Offset Joint	SSM	: Subaru Select Monitor
EGR	: Exhaust Gas Recirculation	ST	: Special Tool
EX	: Exhaust	SW	: Switch
F/B	: Fuse & Joint Box	TCS	: Traction Control System
Ft	: Front	TCM	: Transmission Control Module
FWD	: Front Wheel Drive	TPMS	: Tire Pressure Monitoring System
GPS	: Global Positioning System	VDC	: Vehicle Dynamics Control
HI	: High	VTD	: Variable Torque Distribution
HID	: High Intensity Discharge		

# How to Use This Manuals

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# SPECIFICATIONS

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# TRIBECA

## SPECIFICATIONS

### 1. TRIBECA

#### A: DIMENSION

Overall length	mm (in)	4,865 (191.5)	
Overall width	mm (in)	1,878 (73.9)	
Overall height (at C.W.)	mm (in)	Models without roof rail: 1,695 (66.7) Models with roof rail: 1,730 (68.1)	
Compartment	Length	mm (in)	2,495 (98.2)
	Width	mm (in)	1,475 (58.1)
	Height	mm (in)	1,390 (54.7)
Wheelbase	mm (in)	2,745 (108.1)	
Tread	Front	mm (in)	1,575 (62.0)
	Rear	mm (in)	1,575 (62.0)
Minimum road clearance	mm (in)	211 (8.3)	

#### B: ENGINE

Engine type	Horizontally opposed, liquid cooled, 6-cylinder, 4-stroke gasoline engine	
Valve arrangement	Overhead camshaft	
Bore x stroke	mm (in)	92 x 91 (3.622 x 3.583)
Displacement	cm <sup>3</sup> (cu in)	3,630 (221.5)
Compression ratio	10.5	
Ignition order	1 — 6 — 3 — 2 — 5 — 4	
Idle speed at Park or Neutral position	rpm	700±100
Maximum output	kW (HP)/rpm	191 (256)/6,000
Maximum torque	N-m (kgf-m, ft-lb)/rpm	335 (34.2, 247)/4,400

#### C: ELECTRICAL

Ignition timing (at idling)	BTDC	15°±8°
Spark plug	Type and manufacturer	NGK: SILFR6C11
Generator	12 V — 130 A	
Battery	Type and capacity (5HR)	12 V — 52 AH (75D23L)

#### D: TRANSMISSION

Transmission type	5AT		
Clutch type	TCC		
Gear ratio	1st	3.540	
	2nd	2.264	
	3rd	1.471	
	4th	1.000	
	5th	0.834	
	Reverse	2.370	
Reduction gear (Front)	1st reduction	Type of gear	Helical
		Gear ratio	1.000
	Final reduction	Type of gear	Hypoid
		Gear ratio	3.583
Reduction gear (Rear)	Final reduction	Type of gear	Hypoid
		Gear ratio	3.583

5AT: Electronically controlled fully-automatic, 5-forward speeds and 1-reverse  
TCC: Torque Converter Clutch

**E: STEERING**

Type			Rack & pinion
Turns, lock to lock			3.44
Minimum turning diameter	m (ft)	Curb to curb	11.4 (37.4)
		Wall to wall	12.2 (40.0)

**F: SUSPENSION**

Front	Macpherson strut type suspension
Rear	Double-wishbone type suspension

**G: BRAKE**

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

**H: TIRE**

Wheel size	18 × 8JJ
Tire size	P255/55 R18 104H
Type	Tubeless, Steel belted radial

**I: CAPACITY**

Fuel tank	ℓ (US gal, Imp gal)	64 (16.9, 14.1)	
Engine oil	Total capacity (at overhaul)	ℓ (US qt, Imp qt)	7.8 (8.2, 6.9)
	Filling amount of engine oil ℓ (US qt, Imp qt)	When replacing engine oil and oil filter	6.5 (6.9, 5.7)
		When replacing engine oil only	6.3 (6.7, 5.5)
	ATF	ℓ (US qt, Imp qt)	9.6 — 10.0 (10.1 — 10.6, 8.4 — 8.8)
Front differential gear oil	ℓ (US qt, Imp qt)	1.3 — 1.5 (1.4 — 1.6, 1.1 — 1.3)	
Rear differential gear oil	ℓ (US qt, Imp qt)	0.8 (0.8, 0.7)	
Power steering fluid	ℓ (US qt, Imp qt)	0.9 (0.95, 0.79)	
Engine coolant	ℓ (US qt, Imp qt)	7.6 (8.0, 6.7)	

# TRIBECA

## SPECIFICATIONS

### J: WEIGHT

Model		BASE								
Destination code		C0						C4		
OP code		AK	CE	OM	ON	PM	PN	DJ	LJ	
Curb weight (C.W.)	Front	kg (lb)	1,037 (2,287)	1,042 (2,298)	1,046 (2,306)	1,048 (2,311)	1,048 (2,311)	1,050 (2,315)	1,048 (2,311)	1,048 (2,311)
	Rear	kg (lb)	863 (1,903)	872 (1,923)	885 (1,951)	886 (1,954)	888 (1,958)	889 (1,960)	877 (1,934)	877 (1,934)
	Total	kg (lb)	1,900 (4,190)	1,914 (4,220)	1,931 (4,258)	1,934 (4,264)	1,936 (4,269)	1,939 (4,275)	1,925 (4,245)	1,925 (4,245)
Gross axle weight ratio (G.A.W.)	Front	kg (lb)	1,368 (3,016)	1,368 (3,016)	1,368 (3,016)	1,368 (3,016)	1,368 (3,016)	1,368 (3,016)	1,368 (3,016)	1,368 (3,016)
	Rear	kg (lb)	1,515 (3,340)	1,515 (3,340)	1,515 (3,340)	1,515 (3,340)	1,515 (3,340)	1,515 (3,340)	1,515 (3,340)	1,515 (3,340)
Gross vehicle weight (G.V.W.)		kg (lb)	2,586 (5,700)	2,586 (5,700)	2,586 (5,700)	2,586 (5,700)	2,586 (5,700)	2,586 (5,700)	2,586 (5,700)	2,586 (5,700)
Option	Leather seat		—	—	○	○	○	○	○	○
	Driver seat memory sheet		—	—	○	○	○	○	○	○
	Seat heater		○	○	○	○	○	○	○	○
	Sunroof + roof rail		—	○	—	—	—	—	—	○
	Sunroof + roof rail (silver paint)		—	—	○	○	○	○	○	—
	HID headlight		—	—	○	○	○	○	○	○
	Home link		—	○	○	○	○	○	—	—
	Rear seat entertainment		—	—	—	—	○	○	○	○
	7-spoke aluminum wheel		—	—	○	○	○	○	—	—
	Navigation system		—	—	—	○	—	○	—	—
	Rear view camera + navigation display		○	○	○	○	○	○	○	○
	Rear view camera + inner mirror with rear view display		—	—	—	—	—	—	—	—
	High grade audio & speakers		—	—	—	—	—	—	○	○
	Satellite-compatible + high grade audio & speakers		—	○	—	—	—	—	—	—
HK-type audio & speakers		—	—	○	○	○	○	—	—	
HK-type audio & speakers + XM		—	—	—	—	—	—	—	—	

# TRIBECA

## SPECIFICATIONS

Model		BASE								
Destination code		U4								
OP code		AL	EU	EV	FV	NC	OU	OV	PV	
Curb weight (C.W.)	Front	kg (lb)	1,033 (2,278)	1,044 (2,302)	1,046 (2,307)	1,049 (2,312)	1,037 (2,286)	1,046 (2,305)	1,048 (2,310)	1,050 (2,315)
	Rear	kg (lb)	860 (1,895)	885 (1,951)	887 (1,956)	890 (1,961)	875 (1,928)	885 (1,951)	887 (1,956)	890 (1,961)
	Total	kg (lb)	1,893 (4,173)	1,929 (4,253)	1,934 (4,263)	1,939 (4,273)	1,911 (4,214)	1,931 (4,256)	1,935 (4,266)	1,940 (4,276)
Gross axle weight ratio (G.A.W.)	Front	kg (lb)	1,368 (3,016)	1,368 (3,016)	1,368 (3,016)	1,368 (3,016)	1,368 (3,016)	1,368 (3,016)	1,368 (3,016)	1,368 (3,016)
	Rear	kg (lb)	1,515 (3,340)	1,515 (3,340)	1,515 (3,340)	1,515 (3,340)	1,515 (3,340)	1,515 (3,340)	1,515 (3,340)	1,515 (3,340)
Gross vehicle weight (G.V.W.)		kg (lb)	2,586 (5,700)	2,586 (5,700)	2,586 (5,700)	2,586 (5,700)	2,586 (5,700)	2,586 (5,700)	2,586 (5,700)	2,586 (5,700)
Option	Leather seat		—	○	○	○	○	○	○	○
	Driver seat memory sheet		—	○	○	○	○	○	○	○
	Seat heater		○	○	○	○	○	○	○	○
	Sunroof + roof rail		—	○	○	○	—	—	—	—
	Sunroof + roof rail (silver paint)		—	—	—	—	—	○	○	○
	HID headlight		—	—	—	—	—	○	○	○
	Home link		—	○	○	○	○	○	○	○
	Rear seat entertainment		—	—	—	○	—	—	—	○
	7-spoke aluminum wheel		—	—	—	—	—	○	○	○
	Navigation system		—	—	○	○	—	—	○	○
	Rear view camera + navigation display		—	—	○	○	—	—	○	○
	Rear view camera + inner mirror with rear view display		—	○	—	—	—	○	—	—
	High grade audio & speakers		—	—	—	—	—	—	—	—
	Satellite-compatible + high grade audio & speakers		—	—	—	—	—	—	—	—
HK-type audio & speakers		—	—	—	—	—	—	—	—	
HK-type audio & speakers + XM		—	○	○	○	○	○	○	○	

\*1: For destination code, refer to "ID" section. <Ref. to ID-5, MODEL NUMBER LABEL, IDENTIFICATION, Identification.>





# PRECAUTION

# *PC*



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### 1. Precaution

#### A: CAUTION

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

#### 1. VEHICLE DYNAMICS CONTROL (VDC)

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

#### 2. BRAKE FLUID

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

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

Follow all government regulations concerning disposal of refuse when disposing.

#### 3. RADIATOR FAN

The radiator 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 TEST

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

#### 5. AIRBAG

To prevent bodily injury from unexpected deployment of airbags and unnecessary maintenance, follow the instructions in this manual when performing maintenance on the airbag components or nearby, around front of the vehicle (radiator panel, front wheel apron, front side frame, bumper, hood, front fender), around side of the vehicle (front door, rear door, center pillar, rear fender, side sill, rear wheel apron), around rear of the vehicle (second seat, rear floor pan) and the airbag wiring harnesses or nearby.

To prevent unexpected deployment, turn the ignition switch to OFF and disconnect the ground cable from battery, then wait at least 60 seconds before starting work.

#### 6. AIRBAG AND SEAT BELT PRETENSIONER DISPOSAL

To prevent bodily injury from unexpected airbag deployment, do not dispose the airbag modules and seat belt pretensioner in the same way as other waste. Follow all government regulations concerning disposal of refuse.

#### 7. AIRBAG MODULE

Carefully observe the following when handing and storing the airbag module to prevent bodily injury from unexpected deployment:

- Do not hold the 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 TOOL

To prevent unexpected deployment, only use special tools.

#### 9. WINDOW

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

#### 10. WINDOW ADHESIVE

Always use the recommended or equivalent adhesive when attaching glass to prevent it from coming falling, resulting in accidents and injury.

#### 11. OIL

When handling oil, follow the rules below to prevent unexpected accidents.

- Prepare a container and cloth when performing work which oil possibly spills. If oil spills, wipe it off immediately to prevent from penetrating into floor or flowing out, to protect the environmental.
- Follow all government regulations concerning disposal of refuse when disposing.

#### 12. FUEL

When handling and storing fuel, carefully observe the following to prevent unexpected accidents.

- Be careful of fires.
- Prepare a container and cloth to prevent scattering of fuels when performing work where fuels can be spilled. If the fuel spills, wipe it off immediately to prevent it from penetrating the floor or flowing out, to protect the environmental.
- Follow all government and local regulations concerning disposal of refuse when disposing.

### 13. ENGINE COOLANT

When handling engine coolant, adhere to the following to prevent from unexpected accident.

- Never remove the radiator cap because of the danger of engine coolant blowing out when the engine coolant is hot.
- Prepare a container and cloth to prevent spraying of engine coolant when performing work in which engine coolant can be spilled. If the fuel spills, wipe it off immediately to prevent from penetrating into floor or flowing out for environmental protection.
- Follow all government and local regulations concerning disposal of refuse when disposing.

### 14. AIR CONDITIONER REFRIGERANT

In order to prevent from global warming, avoid releasing air conditioner refrigerant into the atmosphere. Using a refrigerant recovery system, discharge and reuse it.

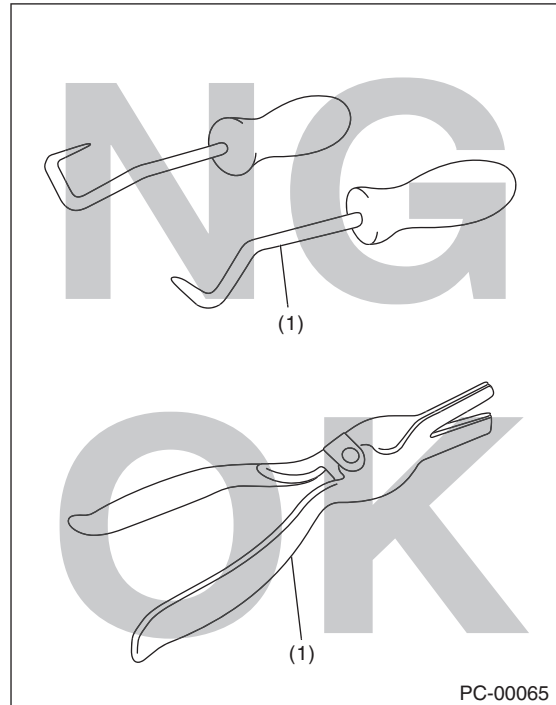
### 15. REMOVAL AND INSTALLATION OPERATION OF HOSES, ETC.

#### 1. Before the removal and installation operation of hoses, etc.

- If you keep using the damaged or deformed hose, it results bleeds or leakage of the fat adheres or disconnection of the hose. Be careful not to spill fat adheres on exhaust pipes, etc. during maintenance to prevent emitting smoke or causing fires.
- Perform the operation with the hose removed. If the operation is performed without removing the hose, it may damage inner surface of the hose.

#### 2. Removal and installation operation of hoses, etc. during the inspection

- Follow the instructions below when removing hose.
  - Do not use a pointed hose remover (hose plucker) when using a general hose remover. It may damage the pipe surface or the hose.



(1) Hose remover

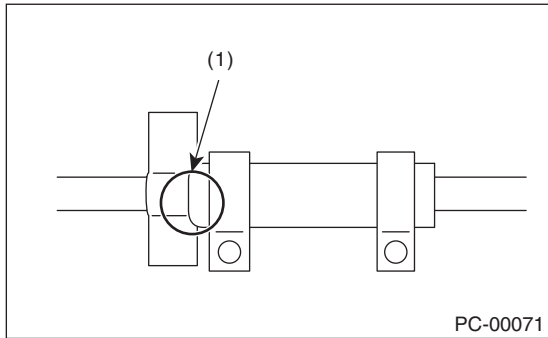
- When draining hose using pliers, be sure to cover the hose with cloth and rotate the hose slightly to extract straight.

# Precaution

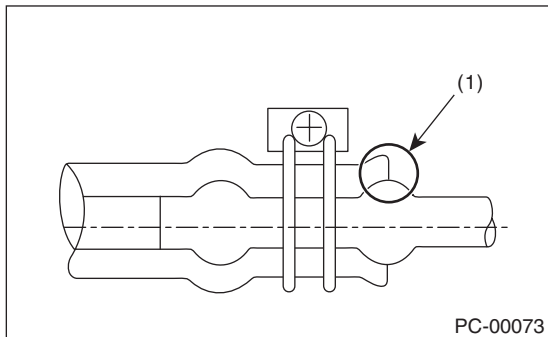
## PRECAUTION

• If you keep using the hose, perform the inspection below and replace the hose with a new part if faulty.

- Replace the hose with a new part if it rides over the stay or spool.



(1) Hose rides over the stay

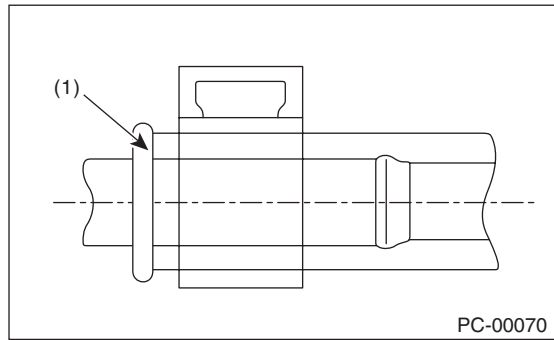
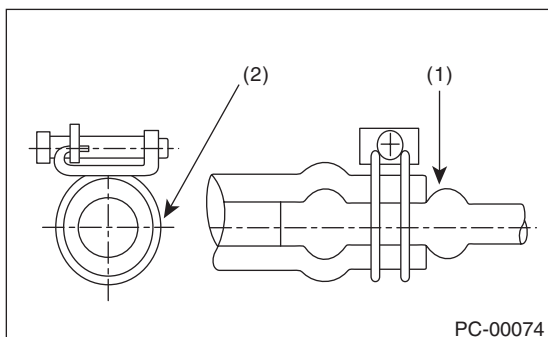


(1) Hose rides over the spool

- Check if the surface and the inner surface of the hose are damaged, cracked, bend, hardened, softened, swelled, peeled or deformed due to the adherence or the entry of the foreign matter by bending the hose. Replace with the new part if faulty.

• Follow the instructions below during installation.

- Check carefully for assembling position.
- Never use lubricants.
- Insert the hose to the specified position (stopper or spool) securely.



- (1) Push against the spool. (Insert the hose and prevent it from becoming wrinkled.)
- (2) Tighten the hose outwards and apply force thoroughly.

- Check if the position, direction and hose layout of the hose clamp are correct. (Check if the position, direction, length and the gap around are correct, or if it is different from the condition before the work)
- After the installation, check that the hose is installed securely and there is no leakage. (Check if it is fixed securely with the clamp)
- For hose clips and hose clamps, perform the inspection below and replace them with a new part if faulty.
  - Check for deformation, rust, damage or foreign matters.
  - For hose clip, check if it works and has clamping force.
  - For hose clamp, check if it can tighten screw, not ovalized or the screw is not damaged.
- For hose pipes, perform the inspection below and replace with a new part if faulty.

Check if the pipe is not damaged, rusted, peeled (peeled plates included), covered with foreign matter, bent, compressed or cracked.
- For the parts below, replaces with a new part when the hose is removed or the installation position is changed.

ATF cooler hose, engine oil cooler hose, power steering suction hose, power steering return hose, fuel hose (delivery/return)

# NOTE

***NT***



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## 1. Note

### A: NOTE

This information will improve the efficiency of maintenance and assure that the finished work is of a good quality.

### 1. FASTENERS NOTICE

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

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

### 2. STATIC ELECTRICITY DAMAGE

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

### 3. BATTERY

When removing the battery terminal, always be sure to turn the ignition to OFF to prevent electrical damage of the control module from overcurrent. Be sure to remove the battery ground cable first.

When removing the battery terminal, memories such as the stereo and control unit DTC are erased. Therefore, the content of each memory should be recorded first.

### 4. SERVICE PARTS

Use genuine parts for maximum performance and maintenance when conducting repairs. Subaru/FHI will not be responsible for poor performance resulting from the use of parts except for genuine parts.

### 5. PROTECTING VEHICLE UNDER MAINTENANCE

Make sure to attach the fender cover, seat covers, etc. before work.

### 6. ENSURING SECURITY DURING WORK

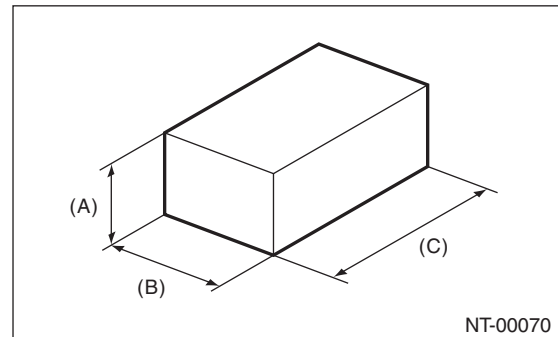
When working in a group of two or more, perform the work with calling each other to ensure mutual safety.

## 7. LIFT AND JACK

When using a lift or shop jack to raise a vehicle or using rigid rack to support 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 that the vehicle is balanced before raising it. Be sure to set the wheel stoppers when jacking-up only the front or rear side of the vehicle.

### NOTE:

- When using a lift, follow its operation manual.
- Do not work or leave unattended while the vehicle is supported with jack, support it with rigid racks.
- Be sure to use the rigid racks with rubber attached to cradle to support the vehicle.
- When using a plate lift, use a rubber attachment. Place the attachment to the specified position of the vehicle, by adjusting front/rear and left/right sides accordingly.

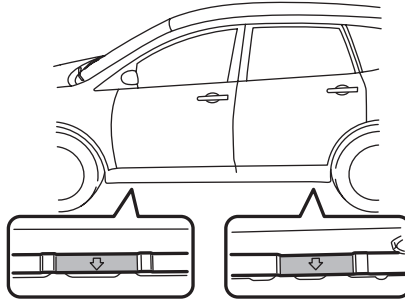


- (A) 80 mm (3.15 in) or more
- (B) 80 — 100 mm (3.15 — 3.94 in)
- (C) 120 — 170 mm (4.72 — 6.69 in)

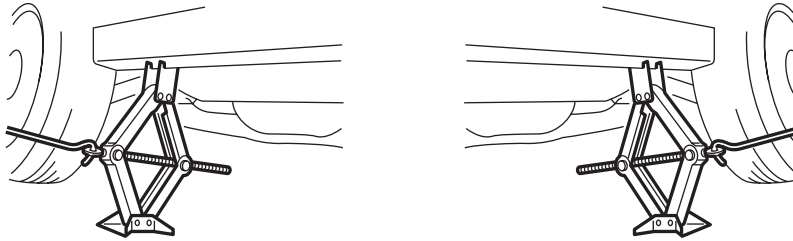
- Align the cushion rubber end of plate lift with the end of rubber attachment. (portion b) Also, align the center of the supporting location with the center of the attachment. (portion a)

- Do not use the plate lift whose attachment does not reach the supporting locations.

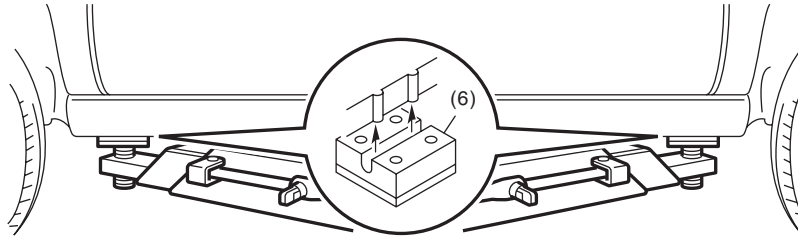
(1)



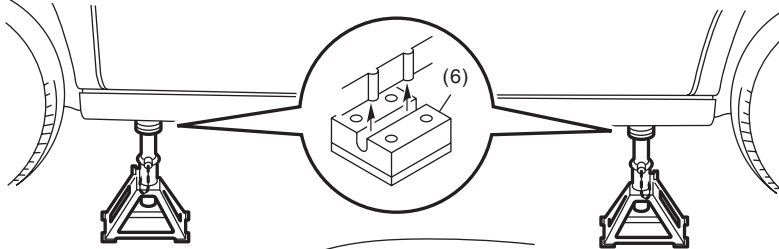
(2)



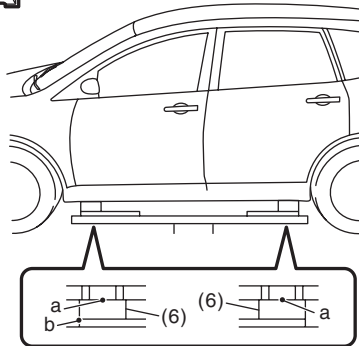
(3)



(4)



(5)



(1) Support locations  
(2) Pantograph jack

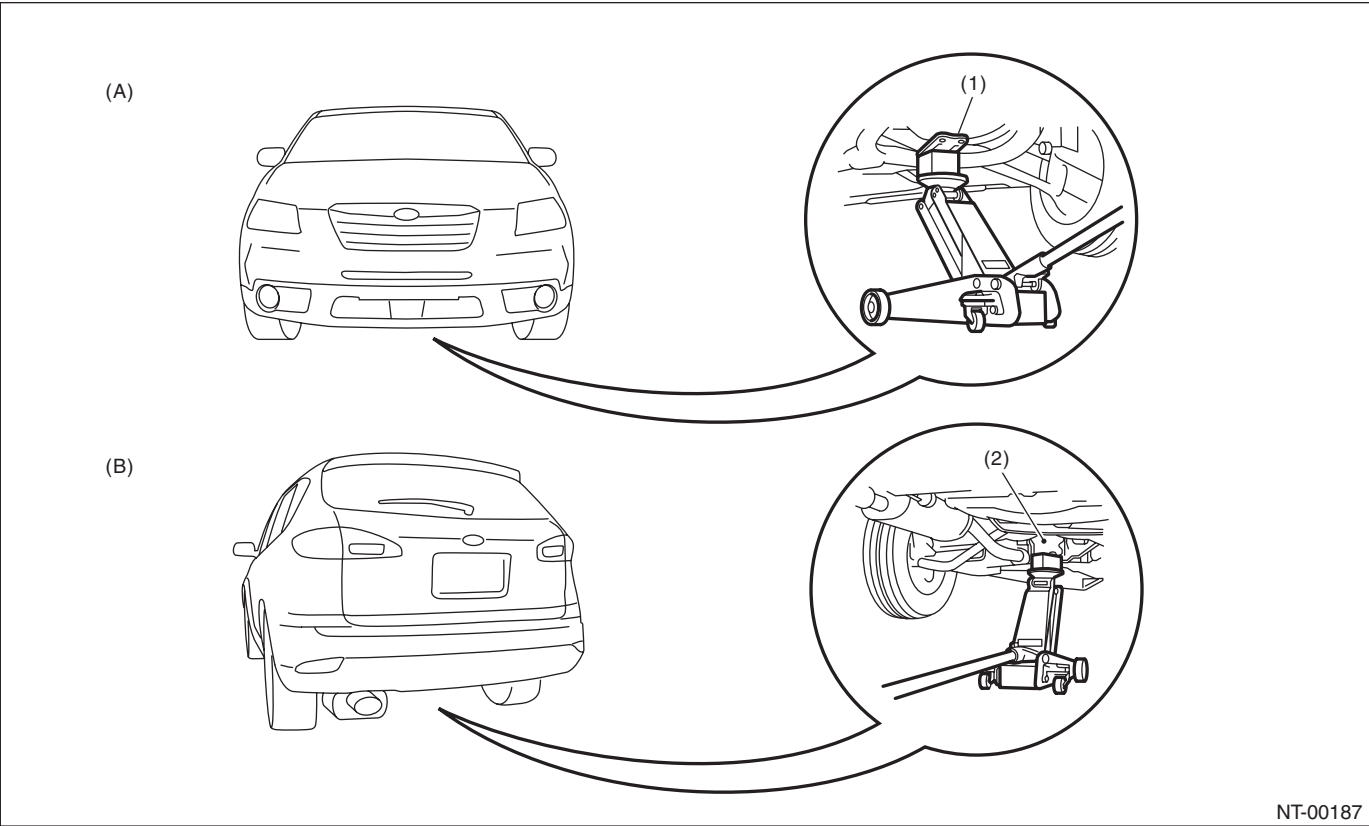
(3) Swing arm lift  
(4) Rigid rack

(5) Plate lift  
(6) Attachment

NT-00442

# Note

NOTE



NT-00187

(A) Front

(B) Rear

(1) Front crossmember

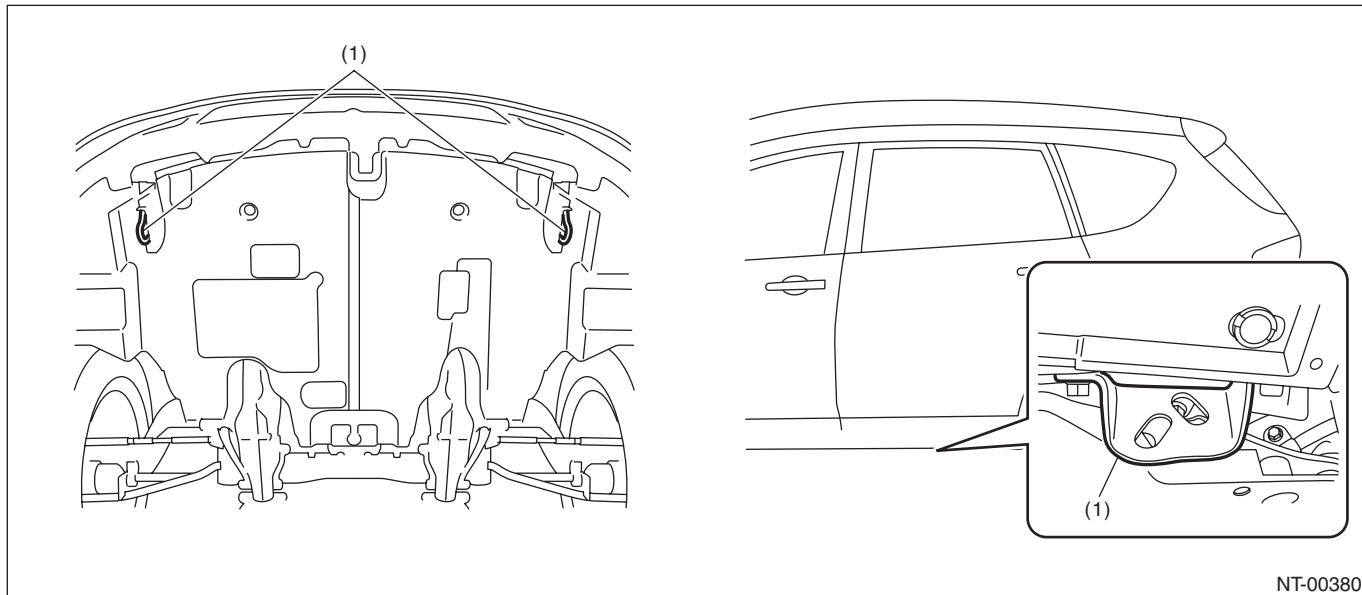
(2) Rear differential



### 8. TIE-DOWNS

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

- Tie-down location



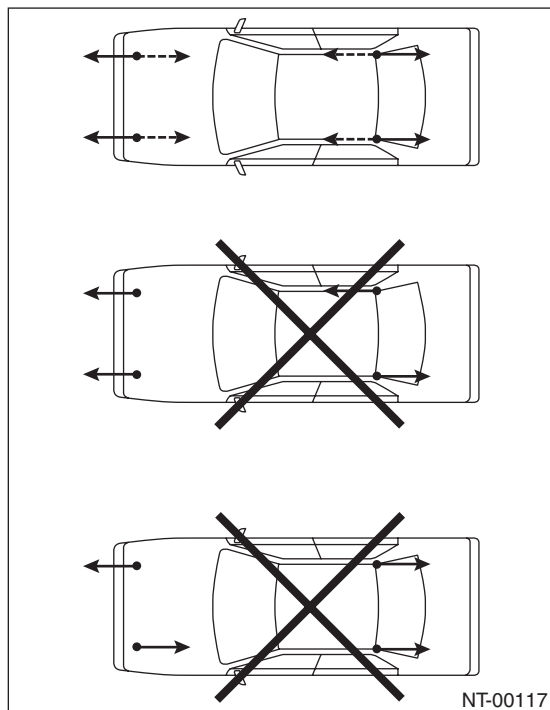
NT-00380

- (1) Hook for tie-down

- Chain direction at tie-down condition

**NOTE:**

Pull the left and right sides in the same direction, and pull front and rear of the vehicle in the opposite direction at the same time.

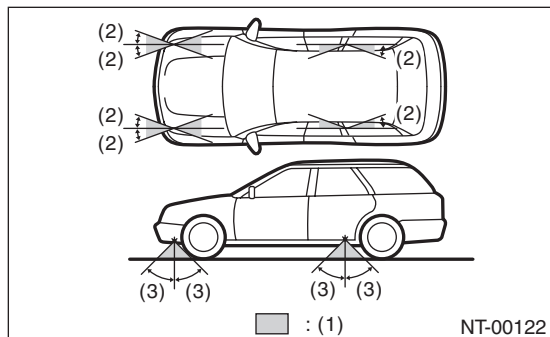


NT-00117

## Note

### NOTE

- Chain pulling range at tie-down condition



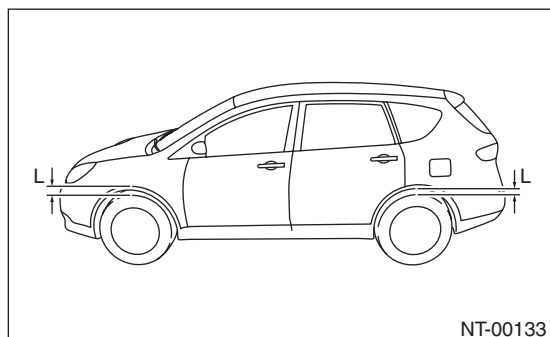
(1) Chain pulling range at tie-down condition

(2) 20°

(3) 45°

- Vehicle sinking volume at tie-down condition

Measure the distance between the highest tire point and highest arch point before and after tie-down. Difference of measured values (sinking volume) should be within 50 mm (1.97 in) and make sure to fix the vehicle securely.



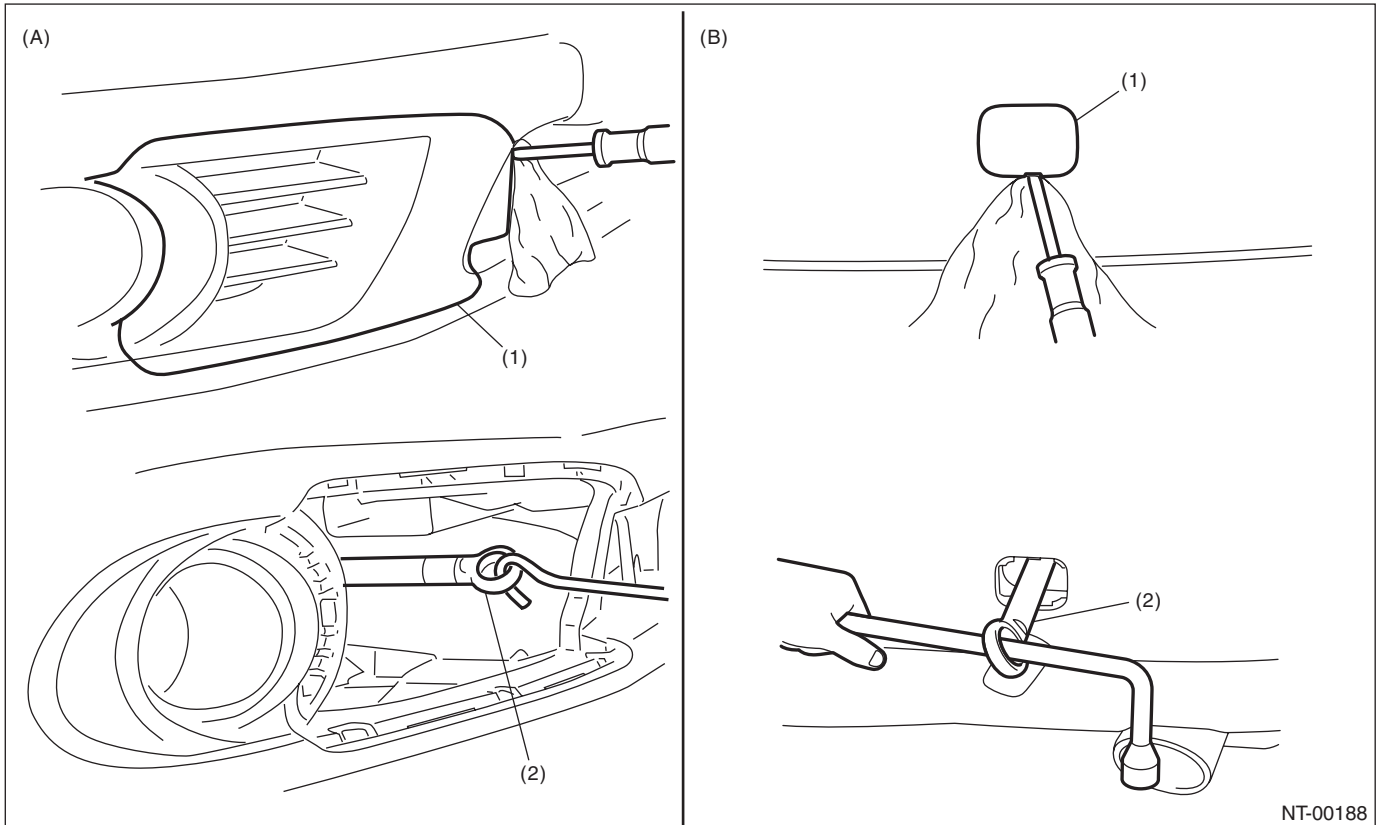
## 9. TOWING

Avoid towing vehicles except when the vehicle cannot be driven. For models with AWD, AT or VTD, use a loader instead of towing. When towing other vehicles, pay attention to the following to prevent eye bolt or vehicle damage resulting from excessive weight.

- Do not tow other vehicles with a front tie-down hook.
- Make sure the vehicle towing is heavier than the vehicle being towed.
- Remove the hook cover, and install the eye bolt.

### CAUTION:

- Pull the screwdriver which is inserted into the hook cover.
- Do not remove the hook cover holding the slit of the hook cover.



NT-00188

(A) Front

(B) Rear

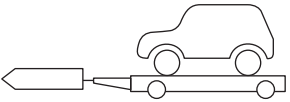

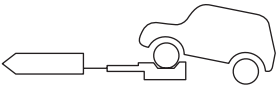
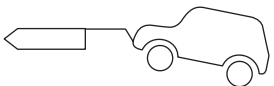
(1) Hook cover

(2) Eye bolt

# Note

## NOTE

### • Precautions

Towing	Precautions	AT
<p>Lifting up four wheels (On a trailer)</p>  <p style="text-align: right;">NT-00023</p>	<p>Towing the vehicle after lifting up all four wheels is a basic rule for AWD model.</p>	○
<p>Rope</p>  <p style="text-align: right;">NT-00024</p>	<ul style="list-style-type: none"> <li>• Check if both front and rear wheels are rotated normally.</li> <li>• Driving speed 30 km/h (19 MPH) or less</li> <li>Allow driving distance 50 km (31 miles) or less</li> </ul>	▲
<p>Raising the front wheels</p>  <p style="text-align: right;">NT-00025</p>	<p>Prohibition</p>	×
<p>Lifting up the front wheels</p>  <p style="text-align: right;">NT-00026</p>	<ul style="list-style-type: none"> <li>• Prohibited, due to damage on bumper, front grille, etc.</li> <li>• Do not raise the vehicle with bumper.</li> </ul>	×

Marked ○ : OK, Marked × : Prohibited, Marked ▲ : Conditionally OK.

---

**CAUTION:**

- Check ATF, gear oil and rear differential oil before driving.
- Place the shift lever in “N” position during towing.
- Do not lift up the rear wheels to avoid unsteady rotation.
- Turn the ignition key to “ACC”, then check the steering wheel moves freely.
- Release the parking brake to avoid tire dragging.
- Since the power steering does not work, be careful for the heavy steering effort. (When engine is stopped)
- Since the servo brake does not work, be careful that the brake is not applied effectively. (When engine is stopped)
- In case of the malfunction of internal transmission or drive system, lift up four wheels (on a trailer) for towing.
- Do not use towing hook (eye bolt) except when towing.
- Make sure to detach the towing hook (eye bolt) after towing. If it remains attached, airbag may not operate properly when receiving a shock. And it may also affect the crash performance of the vehicle.

**10.CARRIER CAR**

Before lowering the vehicle from the carrier car, perform the following operations.

**CAUTION:**

**Always perform the following operations before lowering the vehicle from the carrier car. Otherwise, the power unit will rotate reversely, which may cause the damage to the engine, vacuum pump, and transmission.**

- 1) Start the engine.
- 2) Set the transmission shift position into driving direction of the vehicle. (When the vehicle drives forward, do not shift the transmission in R range. When the vehicle drives rearward, do not shift the transmission to D range.)

## Note

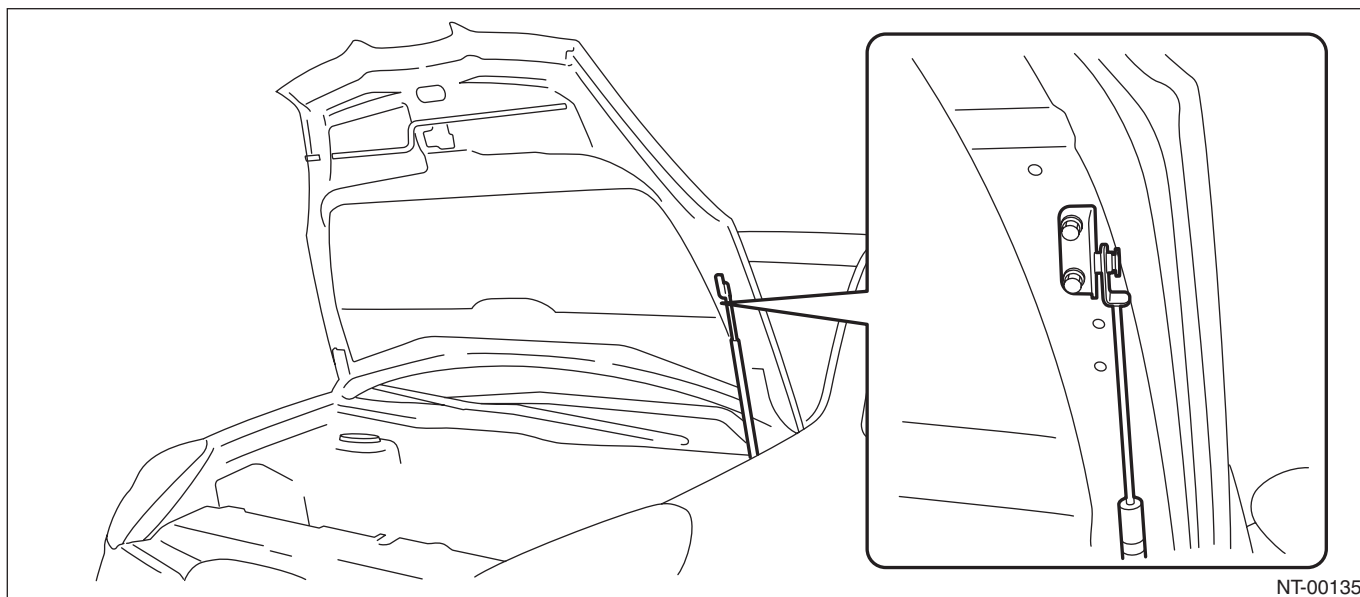
### NOTE

#### 11.FRONT HOOD DAMPER STAY

- At the check and general maintenance

#### CAUTION:

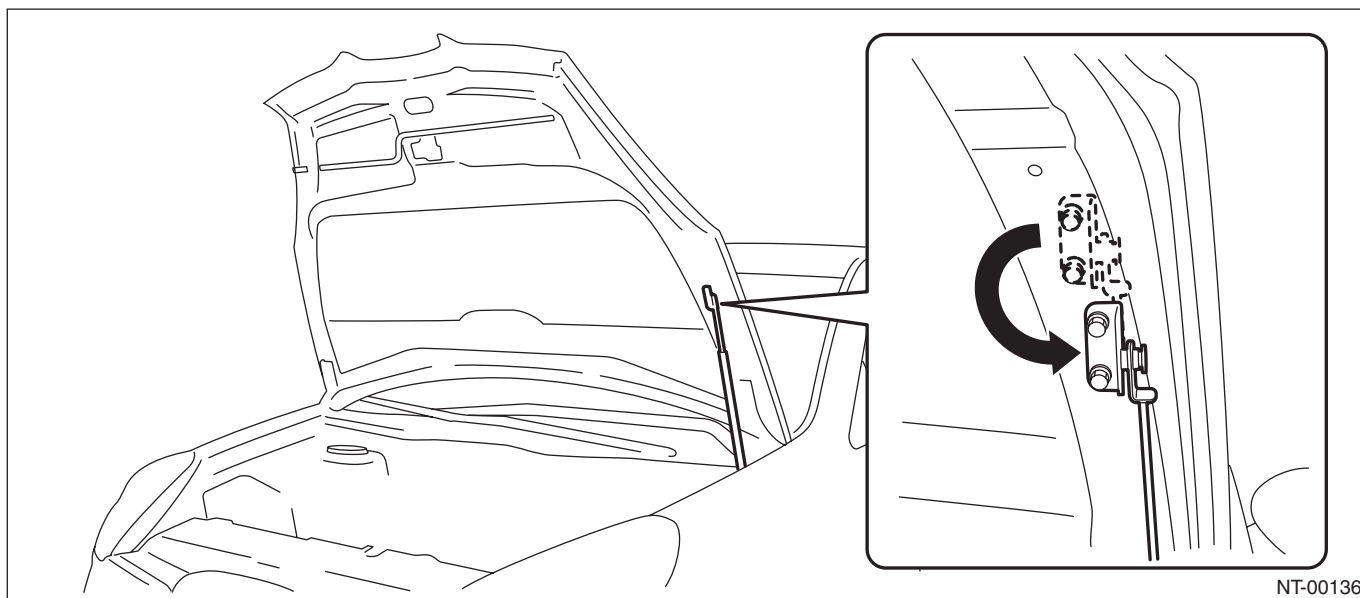
At the inspection and general maintenance, do not detach the damper stays.



- When wider hood opening is necessary  
Set the damper stay below as shown in the figure.

#### Tightening torque:

<Ref. to EB-6, FRONT HOOD, COMPONENT, General Description.>



- After work, set the damper stays back to the normal position and tighten the bolts to the specified torque.

#### CAUTION:

- Always perform works such as inspections and maintenance with both damper stays attached.
- Do not leave one side of damper stay removed.
- The hood cannot be closed with the hood damper on the full open side. When it is necessary to close, tie the hood striker and the radiator panel with a string etc. to fix them.

## 12. GENERAL SCAN TOOL

Using general scan tools will greatly improve the efficiency of repairing engine electronic controls. Subaru Select Monitor can be used to diagnose the engine, VDC, airbag and other electronically controlled parts.

## 13. AWD CIRCUIT MEASURES

Since VTD type is used in the center differential, cut-off of AWD circuit cannot be carried out.

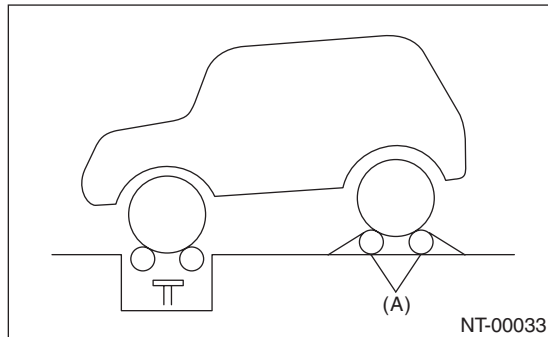
## 14. SPEEDOMETER TEST

### 1) Rear wheel free roller system

- (1) Set the free roller on the floor of rear wheel side securely according to the wheel base and rear tread of the vehicle.
- (2) Let the vehicle ride on the tester and free roller gently.

#### CAUTION:

Fix the vehicle using a pulling metal (chain or wire) to the front and rear towing hooks or tie-down hook to prevent the lateral runout of front wheels and springing out of vehicle.



(A) Free roller

- (3) Set the speedometer tester.
- (4) Conduct the speedometer test work.

#### CAUTION:

Do not suddenly accelerate or decelerate while working.

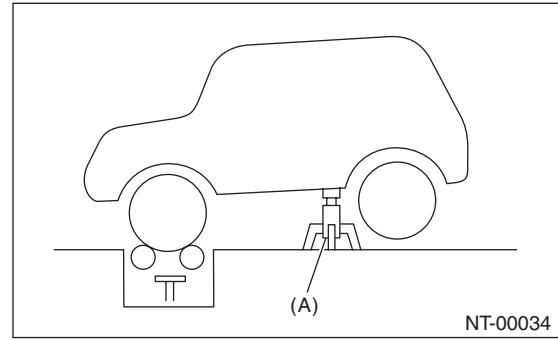
### 2) Rear wheel jack-up system

- (1) Set the vehicle on speedometer tester.

#### CAUTION:

Fix the vehicle using a pulling metal (chain or wire) to the front and rear towing hooks or tie-down hook to prevent the lateral runout of front wheels and springing out of vehicle.

- (2) Jack up the rear wheels and set the rigid racks to the specified locations of side sill.



(A) Rigid rack

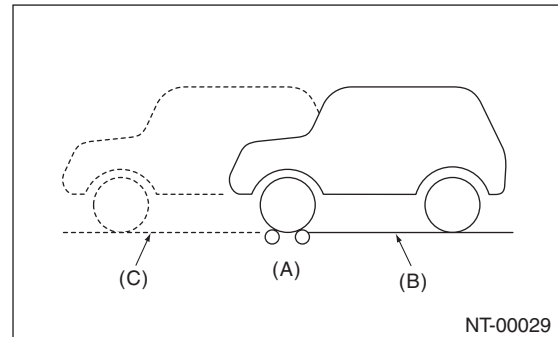
- (3) Conduct the speedometer test work.

#### CAUTION:

Do not suddenly accelerate or decelerate while working.

## 15. BRAKE TEST

- 1) Keep the front or rear wheels on the ground during measurement.



(A) Brake tester

(B) Position for measuring front wheel

(C) Position for measuring rear wheel

- 2) When the brake dragging force is large, inspect whether there is dragging in the brake or brake shoe.

#### Specifications:

	Braking force
Rear wheel total	10% or more of load on front or rear wheels
Difference between right and left wheels	8% or less of load on front or rear wheels
Grand total	50% or more of vehicle weight at the time of test

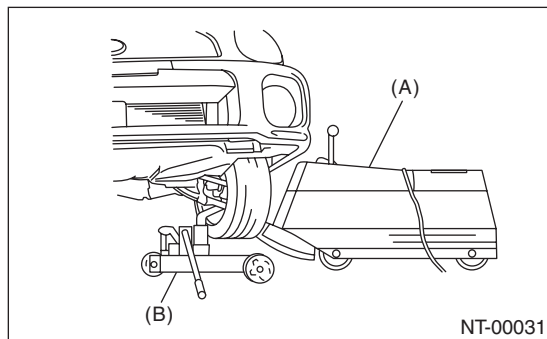
When measurement is difficult to carry out because both of front wheels are locked, check if braking force measurement in this condition conforms to standard grand total.

## 16.ON THE CAR WHEEL BALANCING

### CAUTION:

- Carry out this procedures after measuring the balance of each single tire.
- Set the vehicle so that the front and rear wheels are the same height.
- Release the parking brake during measurement.
- Rotate each wheel by hands, and make sure it rotates without dragging.
- Do not suddenly accelerate or decelerate while working.
- When an error is indicated during engine drive, do not use the motor drive together.

1) Set the rigid rack to the specified locations of side sill, jack up the front or rear two wheels of non-measuring side and set the pickup stands to two wheels of measuring side.



(A) Balancer body

(B) Pickup stand (left and right)

2) For drive wheel, drive the tires with engine for measurement.

3) For non-drive wheel, drive the tires from the on the car wheel balancer for measurement.



# IDENTIFICATION

***ID***

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# Identification

## IDENTIFICATION

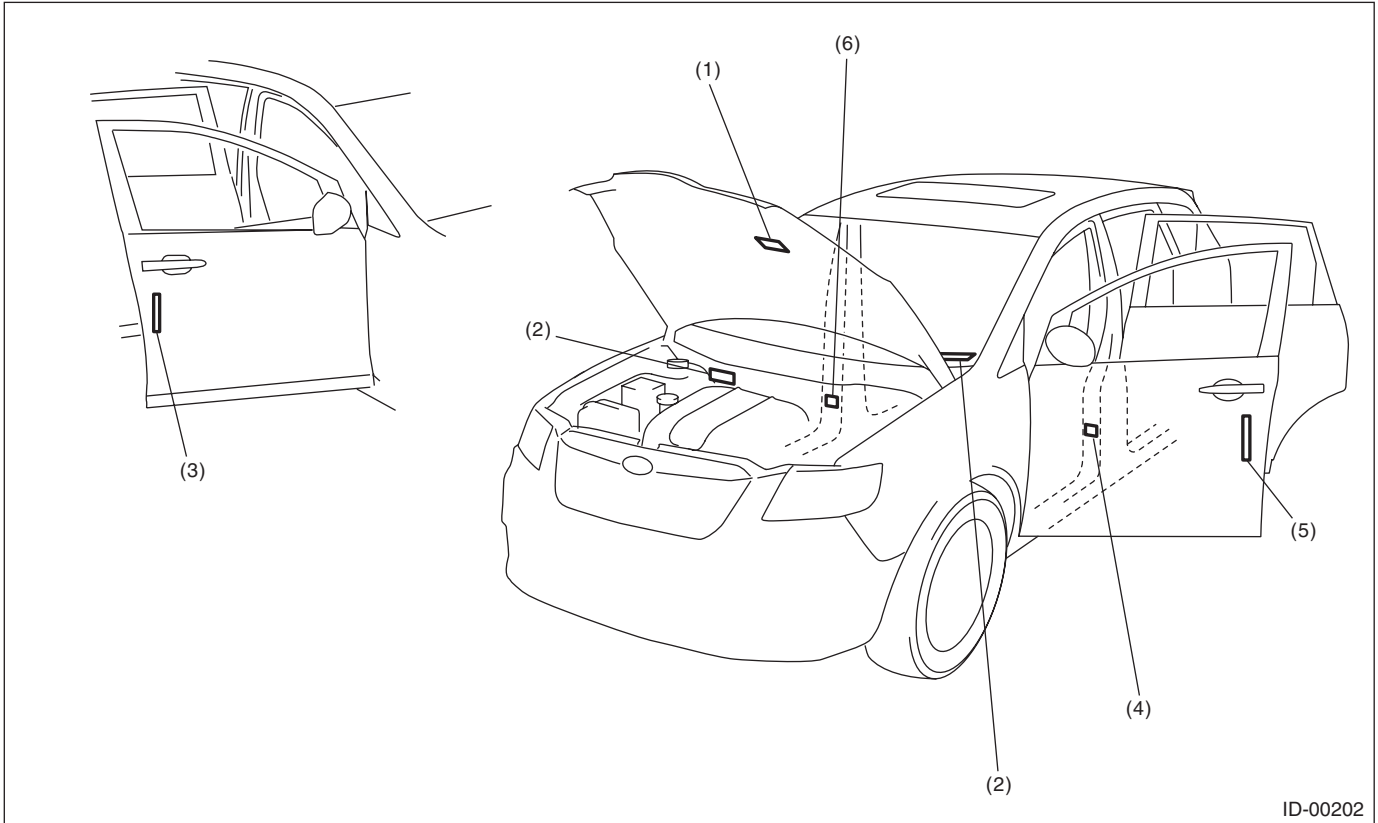
### 1. Identification

#### A: IDENTIFICATION

##### 1. IDENTIFICATION NUMBER AND LABEL LOCATIONS

The V.I.N. (Vehicle Identification Numbers) is used to classify the vehicle.

##### • POSITIONING OF THE PLATE LABEL FOR IDENTIFICATION



(1) Emission control label

(4) Tire inflation pressure label  
(Driver's side)

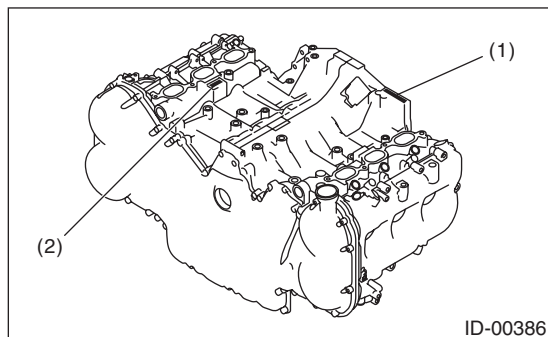
(6) Radio noise label

(2) Vehicle identification number  
(V.I.N.)

(5) FMVSS label (U.S. model)  
CMVSS label (Canada model)

(3) Model number label

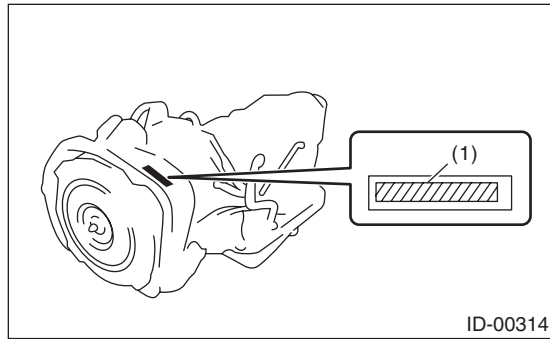
##### • ENGINE



(1) Engine serial number (punch mark)

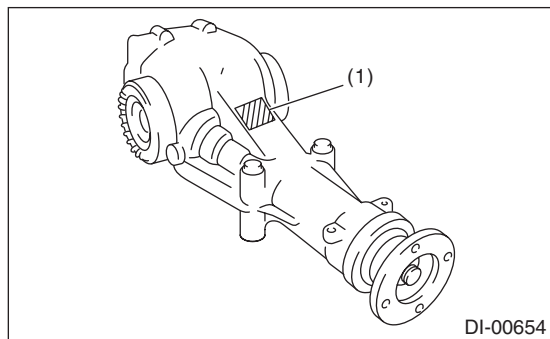
(2) Engine type (casting) crankcase upper side

**• AUTOMATIC TRANSMISSION**



(1) Transmission serial number label and AT type label

**• REAR DIFFERENTIAL**



(1) Type (paint)

**• MODEL NUMBER LABEL**

**FUJI HEAVY INDUSTRIES LTD.**

V I N           \*\*\*\*\*  
 N I V           \*\*\*\*\*

Applied Model Modèle Concerné	*****	Option Code Code d'option	****	Trim Code Code de garniture	***
Color Code Code de couleur	***	Engine Type Modèle de moteur	*****		
Transmission Type Modèle de boîtes vitesse	*****				

ID-00374

# Identification



## IDENTIFICATION

### • FMVSS LABEL (U.S. MODEL)

MFD BY FUJI HEAVY INDUSTRIES LTD.		DATE :	
GVWR :	LB( KG)		
GAWR : F	LB( KG) WITH	TIRES.	RIMS. AT KPA( PSI )COLD
GAWR : R	LB( KG) WITH	TIRES.	RIMS. AT KPA( PSI )COLD
THIS VEHICLE CONFORMS TO ALL APPLICABLE FEDERAL MOTOR VEHICLE SAFETY AND THEFT PREVENTION STANDARDS IN EFFECT ON THE DATE OF MANUFACTURE SHOWN ABOVE.			
VIN : *****		TYPE : MPV	
			
ASSEMBLED BY SIA INC. MADE IN U. S. A			

ID-00373

### • CMVSS LABEL (CANADA MODEL)

MFD BY FUJI HEAVY INDUSTRIES LTD.		DATE :	
GVWR/PNBV	KG		
GAWR/PNBE F	KG WITH	TIRES.	RIMS. AT KPA( PSI )COLD
GAWR/PNBE R	KG WITH	TIRES.	RIMS. AT KPA( PSI )COLD
VIN : *****		TYPE : MPV/VTUM	
			
ASSEMBLED BY SIA INC. MADE IN U. S. A		ICES/NMB-002	

ID-00376

## 2. MEANING OF V.I.N.

The meaning of the V.I.N. is as follows:

**[4S4WX9FDXC4400001]**

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

Digits	Code	Meaning	Details
1 — 3	4S4	Manufacturer body area	4S4: MPV
4	W	Car line	W: TRIBECA
5	X	Body type	X: SUV
6	9	Displacement	9: 3.6 L AWD
7	F	Grade	F: 7Pass G: 7Pass Limited H: 7Pass Limited w/NAVI J: 7Pass Limited w/DVD K: 7Pass Limited w/NAVI & DVD
8	D	Restraint system or GVWR Class	D: Class D (GVWR 5001 — 6000 lbs.), manual belt + dual air-bag + side airbag for seat back + curtain airbag for roof
9	X	Check digit	0 — 9 & X
10	C	Model year	C: 2012MY
11	4	Transmission type	4: Full-time AWD 5AT
12 — 17	400001	Serial number	400001 — 599999

## 3. MODEL NUMBER LABEL

The model number label indicates the type, V.I.N. <Ref. to ID-5, MEANING OF V.I.N., IDENTIFICATION, Identification.>, applied model, option code, trim code, engine type, transmission type and the exterior color code. This information is helpful when placing orders for parts.

**WXFGY5U**

Digits	Code	Meaning	Details
1	W	Series	W: TRIBECA
2	X	Body type	X: Cross utility vehicle
3	F	Total engine displacement Drive system Suspension system	F: 3.6 L AWD
4	G	Model year	G: 2012MY
5	Y	Destination	Y: U.S.A., Canada
6	5	Grade	5: BASE
7	U	Transmission, fuel feed system	U: DOHC MFI 5AT SS

# Identification

## IDENTIFICATION

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The engine and transmission type are as follows.

### ENGINE

#### EZ36DBC5LB

Digits	Code	Meaning	Details
1 and 2	EZ	Engine type symbol	EZ: 6 cylinders
3 and 4	36	Displacement	36: 3.6 L
5	D	Fuel feed device	D: MFI non-turbo (DOHC, H6)
6	B	Exhaust regulations	B: For all states
7	C	Mounted transmission	C: D-5AT
8 — 10	5LB	Detailed specifications	Used when ordering parts. For details, refer to the parts catalog.

### TRANSMISSION

#### TG5D9CJDAA

Digits	Code	Meaning	Details
1	T	Transmission	T: Transmission
2	G	Transmission system	G: Full-time AWD AT center differential
3 and 4	5D	Classification	5D: 5AT
5	9	Series	9: TRIBECA
6	C	Transmission specifications	C: Full-time AWD VTD 5AT
7	J	Mounted engine	J: 3.6 L DOHC
8 — 10	DAA	Detailed specifications	Used when ordering parts. For details, refer to the parts catalog.

### REAR DIFFERENTIAL

#### XB

Code	Reduction gear ratio	LSD
XB	3.583	None

## OPTION

### C0AK

Digits	Code	Meaning	Details
1 — 2	C0	Destination	C0: Canada C4: Central and South America U4: USA
3 — 4	AK	Option equipment	Refer to the option list

• 3-digit number

	A	C	D	E	F	L	N	O	P
Leather seat	—	—	○	○	○	○	○	○	○
Driver seat memory sheet	—	—	○	○	○	○	○	○	○
Seat heater	○	○	○	○	○	○	○	○	○
Sunroof + roof rail	—	○	—	○	○	○	—	—	—
Sunroof + roof rail (silver paint)	—	—	○	—	—	—	—	○	○
HID headlight	—	—	○	—	—	○	—	○	○
Home link	—	○	—	○	○	—	○	○	○
Rear seat entertainment	—	—	○	—	○	○	—	—	○
7-spoke aluminum wheel	—	—	—	—	—	—	—	○	○

• 4-digit number

	C	E	J	K	L	M	N	U	V
Navigation system	—	—	—	—	—	—	○	—	○
Rear view camera + navigation display	—	○	○	○	—	○	○	—	○
Rear view camera + inner mirror with rear view display	—	—	—	—	—	—	—	○	—
High grade audio & speakers	—	—	○	—	—	—	—	—	—
Satellite-compatible + high grade audio & speakers	—	○	—	—	—	—	—	—	—
HK-type audio & speakers	—	—	—	—	—	○	○	—	—
HK-type audio & speakers + XM	○	—	—	—	—	—	—	○	○

# Identification

IDENTIFICATION

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# RECOMMENDED MATERIALS

***RM***

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1. Recommended Materials .....	2



# Recommended Materials

## RECOMMENDED MATERIALS

### 1. Recommended Materials

#### A: RECOMMENDED MATERIALS

##### 1. GENERAL

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

##### 2. FUEL

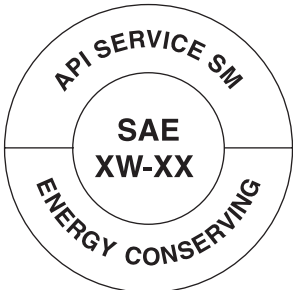

Always use gasoline of the same or higher octane value than specified in the owner's manual. Ignoring the specifications below will result in damage or poor performance of engine and fuel injection system. Use the specified gasoline to correct performance.

##### Unleaded gasoline

In order to reduce air pollution, use unleaded gasoline for the vehicle equipped with catalytic converter. Using leaded gasoline may damage the catalytic converter.

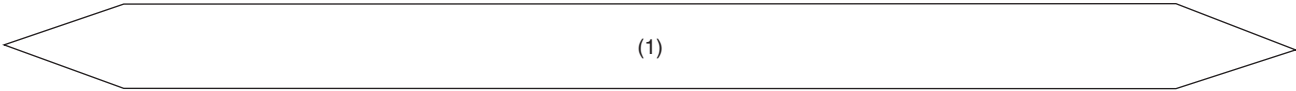
##### 3. LUBRICANTS

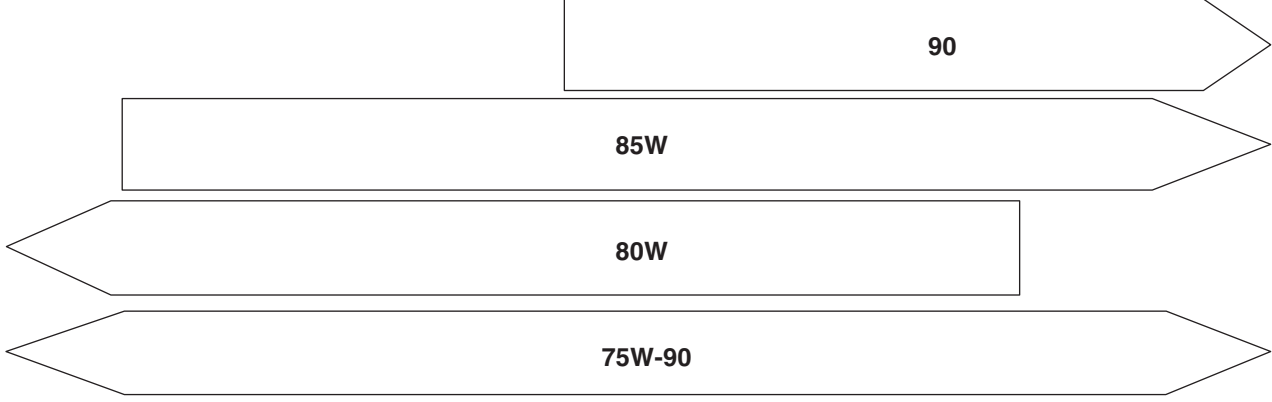
Use the lubricants shown in the table below, or equivalent. See the table below to choose the correct SAE viscosity.

Lubricant	Recommended materials	
	API standard	ILSAC standard
Engine oil Choose oil suitable for the standard from the right.	SN or SM grade "Resource conserving" or "Energy conserving"   RM-00076 Those with the above API service labels	GF-5 or GF-4   RM-00002 Those with the above ILSAC certification mark (Starburst mark)
AT front differential gear oil	GL-5	—
Rear differential gear oil	GL-5	—

# Recommended Materials

RECOMMENDED MATERIALS

SAE viscosity No. and applicable temperature								
Engine oil								
(°C)	-30	-20	-10	0	10	20	30	40
(°F)	-22	-4	14	32	50	68	86	104
								
RM-00075								
(1) 5W-30 (synthetic oil)								

Rear differential gear oil and AT front differential gear oil								
(°C)	-30	-20	-10	0	10	20	30	40
(°F)	-22	-4	14	32	50	68	86	104
								
RM-00058								

# Recommended Materials

## RECOMMENDED MATERIALS

---

### 4. FLUID

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

#### CAUTION:

**Be sure to use the recommended or equivalent ATF. Using material except recommended one or substitute would cause trouble.**

Fluid	Recommended materials	Alternative	Remarks
Automatic transmission fluid	SUBARU ATF	IDEMITSU: ATF HP	—
Power steering fluid	SUBARU ATF	DEXRON III	—
Brake fluid	FMVSS No. 116 DOT3	DOT4	—

### 5. COOLANT

Use genuine coolant to protect the engine.

Engine coolant	Recommended materials	Item number	Alternative
Coolant	SUBARU SUPER COOLANT (Concentrated type)	—	—
	SUBARU SUPER COOLANT (Diluted type)	K0670Y0001	
Water for dilution	Distilled water	—	Soft water or tap water
Cooling system protective agent	Cooling system conditioner	SOA345001	—

### 6. REFRIGERANT

Standard air conditioners on Subaru vehicles use HFC134a refrigerant. Do not mix it with other refrigerants. Also, do not use any compressor oil other than DENSO OIL 8.

Air conditioner	Recommended materials	Item number	Alternative
Refrigerant	HFC134a	—	None
Compressor oil	DENSO OIL 8	—	None

# Recommended Materials

RECOMMENDED MATERIALS

## 7. GREASE

Use grease and supplementary lubricants shown in the table below.

Grease	Application point	Recommended materials	Item number	Alternative
Supplementary lubricants	Oxygen sensor	Spray type lubricant	—	—
Grease	<ul style="list-style-type: none"> <li>• Select lever</li> <li>• Brake pedal</li> </ul>	NIGHTIGHT LYW No. 2 grease	—	—
	Steering gearbox	VALIANT GREASE M2	003608001	ONE LUBER SG
	Disc brake (Lock pin, guide pin, piston boot)	NIGLUBE RX-2	000041000	—
	Between brake pad and shim	Molykote AS-880N	K0777YA010	—
	Brake pad clip	Molykote M7439	K0770YA000	—
	Front axle PTJ	NKG302	—	—
	<ul style="list-style-type: none"> <li>• Front axle EBJ</li> <li>• Rear axle EBJ</li> </ul>	NTG2218-M	—	—
	Rear axle DOJ	NKG205	—	—

## 8. ADHESIVE

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

Adhesive	Application point	Recommended materials	Item number	Alternative
Adhesive	Windshield, front quarter glass, rear window glass, rear quarter glass, rear gate and body	Dow Automotive's adhesive: ESSEX U-400HV or the equivalent Glass primer: U-401 and U-402 Painted surface primer: U-413	—	—
	Rearview mirror base	REPAIR KIT IN MR	65029FC000	—

## Recommended Materials

### RECOMMENDED MATERIALS

#### 9. SEAL MATERIAL

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

Seal material	Application point	Recommended materials	Item number	Alternative
Seal material	Converter case	THREE BOND 1215	004403007	DOW CORNING No. 7038
	Transmission oil pan	THREE BOND 1217B	K0877YA020	—
	<ul style="list-style-type: none"> <li>• Engine oil pressure switch</li> <li>• Cylinder head (seal bolt)</li> <li>• Rear differential lock nut</li> <li>• PCV valve</li> </ul>	THREE BOND 1324	004403042	—
	Steering adjusting screw	THREE BOND 1102	004403006	THREE BOND 1215
	<ul style="list-style-type: none"> <li>• Cylinder block</li> <li>• Cam cap</li> <li>• Engine oil pan</li> <li>• Engine strainer</li> <li>• Cylinder head gasket (Block, head)</li> <li>• Rocker cover</li> <li>• Oil pan upper</li> <li>• Block (Oil pan upper)</li> <li>• Chain cover (Block, head, cam cap, oil pan upper)</li> </ul>	THREE BOND 1217G	K0877Y0100	—
	<ul style="list-style-type: none"> <li>• Door (Front sealing cover)</li> <li>• Door (Rear sealing cover)</li> </ul>	3M Butyl Rubber 8626	—	—

# PRE-DELIVERY INSPECTION

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# Pre-delivery Inspection

## PRE-DELIVERY INSPECTION

### 1. Pre-delivery Inspection

#### A: GENERAL DESCRIPTION

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 condition.
- Check the vehicle before delivery is in normal condition.
- Check the vehicle or parts for any damage occurred during transportation or storage.
- Check the vehicle after repair is in normal condition.
- Make sure to provide a complete vehicle to customer.

For above reasons, all SUBARU dealers (dealerships) must carry out the PDIs before delivery of vehicle. Refer to this manual unless otherwise specified.

#### B: PRE-DELIVERY INSPECTION (PDI) PROCEDURE

##### Static Checks Just After Vehicle Receipt

Operation	Check point
1. Appearance	<ol style="list-style-type: none"><li>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 painted area for damage or stains in detail.</li><li>2. Visually check the glass and light lenses for any damage, cracks or excessive gaps between body sheet metal.</li><li>3. Visually check the plated parts for any damage.</li></ol>
2. Tire	<ol style="list-style-type: none"><li>1. Check the tires for damage, defective, and dents on wheels.</li><li>2. Check the tire air pressure.</li></ol>
3. Fuse installation	If the vehicle is about to be delivered to customer, attach a back-up fuse.
4. Door lock/unlock and open/close operations	<ol style="list-style-type: none"><li>1. Using the key, check the door can be locked or unlocked normally.</li><li>2. Open and close all doors to check that there are no defective.</li><li>3. Operate the power door lock switch to check that the door (rear gate) is locked and unlocked normally.</li></ol>
5. Child safety lock system	Check the child safety lock system operates normally.
6. Rear gate lock/unlock and open/close operation	<ol style="list-style-type: none"><li>1. Check if the rear gate can be unlocked normally through the emergency hole.</li><li>2. Open and close the rear gate to see that there are no problems.</li></ol>
7. Fuel lid opener lock release lever	Operate the fuel lid opener to check that the fuel filler lid can be unlocked normally.
8. Accessory	Check that the following accessories are provided. <ul style="list-style-type: none"><li>• Owner's manual</li><li>• Warranty booklet</li><li>• Maintenance note</li><li>• Spare key</li><li>• Security ID plate</li><li>• Key No. plate</li><li>• Jack</li><li>• Tool set</li><li>• Spare tire</li></ul>
9. Front hood lock release system	Operate the front hood lock release lever to check that the front hood is unlocked normally.
10. Battery	Check the battery terminals for any abnormal conditions such as rust and trace of battery fluid leaks.
11. Brake fluid	Check that the fluid level is normal.
12. Engine oil	Check that the oil level is normal.
13. AT front differential gear oil	Check for leakage of AT front differential gear oil.
14. Engine coolant	Check that the engine coolant level is normal.
15. Window washer fluid	Check that the window washer fluid level is normal.
16. Front hood latch	Check that the front hood is closed and locked normally.
17. Keyless entry system	Check that the keyless entry system operates normally.



# Pre-delivery Inspection

PRE-DELIVERY INSPECTION

Operation	Check point
18. Alarm system	Check that the alarm system operates normally.
19. Seat	<ol style="list-style-type: none"> <li>1. Check the seat surfaces for stains or dirt.</li> <li>2. Check the seat installation conditions and functionality.</li> <li>3. Check that the occupant detection system for passenger's seat operates normally.</li> </ol>
20. Seat belt	<ol style="list-style-type: none"> <li>1. Check the seat belt installation conditions and functionality.</li> <li>2. Check the seat belt warning system operates normally.</li> </ol>

## Checks with the Engine Running

Operation	Check point
21. Delivery (test) mode connector	Turn the ignition switch to ON and check that the malfunction indicator light starts blinking.
22. Immobilizer system	<ol style="list-style-type: none"> <li>1. Check that the engine starts with all keys that are equipped on vehicle.</li> <li>2. 60 seconds after turning ignition switch from ON to ACC or OFF, or immediately after removing the key, check that the security indicator light is blinking.</li> </ol>
23. Starting condition	Start the engine and check that the engine starts smoothly.
24. Exhaust system	Check that the exhaust noise is normal and no leaks are found.
25. Indicator and warning lights	Check that all indicator lights and warning lights operate normally.
26. Heater & ventilation	Check that the heater & ventilation system operates normally.
27. Air conditioner	Check that the air conditioner operates normally.
28. Clock	Check that the clock operates normally.
29. Audio	Check the radio, CD player and AUX for normal operation.
30. Accessory power supply socket	Check that each of the accessory power supply sockets operate normally.
31. Navigation system	<ol style="list-style-type: none"> <li>1. Check all display functions for normal operation.</li> <li>2. Check the map disc (DVD) are provided on vehicle.</li> <li>3. Check that the navigation system operates normally.</li> <li>4. Check that the rearview camera operates normally.</li> </ol>
32. Rear entertainment system	Check that the rear entertainment system operates normally.
33. Lighting system	Check that the lighting system operates normally.
34. Wiper deicer	Check that the wiper deicer operates normally.
35. Illumination control	Check that the illumination control operates normally.
36. Window washer	Check that the window washer system operates normally.
37. Wiper	Check that the wiper system operates normally.
38. Power window	Check that the power window operates normally.
39. Sunroof	Check that the sunroof operates normally.
40. Door mirror	Check that the remote control mirror operates normally.
41. Room mirror (RCD model)	<ol style="list-style-type: none"> <li>1. Check all display functions for normal operation.</li> <li>2. Check that the automatic anti-glare function operates normally.</li> <li>3. Check that the compass function operates normally.</li> <li>4. Check that the rearview camera operates normally.</li> </ol>
42. Rear defogger	Check that the rear defogger system operates normally.

## Dynamic Test with the Vehicle Running

Operation	Check point
43. Brake test	Check the foot brake for normal operations.
44. Parking brake	Check the parking brake for normal operations.
45. AT shift control	Check that the AT shift patterns are correct.
46. Cruise control	Check that the cruise control system operates normally.

# Pre-delivery Inspection

## PRE-DELIVERY INSPECTION

### Checks after Dynamic Test

Operation	Check point
47. ATF level	Check that the ATF level is correct.
48. Power steering fluid level	Check that the power steering fluid level is normal.
49. Fluid leakage	Check for fluid/oil leaks.
50. Water leakage	Spray the vehicle with water and check for water leaks.
51. Appearance 2	<ol style="list-style-type: none"> <li>1. Remove the protective coat. (If equipped)</li> <li>2. Check the body paints for damage and stain.</li> <li>3. Check the plated parts for damage and rust.</li> </ol>

### 1. APPEARANCE CHECK

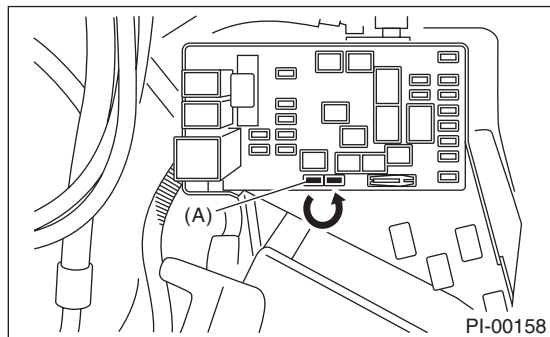
- If the vehicle is covered with protective coating, visually check the vehicle body for damage and dents.
- When the protective coating is removed, visually check the body paints for damage or stains in detail and repair as necessary.
- Visually check the windshield glass, door glasses and light lenses for any damage, cracks or excessive gaps to the body sheet metal and repair as necessary.
- Visually check the plated parts, such as the grilles and door knobs, for damage or loss of gloss and replace the parts as necessary.

### 2. TIRE CHECK

- Check the tires for damage, defective, and dents on wheels.
- Check and adjust the tire size, spare tire and tire air pressure described on the tire air pressure label (driver's side).

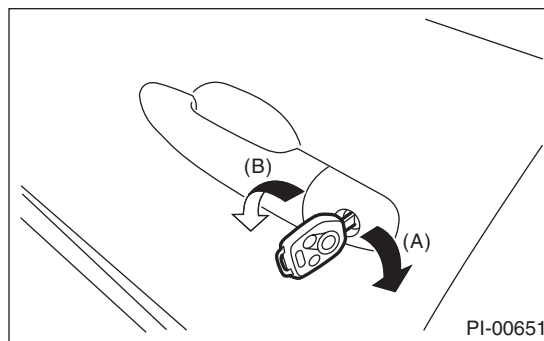
### 3. FUSE INSTALLATION

Fuses for the back-up circuit have been removed to prevent battery discharge. If the vehicle is about to be delivered to the customer, attach a 20 A fuse (A) as shown in the figure.



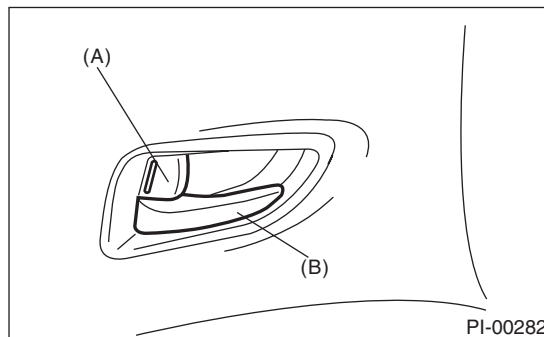
### 4. LOCK/UNLOCK AND OPEN/CLOSE OPERATION CHECKS OF DOORS

1) 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.



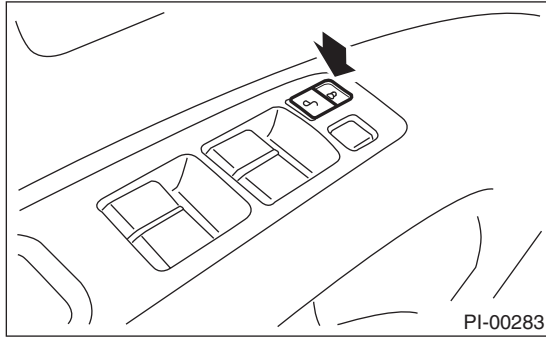
- (A) Unlock  
(B) Lock

2) Completely close the driver's door, and then check the smooth movement with operating door lock knob from lock to unlock several times. Set the door lock knob (A) to lock position. Then pull the inner remote (B) to ensure that doors will not open. For other doors, place the door lock knob (A) to lock position and then pull the inner remote to ensure that doors will not open.

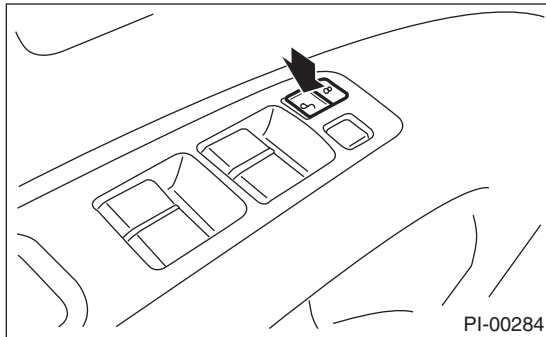


- (A) Door lock knob  
(B) Inner remote

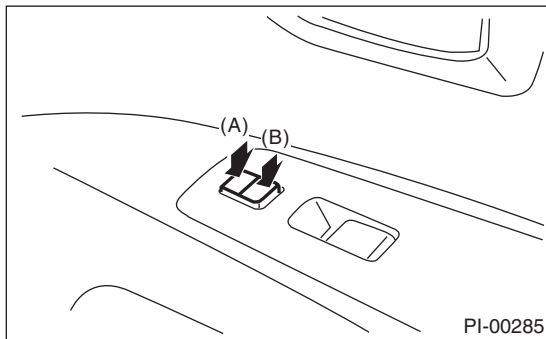
3) Close all the doors, and then press the lock on power door lock switch at driver's side. Check that all doors (including the rear gate) lock.



4) Press the driver's side power door lock switch to unlock side. Check that all doors including rear gate are unlocked.



5) Check that the passenger's power door lock switch locks and unlocks normally in the same manner.

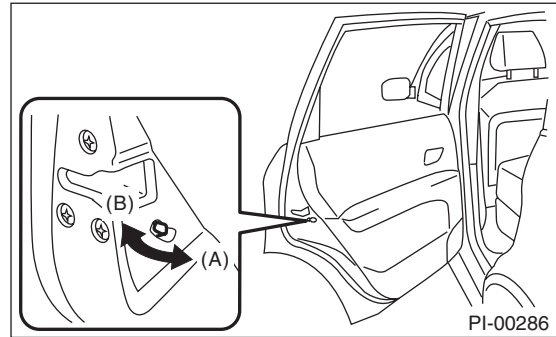


- (A) Lock
- (B) Unlock

6) Insert the key to ignition switch, and open the driver's side door. Press lock on power door lock. Check that the door is not locked.

## 5. OPERATION CHECK OF CHILD SAFETY LOCK SYSTEM

1) Set the child safety lock on both rear doors to the lock position.



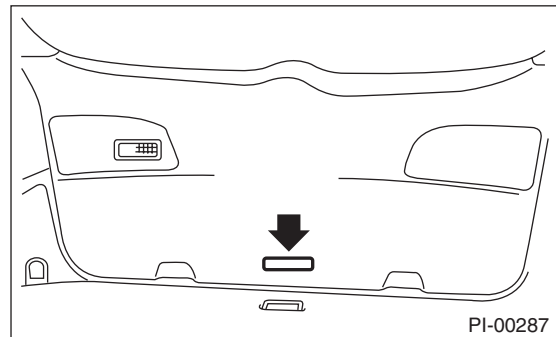
- (A) Lock
- (B) Unlock

- 2) Close the rear doors completely.
- 3) Check that the lock levers of the rear doors are in the unlock position. Then, pull inner remote of rear doors to ensure that the doors will not open.
- 4) Pull the outer handles to ensure that doors will open.

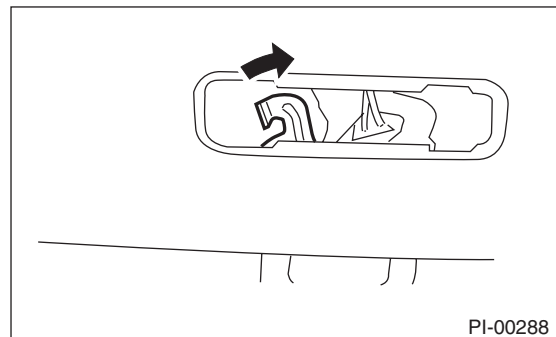
## 6. LOCK/UNLOCK AND OPEN/CLOSE OPERATION CHECKS OF REAR GATE

- 1) Open and close the rear gate several times for smooth movement.
- 2) Operate the rear gate lever and check that the rear gate opens normally.

(1) Remove the cover inside the rear gate.



(2) Operate the lever to check that it opens normally.



# Pre-delivery Inspection

## PRE-DELIVERY INSPECTION

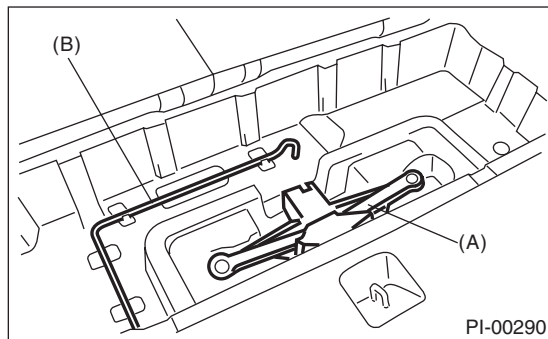
### 7. OPERATION CHECK OF FUEL LID OPENER LOCK RELEASE LEVER

Operate the fuel lid opener to check that the fuel filler lid is unlocked normally. Check that the filler cap is securely closed.

### 8. ACCESSORY CHECK

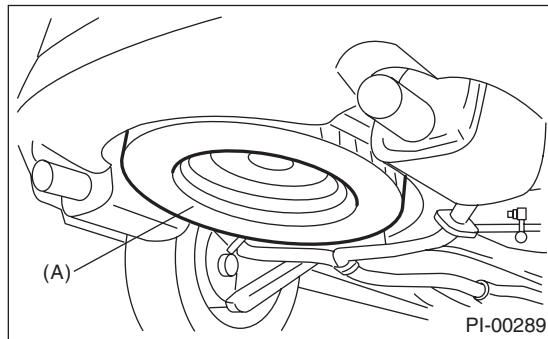
Check that the following accessories are provided.

- Owner's manual
- Warranty booklet
- Maintenance note
- Spare key
- Security ID plate
- Key No. plate
- Jack
- Tool set



- (A) Jack
- (B) Jack handle

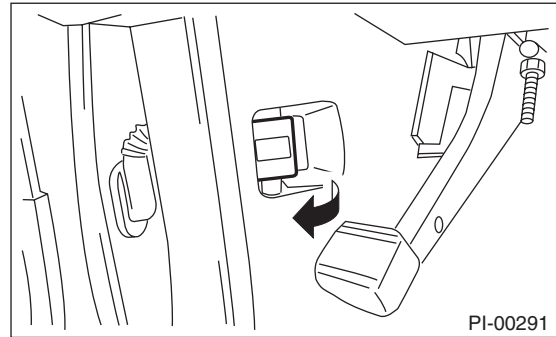
- Spare tire



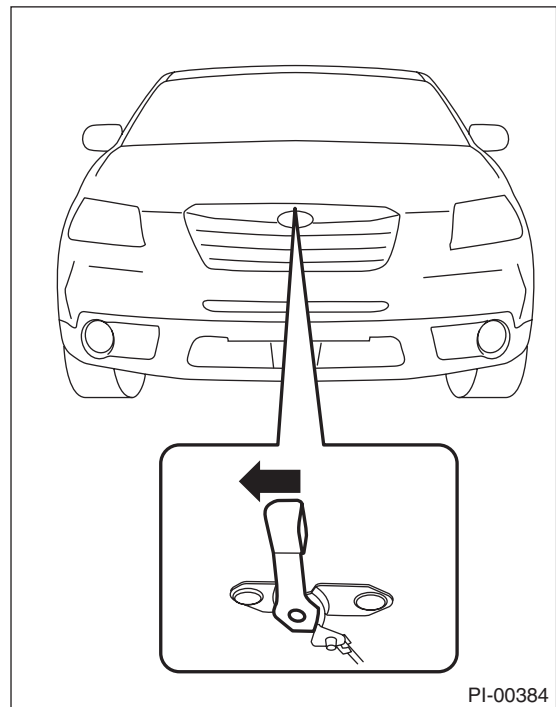
- (A) Spare tire

### 9. OPERATION CHECK OF FRONT HOOD LOCK RELEASE SYSTEM

Operate the front hood lock release lever to check that the front hood is unlocked normally.

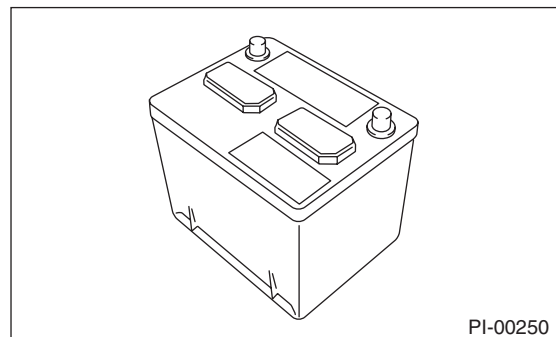


Operate the lever and check that the front hood is opened normally.



### 10. BATTERY

Check the battery terminals to make sure that there are no rust or corruptions due to fluid leaks.

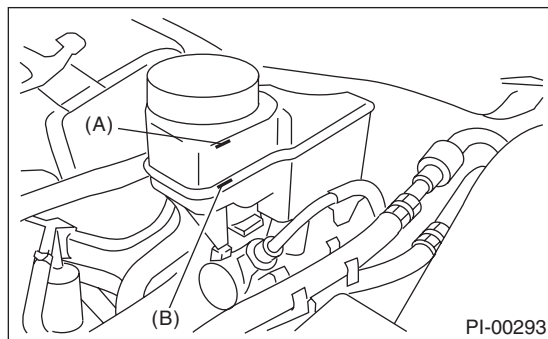


## 11. BRAKE FLUID

### CAUTION:

If the brake fluid is spilt over the exhaust pipe or the under cover, wipe it off with cloth to avoid emitting smoke or causing a fire.

Check that the brake fluid level is normal. 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.



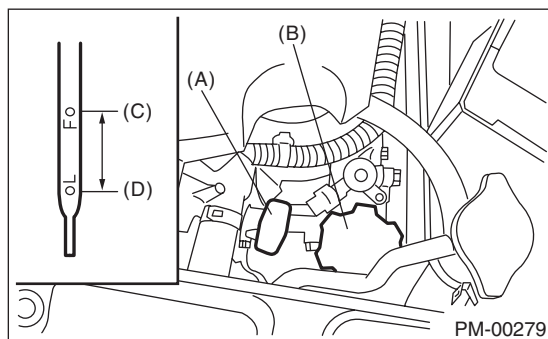
- (A) MAX. level
- (B) MIN. level

## 12. ENGINE OIL

### CAUTION:

If the engine oil is spilt over exhaust pipe or the under cover, wipe it off with cloth to avoid emitting smoke or causing a fire.

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



- (A) Oil level gauge
- (B) Engine oil filler cap
- (C) "F" line
- (D) "L" line

## 13. AT FRONT DIFFERENTIAL GEAR OIL

Check for leakage of AT front differential gear oil.

## 14. ENGINE COOLANT

### CAUTION:

If the coolant is spilt over exhaust pipe, wipe it off with cloth to avoid emitting smoke or causing a fire.

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

## 15. WINDOW WASHER FLUID

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

## 16. FRONT HOOD LATCH CHECK

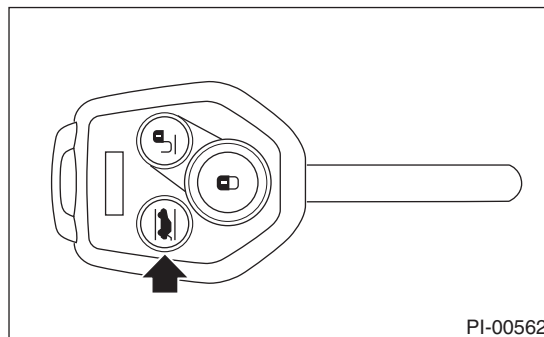
Close the front hood. Check that the front hood is securely latched.

## 17. KEYLESS ENTRY SYSTEM

### NOTE:

The following inspections show the initial settings. When the settings are different from the initial settings, use Subaru Select Monitor to check the details of each setting for inspections. <Ref. to LAN(diag)-29, OPERATION, Read Current Data.>

- 1) Fully open all the door windows.
- 2) Remove the key from the ignition switch and close all the doors including rear gate.
- 3) Press the rear gate open button for one second or more. Check if the rear gate is unlocked and the hazard light blinks twice and the buzzer sounds twice.

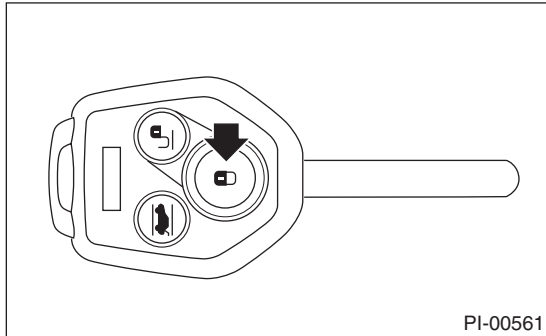


- 4) Press the "LOCK" button on the keyless transmitter with one of the doors (including the rear gate) opened. Check if all doors are locked, hazard light blinks five times and the buzzer sounds five times and warning shows one of the doors (including the rear gate) open.

# Pre-delivery Inspection

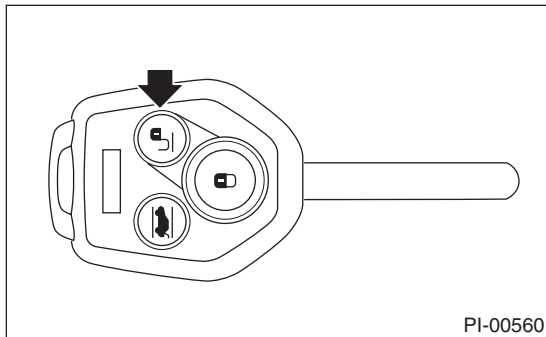
## PRE-DELIVERY INSPECTION

5) Close all the doors including rear gate. Press the "LOCK" button momentarily on the keyless transmitter. Check that all the doors (including rear gate and trunk) are locked, hazard light blinks once and buzzer sounds once.



6) Press the "UNLOCK" button momentarily on the keyless transmitter. Check that the driver's door is unlocked and hazard light blinks twice and the buzzer sounds twice.

And press the "UNLOCK" button momentarily again in 5 seconds. Check that all doors (including rear gate) are unlocked.



7) Within a distance of 10 m from a vehicle, press keyless transmitter's "LOCK" button three times within five seconds. Check that the horn honks once and that the hazard light blinks three times.

8) Move the power door lock switch to the lock position with one of doors (including the rear gate) opened. Next, close all the doors including rear gate. Check if all doors are locked and buzzer sounds once and the hazard light flashes once.

9) Check buzzer operation.

The buzzer sounds when the doors are locked or unlocked. The buzzer can be turned off if desired. Turn the buzzer off or on with following procedure.

- (1) Close all the doors including rear gate, then remove the key from ignition key lock.
- (2) Press the power door lock switch to lock or unlock and hold it until the operation is finished.
- (3) Insert the key into ignition key lock, and insert and remove the key in ignition key lock 5 times in 10 seconds.

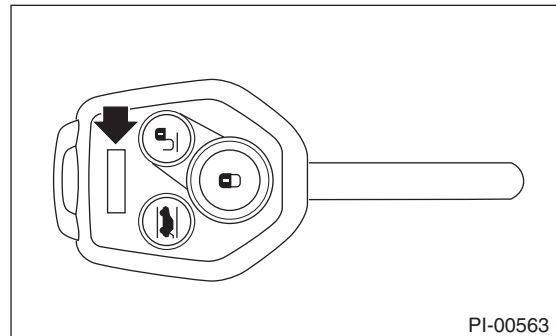
(4) When finished step (3), open and close the driver's door once within 10 seconds.

### NOTE:

When opening and closing of the door is not available within 10 seconds, hazard light blinks once and the change over operation is cancelled. Retry from the step (1).

(5) Hazard light blinks 3 times and the buzzer sound turns ON or OFF.

10) Press the "Panic" button of the keyless transmitter. Check if the alarm condition happens (horn sounds continuously, hazard light blinks, security indicator comes on). Check whether this condition lasts until any button on the keyless transmitter is pressed or lasts for 30 seconds.

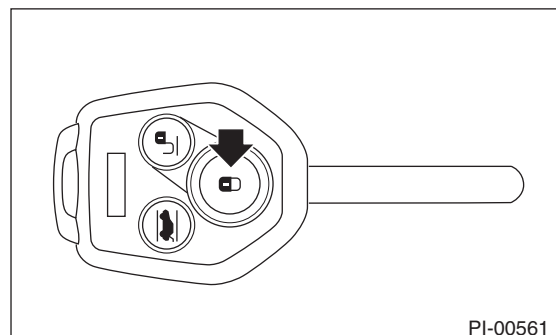


## 18.ALARM SYSTEM

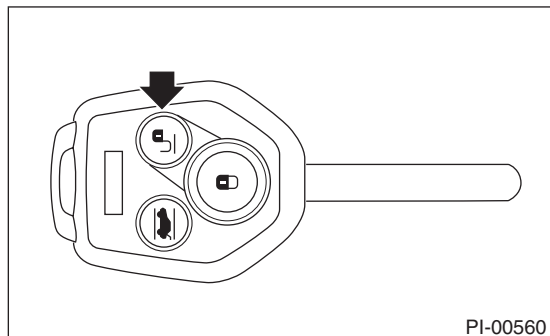
### NOTE:

The following inspections show the initial settings. When the settings are different from the initial settings, use Subaru Select Monitor to check the details of each setting for inspections. <Ref. to LAN(diag)-30, OPERATION, Function Setting (Customize).>

- 1) Fully open all the door windows.
- 2) Remove the key from the ignition switch and close all the doors including rear gate.
- 3) Press the "LOCK" button momentarily on the keyless transmitter. All doors are locked, and buzzer sounds once, hazard blinks once, security indicator light blinks faster (five times per two seconds) for 30 seconds and goes slower (twice per two seconds), then the alarm system is in set condition.



4) Press the “UNLOCK” button momentarily on the keyless transmitter. When the door of the driver’s seat is unlocked, the buzzer sounds twice, the hazard light flashes twice, the room light turns on and the security indicator light flashes once in three seconds, and the alarm system enters the release mode.



5) Close all the doors including rear gate. Press the “LOCK” button momentarily on the keyless transmitter. When all the doors are locked, buzzer sounds once, hazard blinks once and the alarm system is in set condition in 30 seconds.

6) Unlock a door using the inner lock knob and open the door while the security system is in the set mode. Check if the alarm condition happens (horn sounds continuously, hazard light blinks, security indicator illuminates). Check if this condition lasts for a maximum of three minutes or until the “UNLOCK” button of the keyless transmitter is pressed.

**NOTE:**

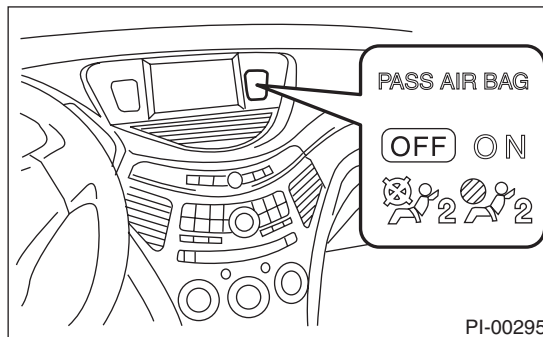
The alarm condition will cease in 30 seconds once the door is closed.

7) When none of above is applicable, perform troubleshooting for the security system.

**19. SEAT**

- 1) Check the seat surfaces for stains or dirt.
- 2) 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 armrest.
- 3) Check the passenger detection system.
  - (1) Turn the ignition switch to ON.

(2) Check that the ON and OFF passenger side airbag indicator light simultaneously for approximately six seconds, extinguish for two seconds and then only the OFF light lights.



(3) Have a person weighing approximately 70 kg (155 lb) or more sit in the passenger’s seat, and check whether the passenger’s airbag indicator light illuminate or not.

(4) Empty the passenger seat, then check whether the passenger side airbag indicator light turns off.

**20. SEAT BELT**

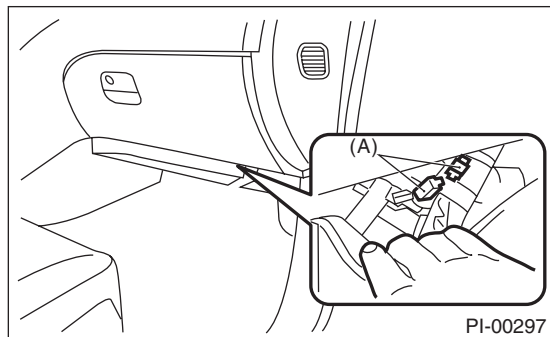
- 1) Check installation condition of seat belt.
- 2) Pull out the seat belt and then release it. Check that the belt retracts smoothly.
- 3) Check seat belt warning function.
  - (1) Turn the ignition switch to ON without fastening driver’s and passenger’s seat belts.
  - (2) Check if the Seat belt warning lights of driver’s and passenger’s side blink for about six seconds and the buzzer beeps intermittently.
  - (3) Then, check that the seat belt warning light comes on, and flashes in about 15-second cycles. (If the passenger seat is empty, the seat belt warning light for passenger side does not operate.)

# Pre-delivery Inspection

## PRE-DELIVERY INSPECTION

### 21.DELIVERY (TEST) MODE CONNECTOR

Turn the ignition switch to ON and check that the malfunction indicator light starts blinking. If the light blinks, return the ignition key to LOCK. Peel the mat at the back of the glove box lower cover and pull out the delivery (test) mode connector. Then disconnect the delivery (test) mode connector. Then, turn the ignition key to ON again. If the engine malfunction indicator light blinks at that time in spite of the disconnected delivery (test) mode connector, carry out an engine diagnosis.



(A) Delivery (test) mode connector (green)

### 22.IMMOBILIZER SYSTEM

- 1) Check that the engine starts with all keys that are equipped on vehicle.
- 2) 60 seconds after turning ignition switch from ON to ACC or OFF, or immediately after removing the key, check that the security indicator light is blinking.

#### NOTE:

If malfunctions occur, refer to "IMMOBILIZER (DIAGNOSIS)". <Ref. to IM(diag)-2, PROCEDURE, Basic Diagnostic Procedure.>

### 23.STARTING CONDITION

Start the engine and check that the engine starts smoothly. If the battery voltage is low, recharge or replace the battery. If there are any noises when starting, immediately stop the engine and check and repair the abnormal components.

### 24.EXHAUST SYSTEM

Listen to the exhaust noise to see if no noises are observed. Check for exhaust leaks.

### 25.INDICATOR AND WARNING LIGHTS

Check that all the indicator and warning lights are off. However, check that either OFF or ON illuminates for PASS AIRBAG OFF and ON indicator.

### 26.HEATER & VENTILATION

Operate the heater & ventilation system to check for normal airflow outlet control, air inlet control, airflow capacity and heating performance.

### 27.AIR CONDITIONER

Operate the front and rear cooler. Check that the A/C compressor operates normally and enough cooling is provided.

#### NOTE:

Idle the engine and operate the air conditioner for 5 minutes to prevent insufficient lubrication of air conditioner system.

### 28.CLOCK

Check the clock for normal operations and enough accuracy.

### 29.AUDIO

Check the radio for full functionality, and check the speakers for proper sound and normal noise levels. Check the CD player and AUX operations.

### 30.ACCESSORY POWER SUPPLY SOCKET

- 1) Check the operation of the rear accessory power supply socket.
- 2) Check operation of the accessory power supply socket in console box.

### 31.NAVIGATION SYSTEM

- 1) Check all display functions for normal operation.
- 2) Check the map disc (DVD) are provided on vehicle.
- 3) Check that the navigation system operates normally.
- 4) Check that the rear view camera operates normally.

### 32.REAR ENTERTAINMENT SYSTEM

Check that the rear entertainment system operates normally.

### 33.LIGHTING SYSTEM

- 1) Check the headlight operations.
- 2) Check the stop light operation.
- 3) Check other lights for normal operations.

### 34.WIPER DEICER

Check that the wiper deicer operates normally.

### 35.ILLUMINATION CONTROL

Check that the illumination control operates normally.



## 36.WINDOW WASHER

- Make sure the nozzle and hose are not clogged.
- Make sure the hose is not bent.
- While the vehicle is at a standstill, make sure that the washer injection position is as shown in the figure.

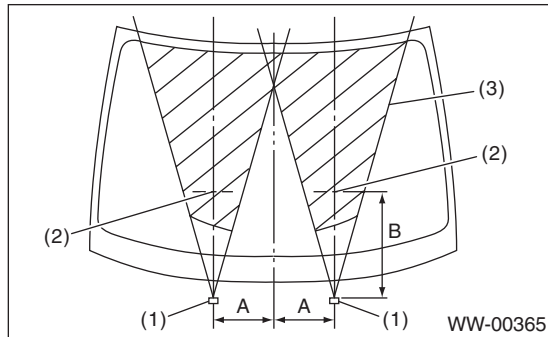
NOTE:

Washer injection position can not be adjusted.

### Front injection position:

**A: 250 mm (9.84 in)**

**B: 433 mm (17.0 in)**



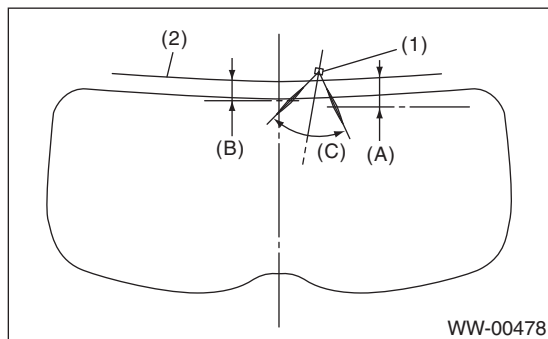
- (1) Nozzle
- (2) Spray center aiming position
- (3) Spray area (shaded area)

### Rear injection position:

**A: 106 mm (4.17 in)**

**B: 93 mm (3.66 in)**

**C: 72°**



- (1) Nozzle
- (2) Upper edge of the rear gate glass
- (A) From the upper edge of the rear gate glass to the middle of the washer injection distance
- (B) From the upper edge of the rear gate glass to the middle of the washer injection distance
- (C) 72°

## 37.WIPER

Check the front and rear wipers for normal operations.

## 38.POWER WINDOW

Operate the power window switches one by one to check that each of the power windows goes up and down without noises.

## 39.SUNROOF

Check that the sunroof operates normally.

## 40.DOOR MIRROR

Check that the remote control mirror operates normally.

## 41.ROOM MIRROR (RCD MODEL)

- 1) Check all display functions for normal operation.
- 2) Check that the automatic anti-glare function operates normally.
- 3) Check that the compass function operates normally.
- 4) Check that the rearview camera operates normally.
- 5) Perform compass calibration. <Ref. to GW-32, CALIBRATION, ADJUSTMENT, Rearview Mirror (RCD Model).>
- 6) Perform compass zone setting. <Ref. to GW-32, ZONE SETTING, ADJUSTMENT, Rearview Mirror (RCD Model).>

## 42.REAR DEFOGGER

Press the rear defogger switch and check that the light inside the switch is activated for approx. 15 minutes and the rear defogger is automatically OFF.

## 43.BRAKE TEST

Check the foot brake for normal operations.

## 44.PARKING BRAKE

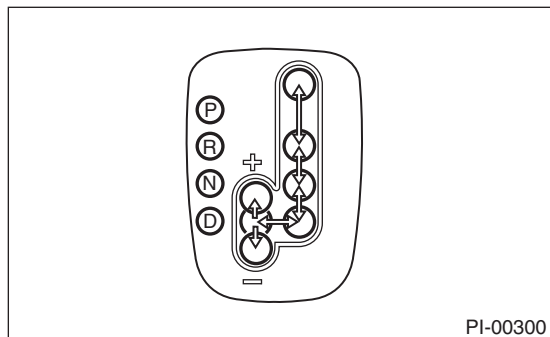
Check the parking brake for normal operations. When applying the parking brake pedal with force of 300 N (30.6 kgf, 67.5 lbf), check that the parking brake pedal is at 5 to 6 notches.

# Pre-delivery Inspection

## PRE-DELIVERY INSPECTION

### 45.AT SHIFT CONTROL

- 1) Turn the ignition switch to ON.
- 2) While brake pedal is not depressed, check if the select lever does not move from "P" range.
- 3) While brake pedal is depressed, check if the select lever moves from "P" range.
- 4) Set the select lever to other than "P" range.
- 5) When the ignition switch is turned OFF, check if the key can be removed from the ignition switch.
- 6) Set the AT select lever to each gear position and check the shifting while driving the vehicle.



Selector position	Gear position				
	1st	2nd	3rd	4th	5th
D	OK	OK	OK	OK	OK
SPORT shift	OK	OK	OK	OK	OK

### 46.CRUISE CONTROL

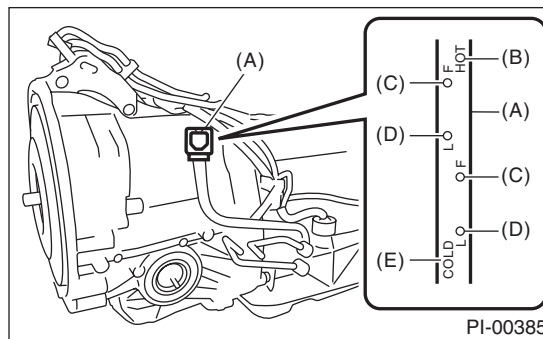
Operate the cruise control system. Check that the system is activated and deactivated correctly.

### 47.ATF LEVEL

#### CAUTION:

**If the ATF is spilt over exhaust pipe, wipe it off with cloth to avoid emitting smoke or causing a fire.**

After selecting all positions (P, R, N, D), set the select lever in "P" range. Idle the engine for 1 or 2 minutes, and measure the ATF level. If the amount is insufficient, check that no leaks are found. Then, add the necessary amount of the specified ATF.



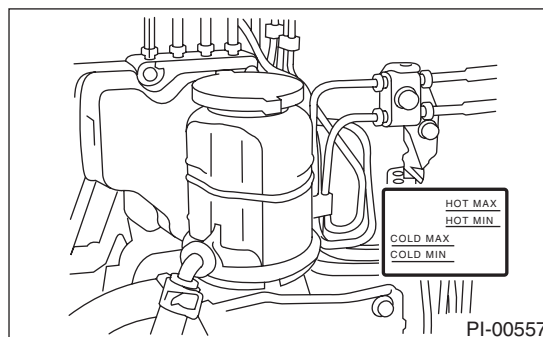
- (A) Level gauge
- (B) ATF level range at "HOT" [70 — 80°C (158 — 176°F)]
- (C) Upper level
- (D) Lower level
- (E) ATF level range at "COLD" [20 — 30°C (68 — 86°F)]

### 48.POWER STEERING FLUID LEVEL

#### CAUTION:

**If any power steering fluid is spilt over the exhaust pipe, wipe it off with a cloth to avoid emitting smoke or causing a fire.**

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



### 49.FLUID LEAK CHECK

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

## 50. WATER LEAK TEST

Spray the vehicle with water using a hose 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 the windows and doors securely. Close the front hood before starting the test.
- Spray the vehicle with water using a hose. The rate of water spray must be approx. 20 to 25 ℓ (5.3 — 6.6 US gal, 4.4 — 5.5 Imp gal) per minute.

When spraying water on areas adjacent to the floor and wheel house, increase the pressure. When spraying water on areas other than the floor 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) away from 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 the areas that may have possibly contributed to the leak.

## 51. APPEARANCE CHECK 2

1) When vehicle body is covered with protective film, peel it off.

### NOTE:

- Use of steam facilitates peeling off the wrap guard.
- For a vehicle left for a long time or at low temperature, sprinkle some water heated to 50 — 60°C (122 — 140°F) over the vehicle to raise its surface temperature before peeling off the wrap guard. Do not use the water heated to over 60°C (140°F).
- If the adhesive remains exists on the coated surface, soak a flannel rag, etc. with a small amount of coating wax or solvent such as oil benzene and IPA, put the soaked cloth on the remains lightly, and then wipe them off with a flannel rag etc.
- Keep solvent from touching the resin or rubber parts. Do not use coating wax or solvent while the component surface temperature is high due to hot weather etc.

- If the coated surface is swollen out due to seams or moisture, expose the vehicle to the sunlight for a few hours or heat the seam and swollen portions using a dryer etc.

- Dispose of the peeled wrap guard as burnable industrial garbage.

2) Check the whole vehicle body for flaking paint, damage by transportation, corrosion, dirt, cracks or blisters.

### NOTE:

- It is better to determine an inspection pattern in order to avoid missing an area, since the total inspection area is wide.

• Do not repair the body paint unless absolutely necessary. Also, if the vehicle is in need of repair to remove scratches or corroded paint, the repair area must be limited to the minimum. Re-painting and spray painting must be avoided as possible.

3) Check each window glass for scratches carefully. Slight damage may be removed by polishing with cerium oxide. (Fill a cup half with cerium oxide, and add warm water to it. Then agitate the content until it turns to wax. Apply this wax to a soft cloth, and polish the glass with it.)

4) Check each portion of the vehicle body and underside components for the formation of rust. If rust is discovered, remove it with sandpaper of #80 to #180 and treat the surface with rust preventive. After this treatment is completed, flush the portion thoroughly, and prepare the surface for repair painting.

5) Check each portion of body and all of the plated parts for deformation or distortion. Also, check each light lens for cracks.

6) Peel the protective tape, vinyl wrapping and identification seal attached to the following places.

- Seats
- Door trim
- Floor carpet
- Side sill
- Front hood lock release lever
- Edge rear
- Rear wiper
- Door mirror
- Front and rear disc brakes

# Pre-delivery Inspection

PRE-DELIVERY INSPECTION

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# PERIODIC MAINTENANCE SERVICES

# PM

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## General Description

PERIODIC MAINTENANCE SERVICES

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### 1. General Description

#### A: GENERAL DESCRIPTION

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

# Schedule

## PERIODIC MAINTENANCE SERVICES

### 2. Schedule

#### A: MAINTENANCE SCHEDULE 1

		Maintenance interval [Number of months or km (miles), whichever occurs first]																	Remarks
Months	3	7.5	15	22.5	30	37.5	45	52.5	60	67.5	75	82.5	90	97.5	105	112.5	120		
× 1,000 km	4.8	12	24	36	48	60	72	81.4	96	108	120	132	144	156	168	180	192		
× 1,000 miles	3	7.5	15	22.5	30	37.5	45	52.5	60	67.5	75	82.5	90	97.5	105	112.5	120		
1	Engine oil	(R)	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	
2	Engine oil filter	(R)	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	
3	Spark plug								R								R		
4	V-belt					I			I				I		R				
5	Fuel line					(I)			(I)				(I)				I		
6	Air cleaner element					R			R				R				R		
7	Cooling system					I			I				I				I		
8	Engine coolant	Replace after the first 11 years or 220,000 km (137,500 miles), and every six years or 120,000 km (75,000 miles) thereafter																	
9	ATF					I			I				I				I		
10	Front & rear differential gear oil					I			I				I				I		
11	Brake line			I		I		I		I		I		I		I			
12	Brake fluid					R			R				R				R		
13	Disc brake pad and disc			I		I		I		I		I		I		I			
14	Parking brake			I		I		I		I		I		I		I			
15	Suspension			I		I		I		I		I		I		I			
16	Wheel bearing							(I)									(I)		
17	Axle boots and joints			I		I		I		I		I		I		I			
18	Tire rotation		P	P	P	P	P	P	P	P	P	P	P	P	P	P	P		
19	Steering system (power steering)			I		I		I		I		I		I		I			
20	SRS airbag system	Inspect every 10 years																	
21	A/C filter	Replace every 15 months or 24,000 km (15,000 miles).																	

Symbols used:

R: Replace

I: Inspection

P: Perform

(R): Recommended service for maintaining the better vehicle performance

(I): Inspections recommended for vehicle safety

NOTE:

(1) This inspection is not required to maintain emission warranty eligibility and it does not affect the manufacturer's obligations under EPA's in-use compliance program.

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

(3) A tire should be replaced when the tread wear indicator appears as a solid band across the tread. The indicators appear when the remaining tread has been worn to 1.8 mm (0.071 in) or less.

(4) When the vehicle is used under extremely dusty conditions, the A/C filter should be replaced more frequently than the periodic replacement.

## Schedule

### PERIODIC MAINTENANCE SERVICES

### **B: MAINTENANCE SCHEDULE 2**

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



## 3. Engine Oil

### A: REPLACEMENT

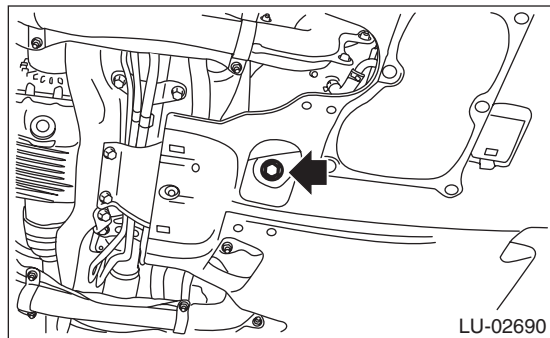
**CAUTION:**

Be careful not to spill the engine oil on exhaust pipe to prevent it from emitting smoke or fire. If engine oil adheres, wipe it off completely.

- 1) Open the engine oil filler cap for quick draining of engine oil.
- 2) Lift up the vehicle.
- 3) Drain engine oil by loosening the engine oil drain plug.

**NOTE:**

Prepare the container for draining of engine oil.



- 4) Tighten the engine oil drain plug after draining engine oil.

**NOTE:**

Use a new drain plug gasket.

**Tightening torque:**

**44 N·m (4.5 kgf·m, 32.5 ft·lb)**

- 5) Lower the vehicle.
- 6) Using engine oil of proper quality and viscosity, fill engine oil through the oil filler duct to the “F” line on level gauge. Make sure that the vehicle is parked on a level surface when checking oil level.

**Recommended oil:**

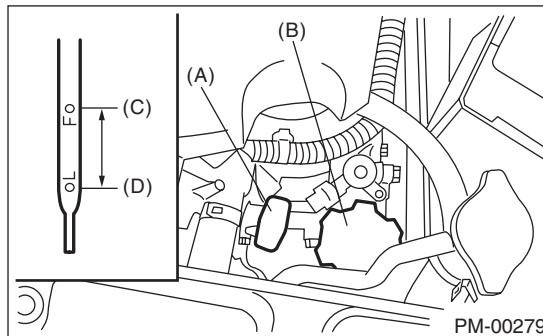
<Ref. to LU(H6DO)-2, SPECIFICATION, General Description.>

**Engine oil capacity:**

<Ref. to LU(H6DO)-2, SPECIFICATION, General Description.>

- 7) Close the engine oil filler cap.
- 8) Start the engine and warm it up for a time.

- 9) After the engine stops, recheck the oil level. If necessary, add engine oil up to the “F” line on level gauge.



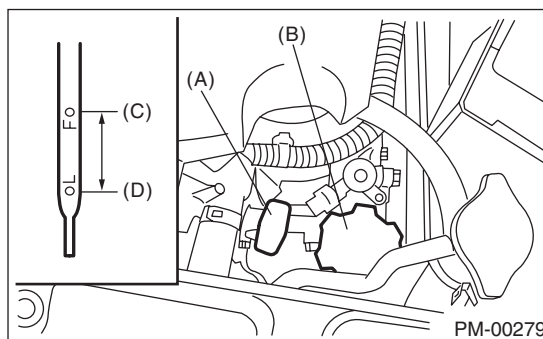
- (A) Oil level gauge
- (B) Engine oil filler cap
- (C) “F” line
- (D) “L” line

### B: INSPECTION

- 1) Park the vehicle on a level surface.
- 2) Remove the 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 properly orientated.
- 4) Remove it again and check the reading. If the engine oil level is below “L” line, add oil to bring the level up to “F” line.
- 5) After turning off the engine, wait a few minutes for the oil to return to the oil pan before checking the level.

**NOTE:**

To prevent overfilling of engine oil, do not add oil above “F” line when the engine is cold.



- (A) Oil level gauge
- (B) Engine oil filler cap
- (C) “F” line
- (D) “L” line

# Engine Oil Filter

## PERIODIC MAINTENANCE SERVICES

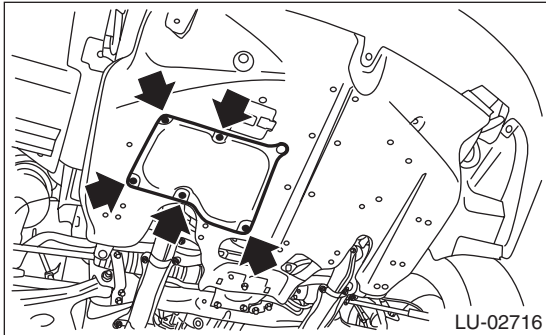
### 4. Engine Oil Filter

#### A: REPLACEMENT

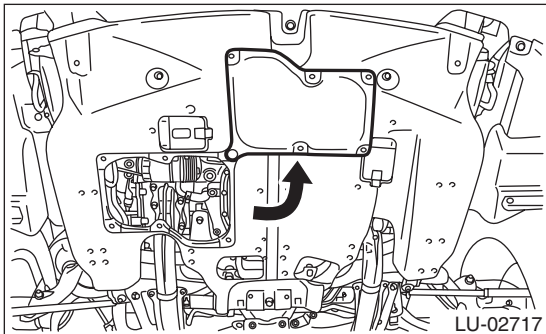
##### CAUTION:

Be careful not to spill the engine oil on exhaust pipe to prevent it from emitting smoke or fire. If engine oil adheres, wipe it off completely.

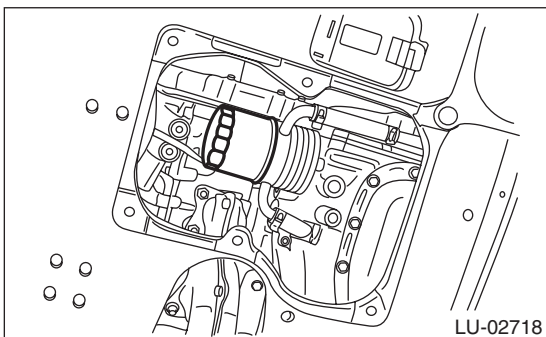
- 1) Lift up the vehicle.
- 2) Drain the engine oil. <Ref. to LU(H6DO)-9, REPLACEMENT, Engine Oil.>
- 3) Remove the service hole cover clip.



- 4) Rotate the service hole cover in the arrow direction.



- 5) Remove the oil filter using ST.  
ST 18332AA020 OIL FILTER WRENCH



- 6) Clean the oil filter installation surface of the oil cooler.
- 7) Obtain a new oil filter and apply a thin coat of engine oil to the seal rubber.
- 8) Install the oil filter turning it by hand, being careful not to damage the seal rubber.

9) Tighten more (approx. 3/4 turn) after the seal rubber contacts the oil cooler. When using a torque wrench, tighten to 14 N·m (1.4 kgf·m, 10.3 ft·lb).

10) Install the service hole cover.

11) Lower the vehicle.

12) Refill the engine oil. <Ref. to LU(H6DO)-9, INSPECTION, Engine Oil.>

13) After installing the oil filter, run the engine and check for oil leakage around seal rubber.

##### NOTE:

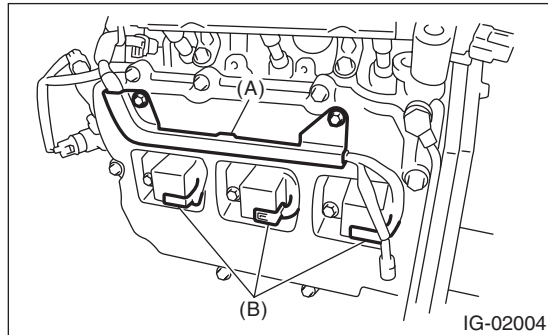
The filter element and filter case are permanently jointed; therefore, interior cleaning is not necessary.

14) Check the engine oil level. <Ref. to LU(H6DO)-9, INSPECTION, Engine Oil.>

## 5. Spark Plug

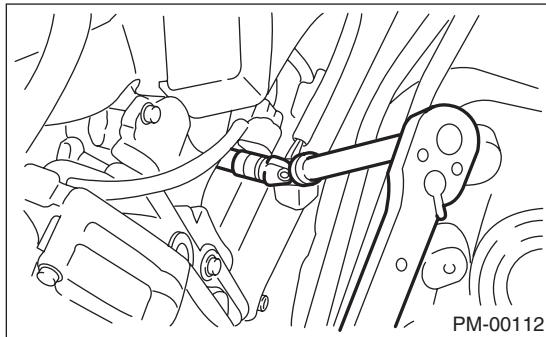
### A: REPLACEMENT

- 1) Remove the battery and battery carrier.
- 2) Remove the air cleaner case.
- 3) Detach the connector from ignition coil.
- 4) Remove the ignition coil.



- (A) Bracket  
(B) Connector

- 5) Remove the spark plug with a spark plug socket.



- 6) Tighten the new spark plug lightly with hand, and then secure with a spark plug socket to the specified torque.

#### NOTE:

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

#### **Recommended spark plug:**

**NGK: SILFR6C11**

#### **Tightening torque:**

**21 N·m (2.1 kgf·m, 15.5 ft·lb)**

- 7) Install the ignition coil.

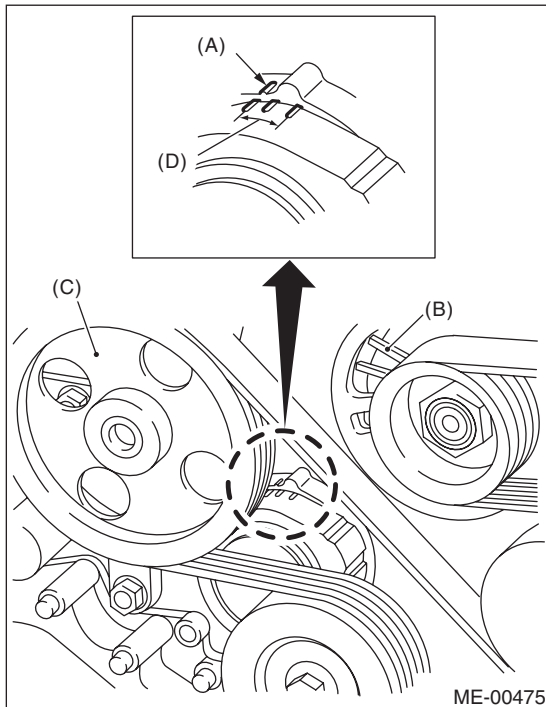
#### **Tightening torque:**

**16 N·m (1.6 kgf·m, 11.8 ft·lb)**

### 6. V-belt

#### A: INSPECTION

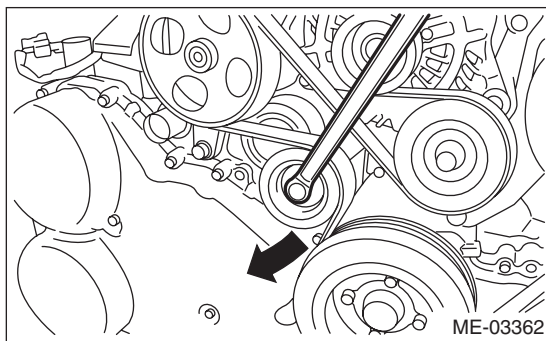
- 1) Replace the belts if cracks, fraying or wear are found.
- 2) Make sure that the V-belt automatic belt tension indicator (A) is within the range of its use limit (D).



- (A) Indicator
- (B) Generator
- (C) Power steering oil pump
- (D) Service limit

#### B: REPLACEMENT

- 1) Remove the collector cover.
- 2) Install the tool to belt tension adjuster assembly installation bolt.
- 3) Rotate the tool clockwise and loosen the V-belt to remove.



- 4) Install in the reverse order of removal.

## 7. Fuel Line

### A: INSPECTION

The fuel line is located mostly internally, so check pipes, areas near pipes, and engine compartment piping for rust, hose damage, loose band, etc. If faulty parts are found, repair or replace them. <Ref. to FU(H6DO)-75, Fuel Delivery and Evaporation Lines.>

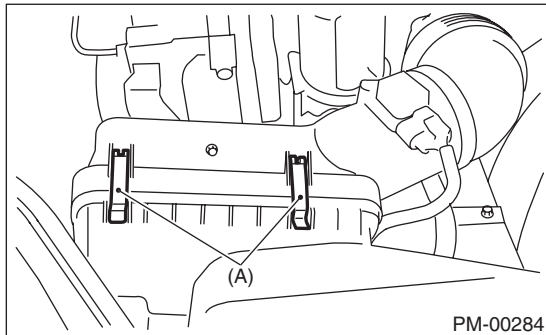
# Air Cleaner Element

## PERIODIC MAINTENANCE SERVICES

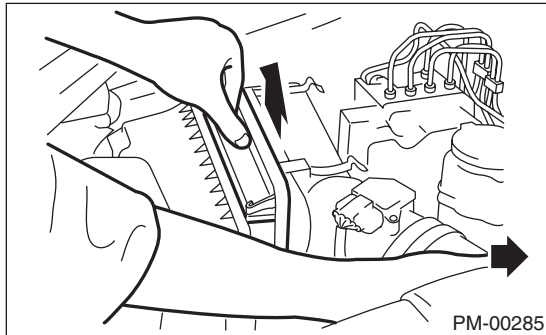
### 8. Air Cleaner Element

#### A: REPLACEMENT

- 1) Disconnect the ground cable from battery.
- 2) Disconnect the connector from mass air flow sensor.
- 3) Remove the clips (A) on air cleaner case.



- 4) While pushing the duct toward the back end of the vehicle, remove the air cleaner element.



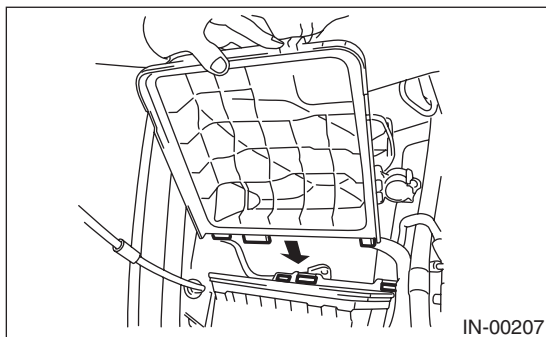
- 5) Check that there are no foreign objects in the clean side.
- 6) Install in the reverse order of removal.

#### CAUTION:

**When replacing the air cleaner element, use SUBARU Genuine air cleaner element according to the engine type. Using other air cleaner element may affect engine performance.**

#### NOTE:

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



## 9. Cooling System

### A: INSPECTION

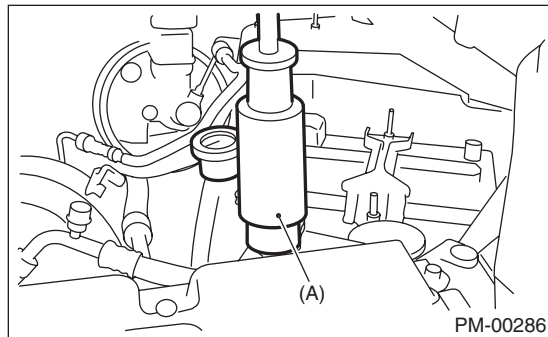
1) To check the radiator for leakage, fill it with engine coolant, and attach the radiator cap tester (A) to the filler neck, and apply pressure. Check the following points:

**157 kPa (1.6 kg/cm<sup>2</sup>, 23 psi)**

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

**NOTE:**

- Be particularly careful not to deform the filler neck of radiator when installing and removing the tester and after testing.



- When performing this check, be sure to keep the engine stationary and fill radiator with coolant.
- Wipe off check points before applying pressure.
- Be careful 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 the cap may prevent valve from functioning normally. be sure to clean the 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 limit value has been maintained for this period. Replace the radiator cap if its valve opens at less than the service limit.

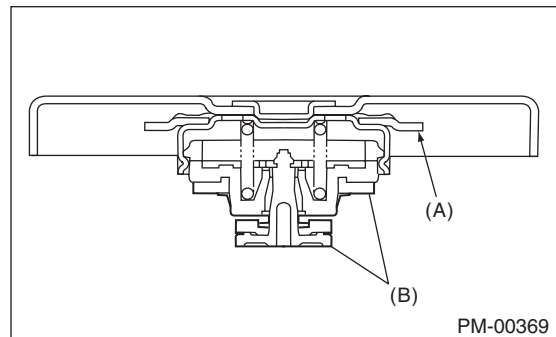
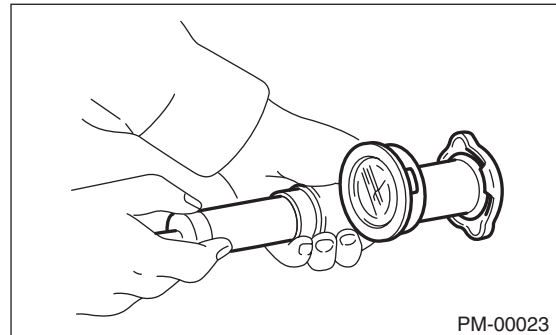
### Radiator cap valve open pressure

**Standard:**

**73.6 — 103 kPa (0.8 — 1.1 kg/cm<sup>2</sup>, 11 — 15 psi)**

**Service limit:**

**63.6 kPa (0.6 kg/cm<sup>2</sup>, 9.2 psi)**



- (A) Check points for deformation
- (B) Check points for deformation, damage, rust

3) Start the engine, and then inspect that it does not overheat or it is not cooled excessively. If it overheats or it is cooled excessively, check the cooling system. <Ref. to CO(H6DO)-14, Water Pump.> <Ref. to CO(H6DO)-15, Thermostat.> <Ref. to CO(H6DO)-17, Radiator.> <Ref. to CO(H6DO)-22, Radiator Cap.>

4) Check the radiator fan operates using Subaru Select Monitor, when the coolant temperature exceeds 95°C (203°F). If it does not operate, check the radiator fan system. <Ref. to CO(H6DO)-10, INSPECTION, Radiator Fan System.>

# Engine Coolant

## PERIODIC MAINTENANCE SERVICES

### 10.Engine Coolant

#### A: REPLACEMENT

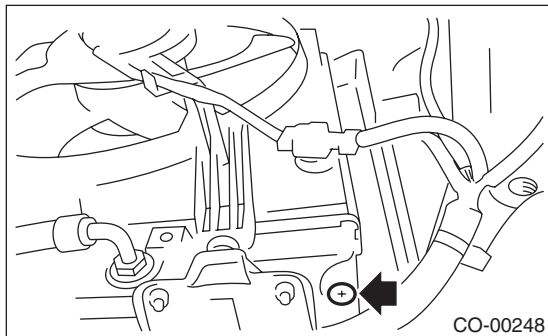
##### WARNING:

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

##### CAUTION:

Be careful not to spill the engine coolant on exhaust pipe to prevent it from emitting smoke or fire. If the engine coolant adheres, wipe it off completely.

- 1) Lift up the vehicle.
- 2) Remove the under cover.
- 3) Place a container under radiator drain pipe.
- 4) Remove the radiator drain cock to drain engine coolant into container.



- 5) For quick draining, open the radiator cap.

##### NOTE:

Be careful not to spill coolant on the floor.

- 6) Drain the coolant from reservoir tank.
- 7) Tighten the radiator drain cock securely after draining coolant.
- 8) Pour cooling system conditioner through the filler neck.

##### **Cooling system protective agent:**

**Cooling system conditioner (Part No. SOA345001)**

- 9) Fill engine coolant into the reservoir tank up to "FULL" level.

##### **Recommended engine coolant:**

**Refer to "RM" section. <Ref. to RM-4, COOLANT, RECOMMENDED MATERIALS, Recommended Materials.>**

##### **Coolant capacity (fill up to "FULL" level):**

**Refer to the "SPC" section. <Ref. to SPC-3, CAPACITY, TRIBECA.>**

##### NOTE:

The SUBARU Super Coolant contains anti-freeze and anti-rust agents, and is especially made for Subaru engines with an aluminum cylinder block. Always use SUBARU Super Coolant, since other coolant may cause corrosion.

- 10) Close the radiator cap, and start the engine. Race 5 to 6 times at 3,000 rpm or less, then stop the engine. (Complete this operation within 40 seconds.)

- 11) Wait for one minute after the engine stops, then open the radiator cap. If the engine coolant level drops, add engine coolant into radiator up to the filler neck position.

- 12) Perform the procedures 10) and 11) again.

- 13) Install the radiator cap and reservoir tank cap properly.

- 14) Start the engine and operate the heater at maximum hot position and the blower speed setting to "LO".

- 15) Run the engine at 2,000 rpm or less until radiator fan starts and stops.

##### NOTE:

- Be careful with the engine coolant temperature gauge to prevent overheating.
- If the radiator hose becomes harden with the pressure of engine coolant, air bleeding operation seems to be almost completed.

- 16) Stop the engine and wait until the engine coolant temperature lowers to 30°C (86°F) or less.

- 17) Open the radiator cap. If the engine coolant level drops, add engine coolant into the coolant filler tank up to the filler neck position and the reservoir tank to "FULL" level.

- 18) Install the radiator cap and reservoir tank cap properly.

- 19) Set the heater setting to maximum hot position and the blower speed setting to "LO" and start the engine. Perform racing at 3,000 rpm or less. If the flowing sound is heard from the heater core, repeat the procedures from step 10).



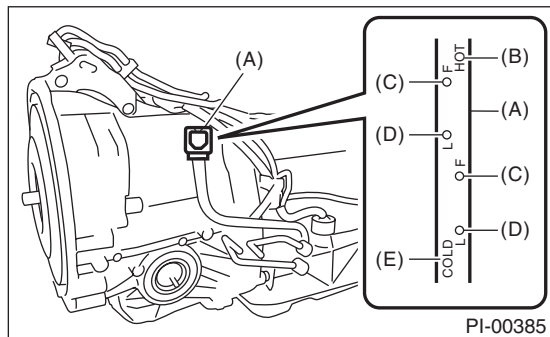
## 11. Automatic Transmission Fluid

### A: INSPECTION

#### CAUTION:

The level of ATF varies with fluid temperature. Pay attention to the ATF temperature when checking ATF level.

- 1) Raise the ATF temperature by driving a distance of 5 to 10 km (3 to 6 miles). Otherwise, idle the engine to raise ATF temperature to 70 — 80°C (158 — 176°F) on Subaru Select Monitor. <Ref. to 5AT(diag)-16, READ CURRENT DATA, OPERATION, Subaru Select Monitor.>
- 2) Make sure the vehicle is level.
- 3) After selecting all positions (P, R, N, D), shift the select lever in “P” range. Idle the engine for 1 to 2 minutes.
- 4) Remove the oil level gauge and wipe it clean.
- 5) Reinsert the level gauge all the way. Make sure the level gauge is inserted correctly and in the proper orientation.
- 6) Remove the oil level gauge again and make sure that the ATF level is between upper and lower marks of the “HOT” side.



- (A) Level gauge  
 (B) ATF level range at “HOT” [70 — 80°C (158 — 176°F)]  
 (C) Upper level  
 (D) Lower level  
 (E) ATF level range at “COLD” [20 — 30°C (68 — 86°F)]

- 7) If the ATF level is below the lower mark, add recommended ATF until the fluid level is between upper and lower marks.

#### CAUTION:

- Be careful not to exceed the upper level limit.
- If ATF is added to the upper limit mark on “HOT” side when the ATF temperature is less than 70°C (158°F), ATF will overfill and cause the oil to spill out.

- 8) Check the ATF for leaks.

Check for leaks in the transmission. If there are leaks, it is necessary to repair or replace gaskets, oil seals, plugs or other parts.

### B: REPLACEMENT

- 1) Lift up the vehicle.
- 2) Remove the ATF drain plug to drain ATF.

#### CAUTION:

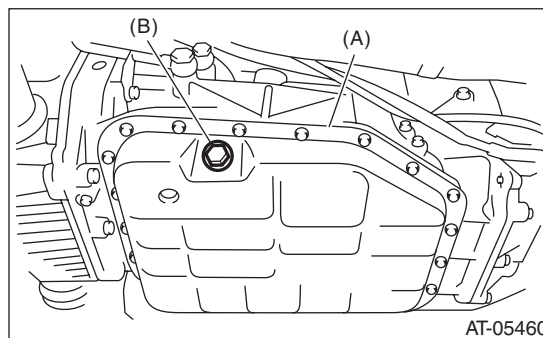
- Directly after the vehicle has been running or the engine has been long idle running, the ATF is hot. Be careful not to burn yourself.
  - Be careful not to spill the ATF on the exhaust pipe to prevent it from emitting smoke or causing fire. If the ATF is spilt, wipe it off completely.
- 3) Check the ATF condition. <Ref. to 5AT-29, CONDITION CHECK, Automatic Transmission Fluid.>
  - 4) Tighten the ATF drain plug to the specified torque.

#### NOTE:

Use a new gasket.

#### Tightening torque:

**20 N·m (2.0 kgf·m, 14.8 ft·lb)**



- (A) Oil pan  
 (B) ATF drain plug

- 5) Lower the vehicle.
- 6) Pour ATF through the oil charge pipe.

#### Recommended ATF:

**Refer to “RM” section. <Ref. to RM-4, FLUID, RECOMMENDED MATERIALS, Recommended Materials.>**

#### Capacity:

**Fill with the same amount of ATF as drained.**

#### CAUTION:

Be sure to use the recommended or equivalent ATF. Using material except recommended one or substitute would cause trouble.

- 7) Check the level and leaks of the ATF. <Ref. to PM-13, INSPECTION, Automatic Transmission Fluid.>

# Front & Rear Differential Gear Oil

## PERIODIC MAINTENANCE SERVICES

### 12. Front & Rear Differential Gear Oil

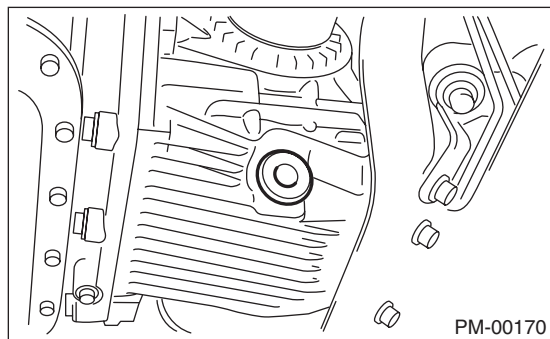
#### A: REPLACEMENT

##### 1. FRONT DIFFERENTIAL

- 1) Lift up the vehicle.
- 2) Drain the differential gear oil by removing drain plug using TORX® bit T70.

#### CAUTION:

- Immediately after the vehicle has been running or after idling for a long time, the differential gear oil will be hot. Be careful not to burn yourself.
- Be careful not to spill the differential gear oil on exhaust pipe to prevent it from emitting smoke or fire. If differential gear oil adheres to the exhaust pipe, wipe it off completely using cloth.



- 3) Using the TORX® bit T70, tighten the drain plug to the specified torque.

#### NOTE:

Use a new gasket.

#### Tightening torque:

**70 N·m (7.1 kgf·m, 51.6 ft·lb)**

- 4) Lower the vehicle.

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

#### NOTE:

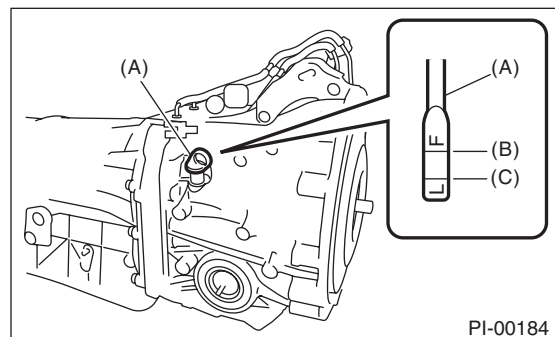
Each oil manufacturer has its base oil and additives. Thus, do not mix two or more brands.

#### Recommended gear oil:

Refer to "RM" section. <Ref. to RM-2, LUBRICANTS, RECOMMENDED MATERIALS, Recommended Materials.>

#### Gear oil capacity:

Refer to the "SPC" section. <Ref. to SPC-3, CAPACITY, TRIBECA.>



- (A) Oil level gauge
- (B) Upper level
- (C) Lower level

##### 2. REAR DIFFERENTIAL

- 1) Lift up the vehicle.
- 2) Drain the oil by removing oil drain plug.

#### CAUTION:

- The differential gear oil will be extremely hot after driving. Be careful not to receive burns.
- Be careful not to spill the differential gear oil on exhaust pipe to prevent it from emitting smoke or fire. If differential gear oil adheres to the exhaust pipe, wipe it off completely using cloth.

- 3) Remove the filler plug for quick draining oil.

- 4) Install the drain plug after draining oil.

#### NOTE:

Use a new gasket.

#### Tightening torque:

**50 N·m (5.1 kgf·m, 36.9 ft·lb)**

## Front & Rear Differential Gear Oil

PERIODIC MAINTENANCE SERVICES

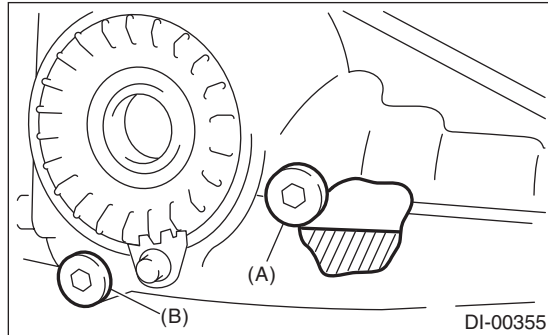
5) Pour oil to the bottom end of filler plug hole.

**Recommended gear oil:**

Refer to “RM” section. <Ref. to RM-2, LUBRICANTS, RECOMMENDED MATERIALS, Recommended Materials.>

**Oil capacity:**

Refer to the “SPC” section. <Ref. to SPC-3, CAPACITY, TRIBECA.>



- (A) Filler plug
- (B) Drain plug

**NOTE:**

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

6) Install the filler plug.

**NOTE:**

Use a new gasket.

**Tightening torque:**

**50 N·m (5.1 kgf·m, 36.9 ft·lb)**

## 13. Brake Line

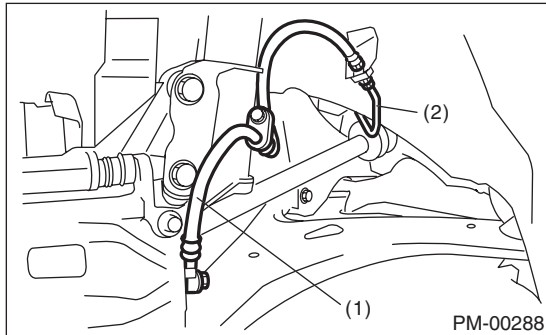
### A: INSPECTION

#### 1. BRAKE LINE

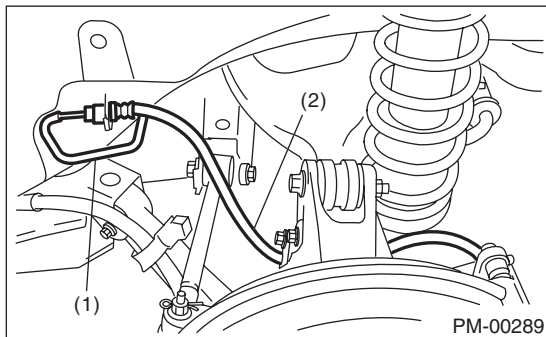
- 1) Check for scratches, swelling, corrosion, traces of fluid leakage on the brake hoses or pipe joints.
- 2) Check the possibility of adjacent parts interfering with brake pipes/hoses during driving, and loose connections/clamps.
- 3) Check any trace of fluid leakage, scratches, etc. on master cylinder,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

**NOTE:**

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



- (1) Front brake hose
- (2) Front brake pipe



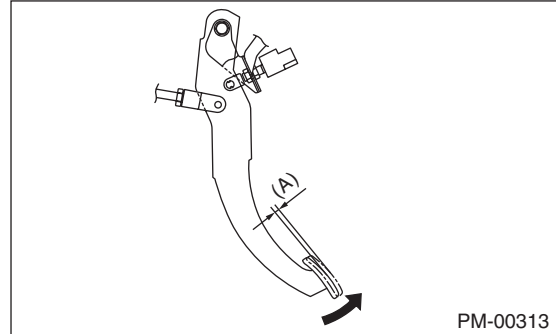
- (1) Rear brake pipe
- (2) Rear brake hose

#### 2. SERVICE BRAKE

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

**Brake pedal free play (Pulling up direction of pedal)**

**0.5 — 2.0 mm (0.02 — 0.08 in)**



(A) Pedal free play

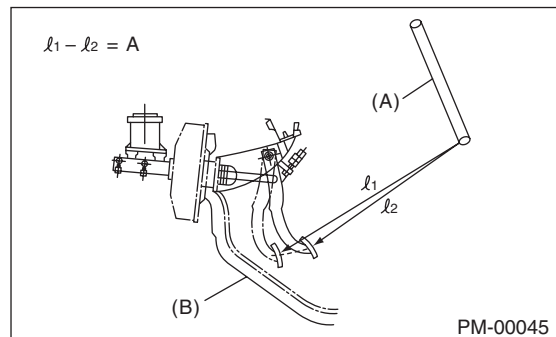
- 2) If the free play is out of specifications above, adjust the brake pedal as follows. <Ref. to BR-38, INSPECTION, Brake Pedal.>

- 3) Check the pedal stroke.

While the engine is idling, depress the brake pedal with a 500 N (51 kgf, 112 lb) load and measure the distance between the brake pedal and steering wheel. With the brake pedal released, measure the distance between pedal and steering wheel again. The difference between the two measured values must be the specified value or less. If the measured value is specification or more, there is possibility of entering air in hydraulic unit.

**Brake pedal stroke A:**

**115 mm (4.5 in)/500 N (51 kgf, 112 lb) or less**



- (A) Steering wheel
- (B) Toe board

- 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.

## 3. BRAKE SERVO SYSTEM

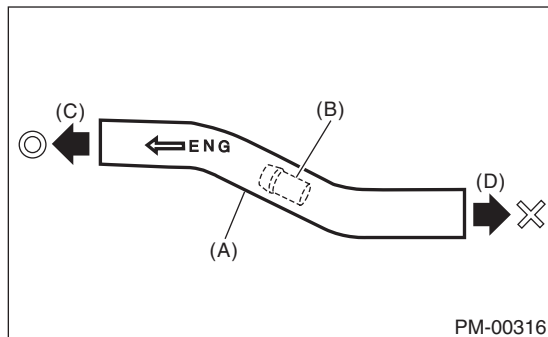
1) With the engine off, depress the brake pedal several times applying the same pedal force. Make sure the travel distance should not change.

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) A check valve is incorporated into the vacuum hose part. Disconnect the vacuum hose to inspect function of check valve.

Make sure air flows from the booster end to engine end but does not flow in the opposite direction in the check valve.



- (A) Vacuum hose
- (B) Check valve
- (C) Engine side
- (D) Brake booster side

5) Check the vacuum hose for cracks or other damage.

### CAUTION:

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

6) Check the vacuum hose to make sure it is tightly secured.

## 14. Brake Fluid

### A: INSPECTION

1) Check that the amount of brake fluid is between the lines of "MIN" and "MAX". If out of the specified range, refill or drain the fluid. If the fluid level is close to "MIN", check the brake pad for wear and refill the fluid.

2) Check the fluid for discoloration. If the fluid is extremely discolored, replace with the new fluid.

### B: REPLACEMENT

#### CAUTION:

- Do not let brake fluid come into contact with the painted surface of the vehicle body and exhaust pipe. Wash away with water immediately and wipe off if it is spilled by accident.
- Avoid mixing brake fluid of different brands to prevent fluid performance from degrading.
- Be careful not to allow dirt or dust to enter the reservoir tank.
- While bleeding air, keep the reservoir tank filled with brake fluid to prevent entry of air.
- Operate the brake pedal slowly.
- For convenience and safety, two people should do the work.

1) Either jack-up the vehicle and place a rigid rack under it, or lift up the vehicle.

2) Remove all the wheels.

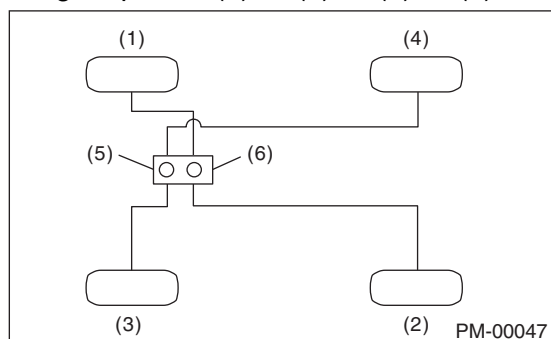
3) Drain the brake fluid from master cylinder.

4) Refill the reservoir tank with recommended brake fluid.

#### Recommended brake fluid:

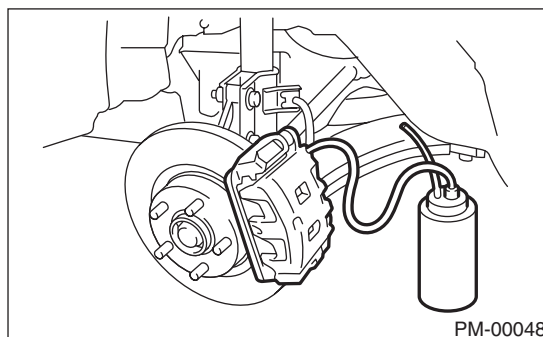
Refer to "RM" section. <Ref. to RM-4, FLUID, RECOMMENDED MATERIALS, Recommended Materials.>

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



- (1) Front RH
- (2) Rear LH
- (3) Front LH
- (4) Rear RH
- (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 the bleeder with cloth, when loosening it, to prevent brake fluid from being splashed over surrounding parts.

- The amount of brake fluid required is approx. 600 ml (20.3 US fl oz, 21.1 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 the bleeder screw approximately 1/4 turn until a small amount of brake fluid drains into the container, and then quickly tighten the screw.

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

#### NOTE:

Add brake fluid as necessary while bleeding air, so that the brake fluid in the tank is always between MAX and MIN.

9) After completing the bleeding operation, hold the brake pedal depressed and tighten the screw and install bleeder cap.

#### Tightening torque:

**8 N·m (0.8 kgf-m, 5.9 ft-lb)**

10) Bleed air from each wheel cylinder by following steps from 5) to 9).

11) Depress the brake pedal with a force of approx. 294 N (30 kgf, 66 lb) and hold it there for approx. 20 seconds. At this time check the pedal to see if it makes any unusual movement. Visually inspect the bleeder screws and brake pipe joints to confirm there is no fluid leakage.

12) Install the wheels, and drive the vehicle for a distance of 2 to 3 km (1 to 2 miles) to confirm that brakes are operating properly.

## 15. Disc Brake Pad and Disc

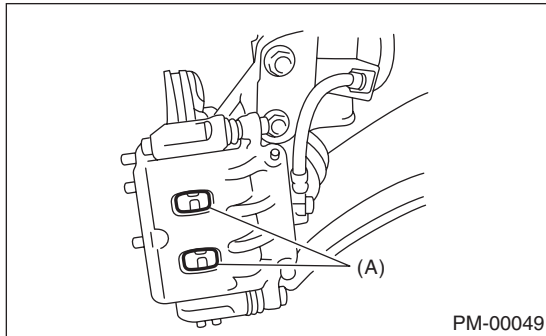
### A: INSPECTION

1) Jack-up the vehicle and support with rigid racks. Then remove the wheels.

2) Visually check the pad thickness through inspection hole of disc brake assembly. Replace the pad if necessary.

**NOTE:**

When replacing a pad, always replace the pads for both the left and right wheels at the same time. Also replace the pad clips if they are twisted or worn.



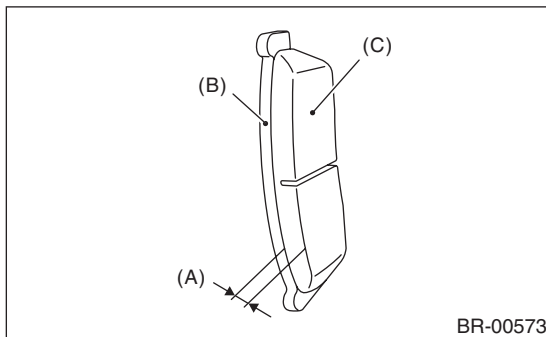
(A) Inspection hole

• Front

Pad thickness		mm (in)
Standard value	11	(0.43)
Wear limit	1.5	(0.059)

• Rear

Pad thickness		mm (in)
Standard value	11	(0.43)
Wear limit	1.5	(0.059)



- (A) Pad thickness
- (B) Back metal
- (C) Lining

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

• Front

Disc rotor thickness		mm (in)
Standard value	30	(1.18)
Wear limit	28	(1.10)

• Rear

Disc rotor thickness		mm (in)
Standard value	18	(0.71)
Wear limit	16	(0.63)

4) Remove the caliper body. <Ref. to BR-15, Front Disc Brake Assembly.> <Ref. to BR-23, Rear Disc Brake Assembly.>

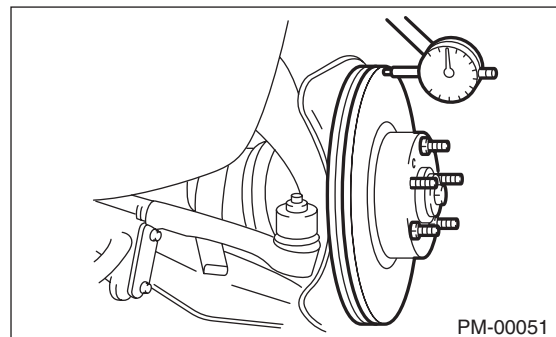
5) Tighten the wheel nuts to secure disc rotor.

6) Set a dial gauge at a point of 10 mm (0.39 in) or less from outer periphery of the rotor, and then measure the disc rotor runout.

**Disc rotor runout limit:**

**Front: 0.05 mm (0.002 in)**

**Rear: 0.05 mm (0.002 in)**



# Parking Brake

## PERIODIC MAINTENANCE SERVICES

### 16. Parking Brake

#### A: INSPECTION

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

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

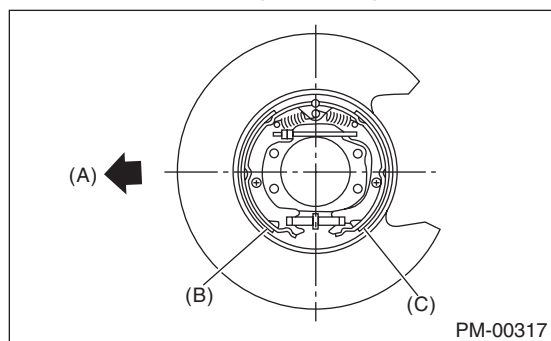
#### NOTE:

Always replace the primary and secondary brake shoe of right and left wheels at the same time.

**Thickness of brake lining (except for back metal):**

**Standard: 4.0 mm (0.157 in)**

**Wear limit: 1.5 mm (0.059 in)**



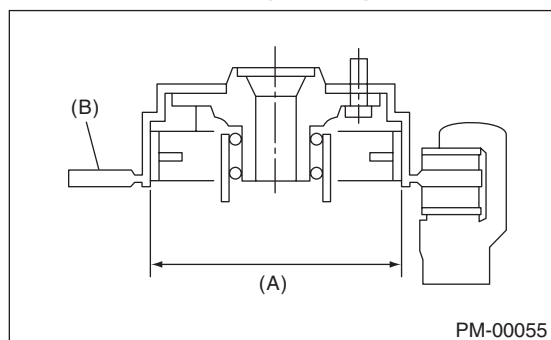
- (A) Forward
- (B) Brake shoe (Primary side)
- (C) Brake shoe (Secondary side)

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

**Brake drum inside diameter:**

**Standard: 210 mm (8.27 in)**

**Wear limit: 211 mm (8.31 in)**



- (A) Inside diameter
- (B) Disc

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

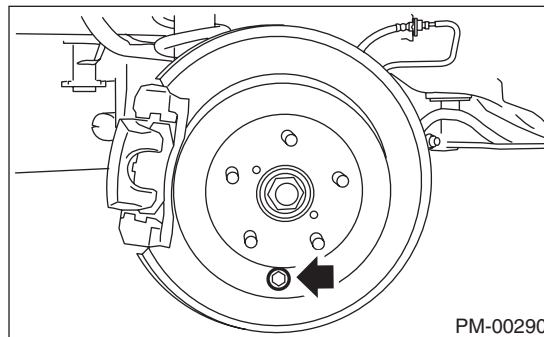
4) When the shoe return spring tension is excessively weakened, replace it.

5) Check whether the parking brake pedal is at the predetermined number of notches (5 to 6 notches).

#### B: ADJUSTMENT

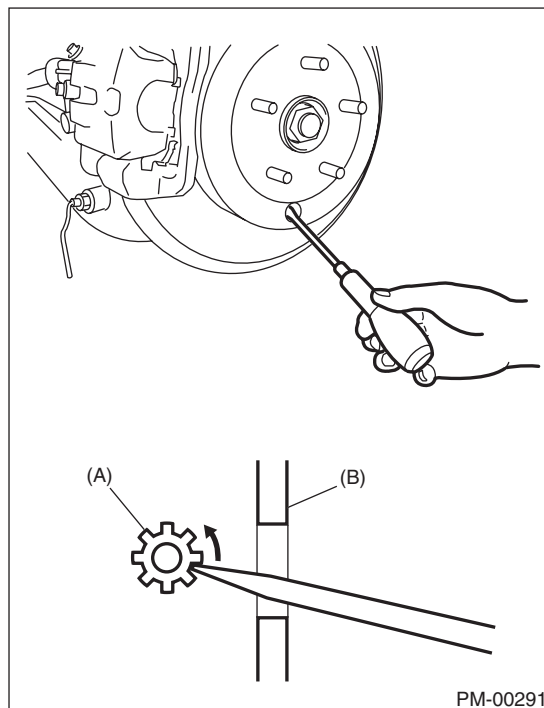
1) Remove the rear tire and release the parking brake.

2) Remove the cover (rubber) installed on the disc rotor.



3) Turn the disc rotor so that the service hole is directly below.

4) Turn the adjuster toward arrow mark (upward) until it is locked slightly, by using flat tip screwdriver as shown in the figure.



- (A) Adjuster
- (B) Disc rotor



- 5) Turn back (downward) the adjuster three to four notches until the brake pedal no longer has any drag.
- 6) Install the cover (rubber) in original position correctly.
- 7) Install the rear tires.
- 8) Adjust so that the parking brake pedal is at the predetermined number of notches (5 to 6 notches).  
<Ref. to PB-9, PEDAL STROKE, ADJUSTMENT, Parking Brake Assembly (Rear Disc Brake).>

# Suspension

## PERIODIC MAINTENANCE SERVICES

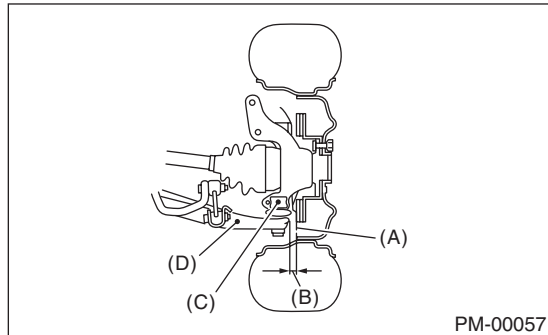
### 17. Suspension

#### A: INSPECTION

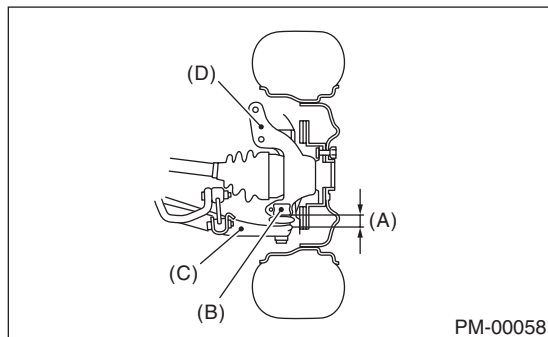
##### 1. SUSPENSION BALL JOINT

1) Jack up the vehicle until front tires are off ground.

2) Grasp the bottom of tire and move it in and out in axial direction. If relative movement (B) is observed between the brake disc cover (A) and end of front arm (D), ball joint (C) may be excessively worn.



3) Grasp the end of front arm and move it up and down. If relative movement (A) is observed between the housing (D) and front arm (C) boss, ball joint (B) may be excessively worn.



4) If relative movement is observed in the step 2), 3), remove and inspect the ball joint. If the free play exceeds standard value, replace the ball joint. <Ref. to FS-16, Front Ball Joint.>

5) Damage of dust cover

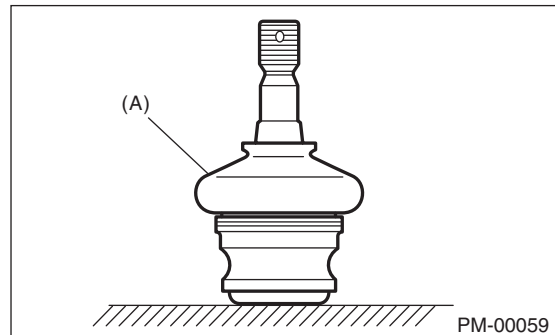
Visually inspect the ball joint dust cover. If it is damaged, remove the front arm. <Ref. to FS-17, Front Arm.> Measure the play of the ball joint. <Ref. to FS-16, Front Ball Joint.>

(1) If the free play exceeds standard value, replace the ball joint.

(2) If the dust cover is damaged, replace with a new ball joint.

#### NOTE:

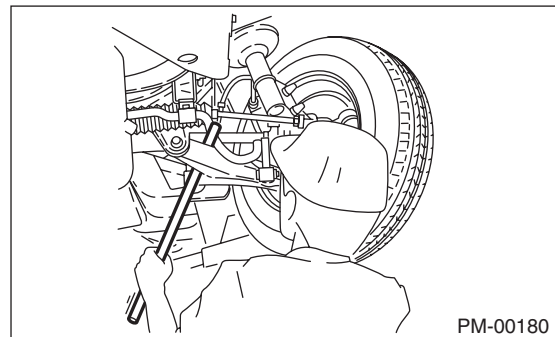
When the front arm ball joint has been removed or replaced, check the toe of front wheel. If the front wheel toe-in is not at specified value, adjust the toe-in. <Ref. to FS-6, Wheel Alignment.>



(A) Dust cover

##### 2. FRONT, REAR SUSPENSION BUSHING

Apply pressure with tire lever etc, and inspect the bushing for excessive wear or damage. Replace the bushings and the arm assembly or link assembly if there is abnormal fatigue or damage.



##### 3. WHEEL ARCH HEIGHT

1) Unload the vehicle, so that it is at curb weight.

2) Check the wheel arch height of the front and rear suspensions to ensure that they are within tolerance. <Ref. to FS-6, Wheel Alignment.>

3) When the wheel arch height is out of standard, visually inspect following components and replace deformed parts.

- Suspension components [Front strut assembly and rear shock absorber assembly]
- Parts connecting suspension and body

4) If none of the components is deformed, replace the suspension with wheel arch height out of specification and adjust the wheel arch height. <Ref. to FS-6, Wheel Alignment.> <Ref. to RS-7, Wheel Alignment.>

## 4. WHEEL ALIGNMENT OF FRONT SUSPENSION

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

- Toe-in
- Camber
- Caster
- Steering angle

<Ref. to FS-6, Wheel Alignment.>

2) When the caster angle does not conform to reference obviously, visually inspect the following components and replace deformed parts.

- Suspension components [Strut assembly, cross-member, front arm, etc.]
- Parts connecting suspension and body

3) When the toe-in and camber are outside of the tolerance value, adjust each one so that they conform to the specified value. <Ref. to FS-6, Wheel Alignment.>

4) When the rotating angles of the right and left tires are not within tolerance, adjust them to standard. <Ref. to FS-6, Wheel Alignment.>

## 5. WHEEL ALIGNMENT OF REAR SUSPENSION

1) Inspect the alignment of the rear suspension and check the following items are within the specified range.

- Toe-in
- Camber
- Thrust angle

<Ref. to RS-7, Wheel Alignment.>

2) When the camber is not within tolerance, visually inspect the following components. If the deformation is found, replace the damaged part.

- Suspension components [Shock absorber, rear upper arm, front lateral link, rear lateral link, rear trailing link, sub frame]
- Parts connecting suspension and body

3) If the toe-in and thrust angle are not within tolerance, adjust them so that they conform to the specified value. <Ref. to FS-6, Wheel Alignment.>

## 6. OIL LEAKAGE OF STRUT AND SHOCK ABSORBER

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

## 7. TIGHTNESS OF BOLTS AND NUTS

Check the bolts and nuts for looseness. Retighten the bolts and nuts to specified torque. If the self-locking nuts and bolts are removed, replace them with new parts.

- Front suspension  
<Ref. to FS-2, General Description.>
- Rear suspension  
<Ref. to RS-2, General Description.>

## 8. DAMAGE TO SUSPENSION PARTS

Check the following parts and the fastening portion of the vehicle body for deformation or excessive rusting which impairs the suspension. If necessary, replace the damaged parts with new parts. If minor rust formation, pitting, etc. are noted, remove the rust and take rust prevention measure.

- Front suspension
  - Front arm
  - Crossmember
  - Strut
- Rear suspension
  - Upper arm
  - Front lateral link
  - Rear lateral link
  - Rear trailing link
  - Rear sub frame
  - Shock absorber
- In the area 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 measures as required.

# Wheel Bearing

## PERIODIC MAINTENANCE SERVICES

### 18. Wheel Bearing

#### A: INSPECTION

##### 1. FRONT WHEEL BEARING

###### NOTE:

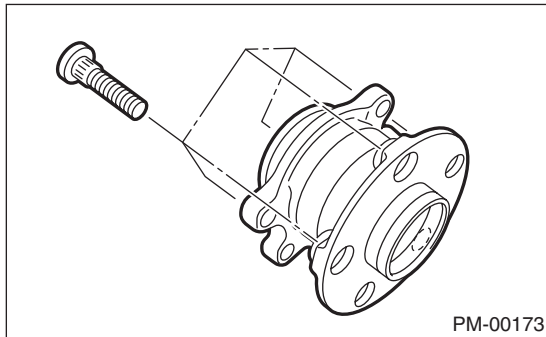
Inspect the condition of front wheel bearing grease.

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

###### **Service limit:**

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

- 5) Remove the bolts and self-locking nuts, and extract the front arm from front crossmember.
  - 6) Remove the PTJ of front drive shaft from transmission. <Ref. to DS-25, Front Drive Shaft.>
  - 7) While supporting the front drive shaft horizontally with one hand, turn the hub with the other hand to check for noise or binding.
- If the hub is noisy or binds, replace the front axle.



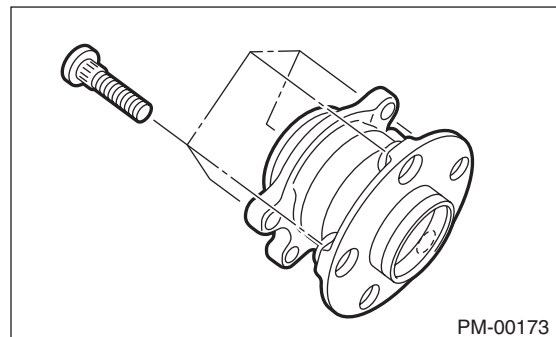
##### 2. REAR WHEEL BEARING

- 1) Jack-up the rear side of vehicle.
- 2) While holding the rear wheel by hand, swing it in and out to check bearing free play.
- 3) Loosen the wheel nuts, and remove the rear wheel.
- 4) If the bearing free play exists in step 2) above, attach a dial gauge to the hub and measure axial play 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-29, Rear Drive Shaft.>
  - 6) While supporting rear drive shaft horizontally with one hand, turn the hub with the other hand to check for noise or binding.
- If the hub is noisy or binds, replace the rear axle.



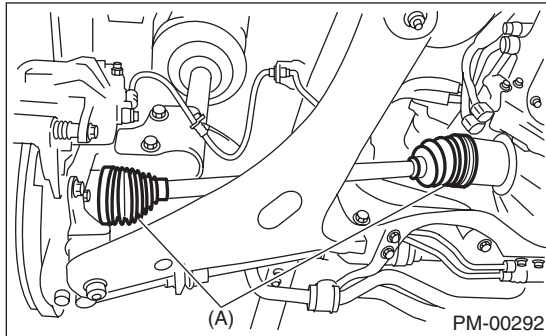
## 19. Axle Boots & Joints

### A: INSPECTION

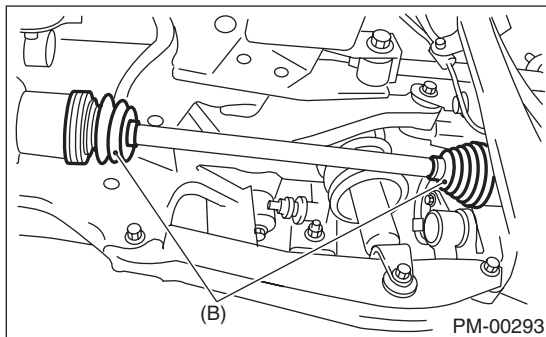
#### 1. FRONT AND REAR AXLE BOOTS

Inspect the front axle boots (A) and rear axle boots (B) for deformation, damage or failure. If faulty, replace with a new part. <Ref. to DS-25, Front Drive Shaft.> <Ref. to DS-29, Rear Drive Shaft.>

- Front



- Rear



#### 2. PROPELLER SHAFT

Inspect the propeller shaft for damage or failure. If faulty, replace with a new part. <Ref. to DS-10, Propeller Shaft.>

## 20. Tire Rotation

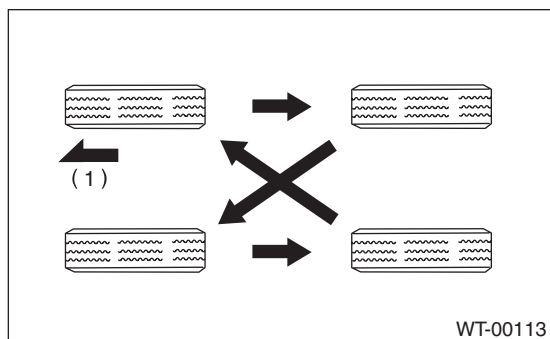
### A: INSPECTION

1) When the tread has worn down to less than 1.8 mm (0.071 in) or the wear indicator appears across the tread, replace the tire. (Replace the right and left tires as a set.)

2) If the tire appears to be worn unevenly, adjust the wheel alignment.

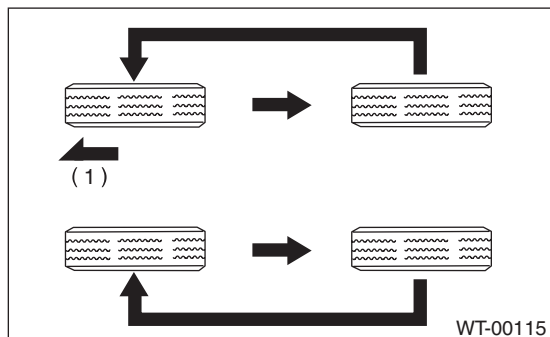
3) Rotate tires periodically (12,000 km/7,500 miles) as shown in the figure, in order to prevent them from uneven wear and to prolong their life.

- When the direction of tire rotation is not specified

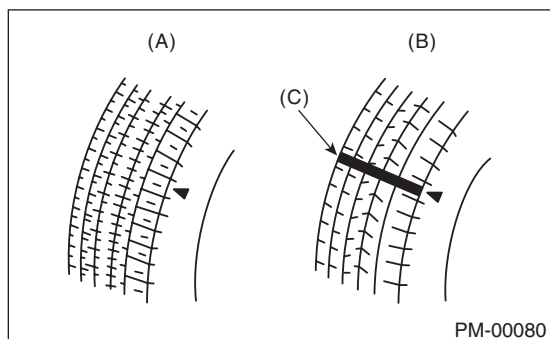


(1) Front

- When the direction of tire rotation is specified



(1) Front



- (A) New tread
- (B) Damaged tread
- (C) Tread wear indicator

## 21. Steering System (Power Steering)

### A: INSPECTION

#### 1. STEERING WHEEL

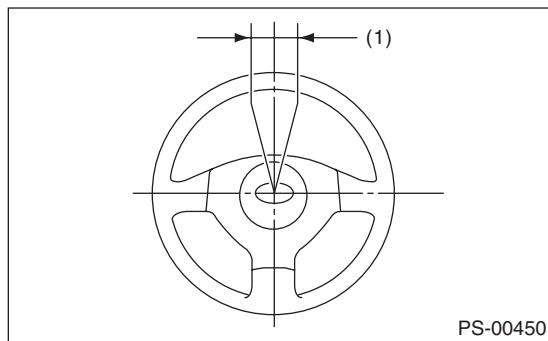
1) Set the steering wheel in a straight-ahead position, and check the wheel spokes to make sure they are correctly set in their specified positions.

2) Lightly turn the 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)**



(1) Steering wheel free play

Move the 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 the 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) Pulled 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:

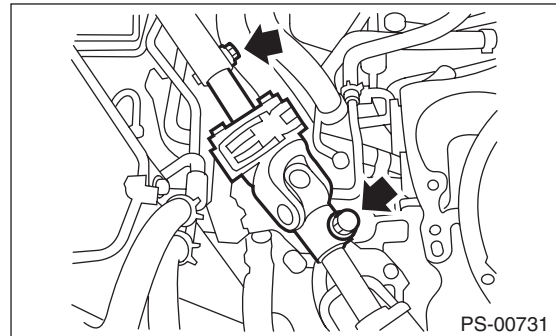
Steering wheel should return to its original position after it has been turned and then released.

#### 2. STEERING SHAFT JOINT

When the steering wheel free play is excessive, disconnect the 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, 17.7 ft-lb)**



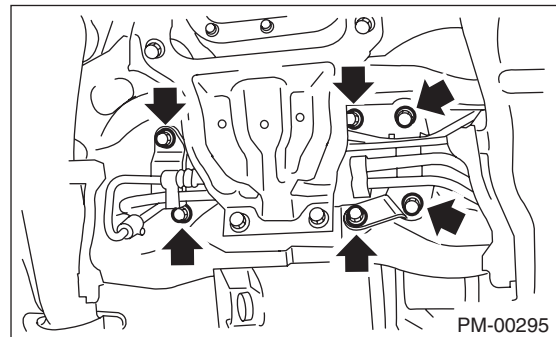
#### 3. GEARBOX

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

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

#### **Tightening torque:**

**60 N·m (6.1 kgf-m, 44.3 ft-lb)**



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

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

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

#### **Liquid gasket:**

**THREE BOND 1102 or equivalent**

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

# Steering System (Power Steering)

## PERIODIC MAINTENANCE SERVICES

5) Tighten the adjusting screw to the specified torque, then loosen it.

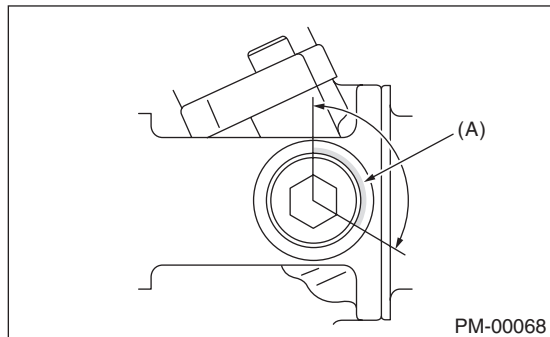
### **Tightening torque:**

**25 N·m (2.5 kgf·m, 18.4 ft·lb)**

6) Tighten the adjusting screw to the specified torque, then loosen it 20°.

### **Tightening torque:**

**5.9 N·m (0.6 kgf·m, 4.4 ft·lb)**



(A) Apply liquid gasket to at least 1/3 of entire perimeter.

7) Install the lock nut. While holding the adjusting screw with wrench, tighten the lock nut using ST.

### **NOTE:**

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

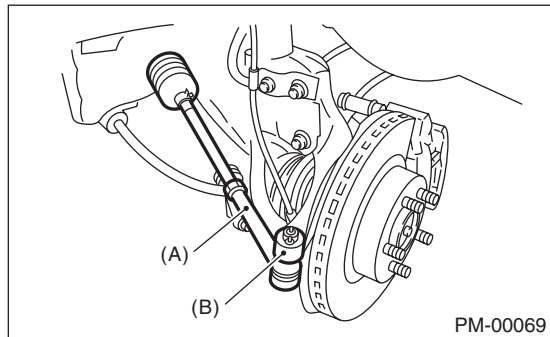
### **Tightening torque (lock nut):**

**25 N·m (2.5 kgf·m, 18.4 ft·lb)**

ST 926230000 SPANNER

## 4. TIE-ROD

1) Check the tie-rod and tie-rod end for bend, cracks or other damages.



(A) Tie-rod end  
(B) Knuckle arm

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

### **Tightening torque:**

**27 N·m (2.8 kgf·m, 19.9 ft·lb)**

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

### **Tightening torque:**

**85 N·m (8.7 kgf·m, 62.7 ft·lb)**

## 5. POWER STEERING FLUID LEVEL

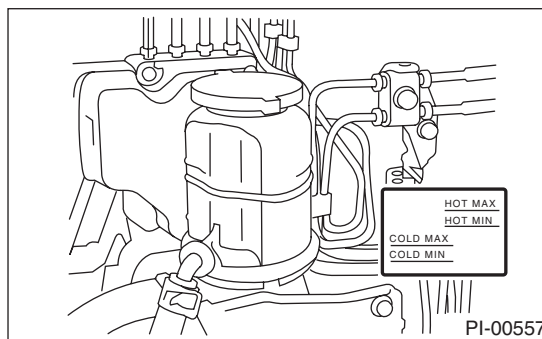
### **NOTE:**

• At power steering fluid temperature 20°C (68°F); read the fluid level on the “COLD” side.

• At power steering fluid temperature 80°C (176°F); read the fluid level on the “HOT” side.

1) Place the vehicle with engine “OFF” on a level surface.

2) Check the fluid level using the scale on the outside of the reservoir tank. If the level is below “MIN”, fill fluid up to “MAX” level.



### **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:**

**Refer to “RM” section. <Ref. to RM-4, FLUID, RECOMMENDED MATERIALS, Recommended Materials.>**

### **Fluid capacity:**

**Refer to the “SPC” section. <Ref. to SPC-3, CAPACITY, TRIBECA.>**

## 6. POWER STEERING FLUID FOR LEAKS

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

If the fluid leaks are found, retighten their fitting bolts (or nuts) and/or replace their parts.

### **NOTE:**

• Wipe the leaked fluid off after correcting fluid leaks.

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

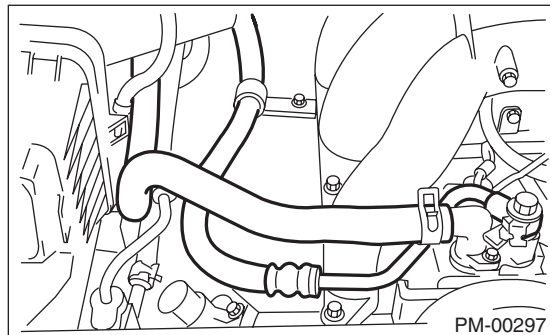


## 7. HOSES OF OIL PUMP FOR DAMAGES

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

### NOTE:

Prevent hoses from turning and/or bending when installing hoses.



## 8. POWER STEERING PIPES FOR DAMAGES

Check the power steering pipes for corrosion and damage.

Replace the pipes with new parts if necessary.

## 9. GEARBOX BOOTS

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

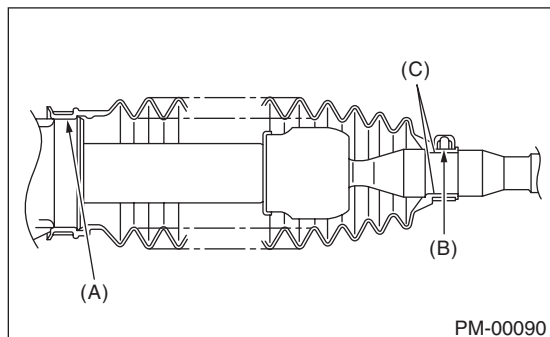
1) Positions (A) and (B) of the gearbox boot are fitted correspondingly in grooves (A) and (B) of the gearbox and rod (C).

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

3) Boot does not have crack or hole.

### NOTE:

Rotate (B) position of gearbox boot against the torsion produced by the adjustment of toe-in etc. Apply grease to the groove (C).



## 10. FITTING BOLTS AND NUTS

Inspect the 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.

# Supplemental Restraint System

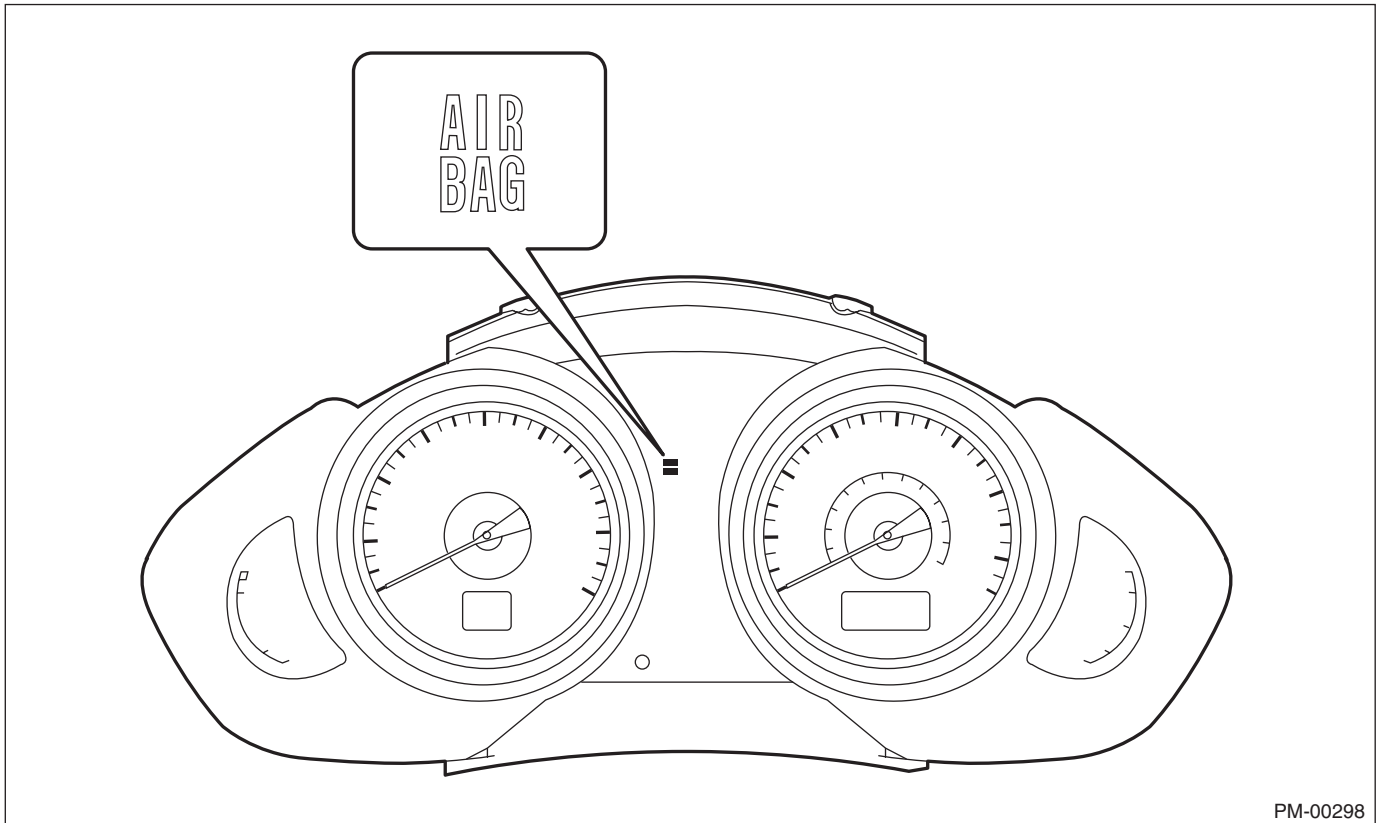
PERIODIC MAINTENANCE SERVICES

## 22. Supplemental Restraint System

### A: INSPECTION

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

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



2) Connect the Subaru Select Monitor to data link connector. Turn the ignition switch to ON, and Subaru Select Monitor switch to ON.

3) Read the Diagnostic Trouble Code (DTC) using Subaru Select Monitor. <Ref. to AB(diag)-22, READ DIAGNOSTIC TROUBLE CODE (DTC), OPERATION, Subaru Select Monitor.>

4) Inspect the airbag system according to the Diagnostic Trouble Code (DTC).

## 23.A/C Filter

### A: REPLACEMENT

For the A/C filter replacement procedures, refer to the AC section. <Ref. to AC-52, REPLACEMENT, A/C Filter.>

# A/C Filter

PERIODIC MAINTENANCE SERVICES

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**ENGINE 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.

<b>FUEL INJECTION (FUEL SYSTEMS)</b>	<b>FU(H6DO)</b>
<b>EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)</b>	<b>EC(H6DO)</b>
<b>INTAKE (INDUCTION)</b>	<b>IN(H6DO)</b>
<b>MECHANICAL</b>	<b>ME(H6DO)</b>
<b>EXHAUST</b>	<b>EX(H6DO)</b>
<b>COOLING</b>	<b>CO(H6DO)</b>
<b>LUBRICATION</b>	<b>LU(H6DO)</b>
<b>SPEED CONTROL SYSTEMS</b>	<b>SP(H6DO)</b>
<b>IGNITION</b>	<b>IG(H6DO)</b>
<b>STARTING/CHARGING SYSTEMS</b>	<b>SC(H6DO)</b>
<b>ENGINE (DIAGNOSTICS)</b>	<b>EN(H6DO)(diag)</b>
<b>GENERAL DESCRIPTION</b>	<b>GD(H6DO)</b>



# FUEL INJECTION (FUEL SYSTEMS)

# *FU(H6DO)*

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# General Description

FUEL INJECTION (FUEL SYSTEMS)

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## 1. General Description

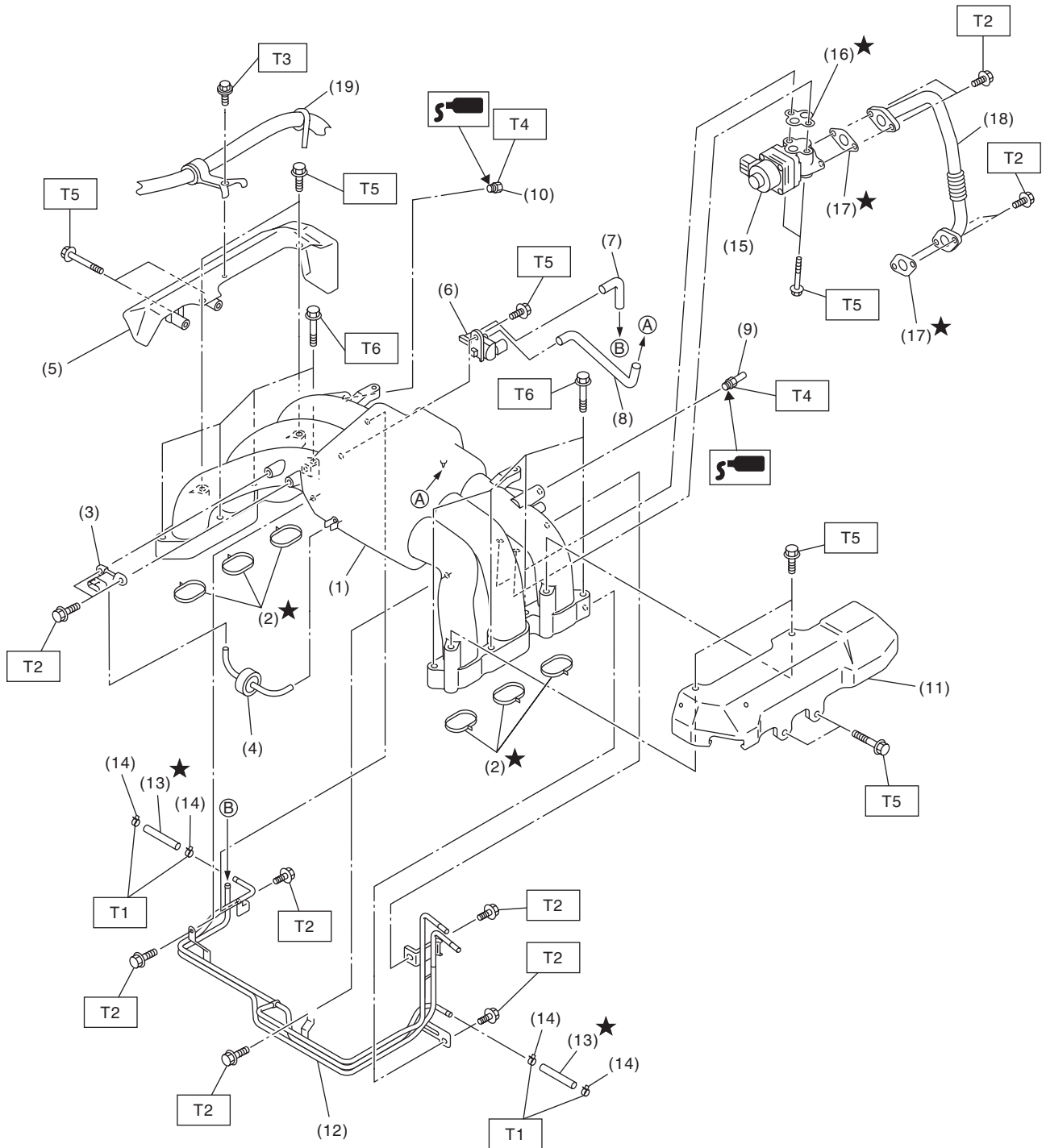
### A: SPECIFICATION

Fuel tank	Capacity	64 $\ell$ (16.9 US gal, 14.1 Imp gal)
	Location	Rear floor under
Fuel pump	Type	Impeller
	Shutoff discharge pressure	550 — 850 kPa (5.61 — 8.67 kg/cm <sup>2</sup> , 79.8 — 123.3 psi)
	Discharge rate	155 $\ell$ (41 US gal, 34.1 Imp gal)/h or more [12 V at 300 kPa (3.06 kg/cm <sup>2</sup> , 43.5 psi)]
Fuel filter		In-tank type



### B: COMPONENT

#### 1. INTAKE MANIFOLD



FU-05647

## General Description

### FUEL INJECTION (FUEL SYSTEMS)

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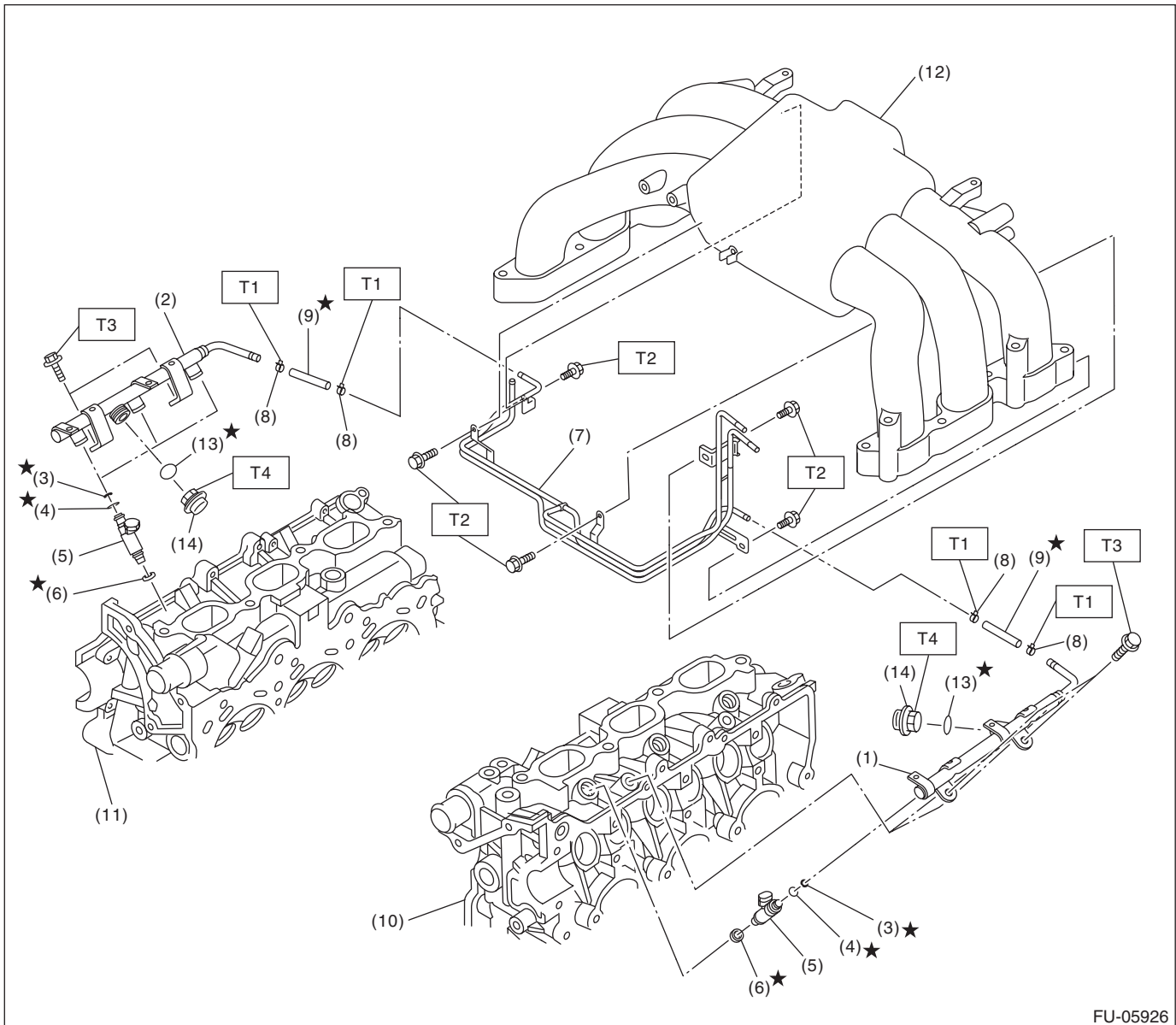
- |                                       |                             |
|---------------------------------------|-----------------------------|
| (1) Intake manifold                   | (11) Fuel pipe protector LH |
| (2) O-ring                            | (12) Fuel pipe ASSY         |
| (3) Manifold absolute pressure sensor | (13) Fuel hose              |
| (4) Filter                            | (14) Clamp                  |
| (5) Fuel pipe protector RH            | (15) EGR valve              |
| (6) Purge control solenoid valve      | (16) Gasket                 |
| (7) Hose                              | (17) Gasket                 |
| (8) Hose                              | (18) EGR pipe               |
| (9) Nipple                            | (19) Feed hose              |
| (10) Plug                             |                             |

---

**Tightening torque:N·m (kgf-m, ft-lb)****T1: 1.25 (0.1, 0.9)****T2: 6.4 (0.7, 4.7)****T3: 13 (1.3, 9.6)****T4: 17 (1.7, 12.5)****T5: 19 (1.9, 14.0)****T6: 25 (2.5, 18.4)**

---

### 2. FUEL INJECTOR



FU-05926

- |                           |                       |
|---------------------------|-----------------------|
| (1) Fuel injector pipe LH | (8) Clamp             |
| (2) Fuel injector pipe RH | (9) Fuel hose         |
| (3) O-ring                | (10) Cylinder head LH |
| (4) Injection rubber      | (11) Cylinder head RH |
| (5) Fuel injector         | (12) Intake manifold  |
| (6) Seal ring             | (13) Gasket           |
| (7) Fuel pipe ASSY        | (14) Pulsation damper |

**Tightening torque: N·m (kgf-m, ft-lb)**

**T1: 1.25 (0.1, 0.9)**

**T2: 6.4 (0.7, 4.7)**

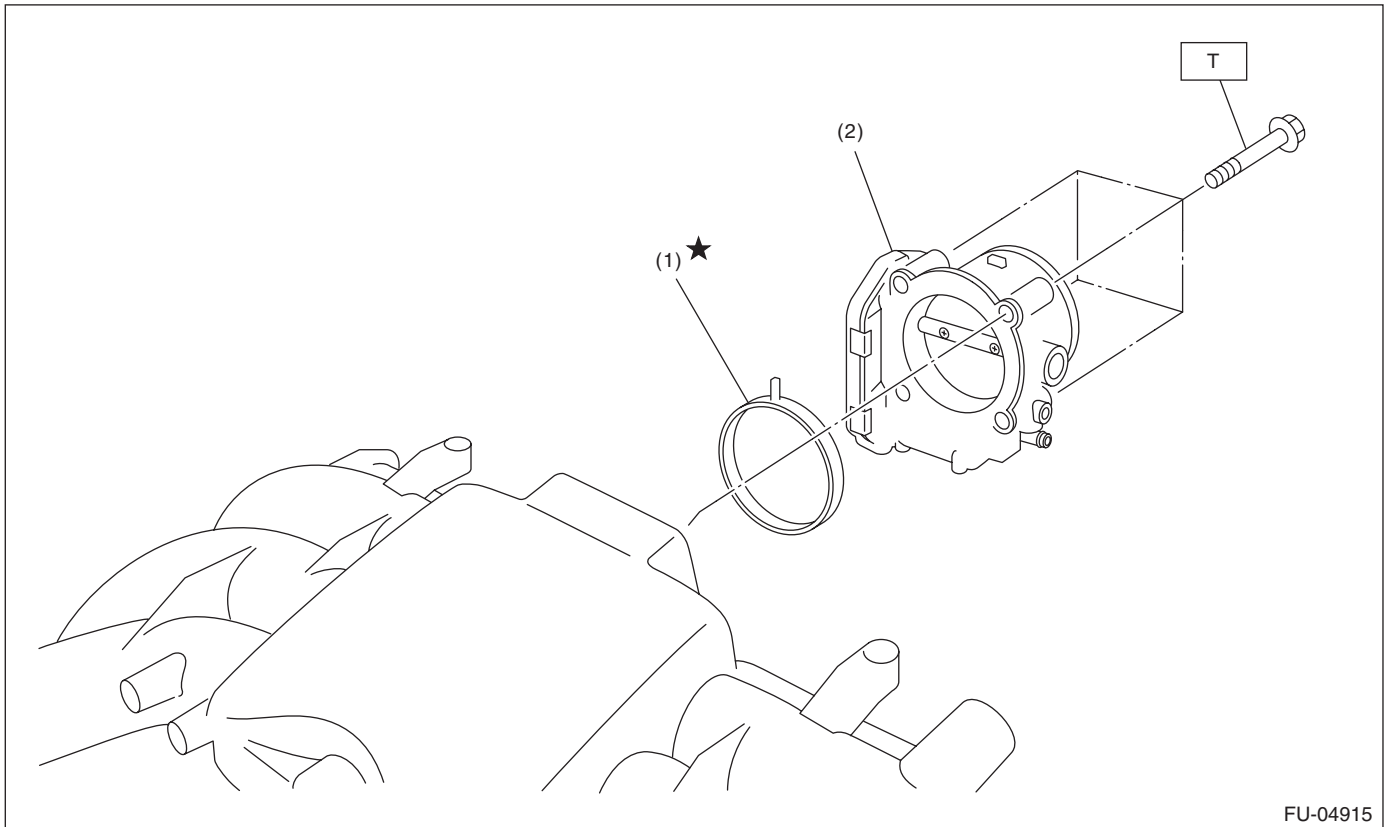
**T3: 19 (1.9, 14.0)**

**T4: 21.6 (2.2, 15.9)**

# General Description

FUEL INJECTION (FUEL SYSTEMS)

## 3. AIR INTAKE SYSTEM



FU-04915

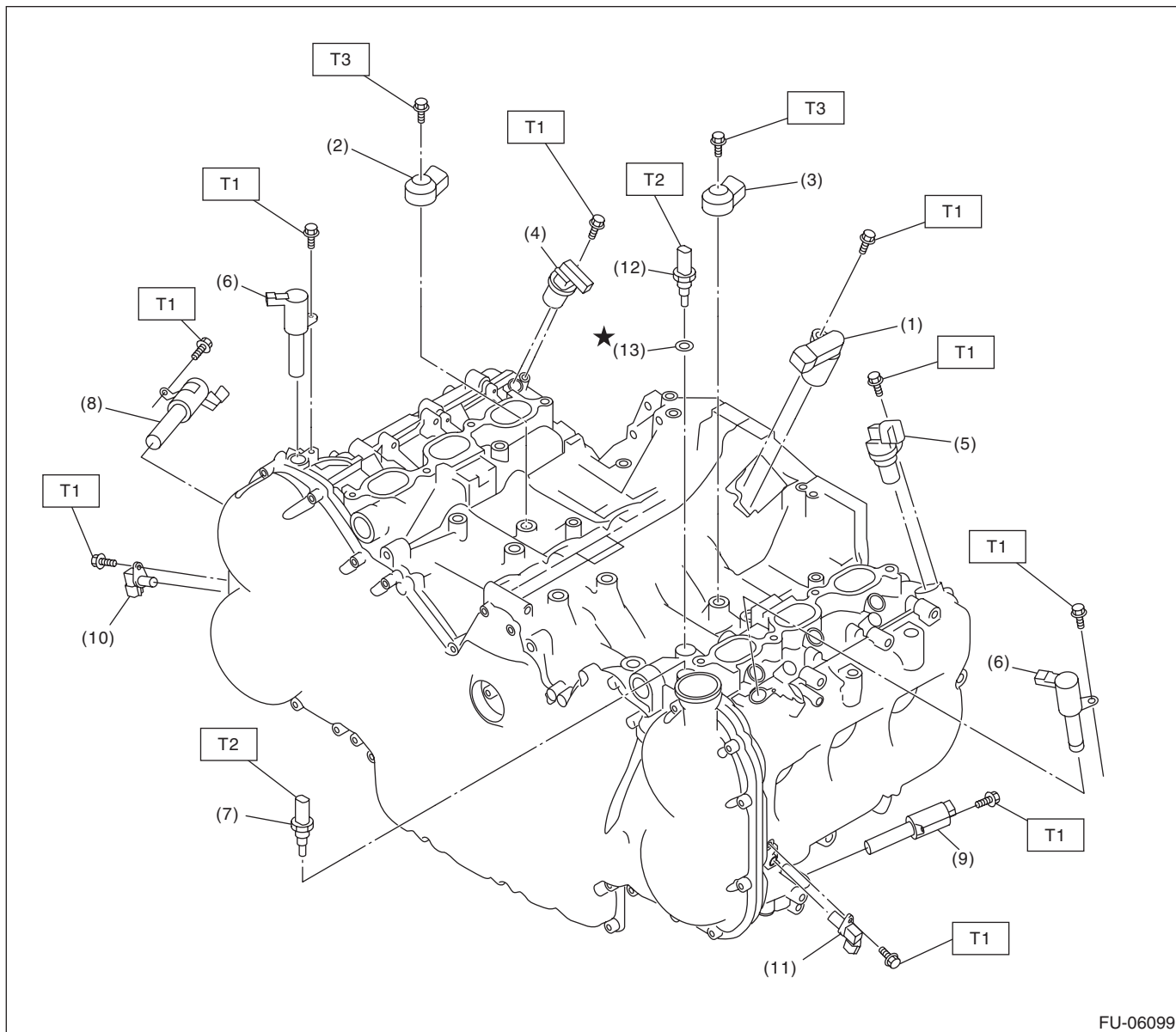
- (1) O-ring
- (2) Throttle body

**Tightening torque: N·m (kgf·m, ft·lb)**

**T: 8 (0.8, 5.9)**

# General Description

## 4. SENSOR



FU-06099

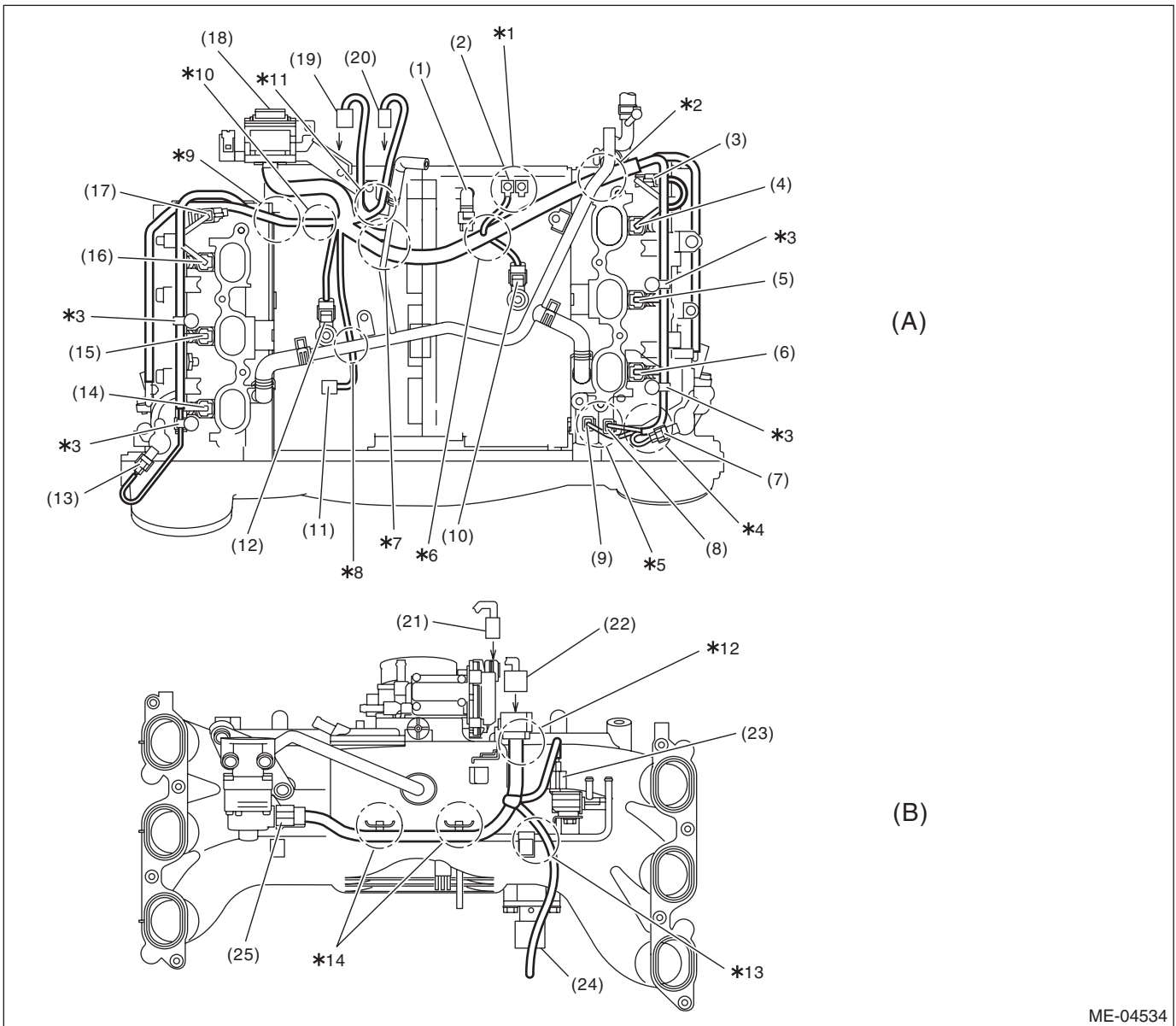
- |  |  |  |
|--|--|--|
| (1) Crankshaft position sensor             | (7) Oil temperature sensor                     | (13) Gasket                                  |
| (2) Knock sensor RH                        | (8) Exhaust oil flow control solenoid valve RH |  |
| (3) Knock sensor LH                        | (9) Exhaust oil flow control solenoid valve LH | <b>Tightening torque: N·m (kgf·m, ft·lb)</b> |
| (4) Intake camshaft position sensor RH     | (10) Exhaust camshaft position sensor RH       | <b>T1: 6.4 (0.7, 4.7)</b>                    |
| (5) Intake camshaft position sensor LH     | (11) Exhaust camshaft position sensor LH       | <b>T2: 22 (2.2, 16.2)</b>                    |
| (6) Intake oil flow control solenoid valve | (12) Engine coolant temperature sensor         | <b>T3: 25 (2.5, 18.4)</b>                    |

# General Description

## FUEL INJECTION (FUEL SYSTEMS)

### 5. ENGINE HARNESS

Engine harness assembly diagram 1



ME-04534

# General Description

## FUEL INJECTION (FUEL SYSTEMS)

(A) Cylinder block upper face	(B) Intake manifold back surface		
(1) Crankshaft position sensor connector	(10) Knock sensor LH connector	(19) Upper/lower connection connector (To intake manifold)	
(2) Engine ground	(11) Power steering switch connector	(20) Electronic throttle control connector (To intake manifold)	
(3) Intake camshaft position sensor LH connector	(12) Knock sensor RH connector	(21) Electronic throttle control connector (From upper part of the cylinder block)	
(4) #6 injector connector	(13) Intake oil flow control solenoid valve RH connector	(22) Upper/lower connection connector (From upper part of the cylinder block)	
(5) #4 injector connector	(14) #1 injector connector	(23) Purge control solenoid valve connector	
(6) #2 injector connector	(15) #3 injector connector	(24) Manifold absolute pressure sensor connector	
(7) Intake oil flow control solenoid valve LH connector	(16) #5 injector connector	(25) EGR valve connector	
(8) Oil temperature sensor connector	(17) Intake camshaft position sensor RH connector		
(9) Engine coolant temperature sensor connector	(18) Engine harness docking connector		

\*1: Install so that engine ground terminals face the rear side of vehicle.

\*2: Route under the heater pipe.

\*3: Attach the engine harness fixing clip to the fuel pipe stay.

\*4: Route from the cutout portion on the fuel pipe protector LH.

\*5: Be careful not to mix up the connectors of oil temperature sensor and engine coolant temperature sensor.

\*6: Route between crankshaft position sensor and knock sensor LH.

\*7: Route under the heater pipe.

\*8: Route under the heater pipe.

\*9: Route under the fuel pipe.

\*10: Attach the engine harness fixing clip to the fixing boss on the cylinder block.

\*11: Route over the heater pipe stay.

\*12: Securely install the engine harness fixing stay.

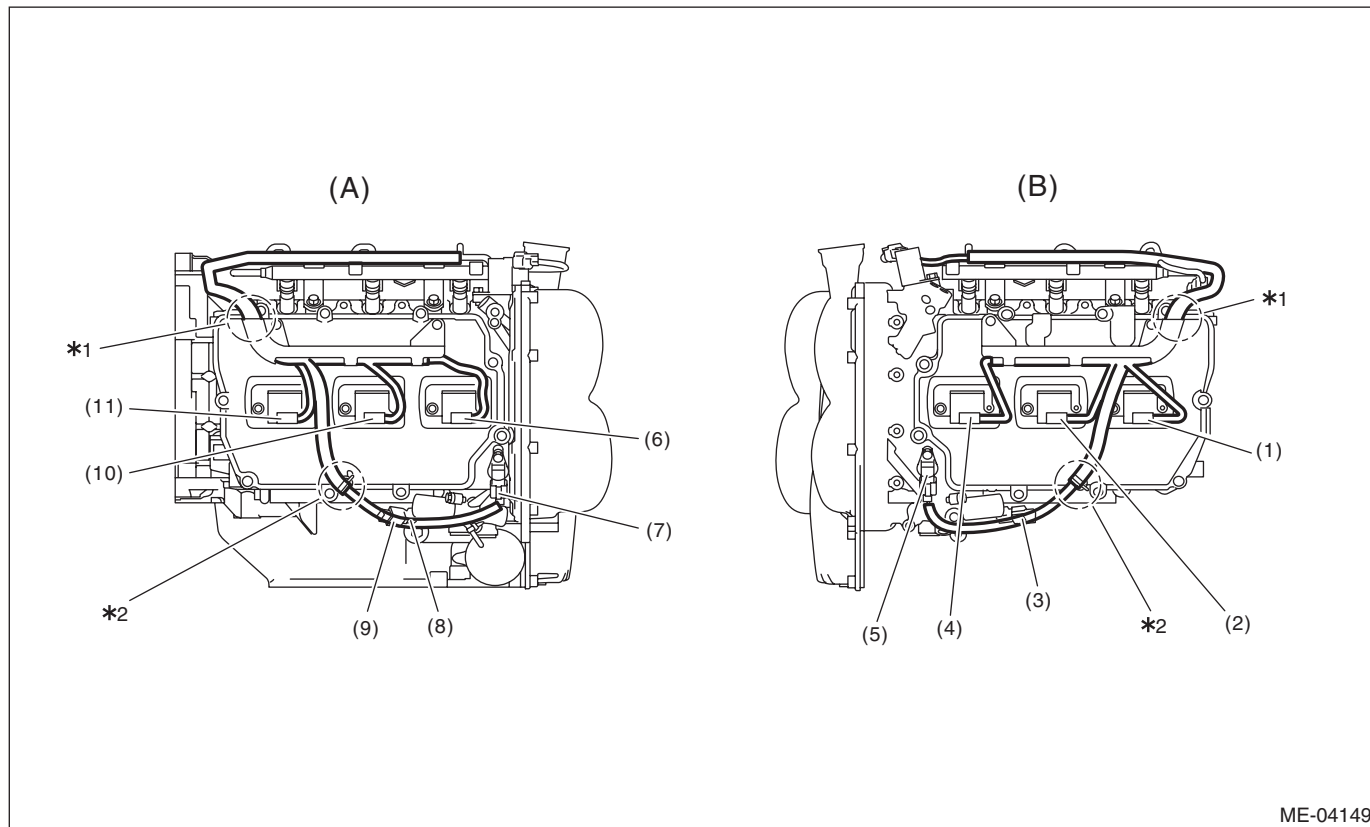
\*13: Route outside the fuel pipe.

\*14: Attach the engine harness fixing clip to the fixing stay on the intake manifold.

# General Description

## FUEL INJECTION (FUEL SYSTEMS)

### Engine harness assembly diagram 2



(A) Right side of the engine

(B) Left side of the engine

(1) #6 ignition coil connector

(5) Exhaust camshaft position sensor  
LH connector

(9) Exhaust oil flow control valve sole-  
noid RH connector

(2) #4 ignition coil connector

(6) #1 injector connector

(10) #3 ignition coil connector

(3) Exhaust oil flow control valve sole-  
noid LH connector

(7) Exhaust camshaft position sensor  
RH connector

(11) #5 ignition coil connector

(4) #2 ignition coil connector

(8) Oil pressure switch connector

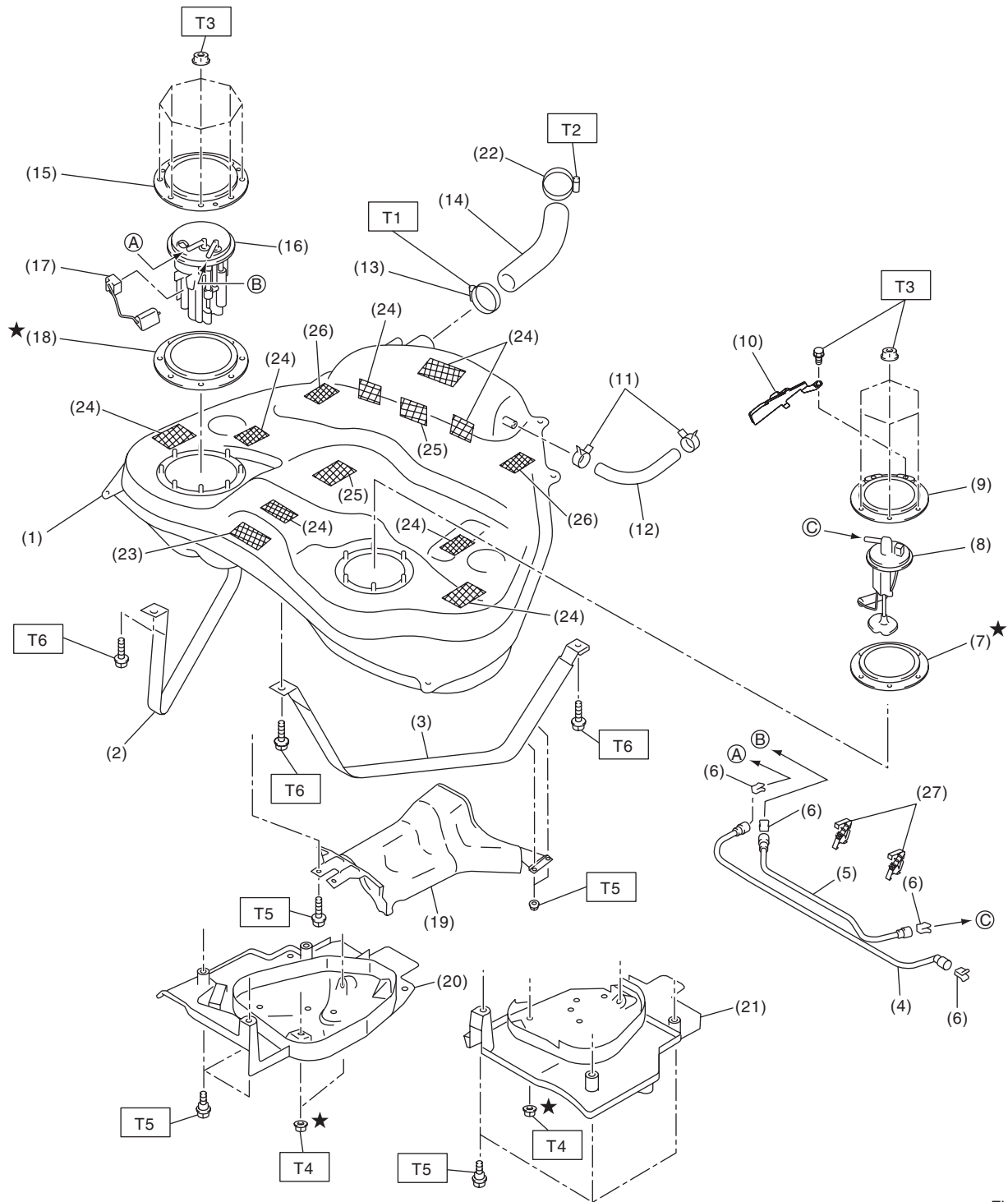
\*1: Align the engine harness stay end with the end of engine harness identification tape.

\*2: Attach the engine harness fixing clip to the fixing boss on the rocker cover.



# General Description

## 6. FUEL TANK



FU-06832

# General Description

## FUEL INJECTION (FUEL SYSTEMS)

---

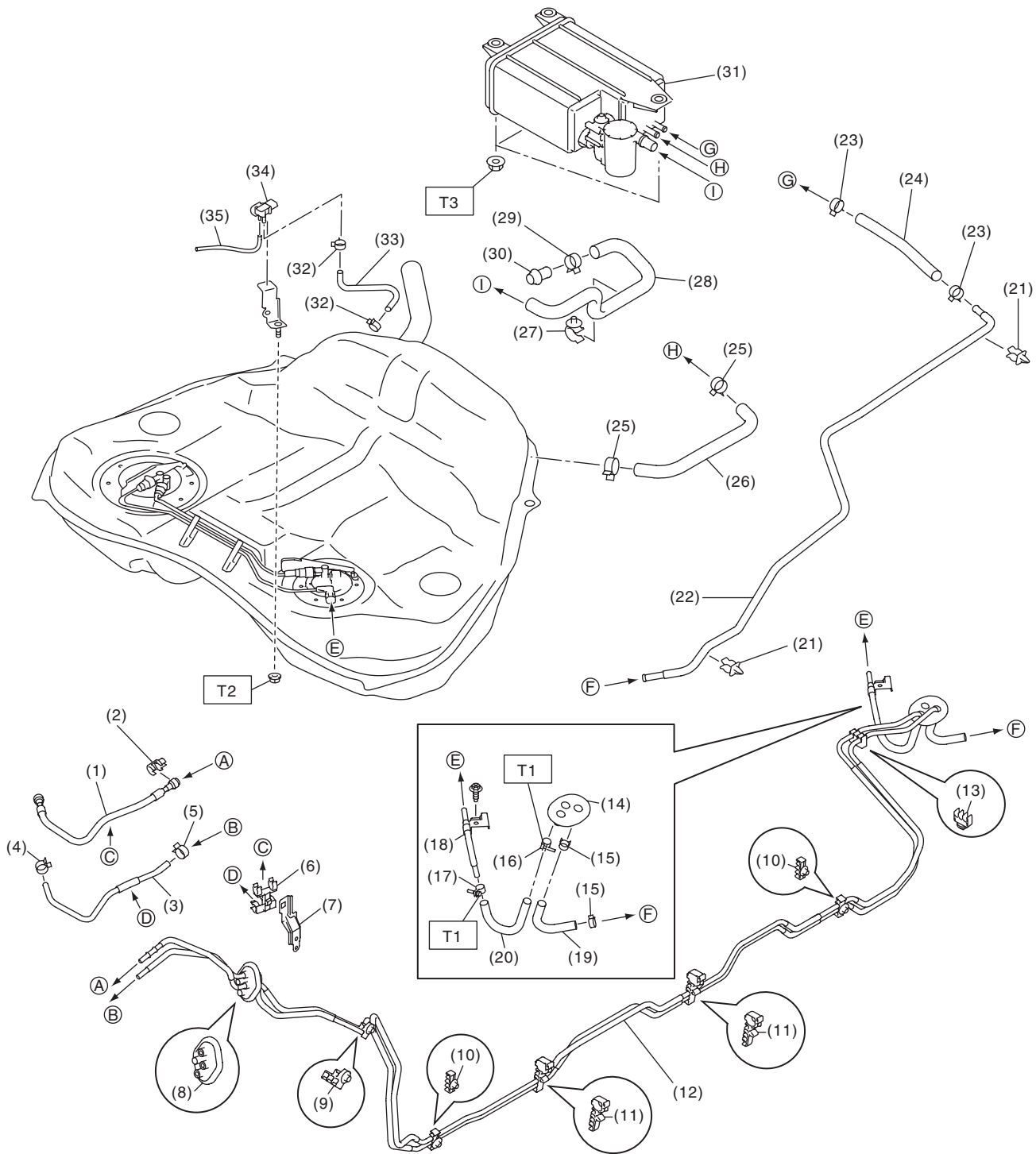
(1) Fuel tank	(13) Clamp	(25) Cushion
(2) Fuel tank band RH	(14) Fuel filler hose	(26) Cushion
(3) Fuel tank band LH	(15) Fuel pump upper plate	(27) Fuel tube clamp
(4) Fuel delivery tube	(16) Fuel pump ASSY	
(5) Fuel sub delivery tube	(17) Fuel level sensor	
(6) Retainer	(18) Fuel level sensor gasket	
(7) Fuel sub level sensor gasket	(19) Heat shield cover	
(8) Fuel sub level sensor	(20) Fuel tank protector RH	
(9) Fuel sub level sensor upper plate	(21) Fuel tank protector LH	
(10) Fuel sub level sensor protector	(22) Clamp	
(11) Clip	(23) Cushion	
(12) Air vent hose	(24) Cushion	

---

**Tightening torque:N·m (kgf-m, ft-lb)****T1: 2 (0.2, 1.5)****T2: 2.5 (0.3, 1.8)****T3: 4.4 (0.4, 3.2)****T4: 9 (0.9, 6.6)****T5: 18 (1.8, 13.3)****T6: 33 (3.4, 24.3)**

---

### 7. FUEL LINE



FU-06691

# General Description

## FUEL INJECTION (FUEL SYSTEMS)

---

- |                          |                           |                                |
|--------------------------|---------------------------|--------------------------------|
| (1) Fuel delivery hose A | (15) Clip                 | (29) Clip                      |
| (2) Connect check cover  | (16) Clamp                | (30) Drain connector           |
| (3) Evaporation hose A   | (17) Clamp                | (31) Canister                  |
| (4) Clip                 | (18) Fuel delivery pipe   | (32) Clip                      |
| (5) Clip                 | (19) Evaporation hose B   | (33) Pressure hose             |
| (6) Hose clamp           | (20) Fuel delivery hose B | (34) Fuel tank pressure sensor |
| (7) Clamp bracket        | (21) Clamp                | (35) Vacuum hose               |
| (8) Grommet              | (22) Purge pipe           |                                |
| (9) Clamp                | (23) Clip                 |                                |
| (10) Clamp               | (24) Purge hose           |                                |
| (11) Clamp               | (25) Clip                 |                                |
| (12) Fuel pipe ASSY      | (26) Air vent hose        |                                |
| (13) Clamp               | (27) Clip                 |                                |
| (14) Grommet             | (28) Drain hose           |                                |

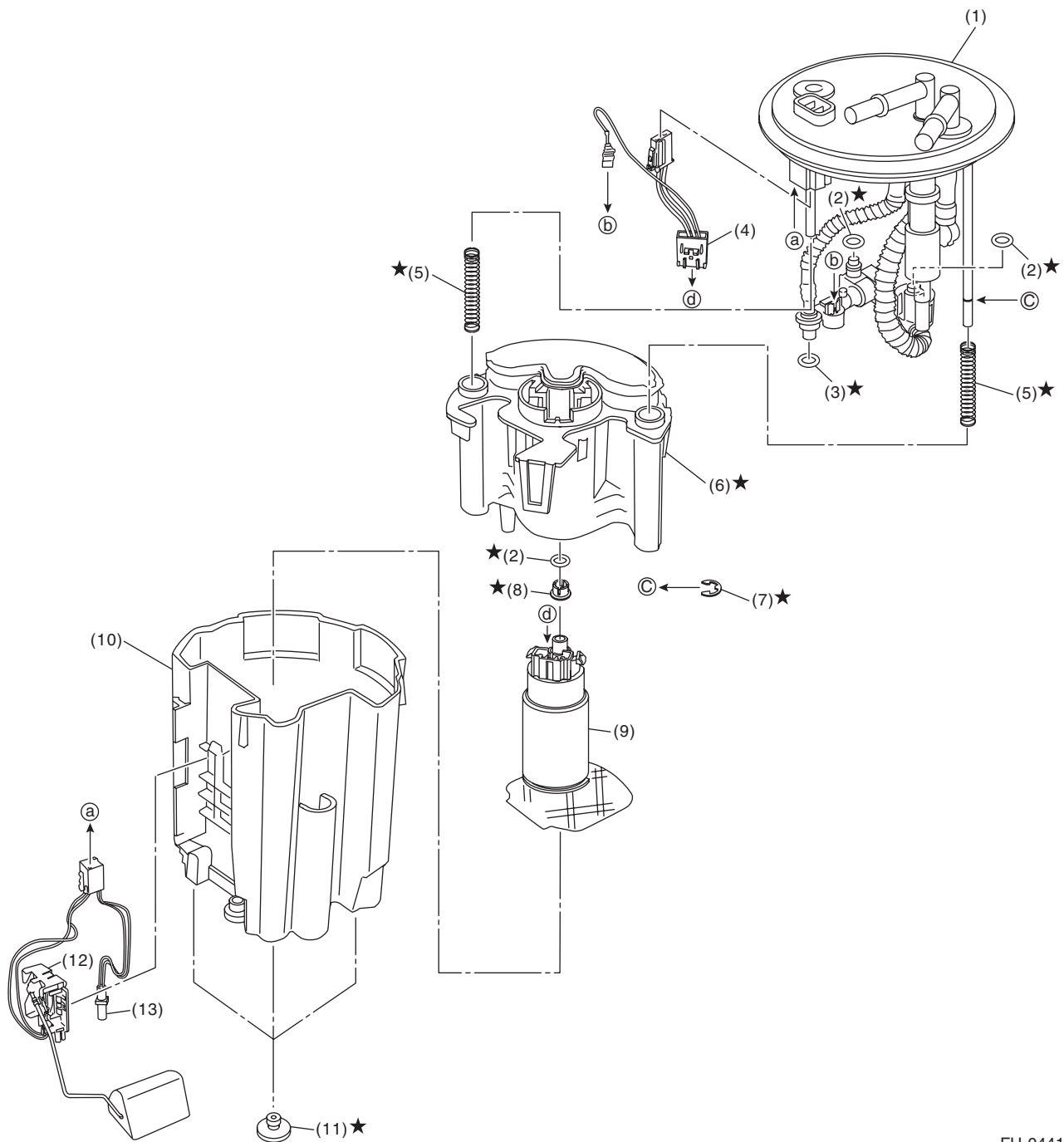
---

**Tightening torque:N·m (kgf-m, ft-lb)****T1: 1.25 (0.1, 0.9)****T2: 7.35 (0.7, 5.4)****T3: 8 (0.8, 5.9)**

---

# General Description

## 8. FUEL PUMP



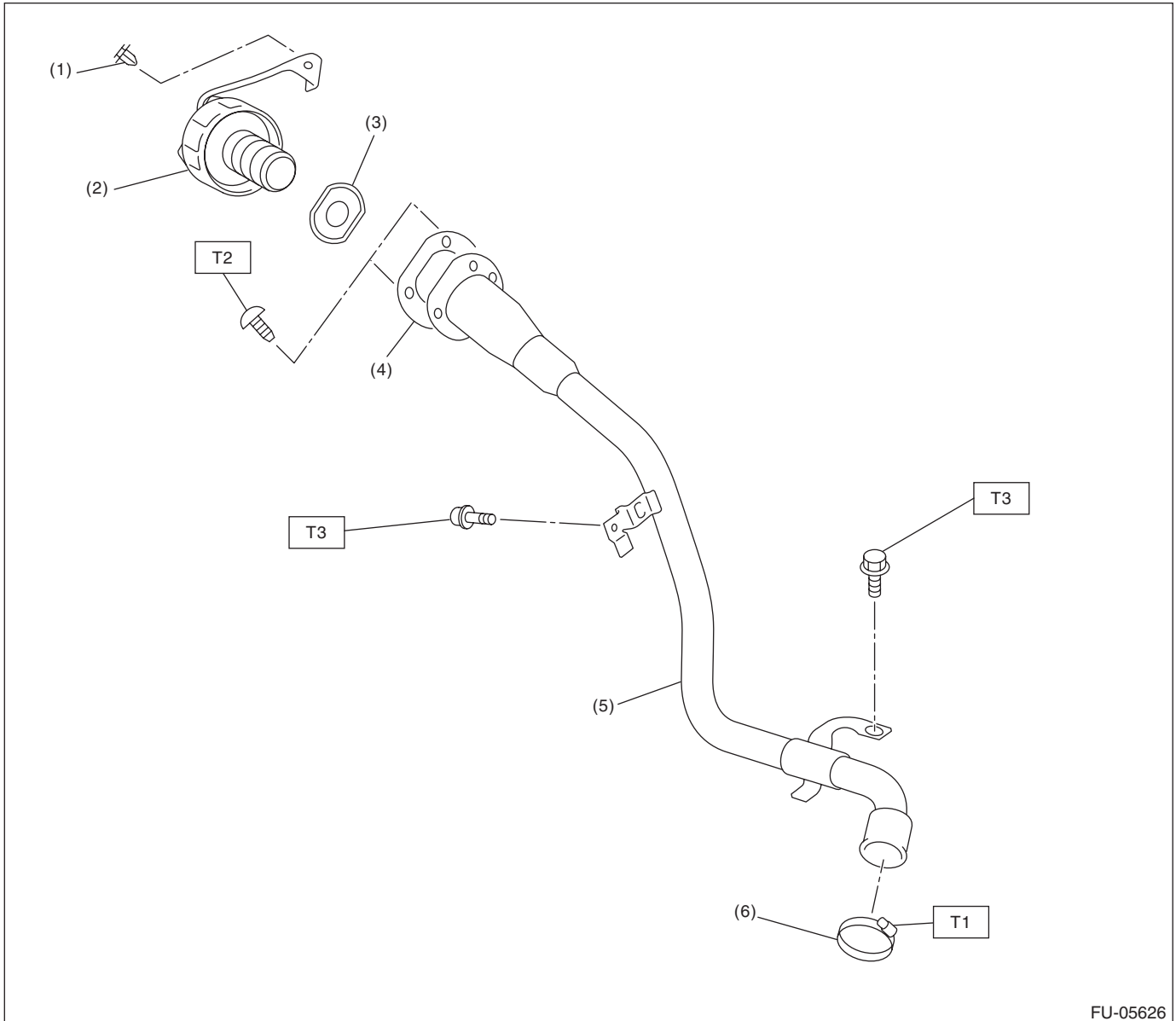
FU-04413

- |                           |                 |                              |
|---------------------------|-----------------|------------------------------|
| (1) Sub tank bracket ASSY | (6) Fuel filter | (11) Cushion                 |
| (2) O-ring                | (7) Clip        | (12) Fuel level sensor       |
| (3) O-ring                | (8) Spacer      | (13) Fuel temperature sensor |
| (4) Fuel pump harness     | (9) Pump ASSY   |                              |
| (5) Spring                | (10) Sub tank   |                              |

# General Description

## FUEL INJECTION (FUEL SYSTEMS)

### 9. FUEL FILLER PIPE



FU-05626

- |                     |                      |
|---------------------|----------------------|
| (1) Clip            | (5) Fuel filler pipe |
| (2) Fuel filler cap | (6) Clamp            |
| (3) Ring            |                      |
| (4) Gasket          |                      |

**Tightening torque: N·m (kgf·m, ft·lb)**

**T1: 2.5 (0.3, 1.8)**

**T2: 4.5 (0.5, 3.3)**

**T3: 7.8 (0.8, 5.5)**

### **C: CAUTION**

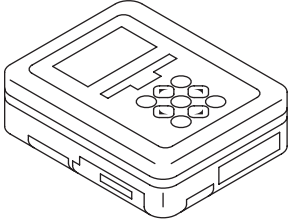
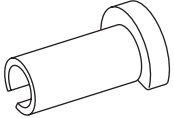
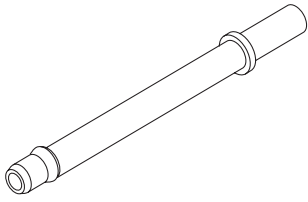
- Wear appropriate work clothing, including a cap, protective goggles and protective shoes when performing any work.
- Remove contamination including dirt and corrosion before removal, installation or disassembly.
- Keep the disassembled parts in order and protect them from dust and dirt.
- Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
- Vehicle components are extremely hot after driving. Be wary of receiving burns from heated parts.
- Be sure to tighten fasteners including bolts and nuts to the specified torque.
- Place shop jacks or rigid racks at the specified points.
- Before disconnecting connectors of sensors or units, be sure to disconnect the ground cable from the battery.
- Place “NO OPEN FLAMES” signs near the working area.
- Prepare a container and cloth to prevent scattering of fuels when performing work where fuels can be spilled. If the fuel spills, wipe it off immediately to prevent from penetrating into floor or flowing out for environmental protection.
- Follow all government and local regulations concerning disposal of refuse when disposing fuel.

# General Description

FUEL INJECTION (FUEL SYSTEMS)

## D: PREPARATION TOOL

### 1. SPECIAL TOOL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p style="text-align: center;">ST1B022XU0</p>	1B022XU0	SUBARU SELECT MONITOR III KIT	Used for draining fuel and each inspection.
 <p style="text-align: center;">ST42099AE000</p>	42099AE000	QUICK CONNECTOR RELEASE	Used for removing the quick connector.
 <p style="text-align: center;">ST18471AA000</p>	18471AA000	FUEL PIPE ADAPTER	Used for draining fuel.

### 2. GENERAL TOOL

TOOL NAME	REMARKS
Circuit tester	Used for measuring resistance and voltage.
Oscilloscope	Used for inspecting the waveform of each sensor.

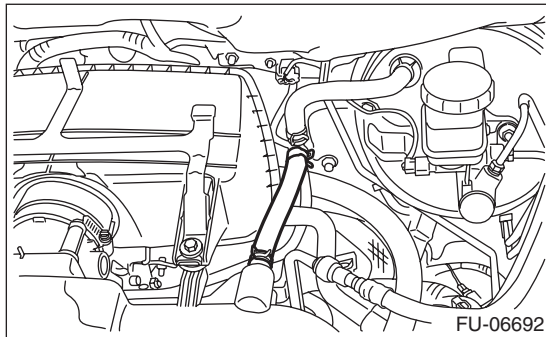


# Throttle Body

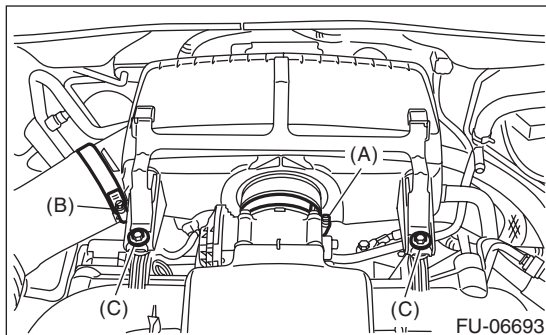
## 2. Throttle Body

### A: REMOVAL

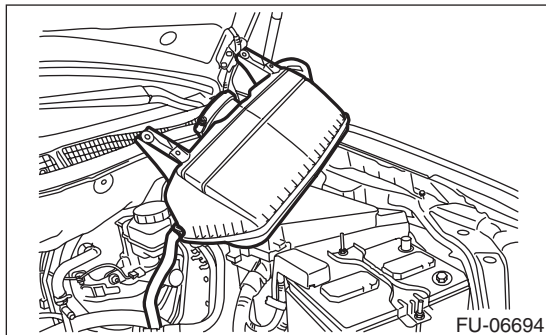
- 1) Remove the collector cover.
- 2) Disconnect the ground cable from battery.
- 3) Disconnect the brake booster vacuum hose from the intake manifold.



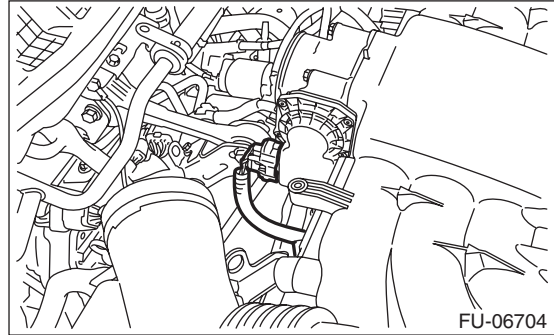
- 4) Loosen the clamp (A) which connects air intake chamber to throttle body.
- 5) Loosen the clamp (B) which connects intake boot to air intake chamber.
- 6) Loosen the bolt (C) which secures air intake chamber and collector cover bracket to the stay.



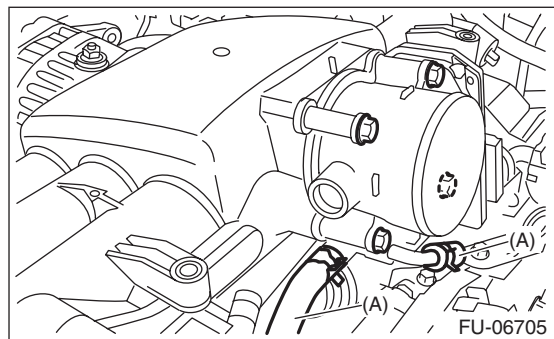
- 7) Remove the air intake chamber, and move it to the left side wheel apron.



- 8) Disconnect the connector from the throttle body.



- 9) Disconnect the engine coolant hoses (A) from throttle body.
- 10) Remove the bolts which secure the throttle body to the intake manifold.



# Throttle Body

## FUEL INJECTION (FUEL SYSTEMS)

### B: INSTALLATION

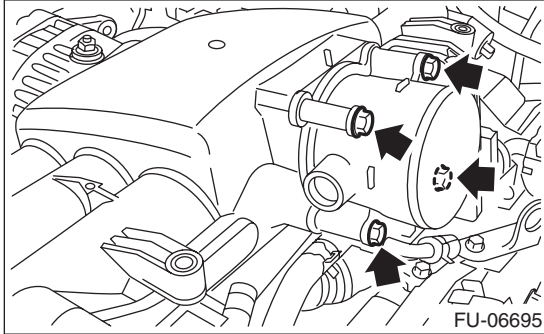
Install in the reverse order of removal.

#### NOTE:

Use new O-rings.

#### Tightening torque:

**8 N·m (0.8 kgf-m, 5.9 ft-lb)**



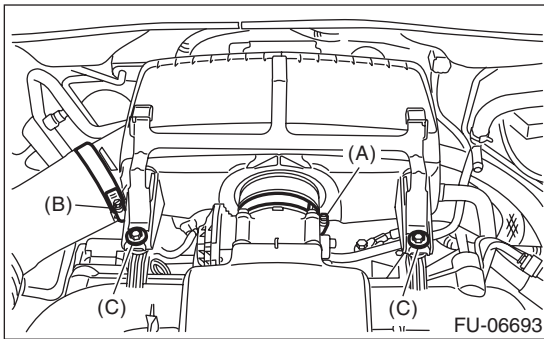
#### Tightening torque:

##### Clamp (A), (B)

**3 N·m (0.3 kgf-m, 2.2 ft-lb)**

##### Bolt (C)

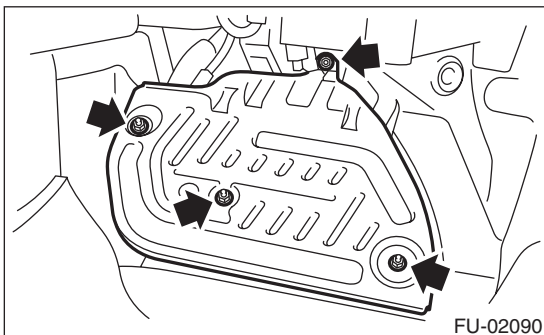
**6.5 N·m (0.7 kgf-m, 4.8 ft-lb)**



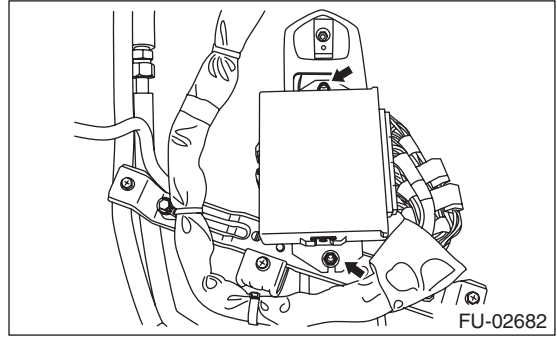
### C: INSPECTION

#### 1. THROTTLE SENSOR (METHOD WITH CIRCUIT TESTER)

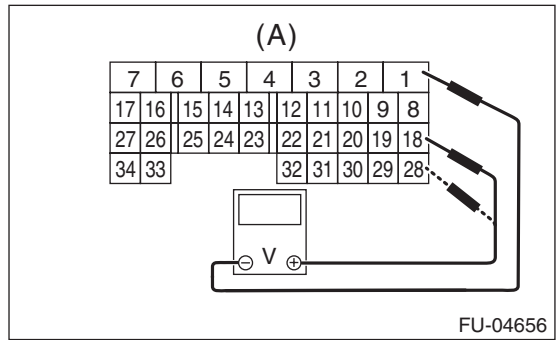
- 1) Disconnect the ground cable from battery.
- 2) Remove the front pillar lower trim and console side panel lower RH of passenger's side.
- 3) Detach the floor mat of passenger's seat.
- 4) Remove the protect cover.



- 5) Remove the ECM from vehicle.



- 6) Turn the ignition switch to ON. (engine OFF)
- 7) Measure the voltage between ECM connector terminals.



(A) To ECM connector

Throttle sensor	Accelerator pedal	Terminal No.	Standard
Main	Not depressed (Full closed)	18 (+) and 1 (-)	Approx. 0.6 V
	Depressed (Full opened)		Approx. 4.04 V
Sub	Not depressed (Full closed)	28 (+) and 1 (-)	Approx. 1.48 V
	Depressed (Full opened)		Approx. 4.23 V

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

#### Tightening torque:

**7.5 N·m (0.8 kgf-m, 5.5 ft-lb)**

## 2. THROTTLE SENSOR (METHOD WITH SUBARU SELECT MONITOR)

- 1) Turn the ignition switch to ON. (engine OFF)
- 2) Read the throttle opening angle signal and voltage of throttle sensor using Subaru Select Monitor.  
<Ref. to EN(H6DO)(diag)-37, READ CURRENT DATA FOR ENGINE (NORMAL MODE), OPERATION, Subaru Select Monitor.>

Throttle sensor	Throttle opening angle signal	Standard
Main	0.0%	Approx. 0.6 V
	100.0%	Approx. 4.04 V
Sub	0.0%	Approx. 1.48 V
	100.0%	Approx. 4.23 V

## 3. OTHER INSPECTIONS

- 1) Check that the throttle body has no deformation, cracks or other damages.
- 2) Check that the engine coolant hose has no cracks, damage or loose part.

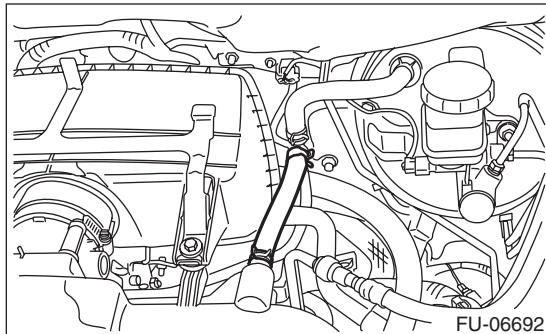
# Intake Manifold

## FUEL INJECTION (FUEL SYSTEMS)

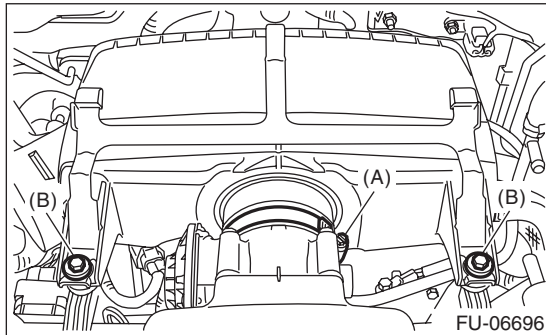
### 3. Intake Manifold

#### A: REMOVAL

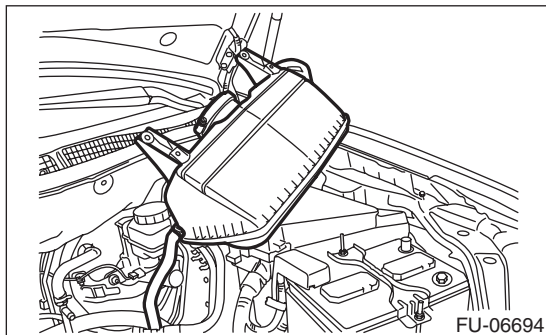
- 1) Remove the collector cover.
- 2) Release the fuel pressure. <Ref. to FU(H6DO)-59, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
- 3) Remove the battery and battery carrier. <Ref. to SC(H6DO)-19, REMOVAL, Battery.>
- 4) Open the fuel filler lid and remove the fuel filler cap.
- 5) Disconnect the brake booster vacuum hose from the intake manifold.



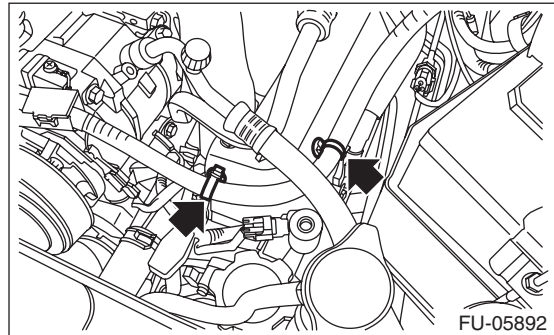
- 6) Remove the air cleaner case and intake boot. <Ref. to IN(H6DO)-6, REMOVAL, Air Cleaner Case.>
- 7) Loosen the clamp (A) which connects air intake chamber to throttle body.
- 8) Loosen the bolt (B) which secures air intake chamber and collector cover bracket to the stay.



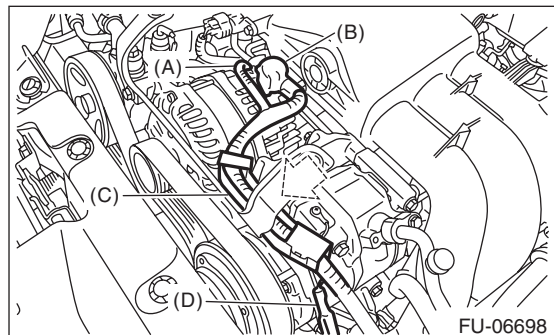
- 9) Remove the air intake chamber, and move it to the left side wheel apron.



- 10) Disconnect the following connector.
  - (1) Remove the securing clips from the two locations on the fuel pipe protector LH.



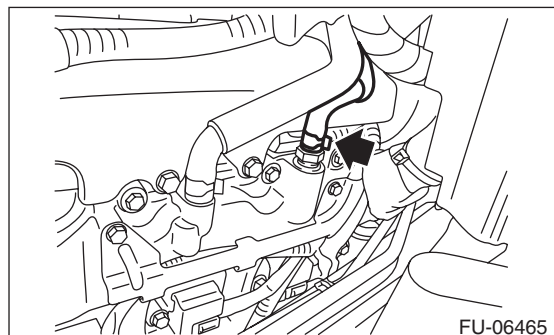
- (2) Generator connector
- (3) Generator terminal B
- (4) Remove the harness cover from collector cover bracket.
- (5) Magnet clutch connector



- (A) Generator connector
- (B) Terminal B
- (C) Remove the harness cover from collector cover bracket.
- (D) Magnet clutch connector

- (6) Slide the harness and connector to the battery side.

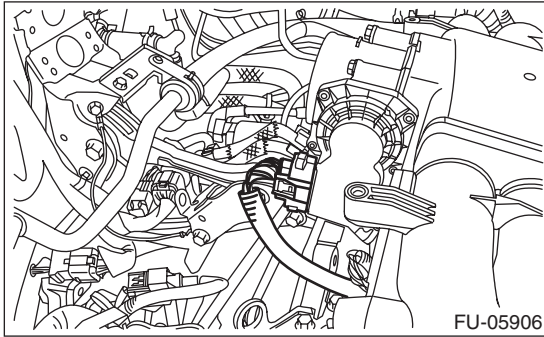
- 11) Disconnect the PCV hose.



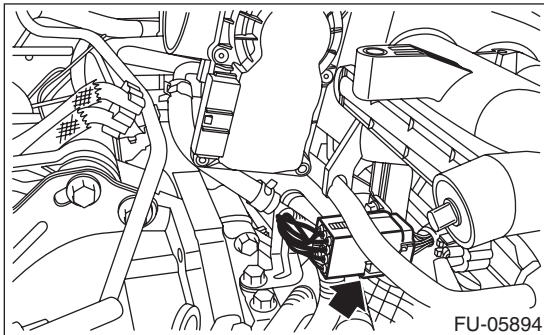
# Intake Manifold

## FUEL INJECTION (FUEL SYSTEMS)

12) Disconnect the connector from the throttle body.



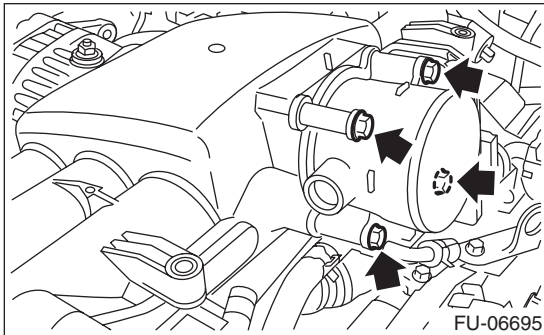
13) Disconnect the engine harness connector.



14) Remove the throttle body from the intake manifold.

**NOTE:**

Do not disconnect the inlet and outlet hoses of engine coolant.



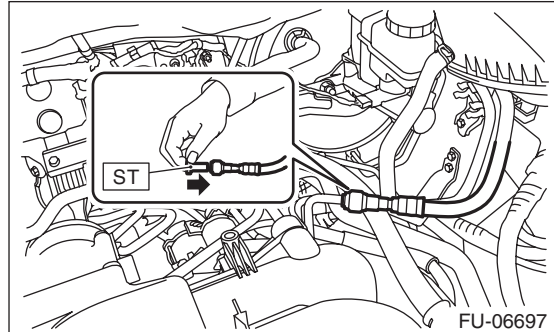
15) Disconnect the fuel delivery hose and evaporation hose.

**CAUTION:**

- Be careful not to spill fuel.
- Catch the fuel from hoses using a container or cloth.

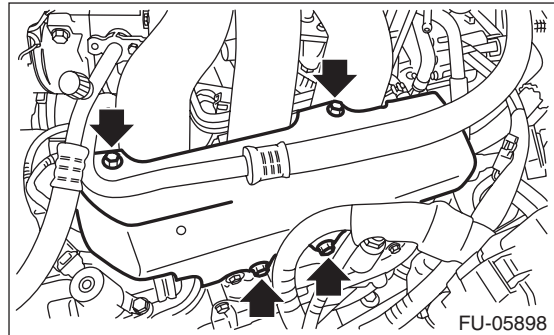
(1) Disconnect the quick connector of the fuel delivery hose by pushing the ST in the direction of the arrow.

ST 42099AE000 QUICK CONNECTOR RELEASE



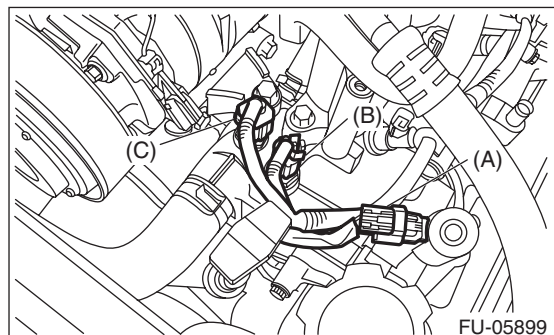
(2) Remove the clip and disconnect the evaporation hose.

16) Remove the fuel pipe protector LH.



17) Disconnect #2, #4, and #6 fuel injector connectors.

18) Disconnect the connectors of the oil temperature sensor, engine coolant temperature sensor and intake oil flow control solenoid valve LH.

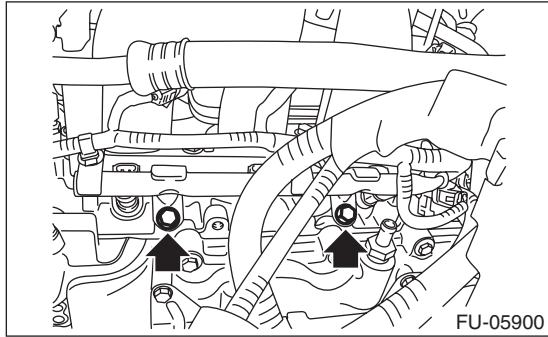


- (A) Intake oil flow control solenoid valve LH
- (B) Oil temperature sensor
- (C) Engine coolant temperature sensor

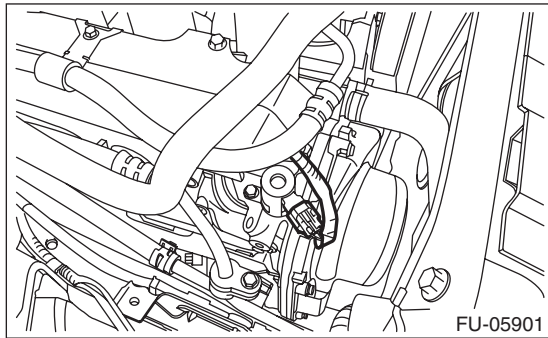
# Intake Manifold

## FUEL INJECTION (FUEL SYSTEMS)

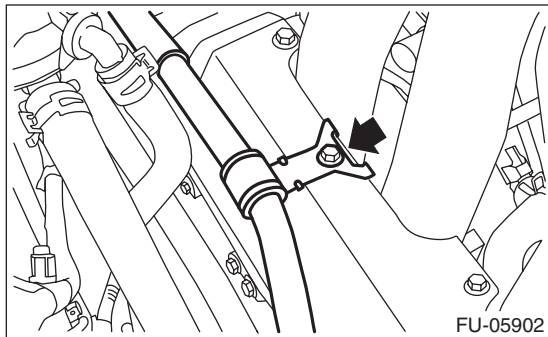
19) Remove the bolts which hold fuel injector pipe LH to cylinder head.



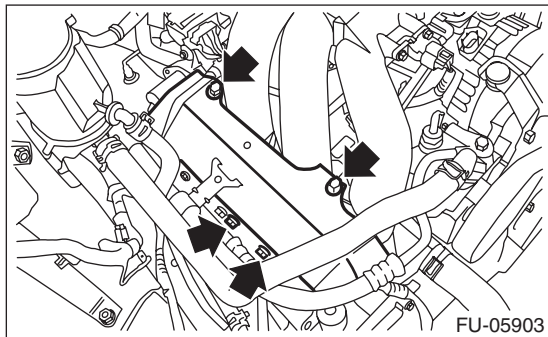
20) Disconnect the connectors of the intake oil flow control solenoid valve RH.



21) Remove the feed hose from the fuel pipe protector RH.

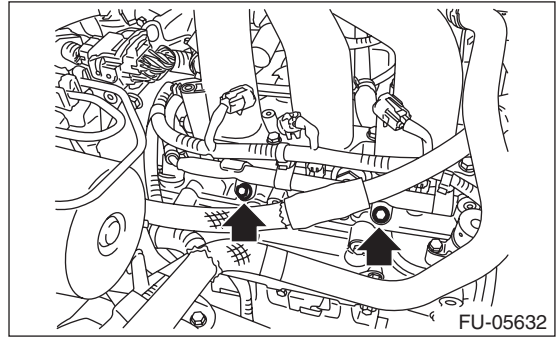


22) Remove the fuel pipe protector RH.



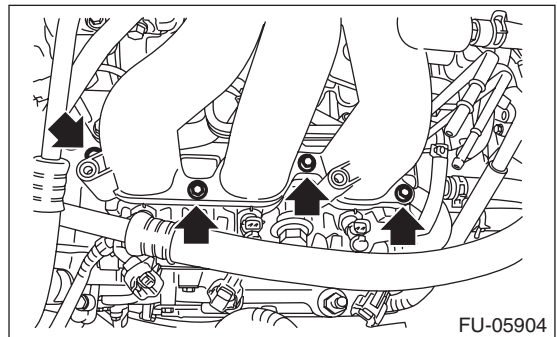
23) Disconnect #1, #3, and #5 fuel injector connectors.

24) Remove the bolts which hold the fuel injector pipe RH to the cylinder head.

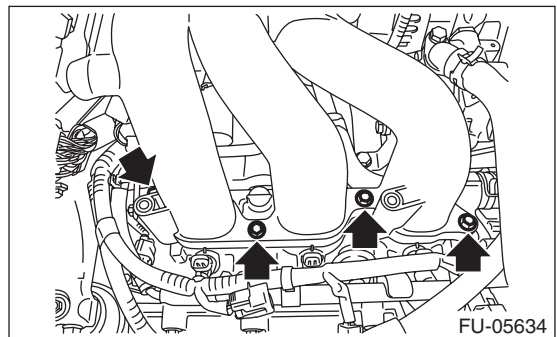


25) Remove the bolts which hold the intake manifold to the cylinder head.

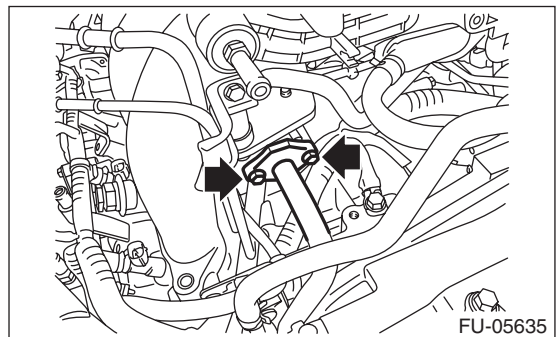
• LH side



• RH side



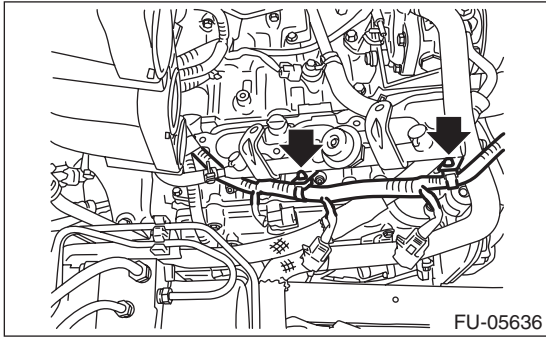
26) Remove the EGR pipe securing bolt.



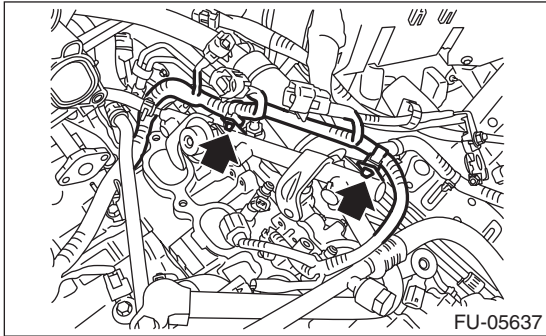
# Intake Manifold

## FUEL INJECTION (FUEL SYSTEMS)

27) Remove the engine harness from the fuel injector pipe RH.



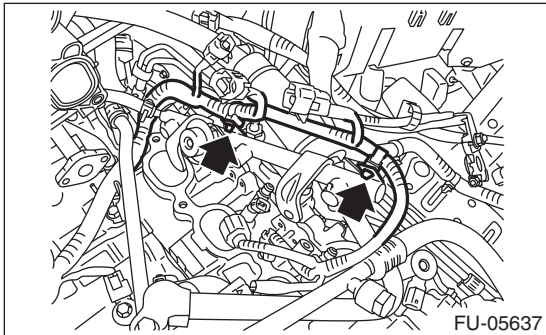
28) Remove the engine harness from the fuel injector pipe LH.



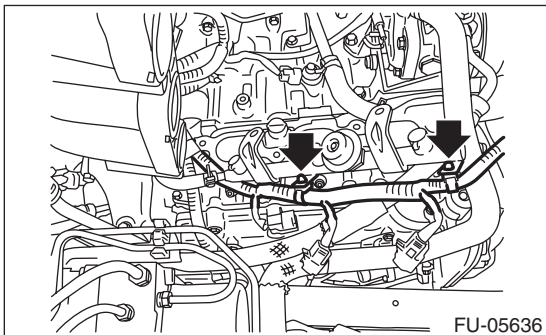
29) Remove the intake manifold.

### B: INSTALLATION

1) Install the engine harness to fuel injector pipe LH.



2) Install the engine harness to fuel injector pipe RH.



3) Install the intake manifold onto cylinder heads.

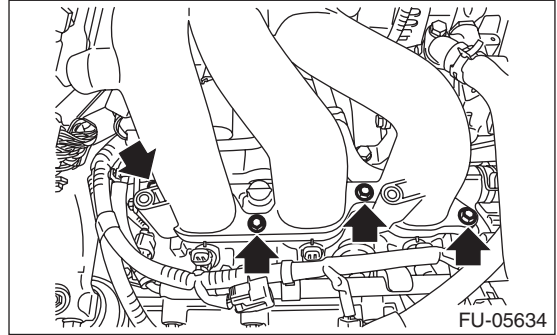
NOTE:

Use new O-rings.

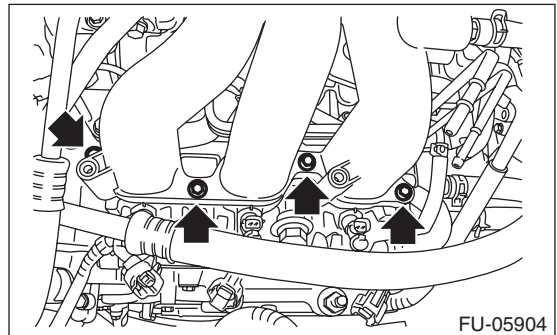
**Tightening torque:**

**25 N·m (2.5 kgf-m, 18.4 ft-lb)**

- RH side



- LH side



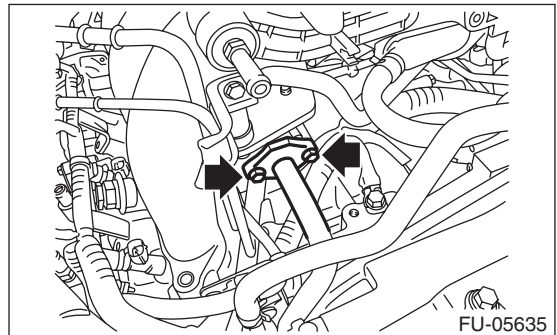
4) Install the EGR pipe securing bolt.

NOTE:

Use a new gasket.

**Tightening torque:**

**6.4 N·m (0.7 kgf-m, 4.7 ft-lb)**



# Intake Manifold

## FUEL INJECTION (FUEL SYSTEMS)

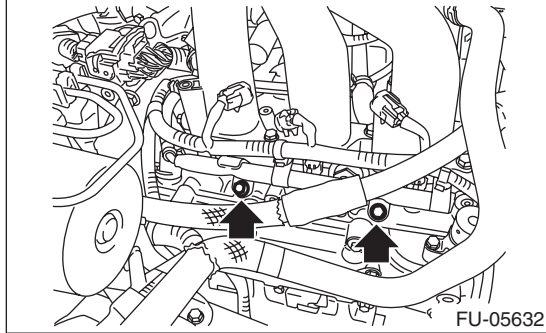
5) Install the bolts which hold fuel injector pipe RH to cylinder head.

**NOTE:**

Use new O-rings, injection rubbers, and seal rings.

**Tightening torque:**

**19 N·m (1.9 kgf·m, 14.0 ft·lb)**

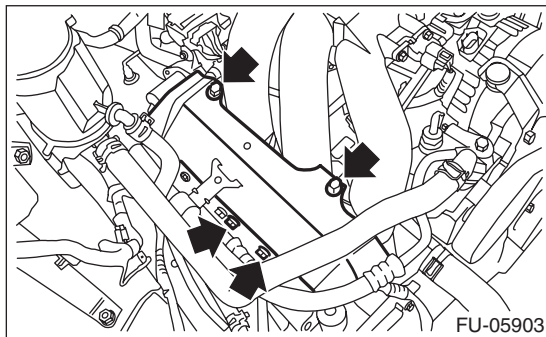


6) Connect #1, #3, and #5 fuel injector connectors.

7) Install the fuel pipe protector RH.

**Tightening torque:**

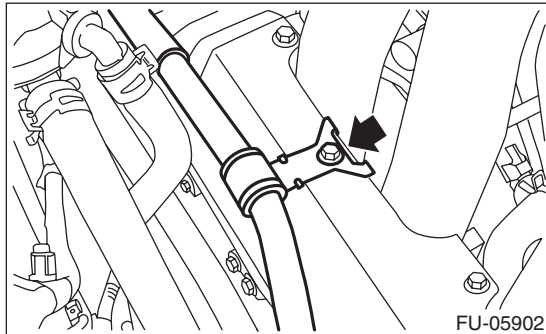
**19 N·m (1.9 kgf·m, 14.0 ft·lb)**



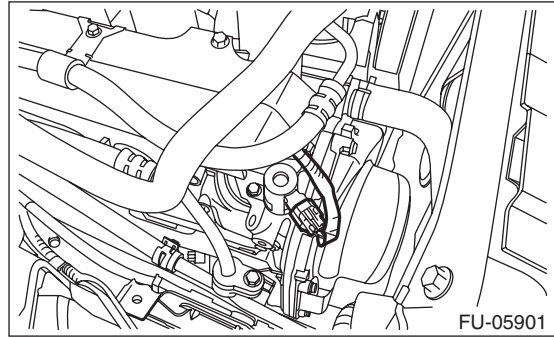
8) Install the feed hose to fuel pipe protector RH.

**Tightening torque:**

**13 N·m (1.3 kgf·m, 9.6 ft·lb)**



9) Connect the connectors of the intake oil flow control solenoid valve RH.



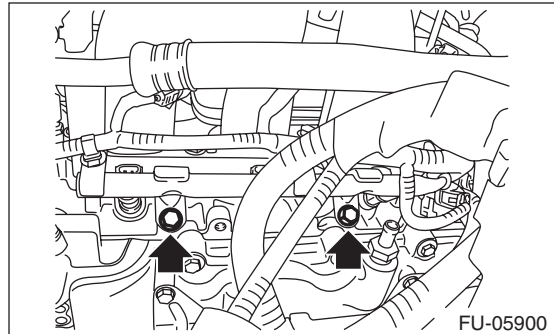
10) Install the bolts which hold fuel injector pipe LH to cylinder head.

**NOTE:**

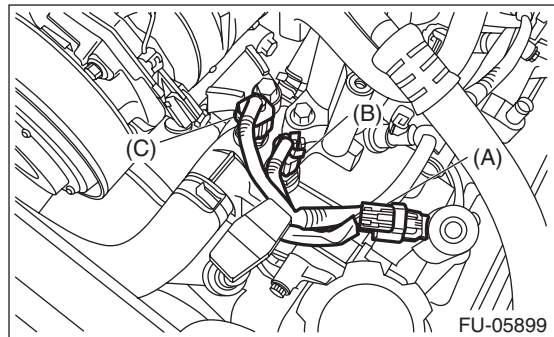
Use new O-rings, injection rubbers, and seal rings.

**Tightening torque:**

**19 N·m (1.9 kgf·m, 14.0 ft·lb)**



11) Connect the connectors of the oil temperature sensor, engine coolant temperature sensor and intake oil flow control solenoid valve LH.



(A) Intake oil flow control solenoid valve LH

(B) Oil temperature sensor

(C) Engine coolant temperature sensor

12) Connect #2, #4, and #6 fuel injector connectors.



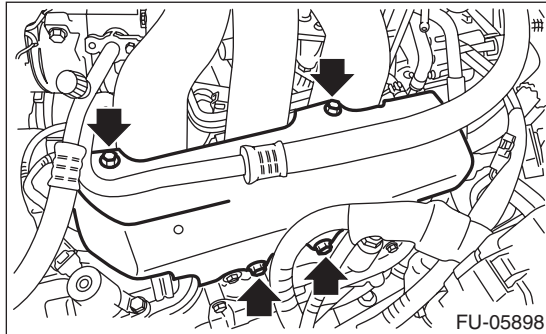
# Intake Manifold

## FUEL INJECTION (FUEL SYSTEMS)

13) Install the fuel pipe protector LH.

**Tightening torque:**

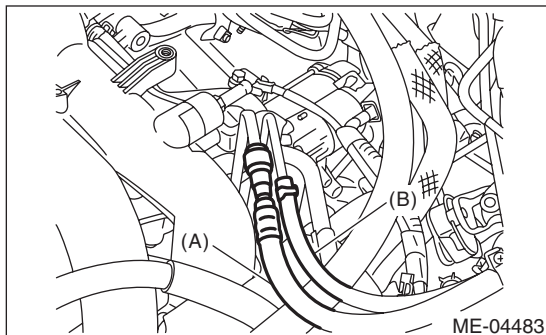
**19 N·m (1.9 kgf·m, 14.0 ft·lb)**



14) Connect the fuel delivery hose (A) and evaporation hose (B).

**NOTE:**

If fuel hoses or clamps are damaged, replace them with new parts.



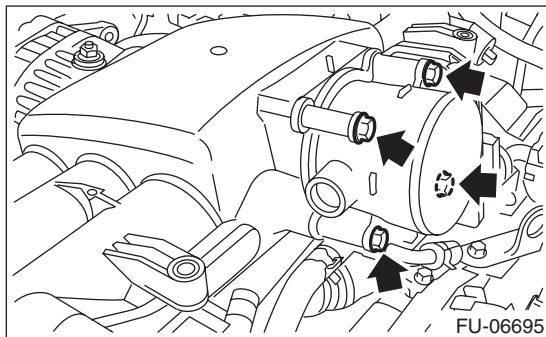
15) Install the throttle body to the intake manifold.

**NOTE:**

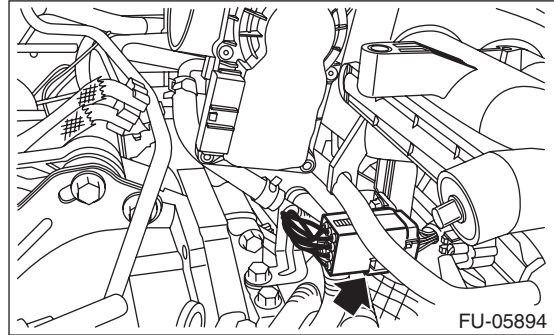
Use new O-rings.

**Tightening torque:**

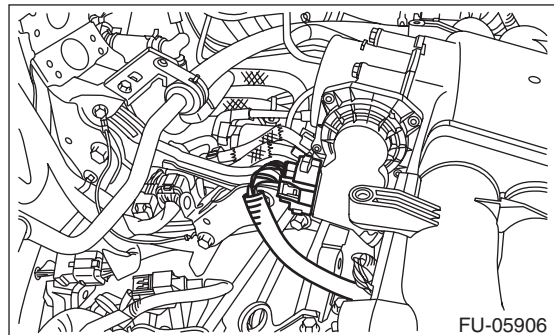
**8 N·m (0.8 kgf·m, 5.9 ft·lb)**



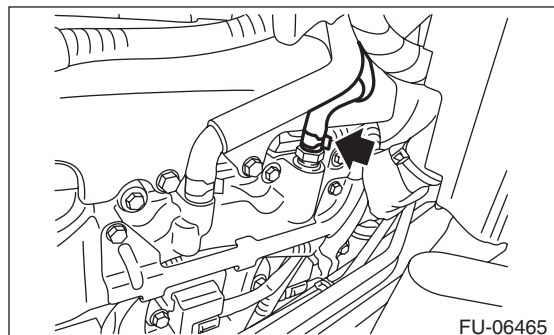
16) Connect the engine harness connector.



17) Connect the connector to the throttle body.

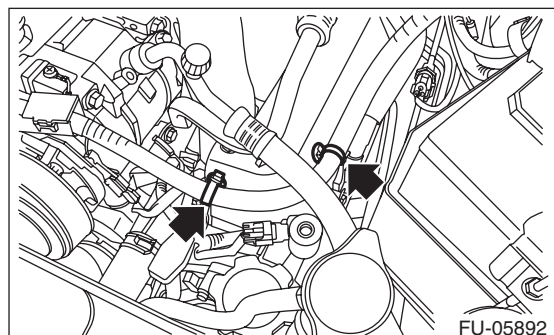


18) Connect the PCV hose.



19) Connect the following connectors.

(1) Install the securing clips to the two locations on the fuel pipe protector LH.



(2) Generator connector  
(3) Generator terminal B

**Tightening torque:**

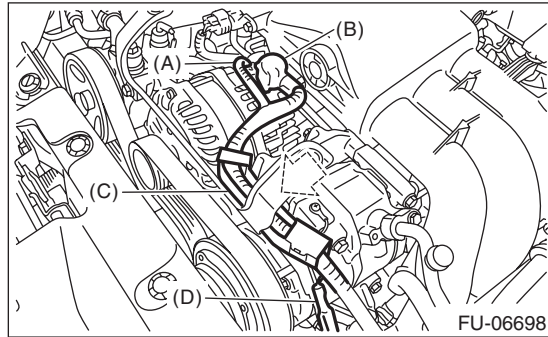
**16 N·m (1.6 kgf·m, 11.8 ft·lb)**

(4) Install the harness cover to the collector cover bracket.

# Intake Manifold

## FUEL INJECTION (FUEL SYSTEMS)

### (5) Magnet clutch connector



- (A) Generator connector
- (B) Terminal B
- (C) Install the harness cover to the collector cover bracket.
- (D) Magnet clutch connector

20) Install the air intake chamber.

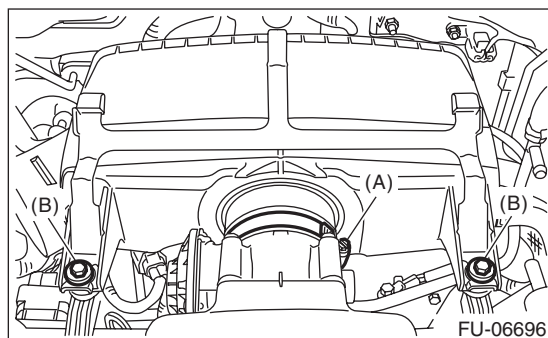
### Tightening torque:

#### Clamp (A)

**3 N·m (0.3 kgf-m, 2.2 ft-lb)**

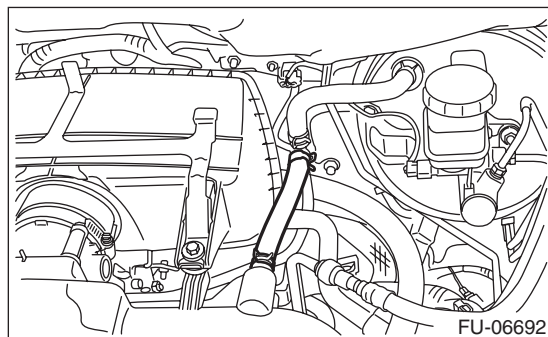
#### Bolt (B)

**6.5 N·m (0.7 kgf-m, 4.8 ft-lb)**



21) Install the air cleaner case and intake boot.  
<Ref. to IN(H6DO)-7, INSTALLATION, Air Cleaner Case.>

22) Connect the brake booster vacuum hose to the intake manifold.



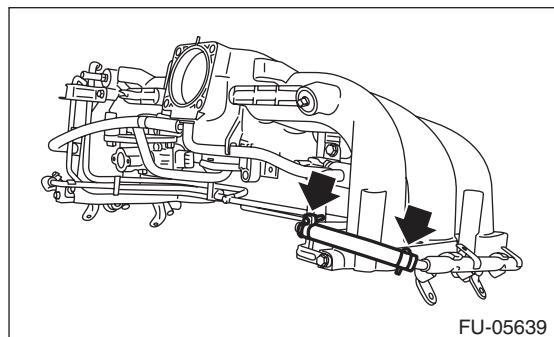
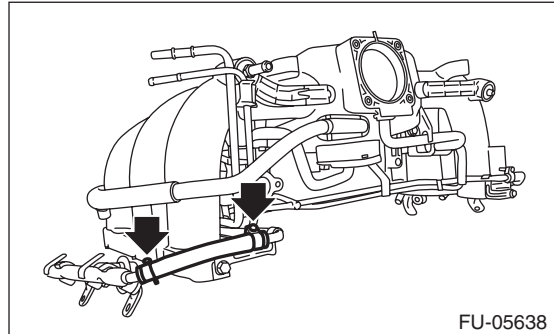
23) Install the battery and battery carrier. <Ref. to SC(H6DO)-19, INSTALLATION, Battery.>

24) Install the collector cover.

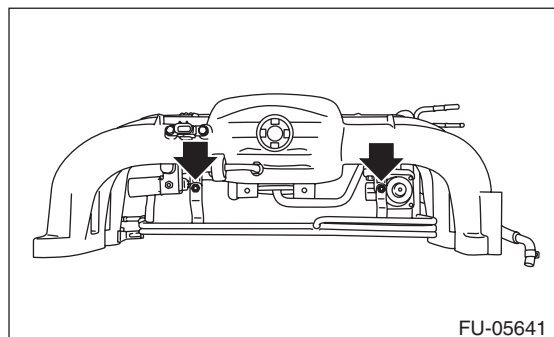
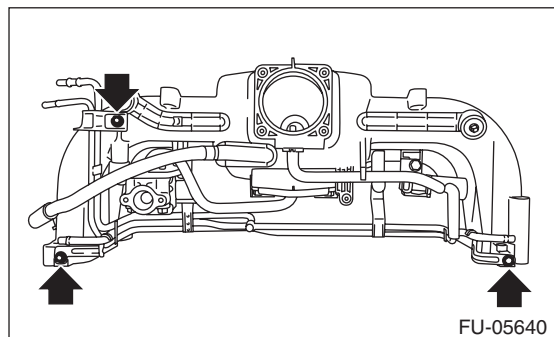
## C: DISASSEMBLY

1) Remove the engine harness from intake manifold. <Ref. to FU(H6DO)-8, ENGINE HARNESS, COMPONENT, General Description.>

2) Remove the fuel injector pipe and the fuel hose.



3) Remove the fuel pipe assembly.



4) Remove the EGR valve. <Ref. to FU(H6DO)-41, REMOVAL, EGR Valve.>

5) Remove the manifold absolute pressure sensor. <Ref. to FU(H6DO)-38, REMOVAL, Manifold Absolute Pressure Sensor.>

6) Remove the purge control solenoid valve. <Ref. to EC(H6DO)-7, REMOVAL, Purge Control Solenoid Valve.>

## D: ASSEMBLY

NOTE:

When assembling the nipple, apply liquid gasket.

**Liquid gasket:**

**THREE BOND 1105 (Part No. 004403010) or equivalent**

**Tightening torque:**

**17 N·m (1.7 kgf·m, 12.5 ft·lb)**

1) Install the purge control solenoid valve. <Ref. to EC(H6DO)-7, INSTALLATION, Purge Control Solenoid Valve.>

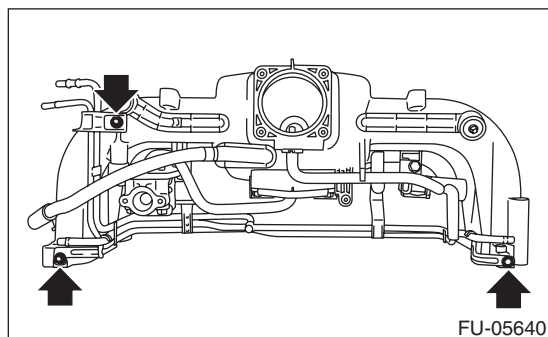
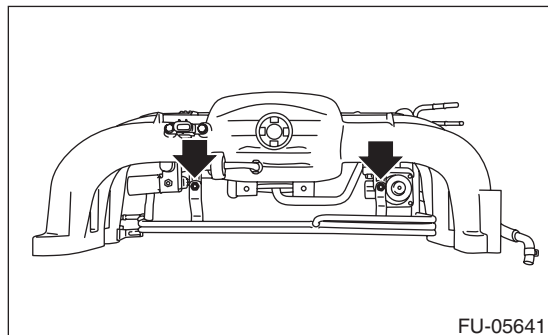
2) Install the manifold absolute pressure sensor. <Ref. to FU(H6DO)-38, INSTALLATION, Manifold Absolute Pressure Sensor.>

3) Install the EGR valve. <Ref. to FU(H6DO)-41, INSTALLATION, EGR Valve.>

4) Install the fuel pipe assembly.

**Tightening torque:**

**6.4 N·m (0.7 kgf·m, 4.7 ft·lb)**



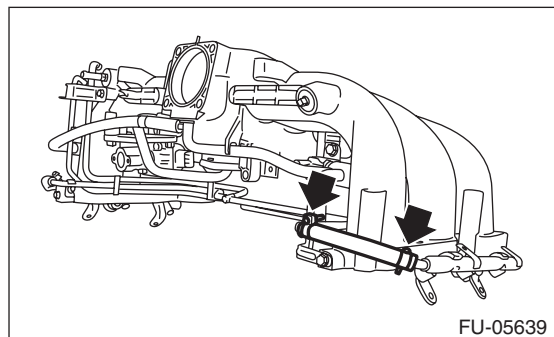
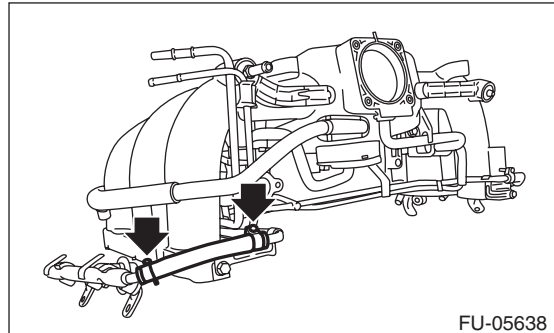
5) Install the fuel injector pipe and the fuel hose.

NOTE:

Use a new fuel hose.

**Tightening torque:**

**1.25 N·m (0.1 kgf·m, 0.9 ft·lb)**



6) Install the engine harness to the intake manifold. <Ref. to FU(H6DO)-8, ENGINE HARNESS, COMPONENT, General Description.>

## E: INSPECTION

1) Check that the intake manifold and fuel pipe have no deformation, cracks and other damages.

2) Check that the hose has no cracks, damage or loose part.

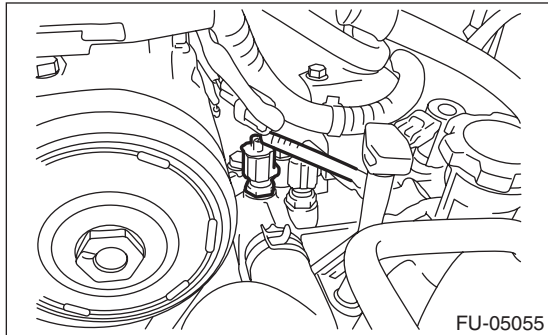
# Engine Coolant Temperature Sensor

FUEL INJECTION (FUEL SYSTEMS)

## 4. Engine Coolant Temperature Sensor

### A: REMOVAL

- 1) Remove the collector cover.
- 2) Disconnect the ground cable from battery.
- 3) Drain engine coolant. <Ref. to CO(H6DO)-12, DRAINING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>
- 4) Disconnect the connectors from the engine coolant temperature sensor.



- 5) Remove the engine coolant temperature sensor.

### B: INSTALLATION

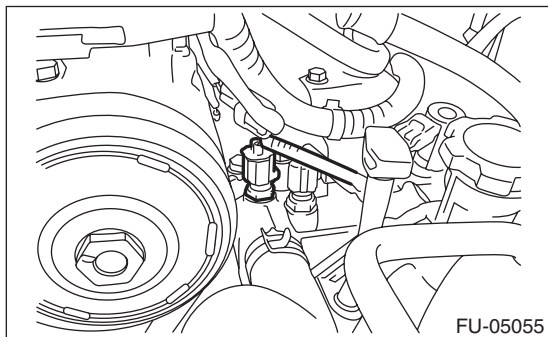
Install in the reverse order of removal.

NOTE:

Use a new gasket.

**Tightening torque:**

**22 N·m (2.2 kgf·m, 16.2 ft·lb)**

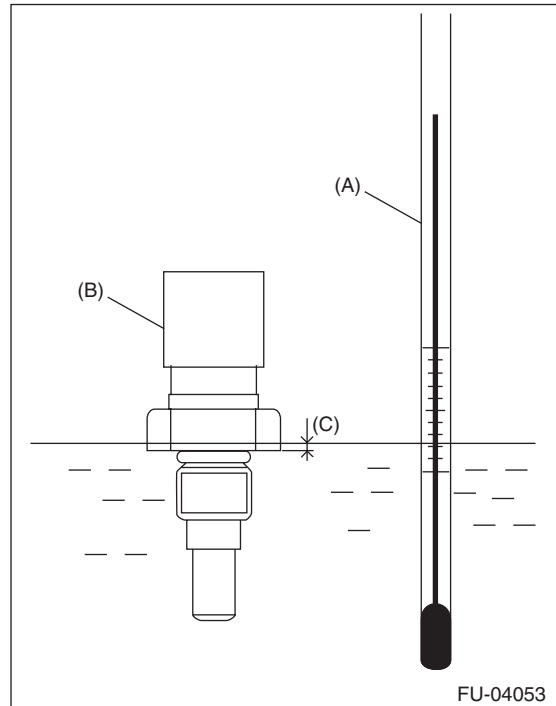


### C: INSPECTION

- 1) Check that the engine coolant temperature sensor has no deformation, cracks or other damages.
- 2) Immerse the engine coolant temperature sensor and a thermometer in water.

**CAUTION:**

Take care not to allow water to get into the engine coolant temperature sensor connector. Completely remove any water inside.



(A) Thermometer

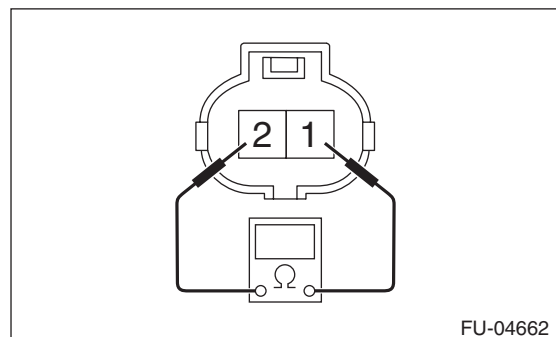
(B) Engine coolant temperature sensor

(C) Hexagonal part height: To approx.  $\frac{1}{3}$

- 3) Raise water temperature gradually, measure the resistance between the engine coolant temperature sensor terminals when the temperature is 20°C (68°F) and 80°C (176°F).

NOTE:

Agitate the water for even temperature distribution.

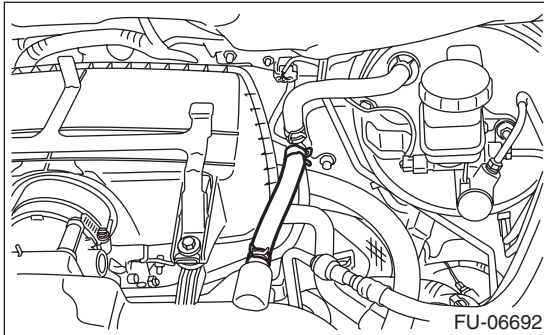


Water temperature	Terminal No.	Standard
20°C (68°F)	1 and 2	2.45±0.2 kΩ
80°C (176°F)		0.318±0.013 kΩ

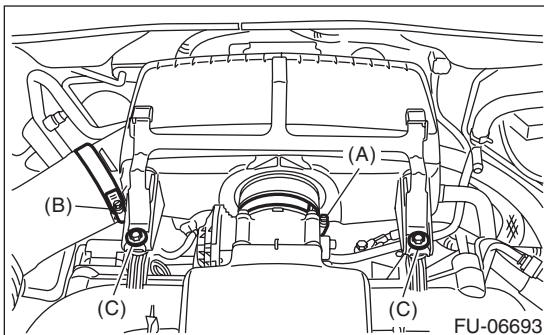
## 5. Crankshaft Position Sensor

### A: REMOVAL

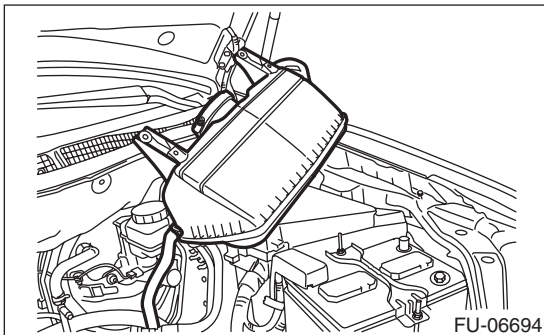
- 1) Remove the collector cover.
- 2) Disconnect the ground cable from battery.
- 3) Disconnect the brake booster vacuum hose from the intake manifold.



- 4) Loosen the clamp (A) which connects air intake chamber to throttle body.
- 5) Loosen the clamp (B) which connects intake boot to air intake chamber.
- 6) Loosen the bolt (C) which secures air intake chamber and collector cover bracket to the stay.



- 7) Remove the air intake chamber, and move it to the left side wheel apron.

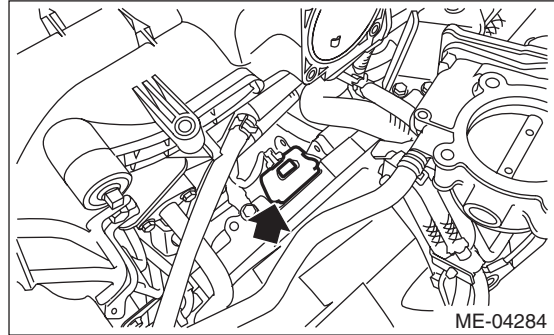


- 8) Remove the throttle body from the intake manifold.

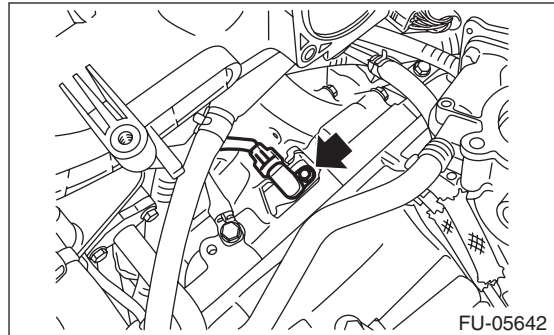
#### NOTE:

Do not disconnect the inlet and outlet hoses of engine coolant.

- 9) Remove the service hole plug.



- 10) Remove the crankshaft position sensor.



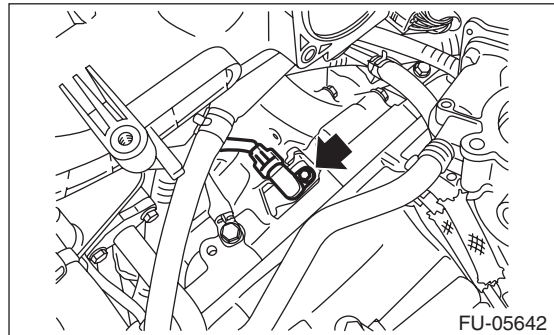
- 11) Disconnect the connector from the crankshaft position sensor.

### B: INSTALLATION

Install in the reverse order of removal.

#### Tightening torque:

**6.4 N·m (0.7 kgf-m, 4.7 ft-lb)**



# Crankshaft Position Sensor

## FUEL INJECTION (FUEL SYSTEMS)

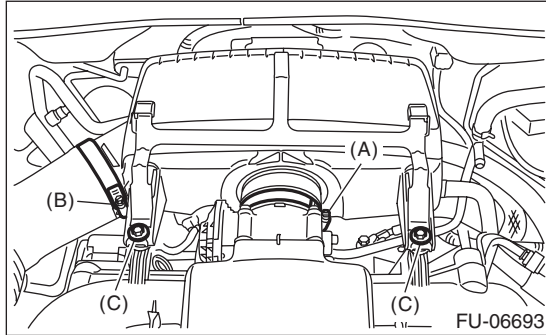
### Tightening torque:

**Clamp (A), (B)**

**3 N·m (0.3 kgf·m, 2.2 ft·lb)**

**Bolt (C)**

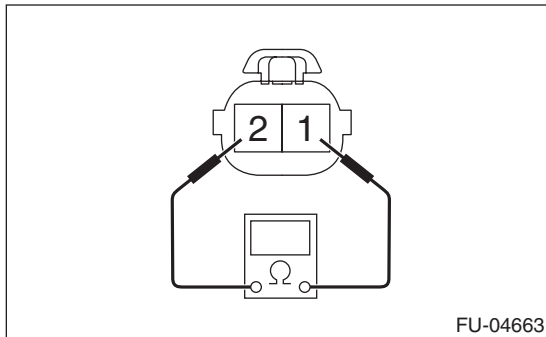
**6.5 N·m (0.7 kgf·m, 4.8 ft·lb)**



## C: INSPECTION

### 1. CRANKSHAFT POSITION SENSOR (METHOD WITH CIRCUIT TESTER)

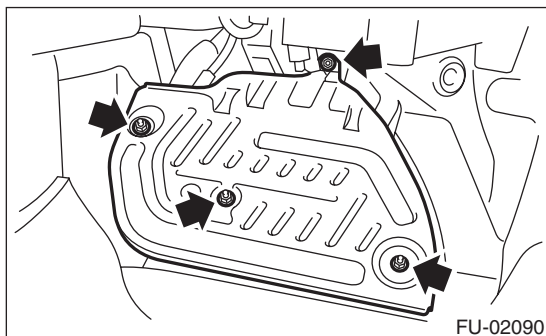
Measure the resistance between crankshaft position sensor terminals.



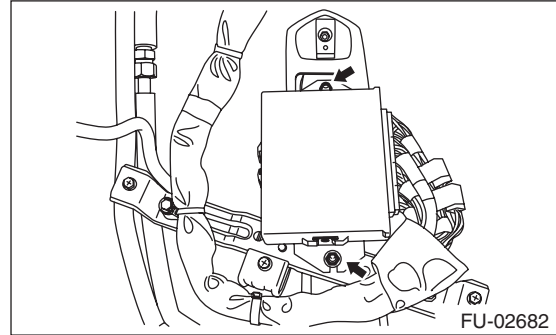
Terminal No.	Standard
1 and 2	1.86±0.186 kΩ

### 2. CRANKSHAFT POSITION SENSOR (METHOD WITH OSCILLOSCOPE)

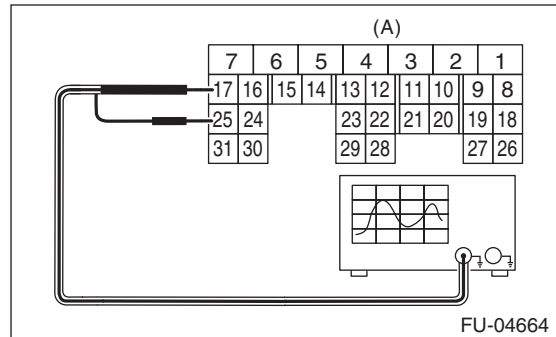
- 1) Prepare an oscilloscope.
- 2) Disconnect the ground cable from battery.
- 3) Remove the front pillar lower trim and console side panel lower RH of passenger's side.
- 4) Detach the floor mat of passenger's seat.
- 5) Remove the protect cover.



- 6) Remove the ECM from vehicle.



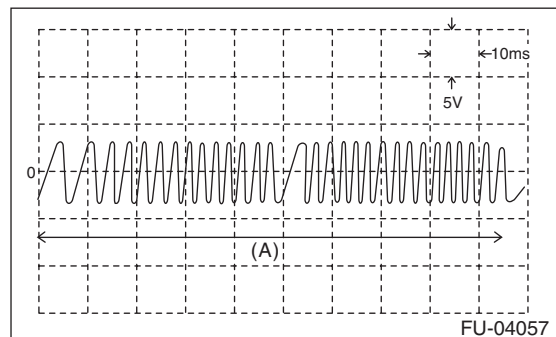
- 7) Connect the probe to ECM connector.



(A) To ECM connector

Terminal No.	Probe
17	+
25	-

- 8) Start the engine and let it idle.
- 9) Check the pattern is the same as the waveform and voltage shown below.



(A) One crankshaft rotation

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

### Tightening torque:

**7.5 N·m (0.8 kgf·m, 5.5 ft·lb)**

### 3. OTHER INSPECTIONS

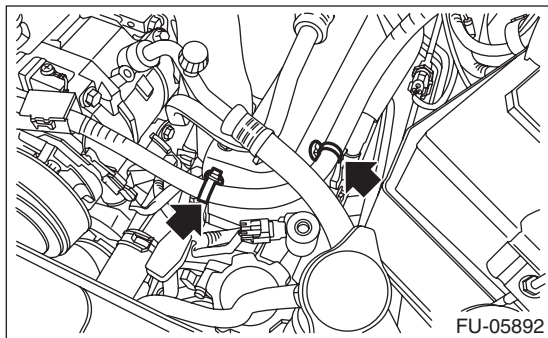
Check that the crankshaft position sensor has no deformation, cracks or other damages.

## 6. Camshaft Position Sensor

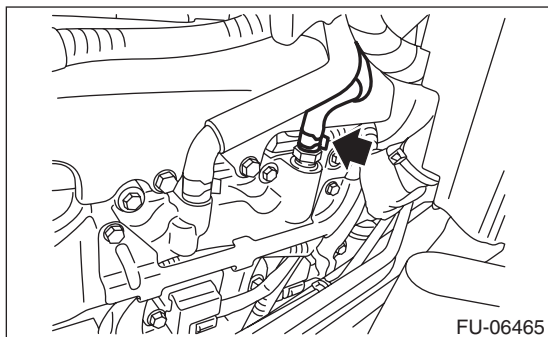
### A: REMOVAL

#### 1. INTAKE SIDE

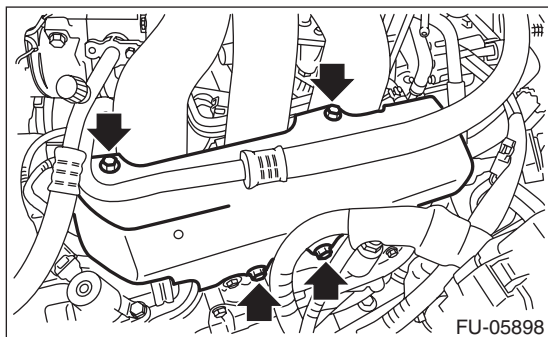
- 1) Remove the collector cover.
- 2) Release the fuel pressure. <Ref. to FU(H6DO)-59, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
- 3) Remove the battery and battery carrier. <Ref. to SC(H6DO)-19, REMOVAL, Battery.>
- 4) Open the fuel filler lid and remove the fuel filler cap.
- 5) Remove the securing clips from the two locations on the fuel pipe protector LH.



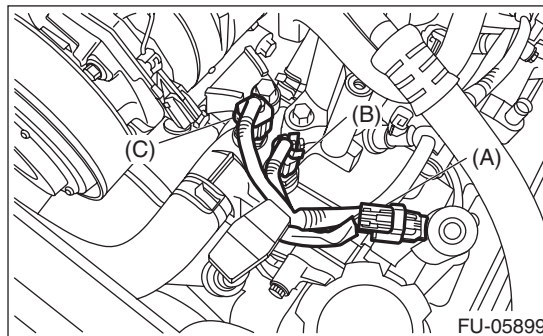
- 6) Disconnect the PCV hose.



- 7) Remove the fuel pipe protector LH.

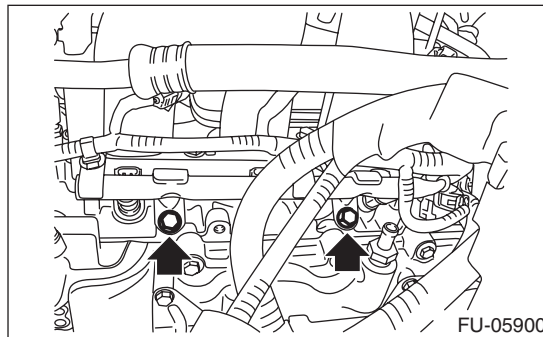


- 8) Disconnect the connectors of the oil temperature sensor, engine coolant temperature sensor and intake oil flow control solenoid valve LH.

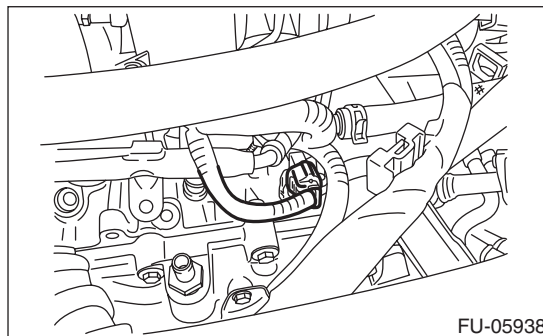


- (A) Intake oil flow control solenoid valve LH
- (B) Oil temperature sensor
- (C) Engine coolant temperature sensor

- 9) Remove the bolts which hold fuel injector pipe LH to cylinder head.



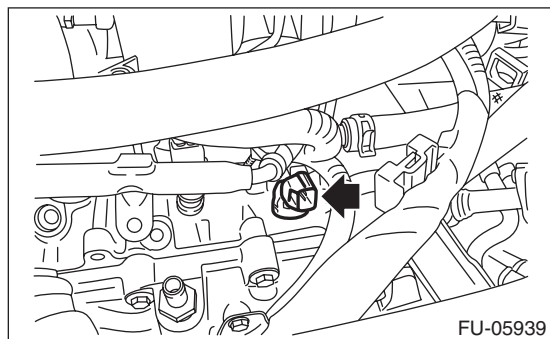
- 10) Slightly raise the fuel injector pipe LH.
- 11) Disconnect the connector from intake camshaft position sensor LH.



# Camshaft Position Sensor

## FUEL INJECTION (FUEL SYSTEMS)

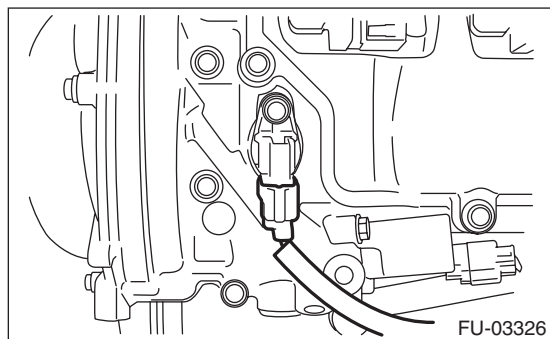
- 12) Remove the intake camshaft position sensor LH.



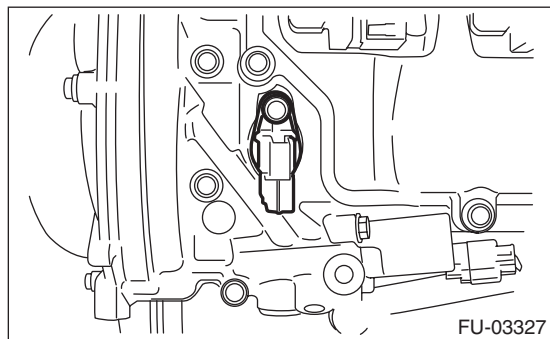
- 13) Remove the intake camshaft position sensor RH in the same procedure as LH side.

### 2. EXHAUST SIDE

- 1) Disconnect the ground cable from battery.
- 2) Lift up the vehicle.
- 3) Remove the under cover. <Ref. to EI-18, REMOVAL, Front Under Cover.>
- 4) Disconnect the connector from exhaust camshaft position sensor LH.



- 5) Remove the exhaust camshaft position sensor LH.



- 6) Remove the exhaust camshaft position sensor RH in the same procedure as LH side.

## B: INSTALLATION

### 1. INTAKE SIDE

Install in the reverse order of removal.

#### Tightening torque:

*Intake camshaft position sensor*  
6.4 N·m (0.7 kgf-m, 4.7 ft-lb)

*Fuel pipe protector*  
19 N·m (1.9 kgf-m, 14.0 ft-lb)

### 2. EXHAUST SIDE

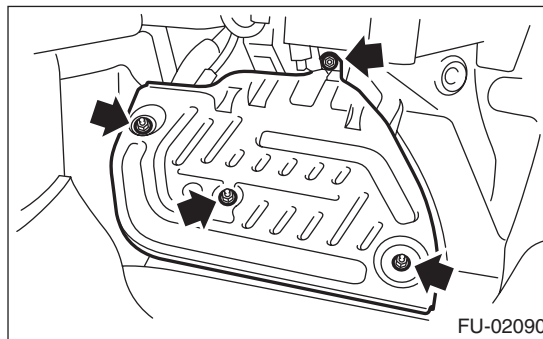
#### Tightening torque:

*Exhaust camshaft position sensor*  
6.4 N·m (0.7 kgf-m, 4.7 ft-lb)

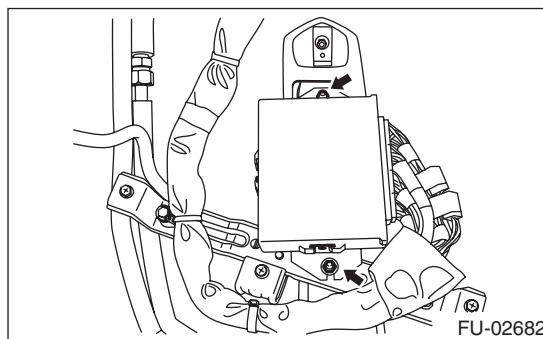
## C: INSPECTION

### 1. CAMSHAFT POSITION SENSOR (METHOD WITH OSCILLOSCOPE)

- 1) Prepare an oscilloscope.
- 2) Disconnect the ground cable from battery.
- 3) Remove the front pillar lower trim and console side panel lower RH of passenger's side.
- 4) Detach the floor mat of passenger's seat.
- 5) Remove the protect cover.



- 6) Remove the ECM from vehicle.



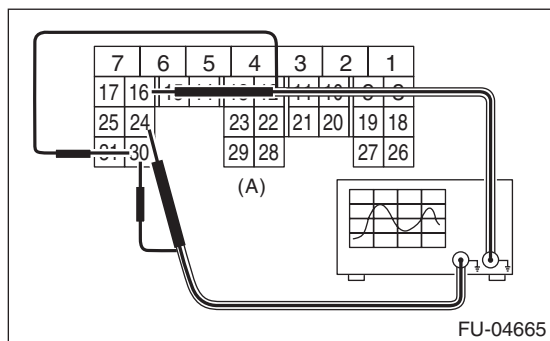


# Camshaft Position Sensor

FUEL INJECTION (FUEL SYSTEMS)

7) Connect the probe to ECM connector.

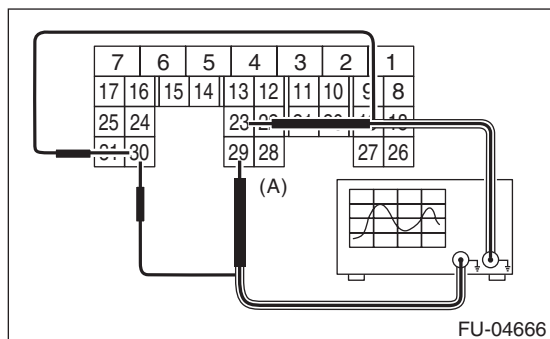
- Intake camshaft position sensor



(A) To ECM connector

Camshaft position sensor	Terminal No.	Probe
RH	24	+
LH	16	+
RH and LH	30	-

- Exhaust camshaft position sensor

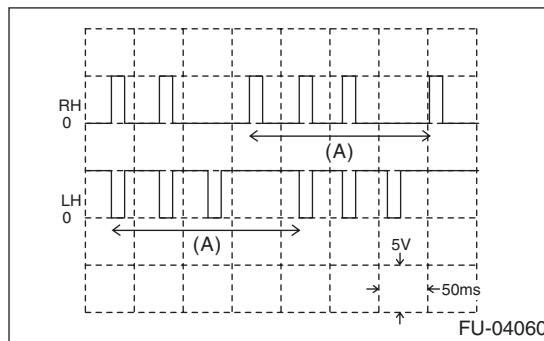


(A) To ECM connector

Camshaft position sensor	Terminal No.	Probe
RH	23	+
LH	29	+
RH and LH	30	-

8) Start the engine and let it idle.

9) Check the pattern is the same as the waveform and voltage shown below.



(A) One camshaft rotation

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

### **Tightening torque:**

**7.5 N·m (0.8 kgf·m, 5.5 ft·lb)**

## 2. OTHER INSPECTIONS

Check that the camshaft position sensor has no deformation, cracks or other damages.

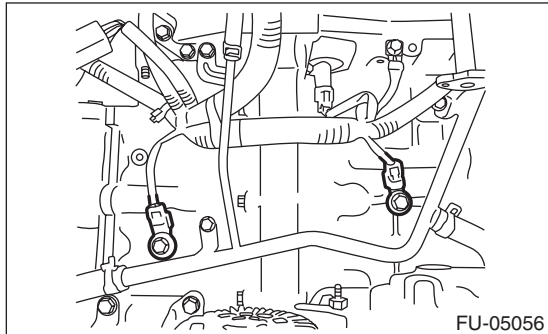
# Knock Sensor

## FUEL INJECTION (FUEL SYSTEMS)

### 7. Knock Sensor

#### A: REMOVAL

- 1) Remove the collector cover.
- 2) Disconnect the ground cable from battery.
- 3) Remove the intake manifold. <Ref. to FU(H6DO)-22, REMOVAL, Intake Manifold.>
- 4) Disconnect the knock sensor connector.
- 5) Remove the knock sensor from cylinder block.



#### B: INSTALLATION

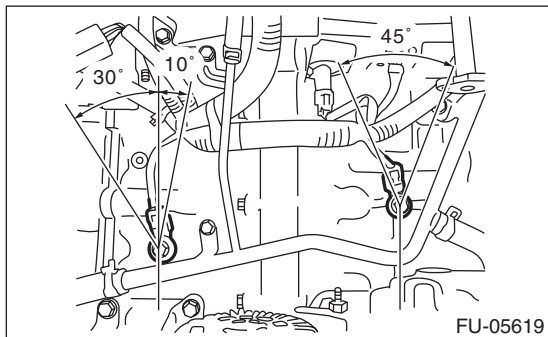
- 1) Install the knock sensor to the cylinder block.

#### **Tightening torque:**

**25 N·m (2.5 kgf·m, 18.4 ft·lb)**

#### NOTE:

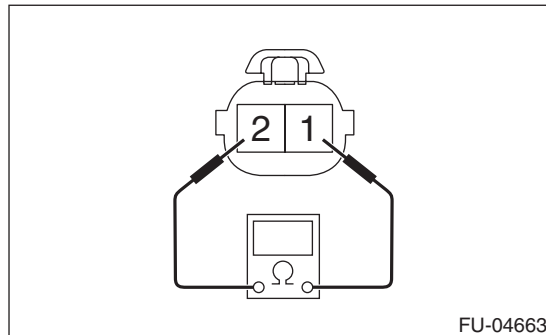
For the knock sensor installation angle, refer to the figure below.



- 2) Connect the knock sensor connector.
- 3) Install the intake manifold. <Ref. to FU(H6DO)-25, INSTALLATION, Intake Manifold.>
- 4) Connect the battery ground terminal.
- 5) Install the collector cover.

#### C: INSPECTION

- 1) Check that the knock sensor has no deformation, cracks or other damages.
- 2) Measure the resistance between knock sensor terminals.



Terminal No.	Standard
1 and 2	560±28 kΩ

## 8. Throttle Position Sensor

### A: SPECIFICATION

Throttle body is a non-disassembled part, so do not remove the throttle position sensor from throttle body.

Refer to "Throttle Body" for removal and installation procedure. <Ref. to FU(H6DO)-19, REMOVAL, Throttle Body.> <Ref. to FU(H6DO)-20, INSTALLATION, Throttle Body.>

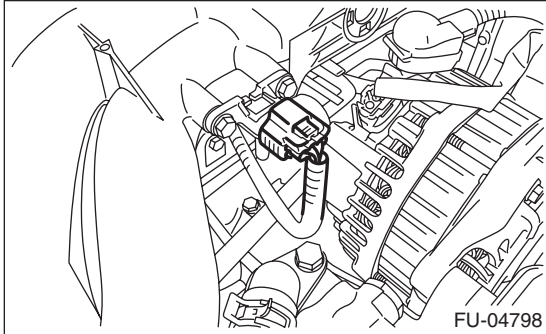
# Manifold Absolute Pressure Sensor

FUEL INJECTION (FUEL SYSTEMS)

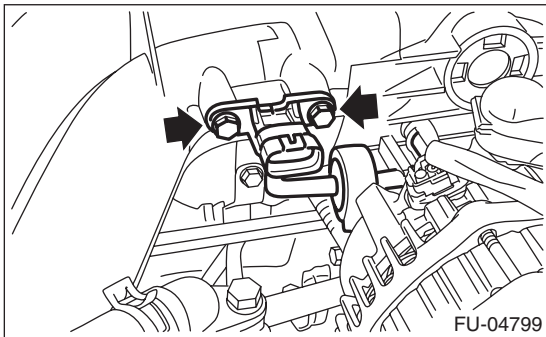
## 9. Manifold Absolute Pressure Sensor

### A: REMOVAL

- 1) Remove the collector cover.
- 2) Disconnect the ground cable from battery.
- 3) Disconnect the manifold pressure sensor connector.



- 4) Remove the manifold pressure sensor and the filter and hose from intake manifold.



### B: INSTALLATION

Install in the reverse order of removal.

**Tightening torque:**

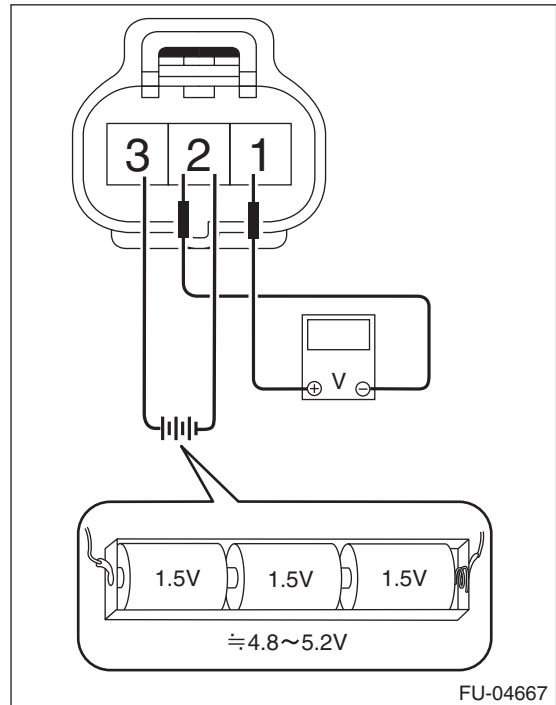
**6.4 N·m (0.7 kgf·m, 4.7 ft·lb)**

### C: INSPECTION

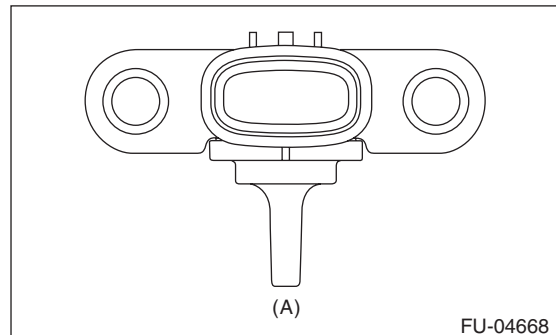
- 1) Check that the manifold absolute pressure sensor has no deformation, cracks or other damages.
- 2) Connect dry-cell battery positive terminal to terminal No. 3 and dry-cell battery ground terminal to terminal No. 2, circuit tester ground terminal to terminal No. 2 and the circuit tester positive terminal to terminal No. 1.

**NOTE:**

- Use new dry-cell batteries.
- Using circuit tester, check the voltage of a single dry-cell battery is 1.6 V or more. And also check the voltage of three batteries in series is between 4.8 V and 5.2 V.



- 3) Connect the Mighty Vac to the pressure port (A) of manifold absolute pressure sensor.



# Manifold Absolute Pressure Sensor

FUEL INJECTION (FUEL SYSTEMS)

4) Check the voltage when generating vacuum and positive pressure using Mighty Vac.

### CAUTION:

**Do not apply vacuum of less than  $-88$  kPa ( $-0.9$  kgf/cm<sup>2</sup>,  $-12.8$  psi). Doing so may damage the manifold absolute pressure sensor.**

### NOTE:

When vacuum occurs at the pressure port of manifold absolute pressure sensor, the voltage will drop from the value as in step 3). When positive pressure occurs, on the other hand, the voltage will rise.

Pressure	Terminal No.	Standard
$-88$ kPa ( $-0.9$ kgf/cm <sup>2</sup> , $-12.8$ psi)	2 (+) and 1 (-)	Approx. 1 V (when 25°C (77°F))
$-35$ kPa ( $-0.4$ kgf/cm <sup>2</sup> , $-5.1$ psi)		Approx. 2.6 V (when 25°C (77°F))
19 kPa ( $-0.2$ kgf/cm <sup>2</sup> , 2.8 psi)		Approx. 4.2 V (when 25°C (77°F))

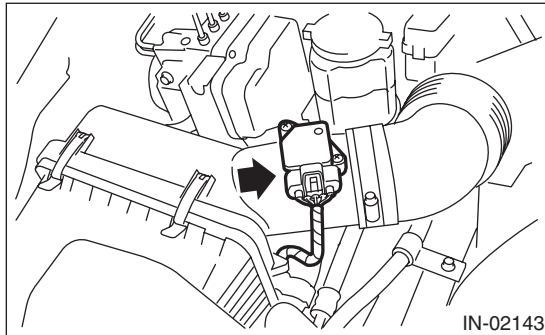
# Mass Air Flow and Intake Air Temperature Sensor

FUEL INJECTION (FUEL SYSTEMS)

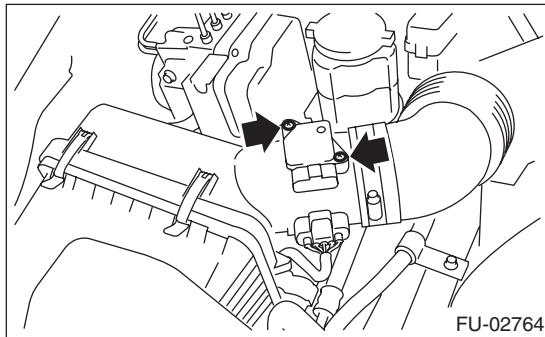
## 10. Mass Air Flow and Intake Air Temperature Sensor

### A: REMOVAL

- 1) Disconnect the ground cable from the battery.
- 2) Disconnect the connector from mass air flow and intake air temperature sensor.



- 3) Remove the mass air flow and intake air temperature sensor.



### B: INSTALLATION

Install in the reverse order of removal.

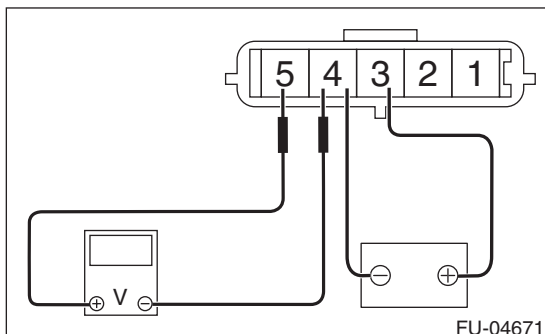
#### Tightening torque:

1 N·m (0.1 kgf·m, 0.7 ft·lb)

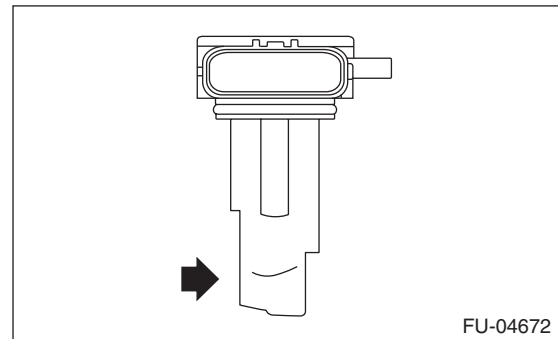
### C: INSPECTION

#### 1. CHECK THE MASS AIR FLOW SENSOR UNIT

- 1) Connect the battery positive terminal to terminal No. 3 and the battery ground terminal to terminal No. 4, the circuit tester positive terminal to terminal No. 5 and the circuit tester ground terminal to terminal No. 4.

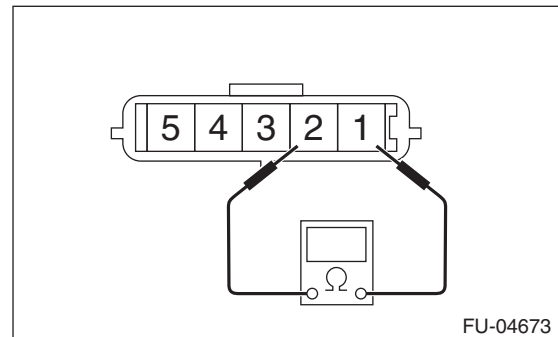


- 2) Check the voltage changes when air is blown to the mass air flow sensor unit in arrow direction.



#### 2. CHECK THE INTAKE AIR TEMPERATURE SENSOR UNIT

Measure the resistance between intake air temperature sensor terminals.



Temperature	Terminal No.	Standard
-20°C (-4°F)	1 and 2	16.0±2.4 kΩ
20°C (68°F)		2.45±0.24 kΩ
60°C (140°F)		0.58±0.087 kΩ

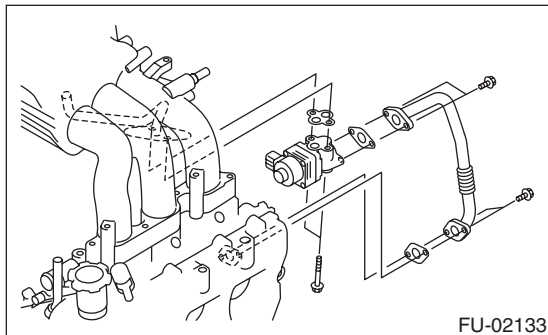
#### 3. OTHER INSPECTIONS

- 1) Check that the mass air flow and intake air temperature sensor has no deformation, cracks or other damages.
- 2) Check that the mass air flow and intake air temperature sensor has no dirt.

## 11.EGR Valve

### A: REMOVAL

- 1) Remove the collector cover.
- 2) Disconnect the ground cable from battery.
- 3) Remove the air intake chamber. <Ref. to IN(H6DO)-8, REMOVAL, Air Intake Chamber.>
- 4) Remove the starter. <Ref. to SC(H6DO)-6, REMOVAL, Starter.>
- 5) Remove the EGR pipe from EGR valve and cylinder head.
- 6) Remove the EGR valve from intake manifold.



- 7) Disconnect the connector from EGR valve.

### B: INSTALLATION

Install in the reverse order of removal.

NOTE:

Use a new gasket.

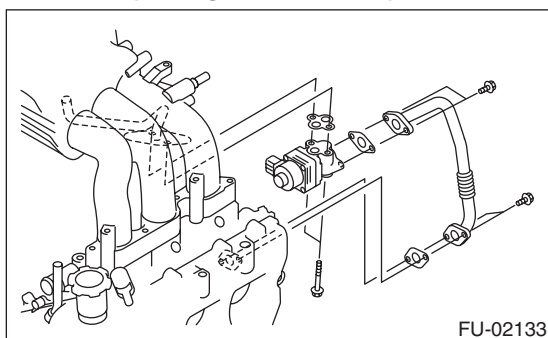
**Tightening torque:**

**EGR valve**

**19 N·m (1.9 kgf-m, 14.0 ft-lb)**

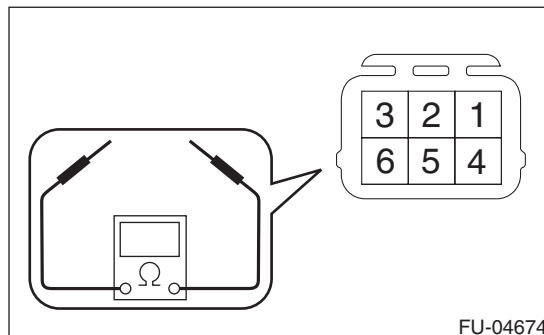
**EGR pipe**

**6.4 N·m (0.7 kgf-m, 4.7 ft-lb)**



### C: INSPECTION

- 1) Check that the EGR valve has no deformation, cracks or other damages.
- 2) Measure the resistance between EGR valve terminals.



Terminal No.	Standard
2 and 1	22±2 Ω
2 and 3	22±2 Ω
5 and 4	22±2 Ω
5 and 6	22±2 Ω

# Fuel Injector

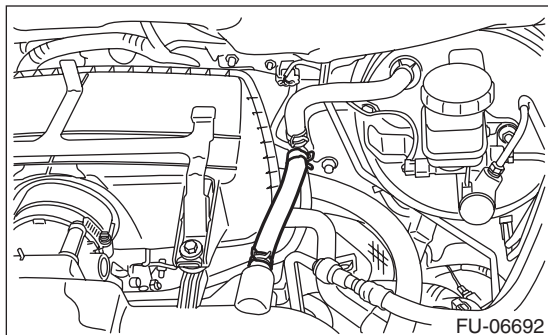
## FUEL INJECTION (FUEL SYSTEMS)

### 12. Fuel Injector

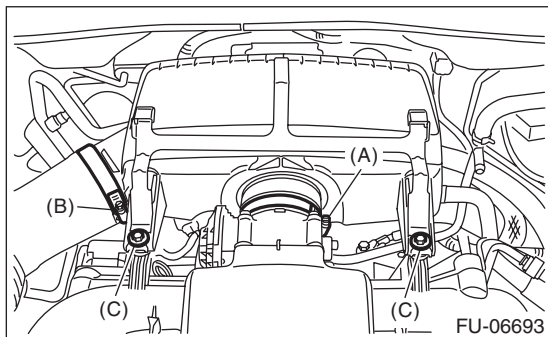
#### A: REMOVAL

##### 1. RH SIDE

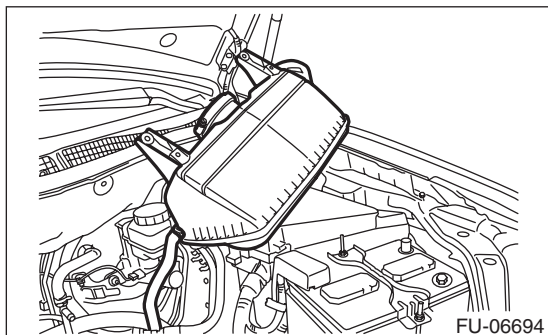
- 1) Remove the collector cover.
- 2) Release the fuel pressure. <Ref. to FU(H6DO)-59, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
- 3) Disconnect the ground cable from battery.
- 4) Open the fuel filler lid and remove the fuel filler cap.
- 5) Disconnect the brake booster vacuum hose from the intake manifold.



- 6) Loosen the clamp (A) which connects air intake chamber to throttle body.
- 7) Loosen the clamp (B) which connects intake boot to air intake chamber.
- 8) Loosen the bolt (C) which secures air intake chamber and collector cover bracket to the stay.

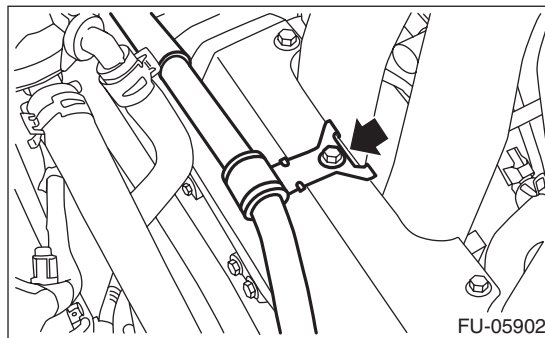


- 9) Remove the air intake chamber, and move it to the left side wheel apron.

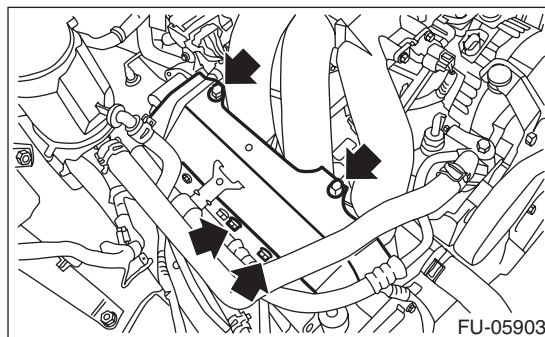


- 10) Remove the air cleaner case and intake boot. <Ref. to IN(H6DO)-6, REMOVAL, Air Cleaner Case.>

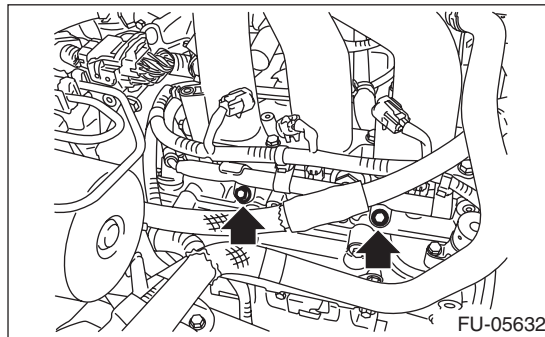
- 11) Remove the feed hose from the fuel pipe protector RH.



- 12) Remove the fuel pipe protector RH.



- 13) Disconnect the connector from fuel injector.
- 14) Remove the bolt which holds fuel injector pipe onto cylinder head.



- 15) Remove the fuel injector while lifting up the fuel injector pipe.

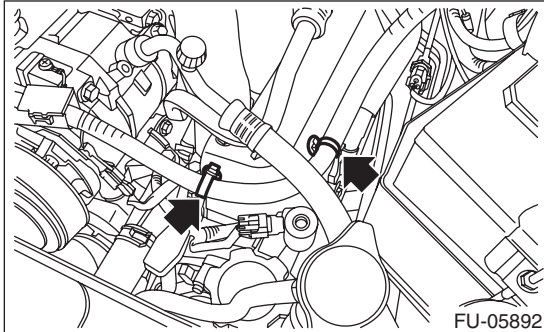


# Fuel Injector

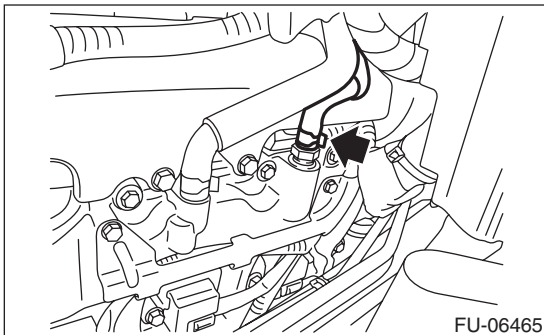
## FUEL INJECTION (FUEL SYSTEMS)

### 2. LH SIDE

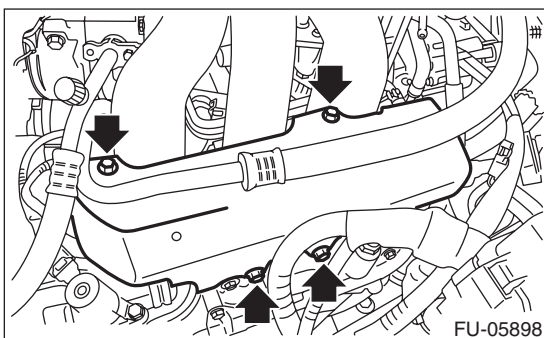
- 1) Remove the collector cover.
- 2) Release the fuel pressure. <Ref. to FU(H6DO)-59, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
- 3) Remove the battery and battery carrier. <Ref. to SC(H6DO)-19, REMOVAL, Battery.>
- 4) Open the fuel filler lid and remove the fuel filler cap.
- 5) Remove the securing clips from the two locations on the fuel pipe protector LH.



- 6) Disconnect the PCV hose.

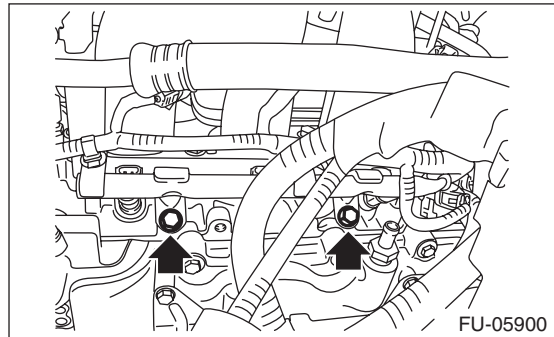


- 7) Remove the fuel pipe protector LH.



- 8) Disconnect the connector from fuel injector.

- 9) Remove the bolt which holds fuel injector pipe onto cylinder head.



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

### B: INSTALLATION

#### 1. RH SIDE

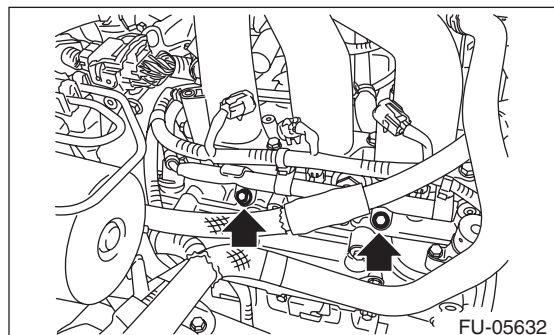
Install in the reverse order of removal.

#### NOTE:

Use new O-rings, injection rubbers, and seal rings.

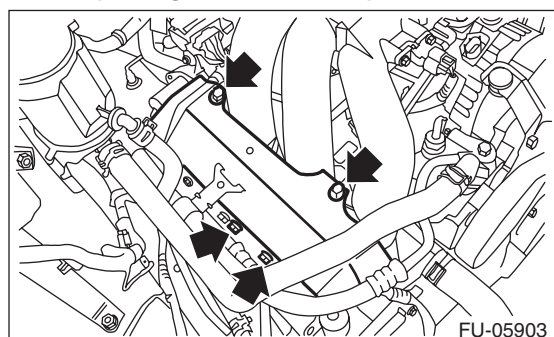
#### Tightening torque:

**19 N·m (1.9 kgf-m, 14.0 ft-lb)**



#### Tightening torque:

**19 N·m (1.9 kgf-m, 14.0 ft-lb)**

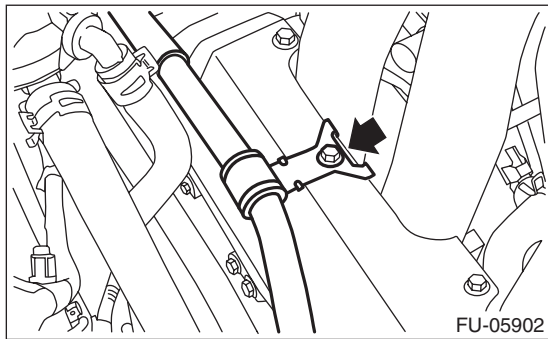


# Fuel Injector

## FUEL INJECTION (FUEL SYSTEMS)

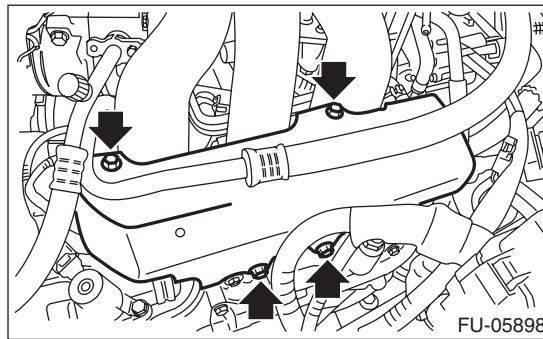
### Tightening torque:

**13 N·m (1.3 kgf·m, 9.6 ft·lb)**



### Tightening torque:

**19 N·m (1.9 kgf·m, 14.0 ft·lb)**



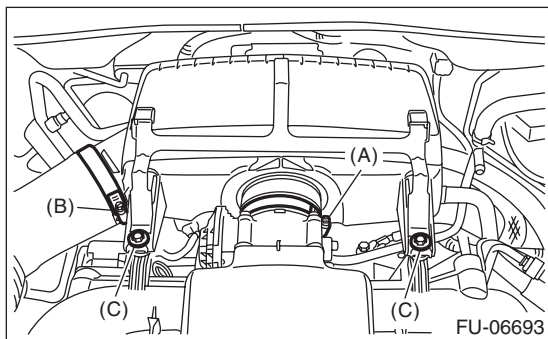
### Tightening torque:

**Clamp (A), (B)**

**3 N·m (0.3 kgf·m, 2.2 ft·lb)**

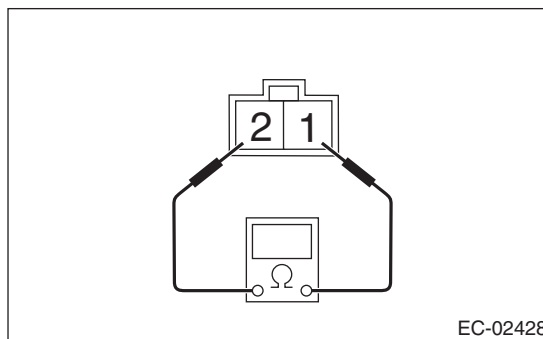
**Bolt (C)**

**6.5 N·m (0.7 kgf·m, 4.8 ft·lb)**



## C: INSPECTION

- 1) Check that the fuel injector has no deformation, cracks or other damages.
- 2) Measure the resistance between fuel injector terminals.



## 2. LH SIDE

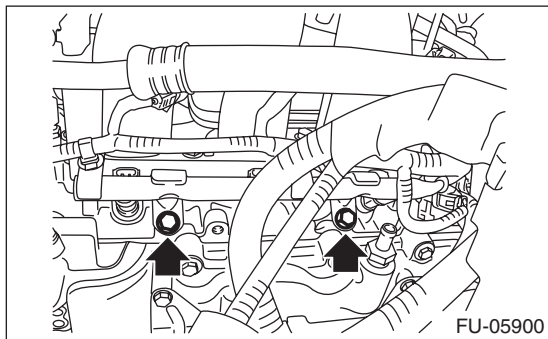
Install in the reverse order of removal.

### NOTE:

Use new O-rings, injection rubbers, and seal rings.

### Tightening torque:

**19 N·m (1.9 kgf·m, 14.0 ft·lb)**



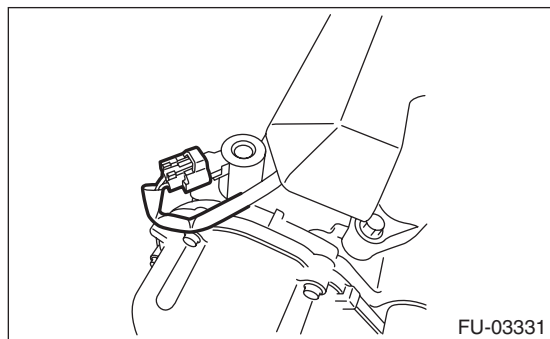
Terminal No.	Standard
1 and 2	Approx. 12.0 Ω (when 20°C (68°F))

## 13. Oil Flow Control Solenoid Valve

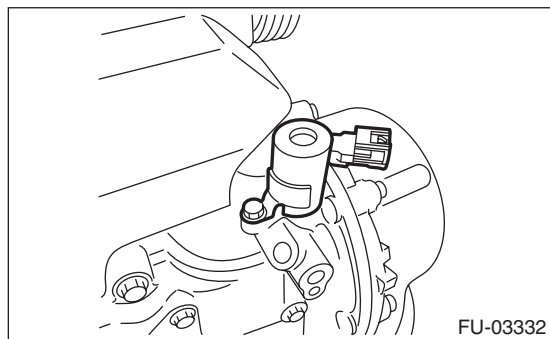
### A: REMOVAL

#### 1. INTAKE SIDE

- 1) Remove the collector cover.
- 2) Disconnect the ground cable from battery.
- 3) Disconnect the connector from the intake oil flow control solenoid valve RH.



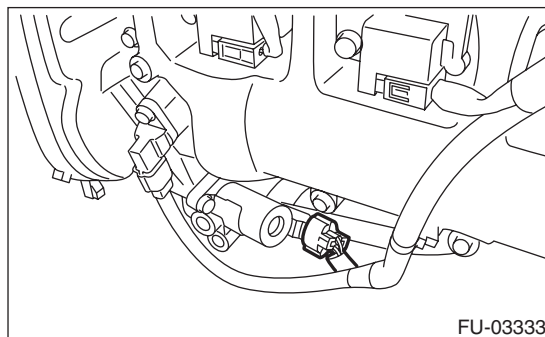
- 4) Remove the intake oil flow control solenoid valve RH.



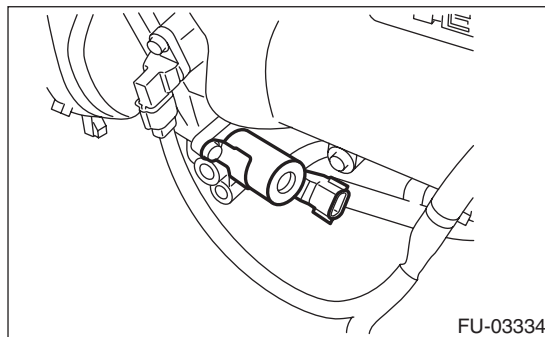
- 5) Remove the intake oil flow control solenoid valve LH in the same procedure as RH.

#### 2. EXHAUST SIDE

- 1) Disconnect the ground cable from battery.
- 2) Lift up the vehicle.
- 3) Remove the under cover. <Ref. to EI-18, REMOVAL, Front Under Cover.>
- 4) Disconnect the connector from the exhaust oil flow control solenoid valve LH.



- 5) Remove the exhaust oil flow control solenoid valve LH.



- 6) Remove the exhaust oil flow control solenoid valve RH in the same procedure as LH.

### B: INSTALLATION

#### 1. INTAKE SIDE

Install in the reverse order of removal.

##### **Tightening torque:**

**Intake oil flow control solenoid valve**  
6.4 N·m (0.7 kgf·m, 4.7 ft·lb)

#### 2. EXHAUST SIDE

##### **Tightening torque:**

**Exhaust oil flow control solenoid valve**  
6.4 N·m (0.7 kgf·m, 4.7 ft·lb)

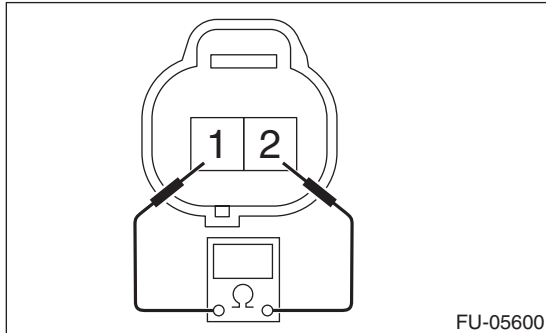
# Oil Flow Control Solenoid Valve

## FUEL INJECTION (FUEL SYSTEMS)

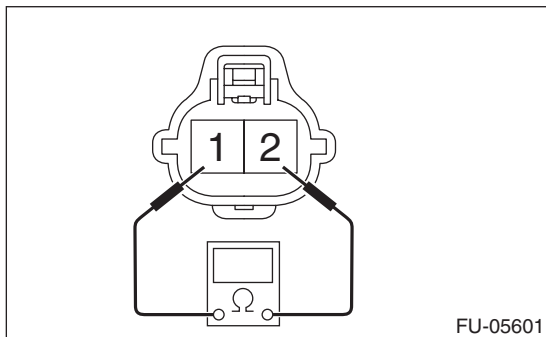
### C: INSPECTION

- 1) Check that the oil flow control solenoid valve has no deformation, cracks or other damages.
- 2) Measure the resistance between the oil flow control solenoid valve terminals.

- Intake oil flow control solenoid valve



- Exhaust oil flow control solenoid valve

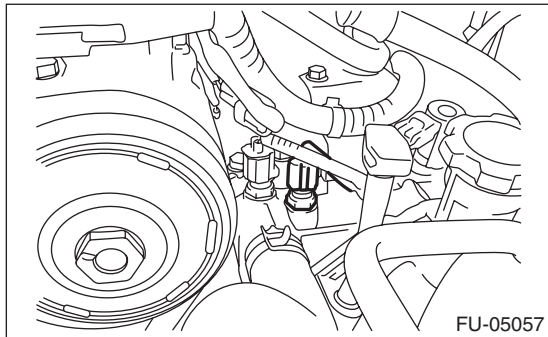


Terminal No.	Standard
1 and 2	$7.4 \pm 0.5 \Omega$ (when 20°C (68°F))

## 14.Oil Temperature Sensor

### A: REMOVAL

- 1) Remove the collector cover.
- 2) Disconnect the ground cable from battery.
- 3) Disconnect the connector from oil temperature sensor.



- 4) Remove the oil temperature sensor.

### B: INSTALLATION

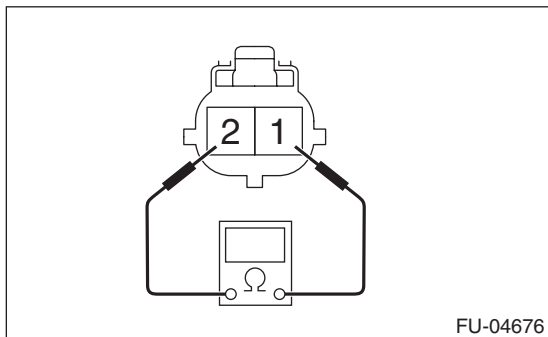
Install in the reverse order of removal.

#### *Tightening torque:*

**22 N·m (2.2 kgf·m, 16.2 ft·lb)**

### C: INSPECTION

- 1) Check that the oil temperature sensor has no deformation, cracks or other damages.
- 2) Check the resistance between the oil temperature sensor terminals.



Terminal No.	Standard
1 and 2	2.45±0.2 Ω (when 20°C (68°F))

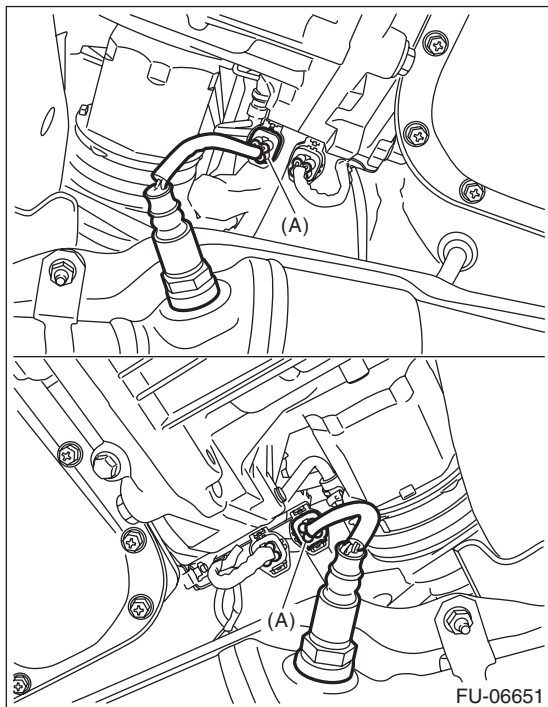
# Front Oxygen (A/F) Sensor

FUEL INJECTION (FUEL SYSTEMS)

## 15. Front Oxygen (A/F) Sensor

### A: REMOVAL

- 1) Disconnect the ground cable from battery.
- 2) Lift up the vehicle.
- 3) Disconnect the connector (A) of the front oxygen (A/F) sensor.

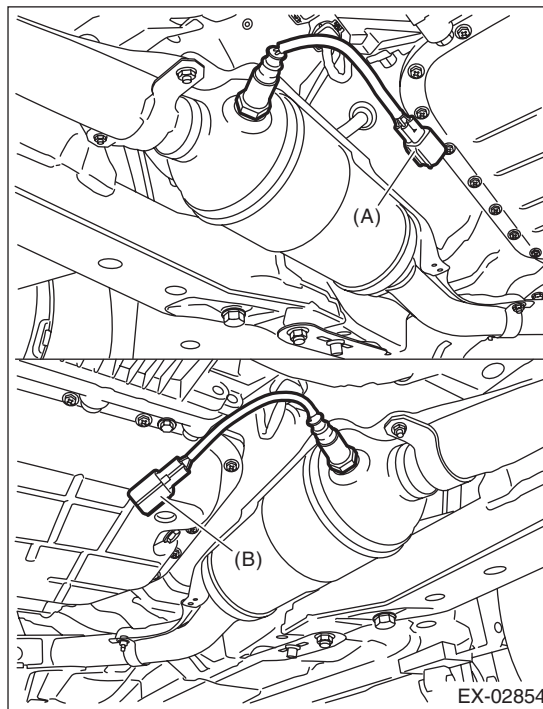


- 4) Apply spray-type lubricant to the threaded portion of front oxygen (A/F) sensor, and leave it for one minute or more.

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

### CAUTION:

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



- (A) Front oxygen (A/F) sensor RH  
(B) Front oxygen (A/F) sensor LH

# Front Oxygen (A/F) Sensor

FUEL INJECTION (FUEL SYSTEMS)

## B: INSTALLATION

### CAUTION:

If lubricant is spilt over the exhaust pipe, wipe it off with cloth to avoid emission of smoke or causing a fire.

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

### CAUTION:

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

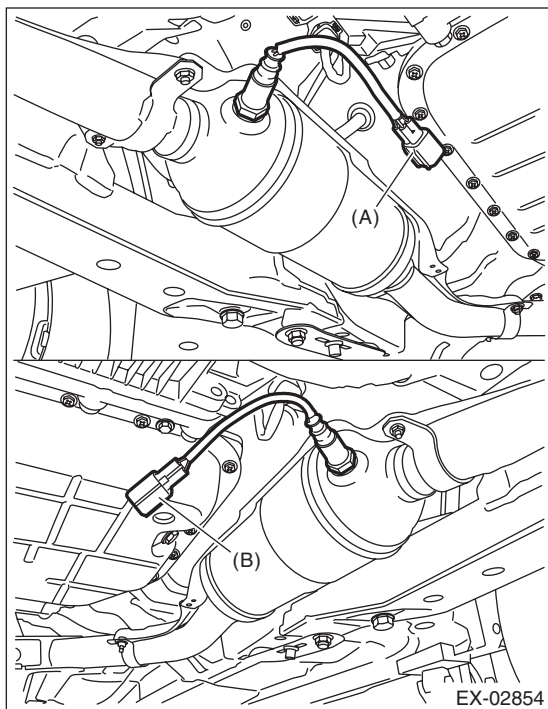
### Anti-seize compound:

**NEVER-SEEZ NSN, JET LUBE SS-30 or equivalent**

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

### Tightening torque:

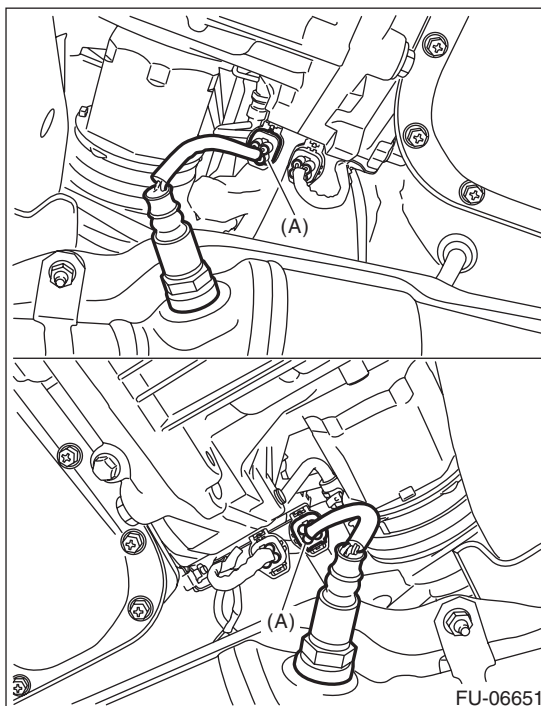
**21 N·m (2.1 kgf-m, 15.5 ft-lb)**



(A) Front oxygen (A/F) sensor RH

(B) Front oxygen (A/F) sensor LH

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



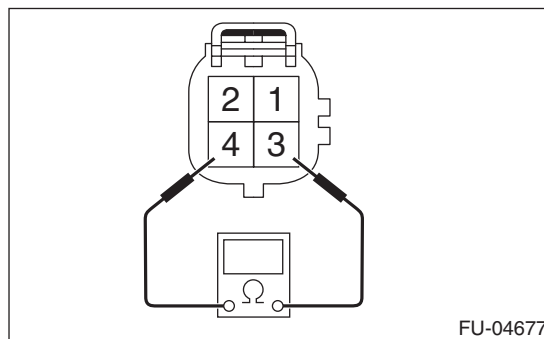
4) Lower the vehicle.

5) Connect the battery ground terminal.

## C: INSPECTION

1) Check that the front oxygen (A/F) sensor has no deformation, cracks or other damages.

2) Measure the resistance between front oxygen (A/F) sensor terminals.



Terminal No.	Standard
3 and 4	2.4±0.24 Ω (when 20°C (68°F))

# Rear Oxygen Sensor

FUEL INJECTION (FUEL SYSTEMS)

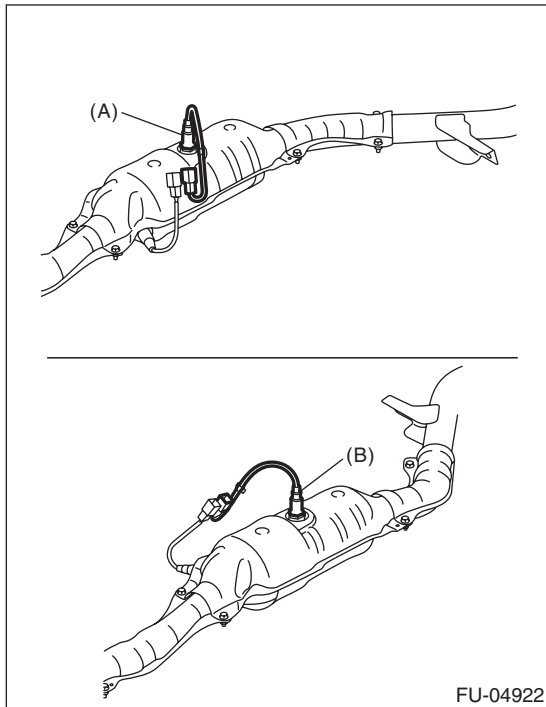
## 16.Rear Oxygen Sensor

### A: REMOVAL

- 1) Disconnect the ground cable from battery.
- 2) Lift up the vehicle.
- 3) Remove the front exhaust pipe. <Ref. to EX(H6DO)-5, REMOVAL, Front Exhaust Pipe.>
- 4) Apply spray-type lubricant to the threaded portion of rear oxygen sensor, and leave it for one minute or more.
- 5) Remove the rear oxygen sensor.

#### CAUTION:

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



- (A) Rear oxygen sensor RH  
(B) Rear oxygen sensor LH

### B: INSTALLATION

#### CAUTION:

If lubricant is spilled over the exhaust pipe, wipe it off with cloth to avoid emission of smoke or causing a fire.

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

#### CAUTION:

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

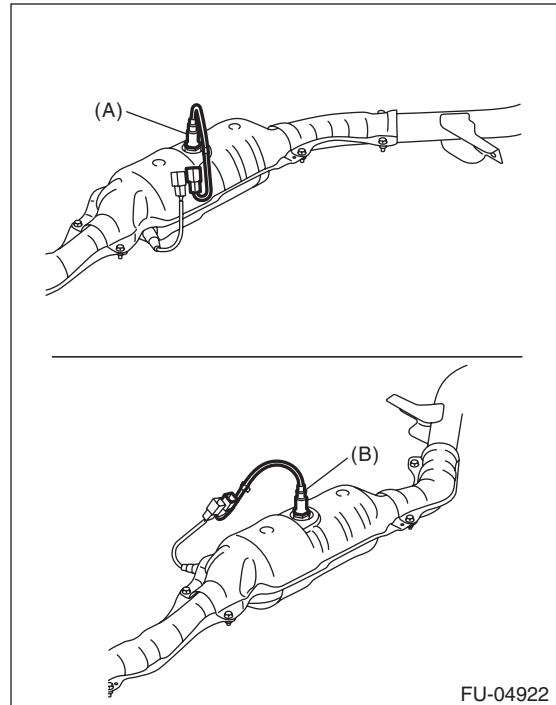
#### Anti-seize compound:

**NEVER-SEEZ NSN, JET LUBE SS-30 or equivalent**

- 2) Install the rear oxygen sensor.

#### Tightening torque:

**21 N·m (2.1 kgf-m, 15.5 ft-lb)**



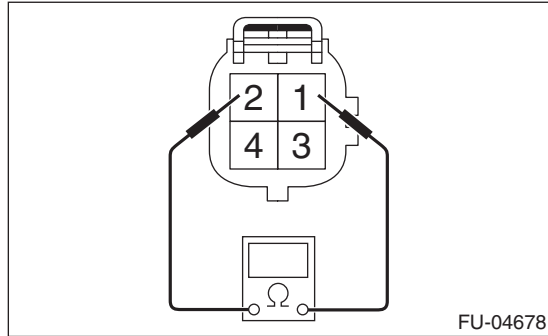
- (A) Rear oxygen sensor RH  
(B) Rear oxygen sensor LH

- 3) Install the front exhaust pipe. <Ref. to EX(H6DO)-5, INSTALLATION, Front Exhaust Pipe.>
- 4) Lower the vehicle.
- 5) Connect the battery ground terminal.



## C: INSPECTION

- 1) Check the rear oxygen (A/F) sensor for deformation, cracks or other damages.
- 2) Check the resistance between rear oxygen (A/F) sensor terminals.



Terminal No.	Standard
1 and 2	$5.6^{+0.8}_{-0.6} \Omega$ (when 20°C (68°F))

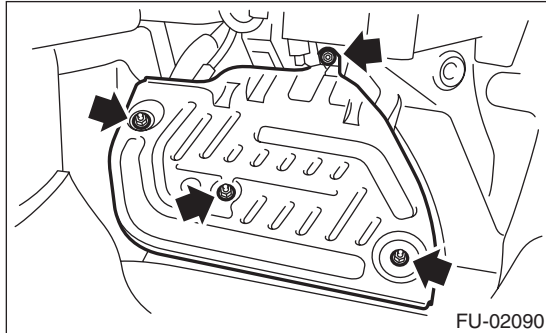
# Engine Control Module (ECM)

## FUEL INJECTION (FUEL SYSTEMS)

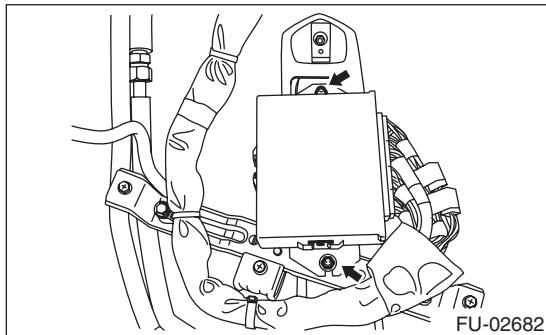
### 17.Engine Control Module (ECM)

#### A: REMOVAL

- 1) Disconnect the ground cable from battery.
- 2) Remove the front pillar lower trim and console side panel lower RH of passenger's side.
- 3) Detach the floor mat of passenger's seat.
- 4) Remove the protect cover.



- 5) Remove the ECM from vehicle.



#### B: INSTALLATION

Install in the reverse order of removal.

##### CAUTION:

- When the ECM of model with immobilizer has been replaced, be sure to perform the registration of immobilizer system. (Refer to "PC application help for Subaru Select Monitor".)
- If replacing ECM or the bracket, replace both parts with new parts at a time.
- After installing the bracket to ECM, do not separate the bracket.
- If the bracket has been installed to ECM in the wrong direction, replace both parts to new parts.

##### NOTE:

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

##### *Tightening torque:*

*7.5 N·m (0.8 kgf-m, 5.5 ft-lb)*

#### C: INSPECTION

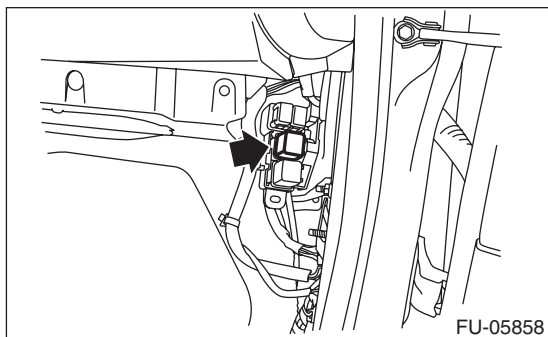
Check that the ECM has no deformation, cracks or other damages.

## 18. Main Relay

### A: REMOVAL

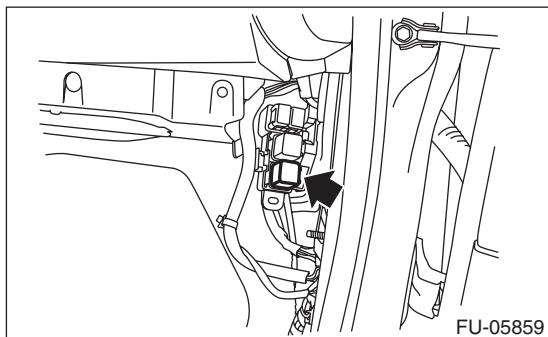
#### 1. MAIN RELAY

- 1) Disconnect the ground cable from battery.
- 2) Remove the passenger's front door scuff plate. <Ref. to EI-44, FRONT DOOR SCUFF PLATE, REMOVAL, Side Trim.>
- 3) Remove the front pillar lower trim. <Ref. to EI-44, FRONT PILLAR LOWER TRIM, REMOVAL, Side Trim.>
- 4) Remove the main relay from the relay holder.



#### 2. MAIN RELAY 2

- 1) Disconnect the ground cable from battery.
- 2) Remove the passenger's front door scuff plate. <Ref. to EI-44, FRONT DOOR SCUFF PLATE, REMOVAL, Side Trim.>
- 3) Remove the front pillar lower trim. <Ref. to EI-44, FRONT PILLAR LOWER TRIM, REMOVAL, Side Trim.>
- 4) Remove main relay 2 from the relay holder.

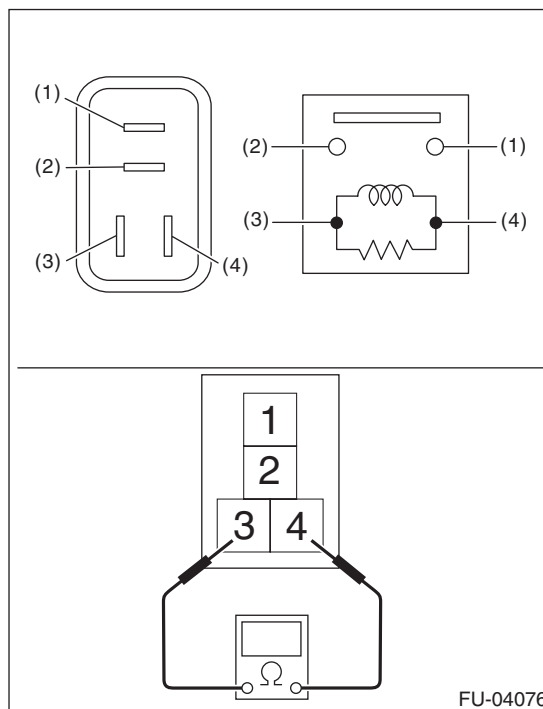


### B: INSTALLATION

Install in the reverse order of removal.

### C: INSPECTION

- 1) Check that the main relay has no deformation, cracks or other damages.
- 2) Measure the resistance between main relay terminals.

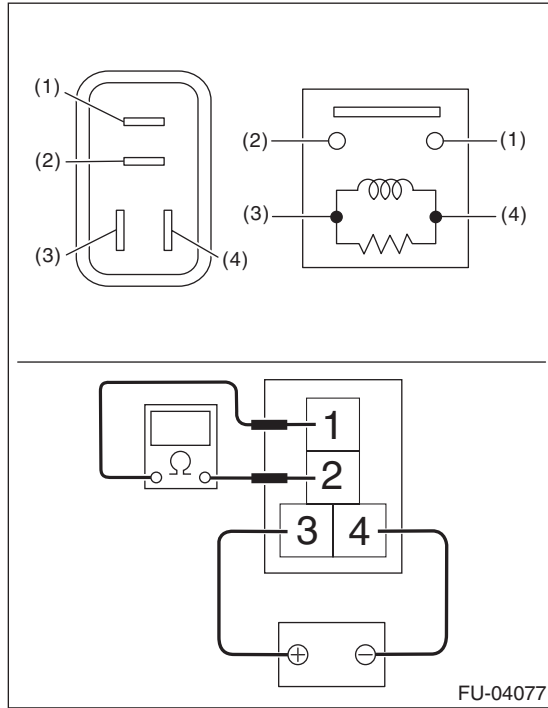


Terminal No.	Standard
1 and 2	1 M $\Omega$ or more
3 and 4	130.4 — 230.8 $\Omega$ (when 20°C (68°F))

# Main Relay

## FUEL INJECTION (FUEL SYSTEMS)

3) Connect battery positive terminal to terminal No. 3 and battery ground terminal to terminal No. 4, and measure the resistance between the main relay terminals.

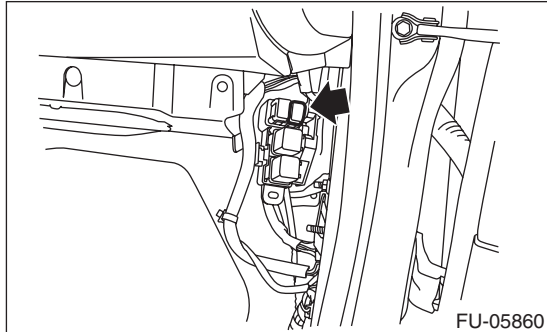


Terminal No.	Standard
1 and 2	Less than 1 $\Omega$

## 19. Fuel Pump Relay

### A: REMOVAL

- 1) Disconnect the ground cable from battery.
- 2) Remove the passenger's front door scuff plate. <Ref. to EI-44, FRONT DOOR SCUFF PLATE, REMOVAL, Side Trim.>
- 3) Remove the front pillar lower trim. <Ref. to EI-44, FRONT PILLAR LOWER TRIM, REMOVAL, Side Trim.>
- 4) Remove the fuel pump relay from the relay holder.

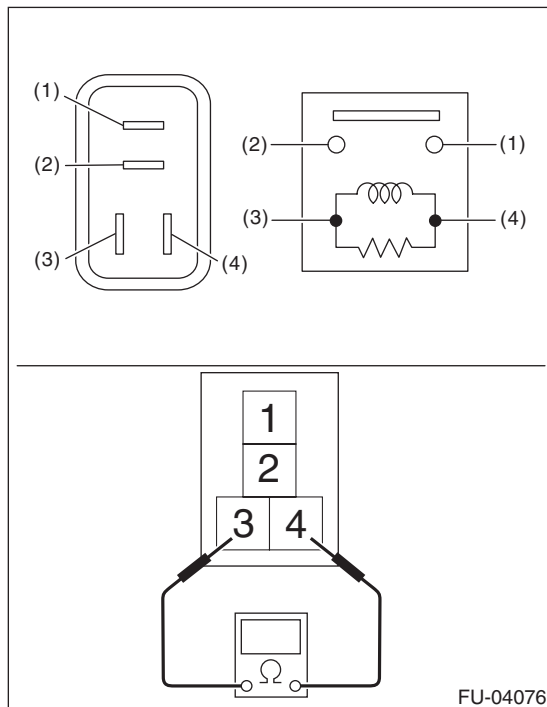


### B: INSTALLATION

Install in the reverse order of removal.

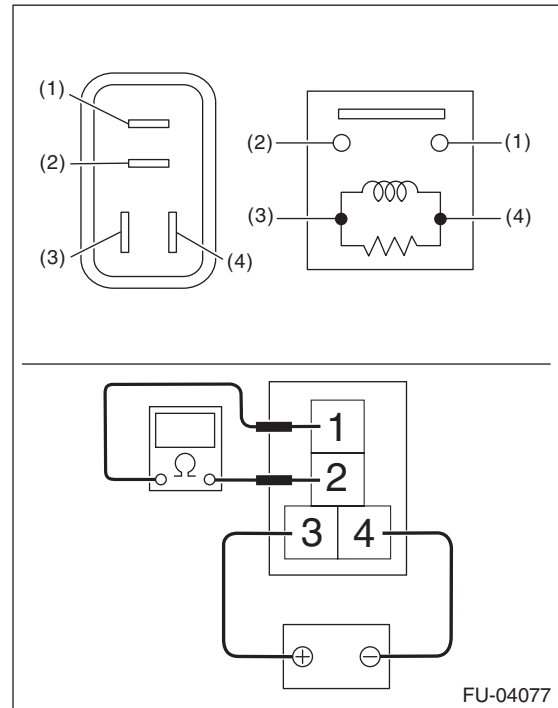
### C: INSPECTION

- 1) Check that the fuel pump relay has no deformation, cracks or other damages.
- 2) Measure the resistance between fuel pump relay terminals.



Terminal No.	Standard
1 and 2	1 MΩ or more
3 and 4	93.8 — 136.4 Ω (when 20°C (68°F))

- 3) Connect battery positive terminal to terminal No. 3 and battery ground terminal to terminal No. 4, and measure the resistance between the fuel pump relay terminals.



Terminal No.	Standard
1 and 2	Less than 1 Ω

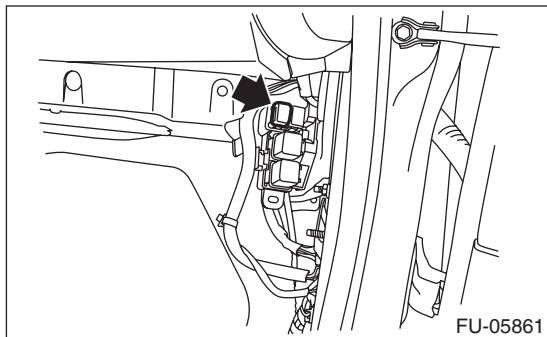
# Electronic Throttle Control Relay

FUEL INJECTION (FUEL SYSTEMS)

## 20. Electronic Throttle Control Relay

### A: REMOVAL

- 1) Disconnect the ground cable from battery.
- 2) Remove the passenger's front door scuff plate. <Ref. to EI-44, FRONT DOOR SCUFF PLATE, REMOVAL, Side Trim.>
- 3) Remove the front pillar lower trim. <Ref. to EI-44, FRONT PILLAR LOWER TRIM, REMOVAL, Side Trim.>
- 4) Remove the electronic throttle control relay from the relay holder.

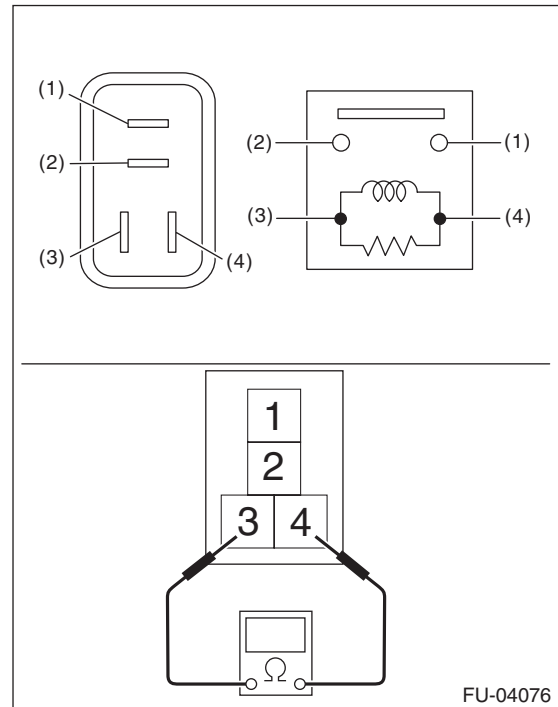


### B: INSTALLATION

Install in the reverse order of removal.

### C: INSPECTION

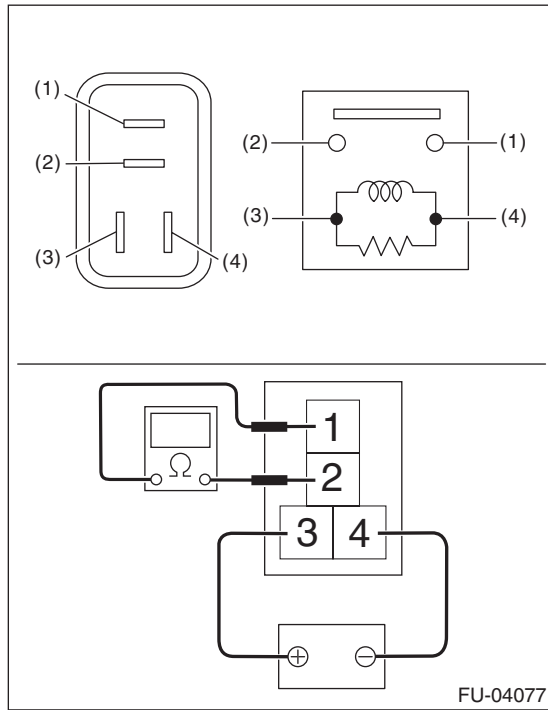
- 1) Check that the electronic throttle control relay has no deformation, cracks or other damages.
- 2) Measure the resistance between electronic throttle control relay terminals.



Terminal No.	Standard
1 and 2	1 M $\Omega$ or more
3 and 4	93.8 — 136.4 $\Omega$ (when 20°C (68°F))

# Electronic Throttle Control Relay

3) Connect battery positive terminal to terminal No. 3 and battery ground terminal to terminal No. 4, and measure the resistance between the electronic throttle control relay terminals.



Terminal No.	Standard
1 and 2	Less than 1 $\Omega$

# Fuel Pump Control Unit

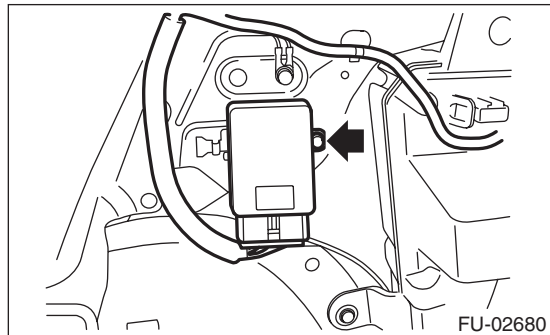
FUEL INJECTION (FUEL SYSTEMS)

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## 21. Fuel Pump Control Unit

### A: REMOVAL

- 1) Disconnect the ground cable from battery.
- 2) Remove the rear quarter trim (right side). <Ref. to EI-46, REMOVAL, Rear Quarter Trim.>
- 3) Disconnect the connector from fuel pump control unit.
- 4) Remove the fuel pump control unit.



### B: INSTALLATION

Install in the reverse order of removal.

**Tightening torque:**

**13 N·m (1.3 kgf-m, 9.6 ft-lb)**

### C: INSPECTION

Check that the fuel pump control unit has no deformation, cracks or other damages.



## 22. Fuel

### A: PROCEDURE

#### 1. RELEASING OF FUEL PRESSURE

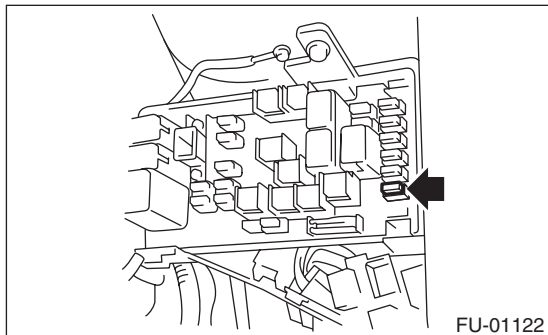
##### WARNING:

Place “NO OPEN FLAMES” signs near the working area.

##### CAUTION:

Be careful not to spill fuel.

1) Remove the fuse of fuel pump from main fuse box.



- 2) Start the engine and run it until it stalls.
- 3) After the engine stalls, crank it for five more seconds.
- 4) Turn the ignition switch to OFF.
- 5) Install the fuse of fuel pump to the main fuse box.

#### 2. DRAINING FUEL (WITH SUBARU SELECT MONITOR)

##### WARNING:

Place “NO OPEN FLAMES” signs near the working area.

##### CAUTION:

Be careful not to spill fuel.

##### NOTE:

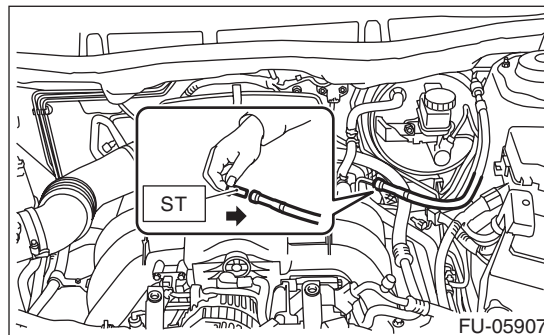
- If the fuel pump cannot be driven, refer to the procedures for draining from the fuel filler hose. <Ref. to FU(H6DO)-59, DRAINING FUEL (THROUGH THE FUEL FILLER HOSE), PROCEDURE, Fuel.>
  - Be careful not to let the battery run-out.
- 1) Release the fuel pressure. <Ref. to FU(H6DO)-59, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
  - 2) Remove the collector cover.

3) Disconnect the fuel delivery hose by pushing the ST in the direction of the arrow.

ST 42099AE000 QUICK CONNECTOR RELEASE

##### CAUTION:

- Be careful not to spill fuel.
- Catch the fuel from hoses using a container or cloth.



- 4) Connect ST to the fuel delivery hose.  
ST 18471AA000 FUEL PIPE ADAPTER
- 5) Connect the gasoline proof hose to ST and put the end of the hose in the container.
- 6) Drive the fuel pump and drain the fuel using Subaru Select Monitor. (Refer to “PC application help for Subaru Select Monitor”.)

##### CAUTION:

Be careful not to spill fuel.

7) Install the related parts in the reverse order after draining the fuel.

#### 3. DRAINING FUEL (THROUGH THE FUEL FILLER HOSE)

##### WARNING:

Place “NO OPEN FLAMES” signs near the working area.

##### CAUTION:

- Be careful not to spill fuel.
  - Fuel may remain in the fuel filler pipe. Draining the fuel from the fuel filler pipe through the fill opening using the gasoline proof pump and the gasoline proof hose (ø10 or less) before the operation.
- 1) Lift up the vehicle.
  - 2) Remove the rear exhaust pipe and muffler. <Ref. to EX(H6DO)-7, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H6DO)-9, REMOVAL, Muffler.>
  - 3) Open the fuel filler lid and remove the fuel filler cap.
  - 4) Drain the fuel from the fuel filler pipe through the filler opening using the gasoline proof pump and the gasoline proof hose (ø10 or less).

# Fuel

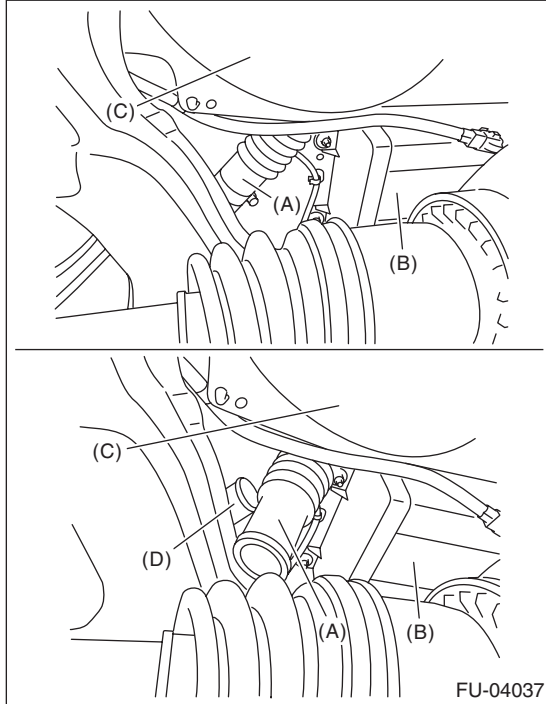
## FUEL INJECTION (FUEL SYSTEMS)

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5) Disconnect the fuel filler hoses from the fuel filler pipe.

**CAUTION:**

- **Be careful not to spill fuel.**
- **Catch the fuel from hoses using a container or cloth.**



- (A) Fuel filler hose
- (B) Canister
- (C) Fuel tank
- (D) Fuel filler pipe

6) Set the container under the vehicle and insert the gasoline proof hose ( $\varnothing 10$  or less) into the fuel filler hose to drain the fuel.

**CAUTION:**

**Be careful not to spill fuel.**

7) Install the related parts in the reverse order after draining the fuel.

**Tightening torque:**

**2.5 N·m (0.3 kgf-m, 1.8 ft-lb)**

## 23. Fuel Tank

### A: REMOVAL

**WARNING:**

Place "NO OPEN FLAMES" signs near the working area.

**CAUTION:**

Be careful not to spill fuel.

1) Release the fuel pressure. <Ref. to FU(H6DO)-59, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>

2) Drain fuel. <Ref. to FU(H6DO)-59, DRAINING FUEL (WITH SUBARU SELECT MONITOR), PROCEDURE, Fuel.>

3) Disconnect the ground cable from battery.

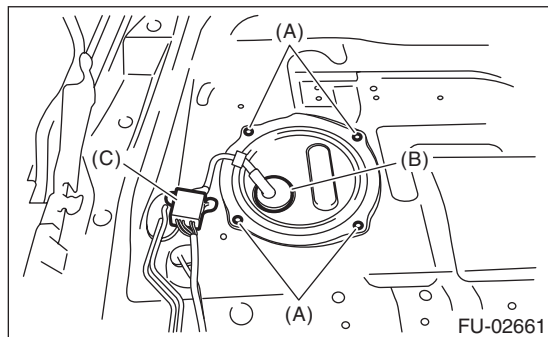
4) Remove the second row seats. <Ref. to SE-15, REMOVAL, Second Seat.>

5) Remove the service hole cover of fuel pump.

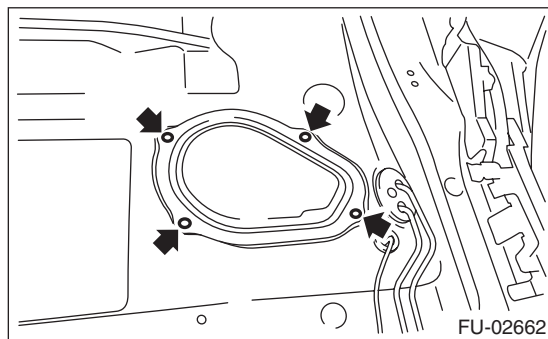
(1) Disconnect the connector (C).

(2) Remove the bolt (A).

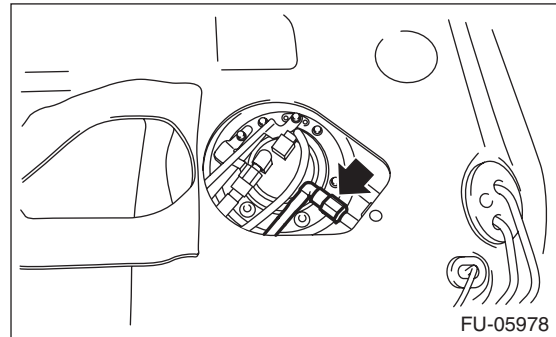
(3) Push the grommet (B) down and remove service hole cover.



6) Remove the service hole cover of fuel sub level sensor.



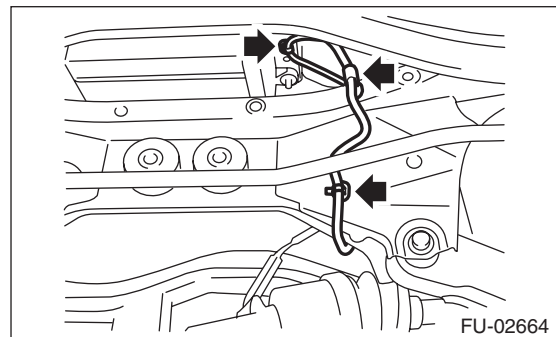
7) Disconnect the quick connector on the fuel delivery tube. <Ref. to FU(H6DO)-75, REMOVAL, Fuel Delivery and Evaporation Lines.>



8) Remove the rear wheels.

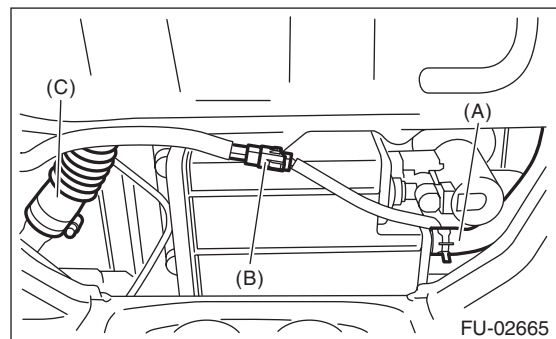
9) Lift up the vehicle.

10) Remove the clip holding the harness.



11) Remove the rear suspension assembly. <Ref. to RS-17, REMOVAL, Rear Sub Frame.>

12) Disconnect purge hose (A), connector (B) and fuel filler hose (C).



# Fuel Tank

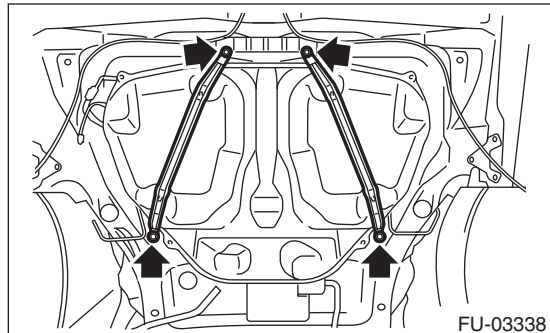
## FUEL INJECTION (FUEL SYSTEMS)

13) Remove the fuel tank from the vehicle.

### WARNING:

- A helper is required to perform this work.
- Fuel may remain in the fuel tank. This will cause the left and right sides to be unbalanced. Be careful not to drop the fuel tank when removing.

- (1) Support the fuel tank with the transmission jack.
- (2) Remove the fuel tank band that holds the fuel tank.
- (3) Remove the fuel tank from the vehicle.



## B: INSTALLATION

1) Install the fuel tank to the vehicle.

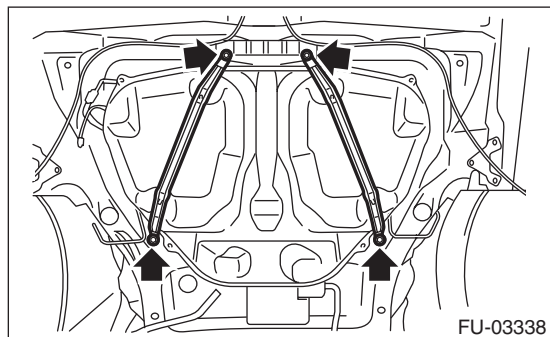
### WARNING:

A helper is required to perform this work.

- (1) Lift the fuel tank with the transmission jack.
- (2) Mount the fuel tank to the vehicle with a jack.
- (3) Install the fuel tank band that holds the fuel tank.

### Tightening torque:

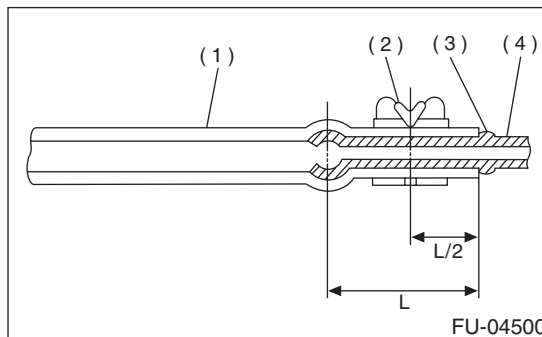
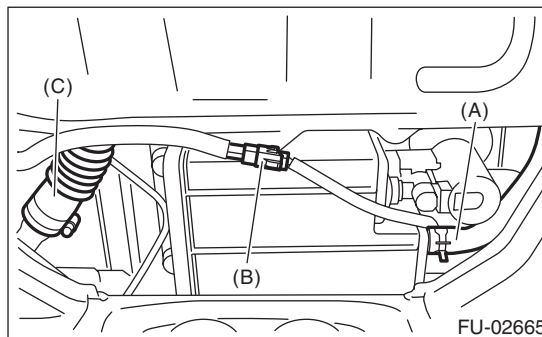
**33 N-m (3.4 kgf-m, 24.3 ft-lb)**



2) Connect purge hose (A), connector (B) and fuel filler hose (C).

### Tightening torque:

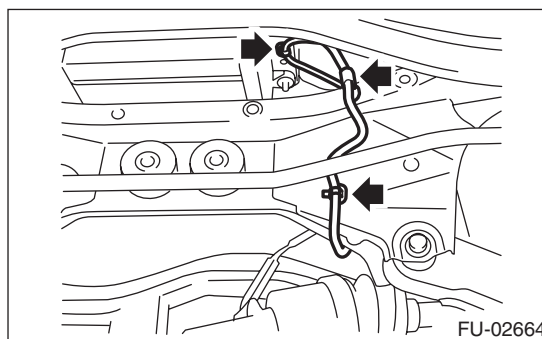
**2.5 N-m (0.3 kgf-m, 1.8 ft-lb)**



- (1) Hose
- (2) Clamp or clip
- (3) Spool
- (4) Pipe

3) Install the rear suspension assembly. <Ref. to RS-17, INSTALLATION, Rear Sub Frame.>

4) Install the clip that holds the harness.



5) Lower the vehicle.

6) Install the rear wheels.

### Tightening torque:

**Chromed plated wheel**

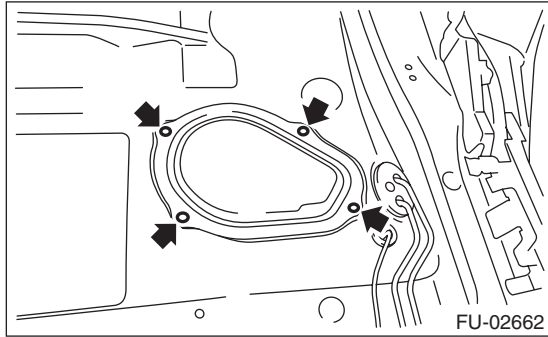
**150 N-m (15.3 kgf-m, 110.6 ft-lb)**

**Other than above**

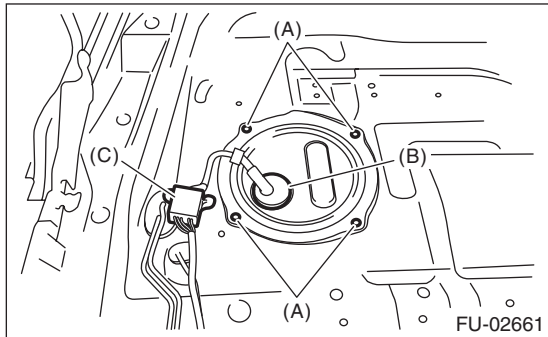
**120 N-m (12.2 kgf-m, 88.5 ft-lb)**

7) Connect the quick connector of the fuel delivery tube. <Ref. to FU(H6DO)-77, INSTALLATION, Fuel Delivery and Evaporation Lines.>

- 8) Install the service hole cover of fuel sub level sensor.



- 9) Install the service hole cover of fuel pump.  
 (1) Push on the grommet (B) to install it to the service hole cover.  
 (2) Tighten the bolt (A).  
 (3) Connect the connector (C).



- 10) Install the second seat. <Ref. to SE-15, INSTALLATION, Second Seat.>  
 11) Connect the battery ground terminal.  
 12) Inspect the wheel alignment and adjust if necessary.

### C: INSPECTION

- 1) Check that the fuel tank does not have holes, cracks or is damaged in any other way.  
 2) Make sure that the fuel pipe and fuel hose are not cracked and that the connections are tight.

# Fuel Filler Pipe

FUEL INJECTION (FUEL SYSTEMS)

## 24. Fuel Filler Pipe

### A: REMOVAL

#### WARNING:

Place "NO OPEN FLAMES" signs near the working area.

#### CAUTION:

Be careful not to spill fuel.

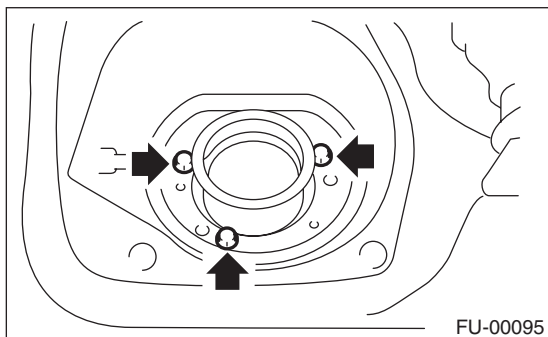
1) Release the fuel pressure. <Ref. to FU(H6DO)-59, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>

2) Drain fuel. <Ref. to FU(H6DO)-59, DRAINING FUEL (WITH SUBARU SELECT MONITOR), PROCEDURE, Fuel.>

3) Disconnect the ground cable from battery.

4) Open the fuel filler lid and remove the fuel filler cap.

5) Remove the bolt which secures the gasket.



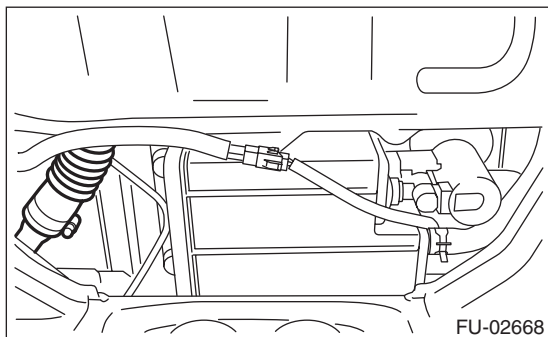
6) Remove the rear wheel RH.

7) Lift up the vehicle.

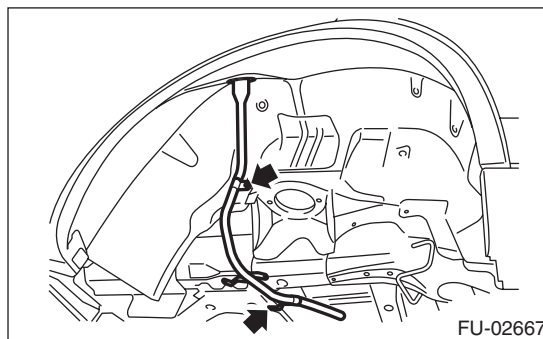
8) Remove the mud guard. <Ref. to EI-20, REMOVAL, Mud Guard.>

9) Remove the rear suspension assembly. <Ref. to RS-17, REMOVAL, Rear Sub Frame.>

10) Disconnect the fuel filler hose.



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



12) Remove the fuel filler pipe to the underside of the vehicle.

### B: INSTALLATION

1) Open the fuel filler lid.

2) Set the fuel saucer (A) with gasket (C), and insert the fuel filler pipe into hole from the inner side of apron.

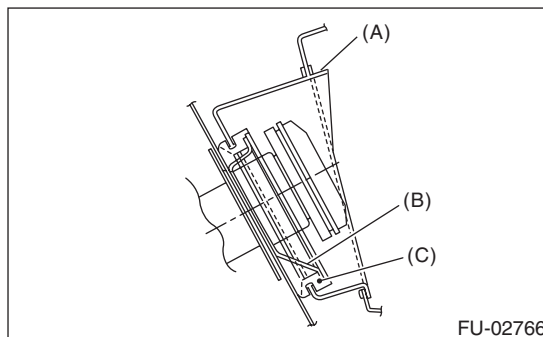
3) Align the holes in fuel filler pipe neck and set the cup (B), and tighten the bolts.

#### NOTE:

If the edges of gasket are folded toward inside, straighten it with a flat tip screwdriver.

#### Tightening torque:

**4.5 N·m (0.5 kgf-m, 3.3 ft-lb)**



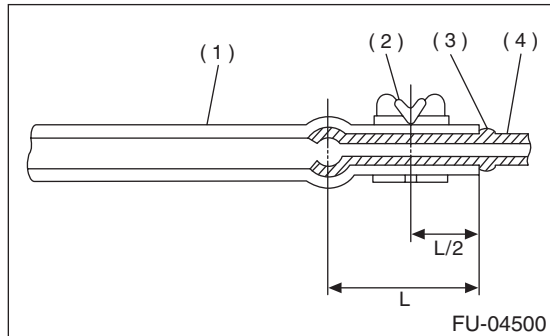
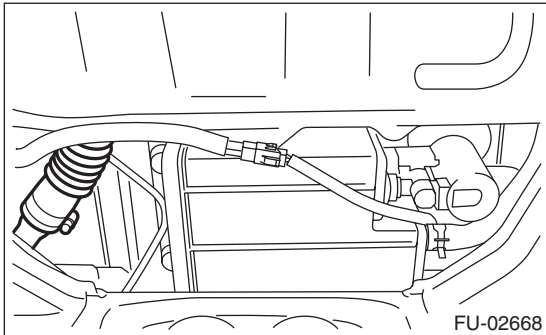
# Fuel Filler Pipe

FUEL INJECTION (FUEL SYSTEMS)

4) Correctly insert the fuel filler hose to specified position, and then tighten the clamp.

**Tightening torque:**

**2.5 N·m (0.3 kgf-m, 1.8 ft-lb)**

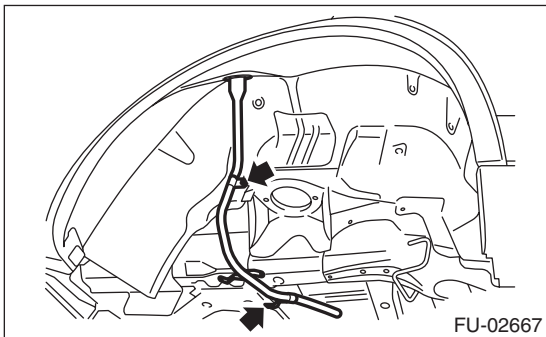


- (1) Hose
- (2) Clamp or clip
- (3) Spool
- (4) Pipe

5) Tighten the bolts which hold the fuel filler pipe on the body.

**Tightening torque:**

**7.5 N·m (0.8 kgf-m, 5.5 ft-lb)**



6) Install the rear suspension assembly. <Ref. to RS-17, INSTALLATION, Rear Sub Frame.>

7) Install the mud guard. <Ref. to EI-20, INSTALLATION, Mud Guard.>

8) Lower the vehicle.

9) Install the rear wheel RH.

**Tightening torque:**

**Chromed plated wheel**

**150 N·m (15.3 kgf-m, 110.6 ft-lb)**

**Other than above**

**120 N·m (12.2 kgf-m, 88.5 ft-lb)**

10) Connect the battery ground terminal.

11) Inspect the wheel alignment and adjust if necessary.

## C: INSPECTION

Check that the fuel filler pipe does not have deformation, cracks or other damages.

# Fuel Pump

## FUEL INJECTION (FUEL SYSTEMS)

### 25. Fuel Pump

#### A: REMOVAL

##### WARNING:

Place "NO OPEN FLAMES" signs near the working area.

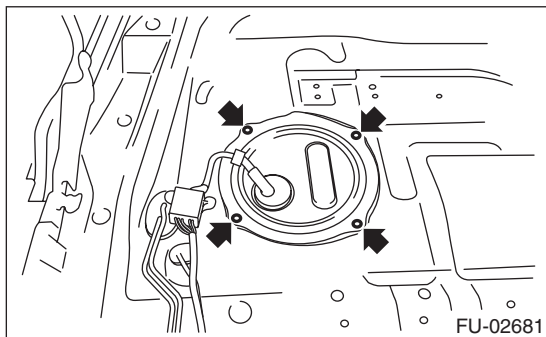
##### CAUTION:

- Be careful not to spill fuel.
- If the fuel gauge indicates that two thirds or more of the fuel is remaining, be sure to drain fuel before starting work to avoid the fuel to spill.

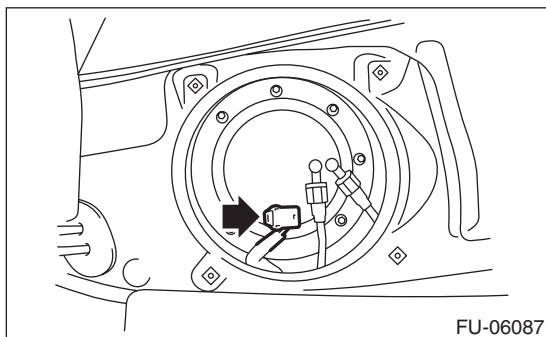
##### NOTE:

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

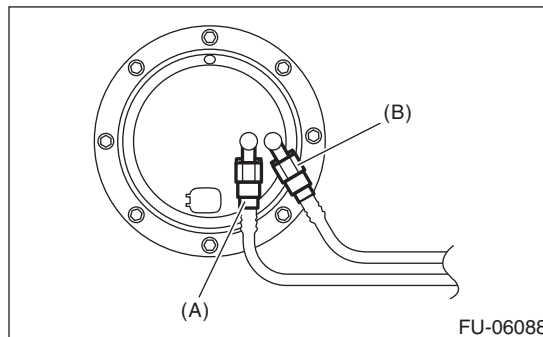
- 1) Release the fuel pressure. <Ref. to FU(H6DO)-59, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
- 2) Drain fuel. <Ref. to FU(H6DO)-59, DRAINING FUEL (WITH SUBARU SELECT MONITOR), PROCEDURE, Fuel.>
- 3) Disconnect the ground cable from battery.
- 4) Remove the second row seats. <Ref. to SE-15, REMOVAL, Second Seat.>
- 5) Remove the service hole cover.



- 6) Disconnect the connector from fuel pump.

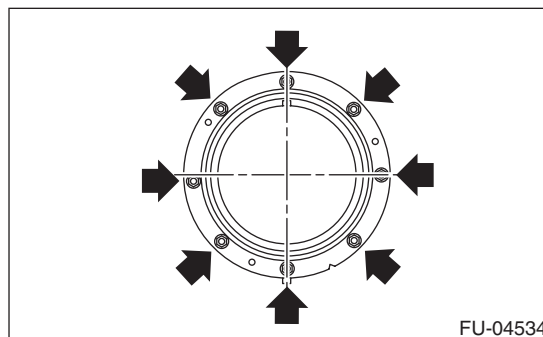


- 7) Disconnect the quick connectors of fuel delivery tube and fuel sub delivery tube. <Ref. to FU(H6DO)-75, REMOVAL, Fuel Delivery and Evaporation Lines.>



- (A) Fuel delivery tube  
(B) Fuel sub delivery tube

- 8) Remove the nuts securing the fuel pump upper plate to the fuel tank and remove the fuel pump upper plate.



- 9) Remove the fuel pump assembly from the fuel tank.



## B: INSTALLATION

Install in the reverse order of removal while being careful of the following.

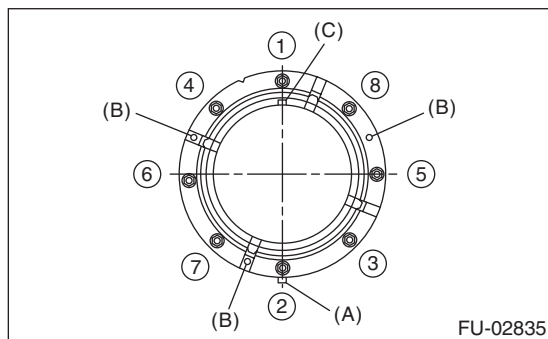
- Make sure the sealing portion is free from fuel or foreign matter before installation.
- Install with the protrusion (A) of gasket aimed at the front side of the vehicle.
- Insert the protrusion (B) of gasket into the upper plate. (3 places)
- Align the protrusion (C) of fuel pump assembly with the cutout on the upper plate.
- Tighten the nuts to the specified torque in the order as shown in the figure.

NOTE:

Use a new gasket.

**Tightening torque:**

**4.4 N·m (0.4 kgf·m, 3.2 ft·lb)**

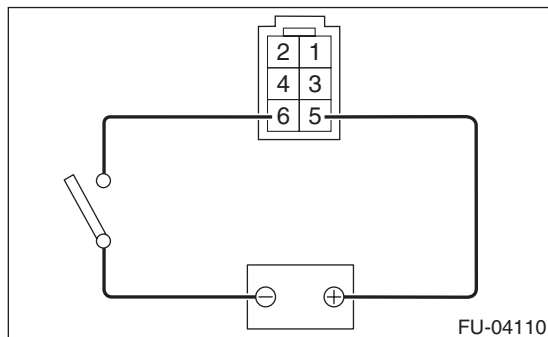


## C: INSPECTION

- 1) Check that the fuel pump has no deformation, cracks or other damages.
- 2) Connect the battery positive terminal to terminal No. 5 and the battery ground terminal to terminal No. 6, and inspect the fuel pump operation.

**WARNING:**

- **Wipe off fuel completely.**
- **Keep the battery as far apart from fuel pump as possible.**
- **Do not run the fuel pump for a long time under non-load condition.**



# Fuel Level Sensor

FUEL INJECTION (FUEL SYSTEMS)

## 26. Fuel Level Sensor

### A: REMOVAL

**WARNING:**

Place "NO OPEN FLAMES" signs near the working area.

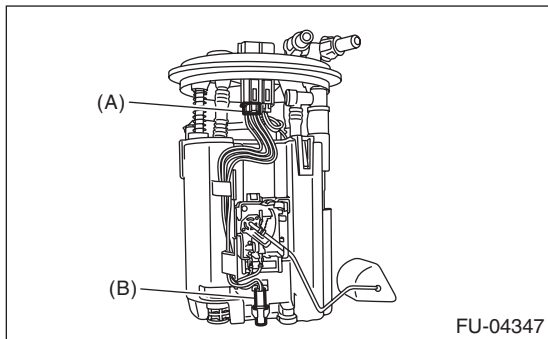
**CAUTION:**

- Be careful not to spill fuel.
- If the fuel gauge indicates that two thirds or more of the fuel is remaining, be sure to drain fuel before starting work to avoid the fuel to spill.

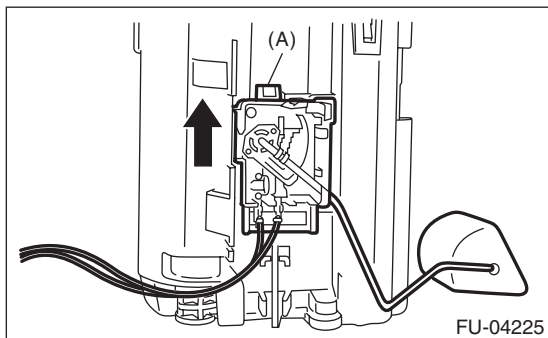
**NOTE:**

The fuel level sensor is built in fuel pump assembly.

- 1) Remove the fuel pump assembly. <Ref. to FU(H6DO)-66, REMOVAL, Fuel Pump.>
- 2) Disconnect the fuel level sensor connector (A) from the sub tank bracket assembly.
- 3) Remove the fuel temperature sensor (B) from sub tank.



- 4) Slide the fuel level sensor in the direction of the arrow and remove the fuel level sensor by pressing the claw (A) of the fuel level sensor.



### B: INSTALLATION

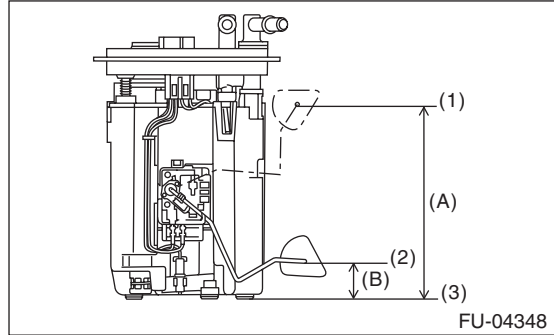
Install in the reverse order of removal.

### C: INSPECTION

- 1) Check that the fuel level sensor has no damage.
- 2) Measure the fuel level sensor float position.

**NOTE:**

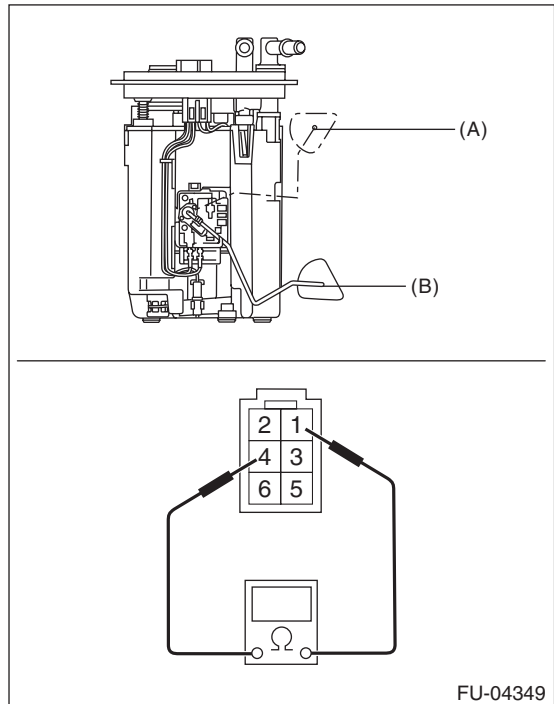
When inspecting the fuel level sensor, perform the work with the sensor installed to the fuel pump.



- (1) FULL
- (2) EMPTY
- (3) Fuel tank seating surface

Float position	Standard
FULL to Fuel tank seating surface (A)	135 ±4 mm (5.315±0.157 in)
EMPTY to Fuel tank seating surface (B)	23.7 ±4 mm (0.933±0.157 in)

- 3) Measure the resistance between fuel level sensor terminals.



Float position	Terminal No.	Standard
FULL (A)	1 and 4	2.0±1.0 Ω
EMPTY (B)		31.9±1.0 Ω

## 27. Fuel Sub Level Sensor

### A: REMOVAL

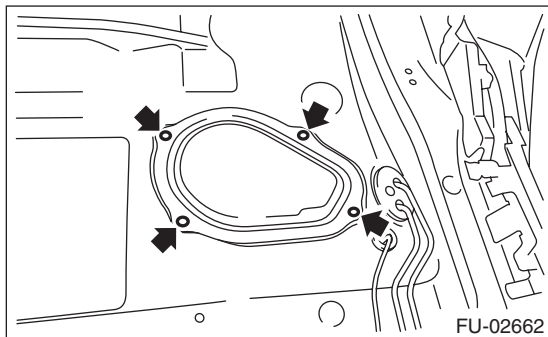
**WARNING:**

Place "NO OPEN FLAMES" signs near the working area.

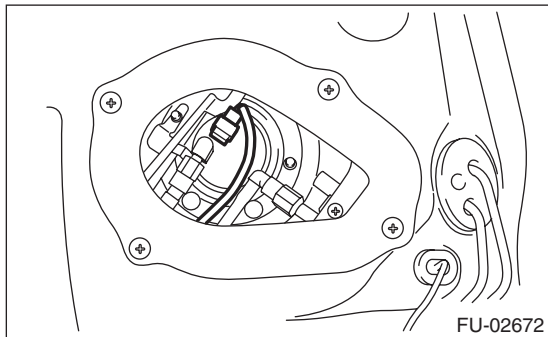
**CAUTION:**

- Be careful not to spill fuel.
- If the fuel gauge indicates that two thirds or more of the fuel is remaining, be sure to drain fuel before starting work to avoid the fuel to spill.

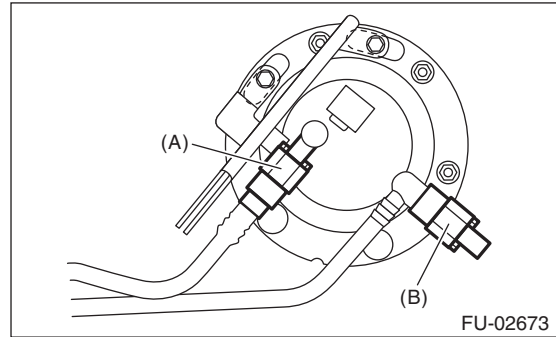
- 1) Release the fuel pressure. <Ref. to FU(H6DO)-59, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
- 2) Drain fuel. <Ref. to FU(H6DO)-59, DRAINING FUEL (WITH SUBARU SELECT MONITOR), PROCEDURE, Fuel.>
- 3) Disconnect the ground cable from battery.
- 4) Remove the second row seats. <Ref. to SE-15, REMOVAL, Second Seat.>
- 5) Remove the service hole cover.



- 6) Disconnect the connector from the fuel sub level sensor.

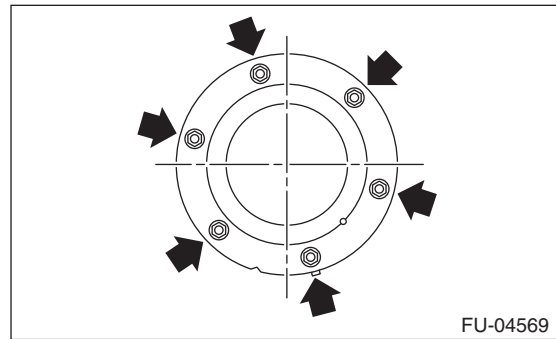


- 7) Disconnect the quick connectors of fuel delivery tube and fuel sub delivery tube. <Ref. to FU(H6DO)-75, REMOVAL, Fuel Delivery and Evaporation Lines.>



- (A) Fuel sub delivery tube  
(B) Fuel delivery tube

- 8) Remove the nuts securing the fuel sub level sensor upper plate to the fuel tank and remove the fuel sub level sensor upper plate.



- 9) Remove the fuel sub level sensor.

# Fuel Sub Level Sensor

## FUEL INJECTION (FUEL SYSTEMS)

### B: INSTALLATION

Install in the reverse order of removal while being careful of the following.

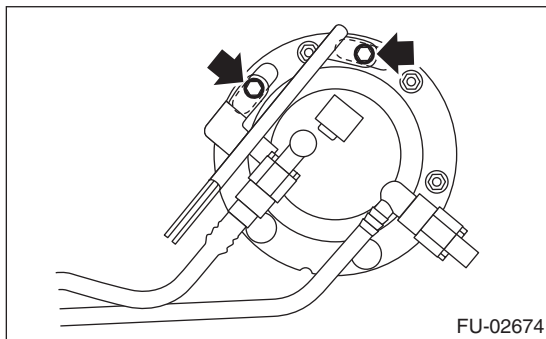
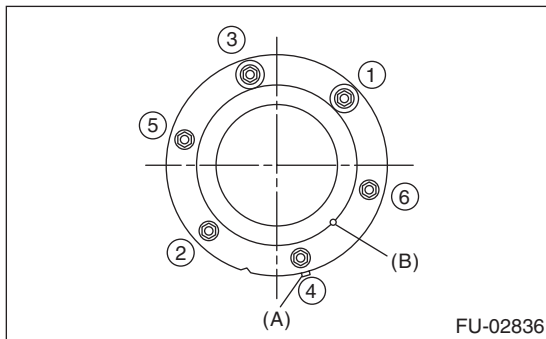
- Make sure the sealing portion is free from fuel or foreign matter before installation.
- Align protrusion (A) of the gasket to the position shown in the following figure.
- Align protrusion of the fuel sub level sensor to the cutout in the fuel sub level sensor upper plate.
- Tighten the nuts and bolts to the specified torque in the order as shown in the figure.

NOTE:

Use a new gasket.

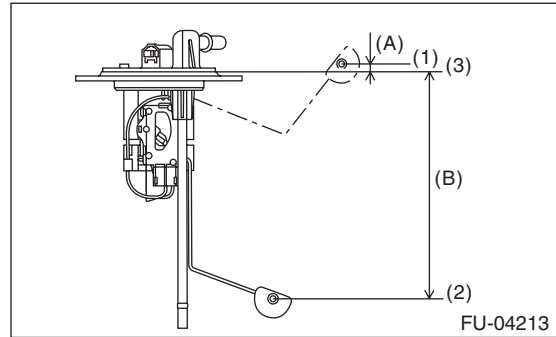
**Tightening torque:**

**4.4 N·m (0.4 kgf·m, 3.2 ft·lb)**



### C: INSPECTION

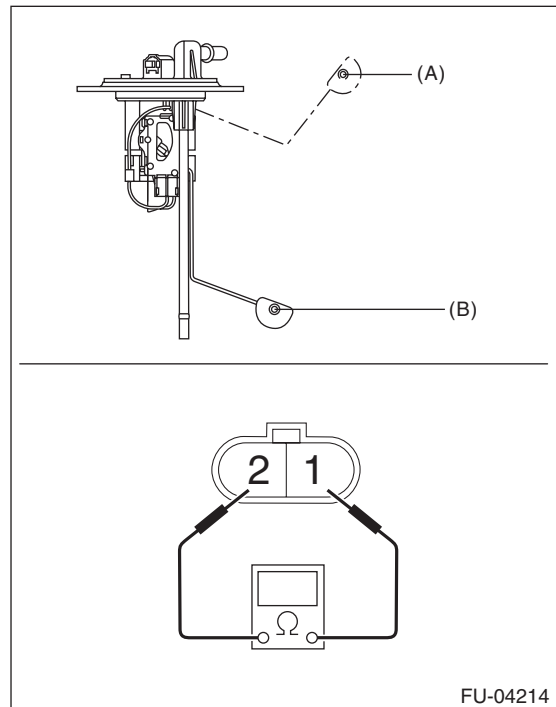
- 1) Check that the fuel sub level sensor has no damage.
- 2) Measure the fuel sub level sensor float position.



- (1) FULL  
(2) EMPTY  
(3) Datum points

Float position	Standard
FULL to Datum point (A)	5.3±3.5 mm (0.209±0.138 in)
EMPTY to Datum point (B)	160.6±3.5 mm (6.323±0.138 in)

- 3) Measure the resistance between fuel sub level sensor terminals.



Float position	Terminal No.	Standard
FULL (A)	1 and 2	2.0±1.0 Ω
EMPTY (B)		62.1±1.0 Ω

## 28. Fuel Filter

### A: REMOVAL

**WARNING:**

Place "NO OPEN FLAMES" signs near the working area.

**CAUTION:**

- Be careful not to spill fuel.
- If the fuel gauge indicates that two thirds or more of the fuel is remaining, be sure to drain fuel before starting work to avoid the fuel to spill.
- Be careful not to drop or apply any impact to the fuel pump during work. This may deteriorate its performance.

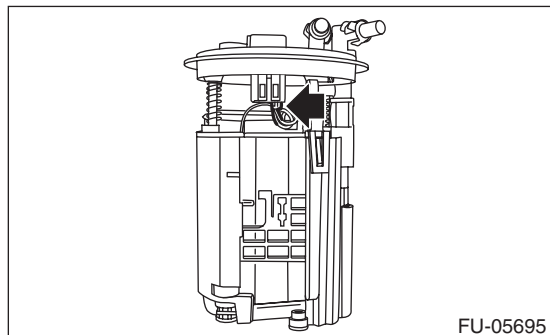
**NOTE:**

The fuel filter is built in fuel pump assembly.

1) Remove the fuel pump assembly. <Ref. to FU(H6DO)-66, REMOVAL, Fuel Pump.>

2) Remove the fuel level sensor and fuel temperature sensor. <Ref. to FU(H6DO)-68, REMOVAL, Fuel Level Sensor.>

3) Disconnect the pump assembly connector from sub tank bracket assembly.



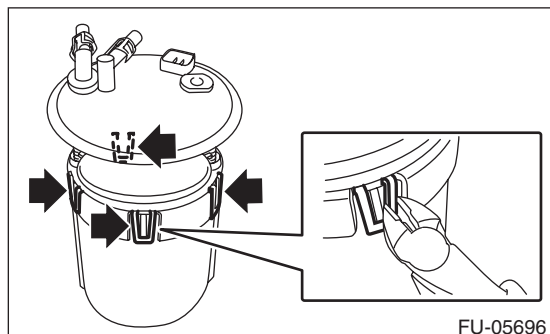
4) Cut off the tab holders connecting the sub tank bracket assembly and the sub tank in four locations, and separate the two.

**CAUTION:**

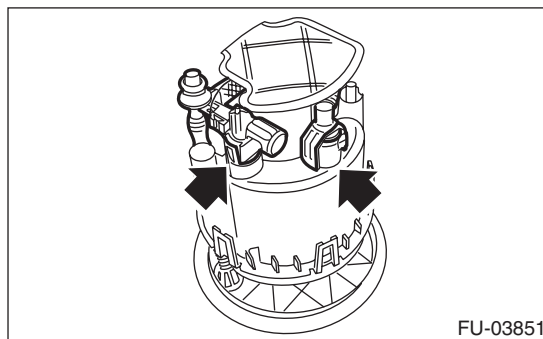
Be careful not to damage the sub tank.

**NOTE:**

If the O-ring is remaining on the sub tank, remove.



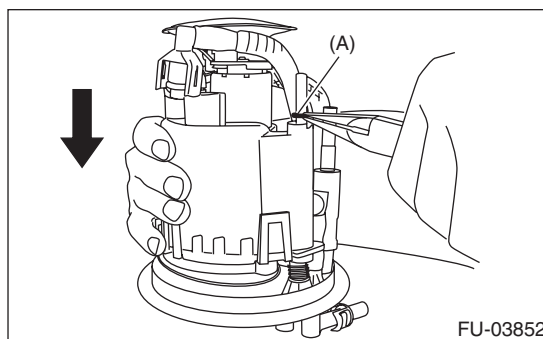
5) Disconnect two connectors of fuel delivery pipe from fuel filter assembly.



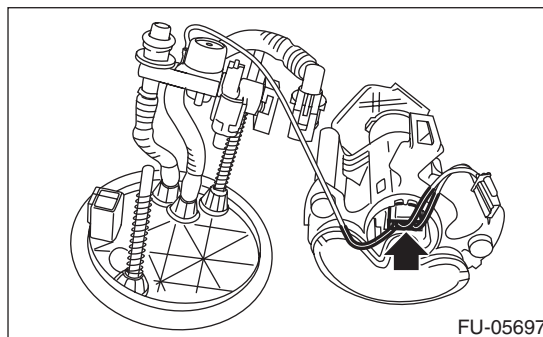
6) Push to compress the fuel filter assembly in the direction of the arrow, remove clip (A), and separate the sub tank bracket assembly and the fuel filter assembly.

**CAUTION:**

When separating the sub tank bracket assembly and the fuel filter assembly, be careful not to damage the ground wire.



7) Disconnect the connector from the pump assembly.



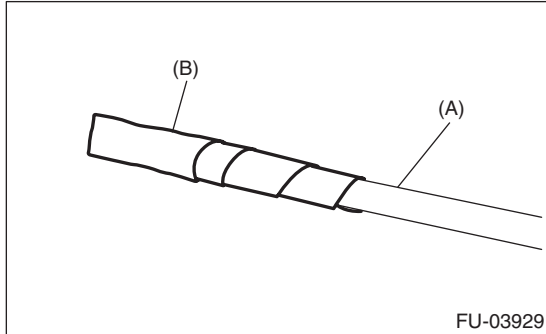
# Fuel Filter

## FUEL INJECTION (FUEL SYSTEMS)

8) Lift the two tab holders connecting the pump assembly to the fuel filter using a flat tip screwdriver [with a shaft diameter of approx. 3 mm (0.12 in)], etc., and separate the fuel filter and pump assembly.

### CAUTION:

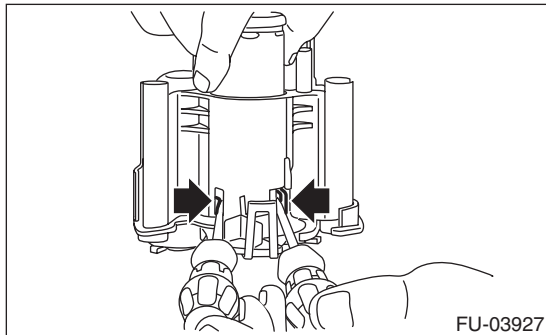
- To prevent damaging the tabs of the pump assembly, wrap the tip of flat tip screwdriver (A), etc. with tape (B).



- Be careful not to drop or apply any impact to the pump assembly.

### NOTE:

If the spacer and O-ring is remaining on the pump assembly, remove these.

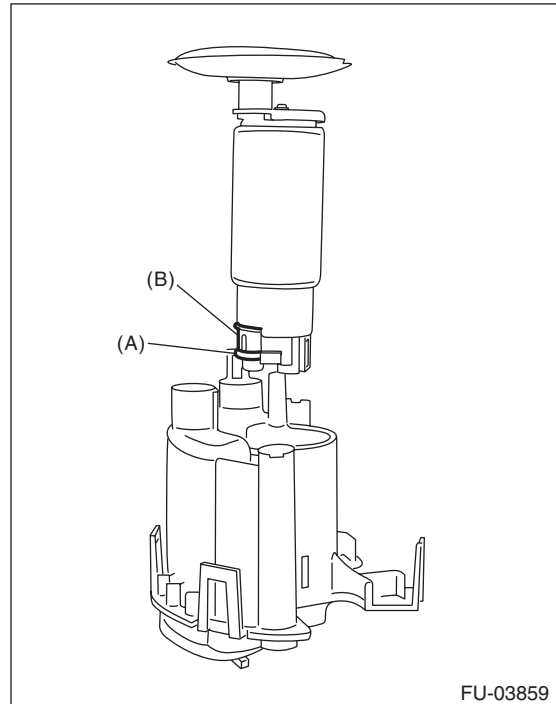


## B: INSTALLATION

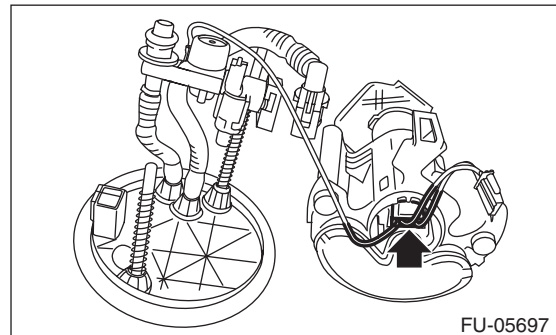
1) Assemble O-ring (A) and spacer (B) to the pump assembly and attach the pump assembly to the fuel filter.

### NOTE:

- Use new O-rings [8 mm (0.31 in) inner diameter].
- Use a new spacer.
- Apply gasoline to the O-ring.
- Insert the pump assembly until a “pop” is heard.



2) Connect the connector to the pump assembly.



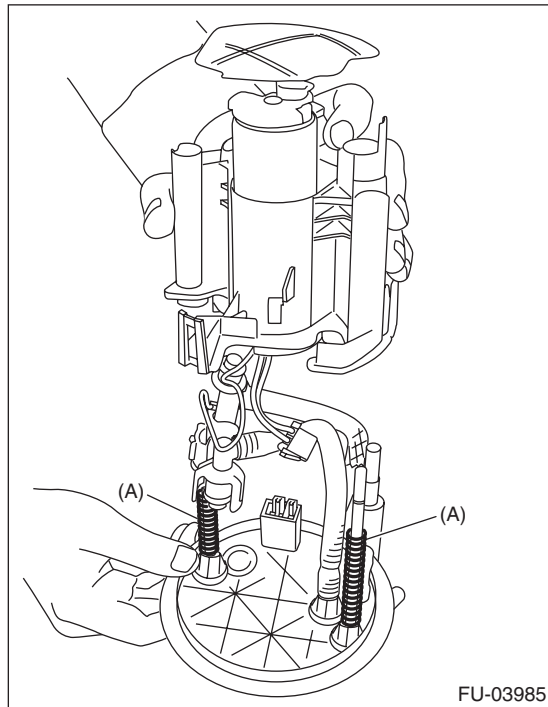
# Fuel Filter

## FUEL INJECTION (FUEL SYSTEMS)

3) Attach spring (A) to the metal rod of the sub tank bracket assembly, and assemble the fuel filter assembly.

**NOTE:**

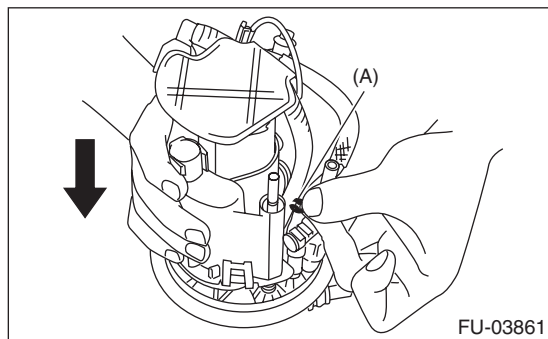
Use a new spring.



4) Push the fuel filter assembly in the direction of the arrow to compress, and attach clip (A).

**NOTE:**

Use a new clip.



5) Connect the fuel piping connector to the fuel filter assembly.

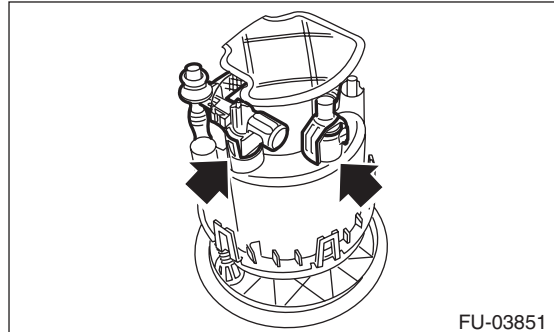
**NOTE:**

- Use new O-rings.
- Apply gasoline to the O-ring.
- The O-rings of the black and white connectors are identified by a difference in diameter. Be careful not to confuse the two during assembly.

**O-ring inner diameter:**

**Black connector O-ring [Approx. 7 mm (0.28 in)]**

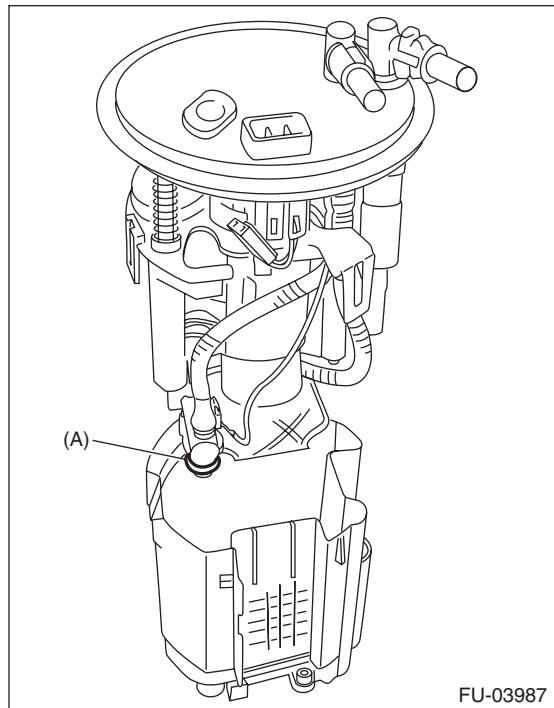
**White connector O-ring [Approx. 8 mm (0.31 in)]**



6) Attach the O-ring (A) to the fuel filter assembly, and attach the sub tank to the sub tank bracket assembly.

**NOTE:**

- Use new O-rings [8 mm (0.31 in) inner diameter].
- Apply gasoline to the O-ring.
- Insert the pump assembly until a “pop” is heard.

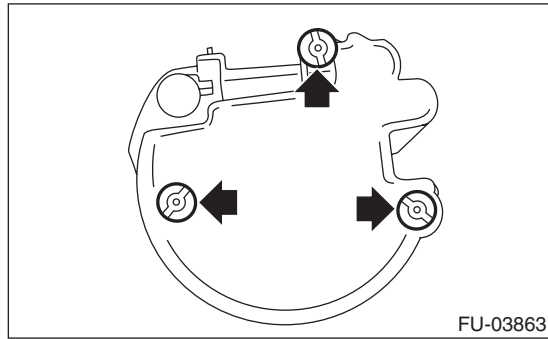


## Fuel Filter

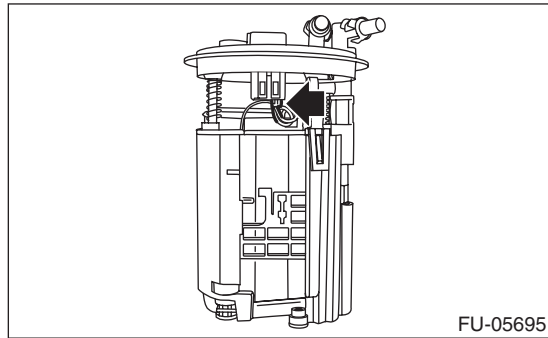
### FUEL INJECTION (FUEL SYSTEMS)

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7) Replace the cushion on the rear face of the sub tank with a new cushion.



8) Connect the pump assembly connector to the sub tank bracket assembly.



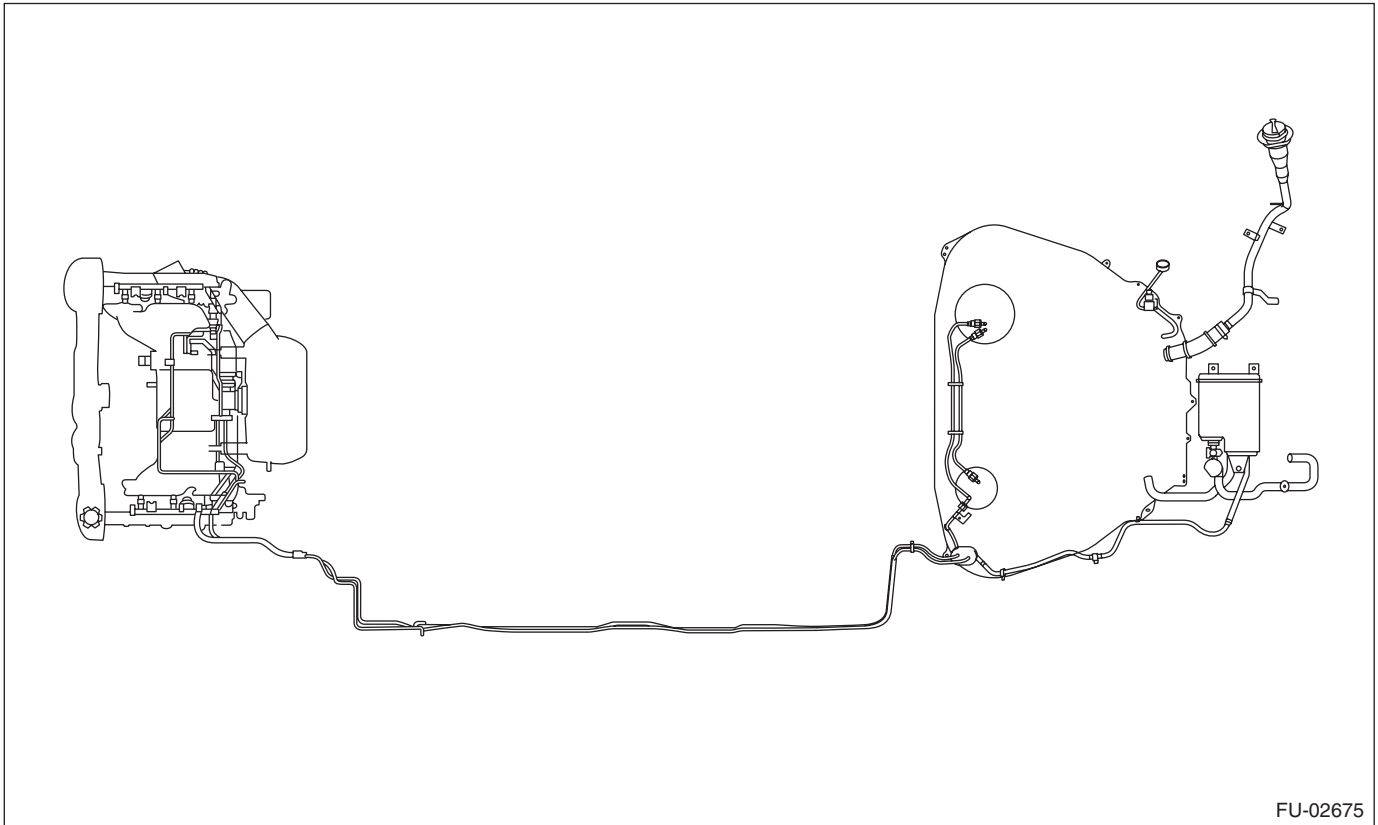
9) Install the fuel level sensor and fuel temperature sensor. <Ref. to FU(H6DO)-68, INSTALLATION, Fuel Level Sensor.>

10) Install the fuel pump assembly. <Ref. to FU(H6DO)-67, INSTALLATION, Fuel Pump.>



## 29. Fuel Delivery and Evaporation Lines

### A: REMOVAL



FU-02675

**WARNING:**

Place “NO OPEN FLAMES” signs near the working area.

**CAUTION:**

**Be careful not to spill fuel.**

- 1) Release the fuel pressure. <Ref. to FU(H6DO)-59, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
- 2) Open the fuel filler lid and remove the fuel filler cap.
- 3) Remove the floor mat. <Ref. to EI-48, REMOVAL, Floor Mat.>
- 4) Disconnect the fuel delivery pipe and hose and the evaporation pipe and hose.

# Fuel Delivery and Evaporation Lines

## FUEL INJECTION (FUEL SYSTEMS)

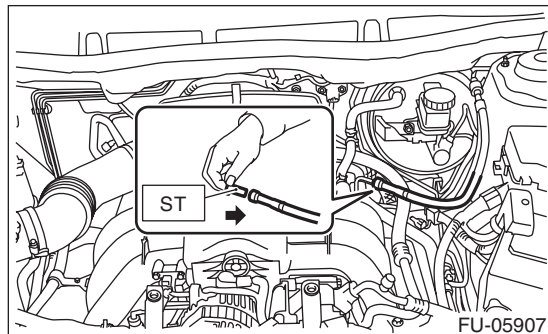
5) In the engine compartment, disconnect the fuel delivery hoses and evaporation hose.

### CAUTION:

- Be careful not to spill fuel.
- Catch the fuel from hoses using a container or cloth.

(1) Disconnect the quick connector of the fuel delivery line by pushing the ST in the direction of the arrow.

ST 42099AE000 QUICK CONNECTOR RELEASE



(2) Remove the clip and disconnect the evaporation hose.

6) Remove the fuel tank. <Ref. to FU(H6DO)-61, REMOVAL, Fuel Tank.>

7) Disconnect the quick connector, and remove the fuel delivery tube and fuel sub delivery tube from the fuel tank.

- When using ST

1. Attach ST to the pipe and push ST in the direction of arrow mark to disconnect the quick connector.

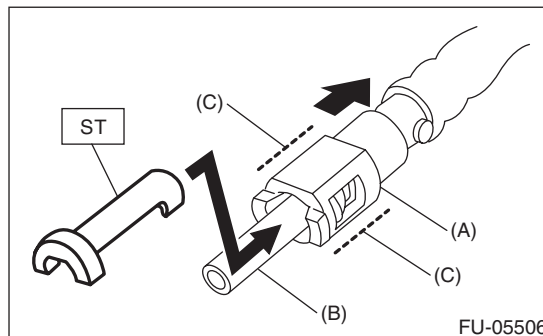
ST 42099AE000 QUICK CONNECTOR RELEASE

### CAUTION:

- Be careful not to spill fuel.
- Catch the fuel from hoses using a container or cloth.
- To disconnect the connector, hold (C) shown in the figure and pull in axial direction.
- If the connector and pipe are sticking to each other, push and pull the connector with ST pushed, and then pull the connector after it starts moving freely.
- When disconnecting the connector, do not bend or twist the tube forcibly. If the tube is bent, replace with a new part.

### NOTE:

Clean the pipe and quick connector, if they are covered with dust.

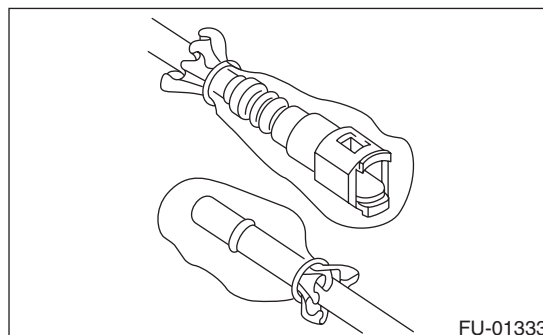


- (A) Quick connector
- (B) Pipe
- (C) Connector holding position

2. To prevent from damaging or entering foreign matter, wrap the pipes and quick connectors with plastic bag etc.

### CAUTION:

When reusing the retainer, do not disconnect the retainer from the connector.



- When not using ST  
1. Push the retainer in the direction of the arrow, disconnect the quick connector from pipe.

### CAUTION:

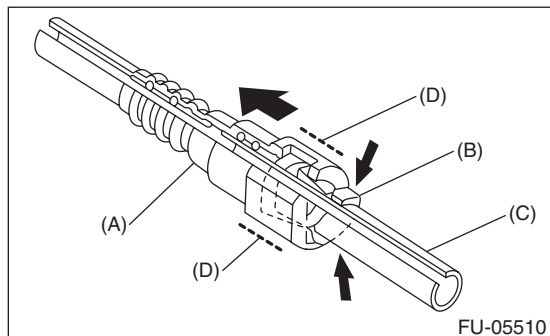
- Be careful not to spill fuel.
- Catch the fuel from hoses using a container or cloth.
- To disconnect the connector, hold (D) shown in the figure and pull in axial direction.
- If the connector and pipe are sticking to each other, push and pull the connector with the retainer pushed in the direction of the arrow, and then pull the connector after it starts moving freely.
- When disconnecting the connector, do not bend or twist the tube forcibly. If the tube is bent, replace with a new part.

# Fuel Delivery and Evaporation Lines

FUEL INJECTION (FUEL SYSTEMS)

## NOTE:

Clean the pipe and quick connector, if they are covered with dust.

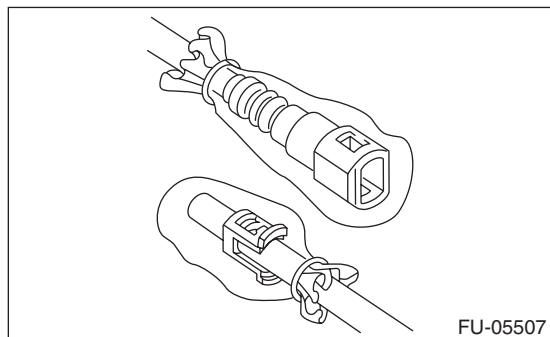


- (A) Quick connector
- (B) Retainer
- (C) Pipe
- (D) Connector holding position

2. To prevent from damaging or entering foreign matter, wrap the pipes and quick connectors with plastic bag etc.

## CAUTION:

When reusing the retainer, do not disconnect the retainer from the pipe.

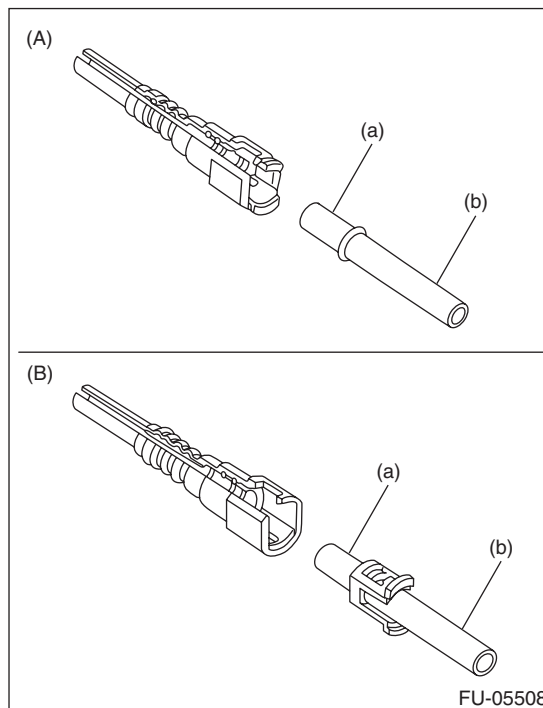


## B: INSTALLATION

### 1. CONNECTING THE FUEL LINE QUICK CONNECTOR

#### CAUTION:

- Make sure there are no damage or dust on connections. If necessary, clean seal surface of pipe.



- (A) When removed using the ST
- (B) When removed without using the ST
- (a) Seal surface
- (b) Pipe

- When reusing the retainer, make sure that neither scratches nor deformation exist on the retainer. If it is faulty, use a new part.

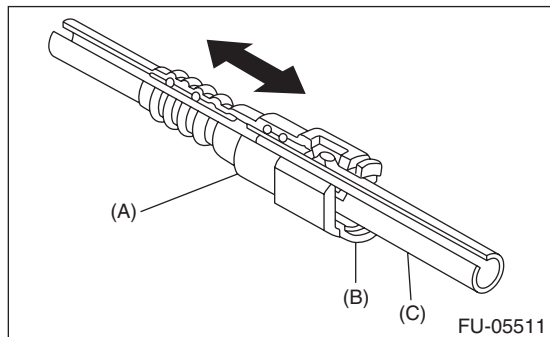
# Fuel Delivery and Evaporation Lines

## FUEL INJECTION (FUEL SYSTEMS)

1) Connect the quick connector to pipe.

### CAUTION:

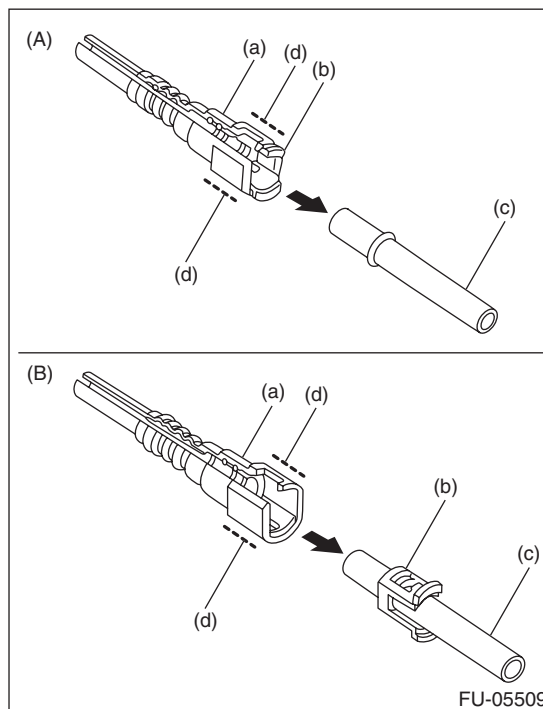
- Make sure that the quick connector is securely connected.



- (A) Quick connector
- (B) Retainer
- (C) Pipe

- Make sure the two retainer pawls are engaged in their mating positions in the quick connector.
- Be sure to inspect tubes and their connections for any leakage of fuel.
- To connect the connector, hold (d) shown in the figure and push in axial direction.

- When connecting the connector, do not bend or twist the tube forcibly. If the tube is bent, replace with a new part.



- (A) When removed using the ST
- (B) When removed without using the ST
- (a) Quick connector
- (b) Retainer
- (c) Pipe
- (d) Connector holding position

## 2. CONNECTING THE FUEL DELIVERY HOSE AND FUEL HOSE

Connect the fuel delivery hose or fuel hose as shown in the figure.

### CAUTION:

- If the connection portion has a spool or stopper, do not allow the end of the hose to bend or ride over by inserting the hose too deep.
- Be sure to inspect hoses and their connections for any leakage of fuel.

### NOTE:

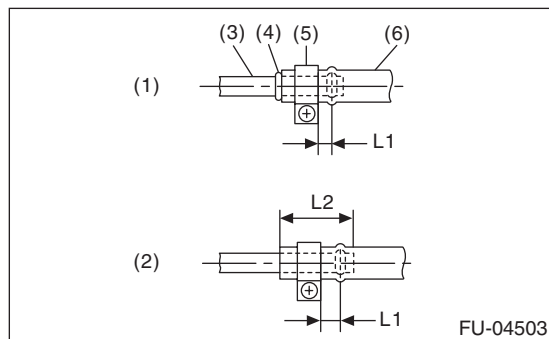
Use new fuel delivery hose and fuel hose.

### Tightening torque:

**1.25 N·m (0.1 kgf-m, 0.9 ft-lb)**

**L1: 2.5±1.5 mm (0.098±0.059 in)**

**L2: 22.5±2.5 mm (0.886±0.098 in)**

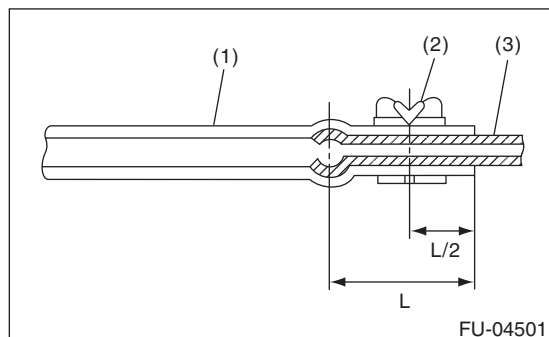


- (1) When there is a spool or bump
- (2) When there is no spool or bump
- (3) Pipe
- (4) Spool or bump
- (5) Clamp
- (6) Hose

## 3. EVAPORATION HOSE CONNECTION

Connect the evaporation hose to the pipe with an overlap of 15 to 20 mm (0.59 to 0.79 in).

**L = 17.5±2.5 mm (0.689±0.098 in)**



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

# Fuel System Trouble in General

## FUEL INJECTION (FUEL SYSTEMS)

### 30. Fuel System Trouble in General

#### A: INSPECTION

Trouble	Possible cause	Corrective action
Insufficient fuel supply to injector	a. Fuel pump does not operate.	
	○ Defective terminal contact	Inspect contact, especially ground, and tighten it securely.
	○ Trouble in electromagnetic or electronic circuit parts	Replace the faulty parts.
	b. Decline of fuel pump function	Replace the fuel pump.
	c. Clogged fuel filter	Replace the fuel filter. Clean or replace the fuel tank if necessary.
	d. Clogged or bent fuel line pipe, hose or tube	Clean, correct or replace the fuel line pipe, hose or tube.
	e. Air is mixed in fuel system.	Check the fuel line connections, correct or replace the defective part.
	f. Damaged diaphragm of pressure regulator	Replace the pressure regulator.
Leakage or blow out of fuel	a. Loose connections of fuel line pipe, hose or tube	Check the fuel line connections, correct or replace the defective part.
	b. Cracked fuel line pipe, hose or tube	Replace the fuel line pipe, hose or tube.
	c. Cracked fuel tank or defective welding part	Replace the fuel tank.
	d. Clogged or bent fuel line pipe, hose or tube	Clean, correct or replace the fuel line pipe, hose or tube.
Gasoline smell inside of compartment	a. Loose connections of fuel line pipe, hose or tube	Check the fuel line connections, correct or replace the defective part.
	b. Improper installation of rubber saucer	Correct or replace the rubber saucer.
	c. Defective canister	Replace the canister.
Defective fuel gauge	a. Defective operation of fuel level sensor	Replace the fuel level sensor.
	b. Defective operation of combination meter	Replace the combination meter.
Noise	a. Large operation noise or vibration of fuel pump	Replace the fuel pump.

#### NOTE:

- When the vehicle is left unattended for an extended period of time, water may accumulate in the fuel tank. Fill fuel fully to prevent the problem.
- In snow-covered areas, mountainous areas, skiing areas, etc. where ambient temperatures drop to 0°C (32°F) or less throughout the winter season, use a water removing agent in the fuel system to prevent freezing fuel system and accumulating water.
- When water is accumulated in fuel filter, fill the water removing agent in the fuel tank.
- Before using water removing agent, follow the cautions noted on the bottle.

# EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)

# *EC(H6DO)*

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# General Description

EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)

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## 1. General Description

### A: CAUTION

- Wear appropriate work clothing, including a cap, protective goggles and protective shoes when performing any work.
- 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.
- Vehicle components are extremely hot after driving. Be wary of receiving burns from heated parts.
- Be sure to tighten fasteners including bolts and nuts to the specified torque.
- Place shop jacks or rigid racks at the specified points.
- Before disconnecting connectors of sensors or units, be sure to disconnect the ground cable from the battery.

### B: PREPARATION TOOL

#### 1. GENERAL TOOL

TOOL NAME	REMARKS
Circuit tester	Used for measuring resistance.
Mighty Vac	Used for inspecting the fuel tank pressure sensor.



# Front Catalytic Converter

EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)

---

## 2. Front Catalytic Converter

### A: REMOVAL

The front and rear catalytic converters are integrated into the front exhaust pipe; therefore, refer to "Front Exhaust Pipe" for the removal procedure. <Ref. to EX(H6DO)-5, REMOVAL, Front Exhaust Pipe.>

### B: INSTALLATION

The front and rear catalytic converters are integrated into front exhaust pipe as one unit; therefore, refer to "Front Exhaust Pipe" for installation procedure. <Ref. to EX(H6DO)-5, INSTALLATION, Front Exhaust Pipe.>

### C: INSPECTION

- 1) Check the connections and welds for exhaust leaks.
- 2) Make sure there are no holes or rusting.

# Rear Catalytic Converter

EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)

---

## 3. Rear Catalytic Converter

### A: REMOVAL

The front and rear catalytic converters are integrated into the front exhaust pipe; therefore, refer to "Front Exhaust Pipe" for the removal procedure. <Ref. to EX(H6DO)-5, REMOVAL, Front Exhaust Pipe.>

### B: INSTALLATION

The front and rear catalytic converters are integrated into front exhaust pipe as one unit; therefore, refer to "Front Exhaust Pipe" for installation procedure. <Ref. to EX(H6DO)-5, INSTALLATION, Front Exhaust Pipe.>

### C: INSPECTION

- 1) Check the connections and welds for exhaust leaks.
- 2) Make sure there are no holes or rusting.

# EGR Valve

EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)

---

## 4. EGR Valve

### A: REMOVAL

For removal procedure, refer to “FU(H6DO)” section. <Ref. to FU(H6DO)-41, REMOVAL, EGR Valve.>

### B: INSTALLATION

For installation procedure, refer to “FU(H6DO)” section. <Ref. to FU(H6DO)-41, INSTALLATION, EGR Valve.>

### C: INSPECTION

For inspection procedures, refer to the “FU(H6DO)” section. <Ref. to FU(H6DO)-41, INSPECTION, EGR Valve.>

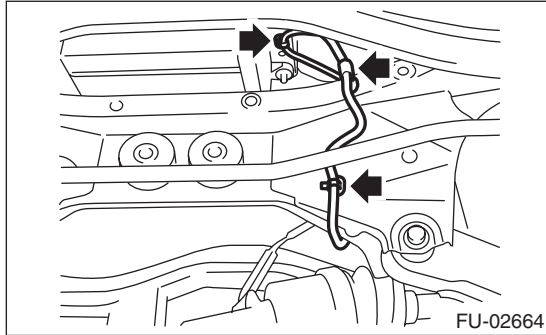
# Canister

EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)

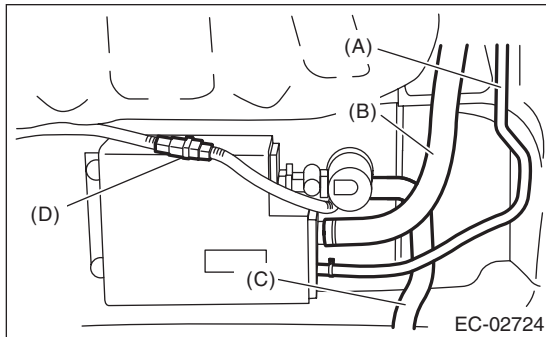
## 5. Canister

### A: REMOVAL

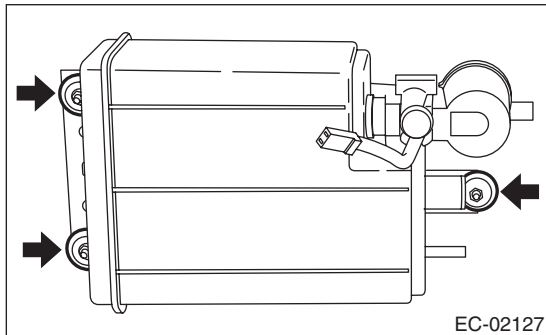
- 1) Disconnect the ground cable from battery.
- 2) Lift up the vehicle.
- 3) Remove the clip holding the harness.



- 4) Remove the rear suspension assembly. <Ref. to RS-17, REMOVAL, Rear Sub Frame.>
- 5) Disconnect the purge hose (A), air vent hose (B), drain hose (C) and connector (D).



- 6) Remove the canister from body.

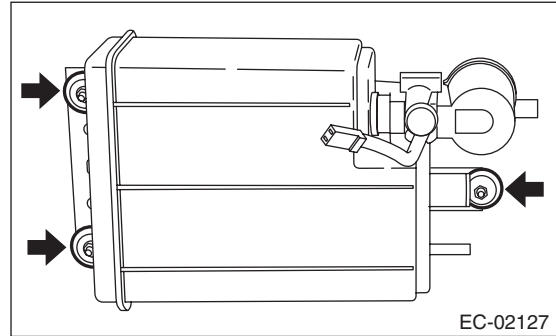


### B: INSTALLATION

Install in the reverse order of removal.

**Tightening torque:**

**8 N·m (0.8 kgf-m, 5.9 ft-lb)**



### C: INSPECTION

Check that the canister has no deformation, cracks or other damages.

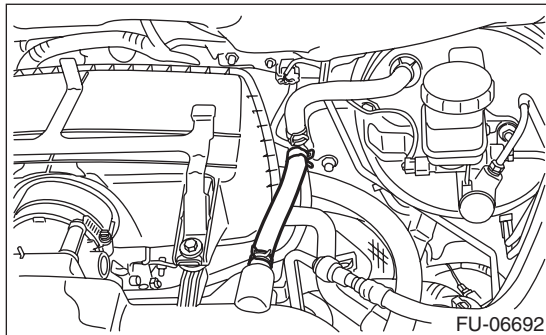
# Purge Control Solenoid Valve

EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)

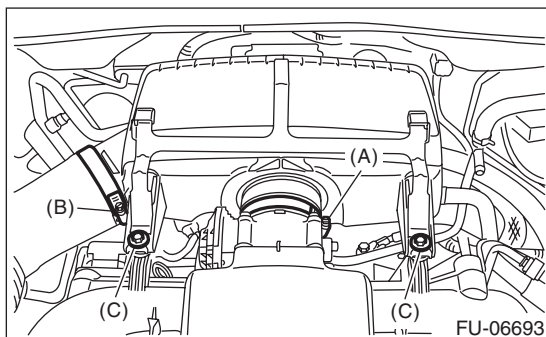
## 6. Purge Control Solenoid Valve

### A: REMOVAL

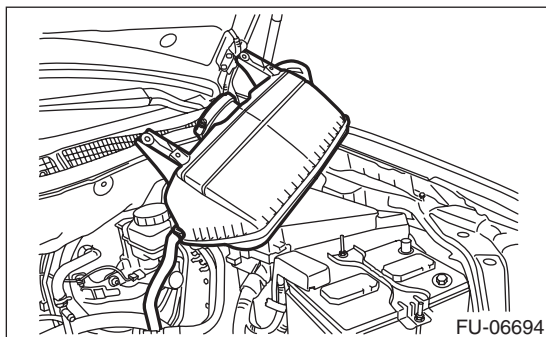
- 1) Remove the collector cover.
- 2) Disconnect the ground cable from battery.
- 3) Disconnect the brake booster vacuum hose from the intake manifold.



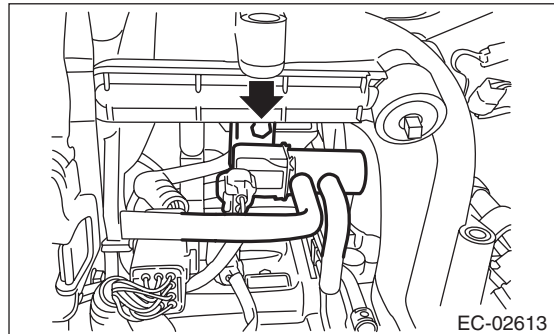
- 4) Loosen the clamp (A) which connects air intake chamber to throttle body.
- 5) Loosen the clamp (B) which connects intake boot to air intake chamber.
- 6) Loosen the bolt (C) which secures air intake chamber and collector cover bracket to the stay.



- 7) Remove the air intake chamber, and move it to the left side wheel apron.



- 8) Disconnect the connector and hoses of purge control solenoid valve, and then remove the purge control solenoid valve.

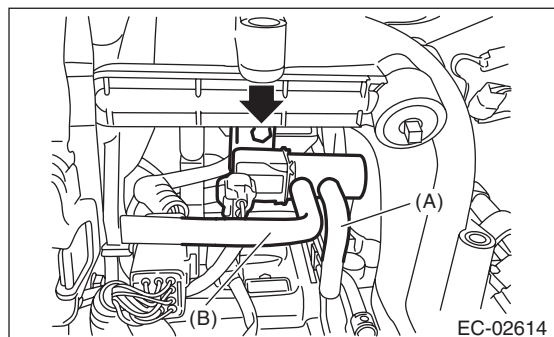


### B: INSTALLATION

Install in the reverse order of removal.

#### Tightening torque:

**19 N·m (1.9 kgf-m, 14.0 ft-lb)**



(A) To fuel pipe (evaporation line)

(B) To intake manifold

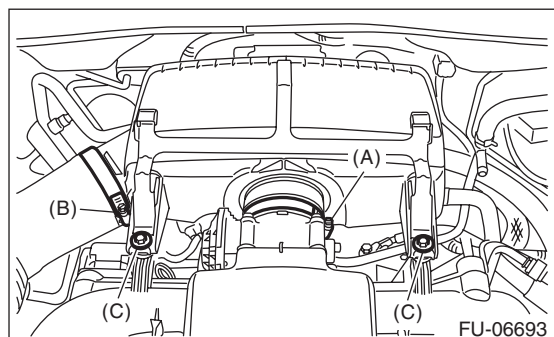
#### Tightening torque:

**Clamp (A), (B)**

**3 N·m (0.3 kgf-m, 2.2 ft-lb)**

**Bolt (C)**

**6.5 N·m (0.7 kgf-m, 4.8 ft-lb)**



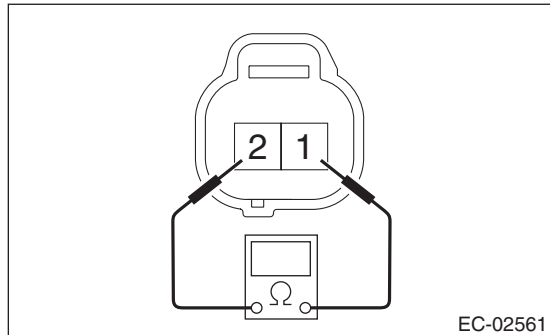
# Purge Control Solenoid Valve

EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)

## C: INSPECTION

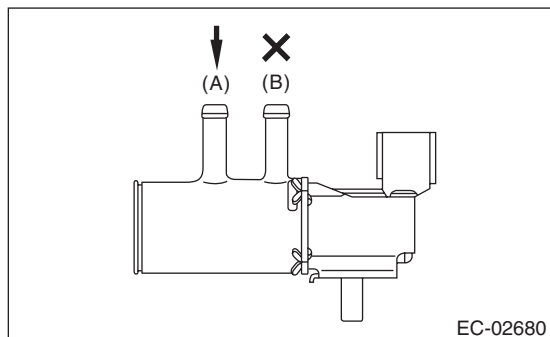
### 1. PURGE CONTROL SOLENOID VALVE

- 1) Check that the purge control solenoid valve has no deformation, cracks or other damages.
- 2) Measure the resistance between the purge control solenoid valve terminals.

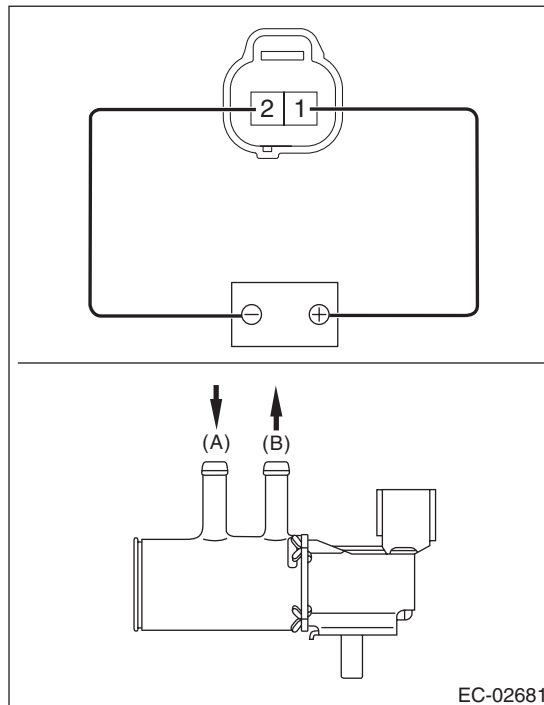


	Terminal No.	Standard
Purge control solenoid valve	1 and 2	$32 \pm 3 \Omega$ (when $20^{\circ}\text{C}$ ( $68^{\circ}\text{F}$ ))

- 3) Check that air does not come out from (B) when air is blown into (A).



- 4) Connect the battery positive terminal to the terminal No. 1 and the battery negative terminal to the terminal No. 2. Check that air is discharged from (B), when supplying air to (A).



### 2. OTHER INSPECTIONS

Check that the evaporation hose has no cracks, damage or loose part.

# Fuel Level Sensor

EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)

---

## 7. Fuel Level Sensor

### A: REMOVAL

For removal procedure, refer to “FU(H6DO)” section. <Ref. to FU(H6DO)-68, REMOVAL, Fuel Level Sensor.>

### B: INSTALLATION

For installation procedure, refer to “FU(H6DO)” section. <Ref. to FU(H6DO)-68, INSTALLATION, Fuel Level Sensor.>

### C: INSPECTION

For inspection procedures, refer to the “FU(H6DO)” section. <Ref. to FU(H6DO)-68, INSPECTION, Fuel Level Sensor.>

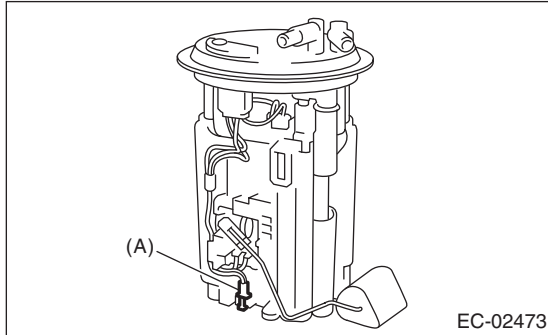
# Fuel Temperature Sensor

EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)

## 8. Fuel Temperature Sensor

### A: REMOVAL

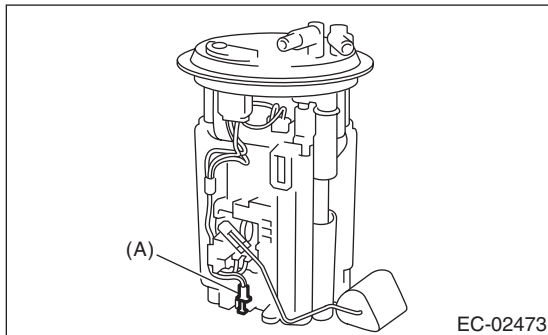
The fuel temperature sensor and fuel level sensor are integrated into one unit; therefore, refer to “Fuel Level Sensor” for removal procedure. <Ref. to FU(H6DO)-68, REMOVAL, Fuel Level Sensor.>



(A) Fuel temperature sensor

### B: INSTALLATION

The fuel temperature sensor and fuel level sensor are integrated into one unit; therefore, refer to “Fuel Level Sensor” for installation procedure. <Ref. to FU(H6DO)-68, INSTALLATION, Fuel Level Sensor.>



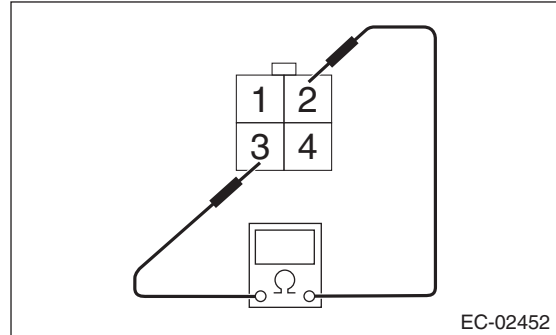
(A) Fuel temperature sensor

### C: INSPECTION

- 1) Check that the fuel temperature sensor has no deformation, cracks or other damages.
- 2) Check the resistance between the fuel temperature sensor terminals.

#### CAUTION:

When inspecting the resistance, check the circuit tester specification and be careful not to turn on electricity 3 V or more to prevent damaging the fuel temperature sensor.



Temperature	Terminal No.	Standard
-10°C (14°F)	2 and 3	11.21±0.69 kΩ (measured current 0.10 mA)
20°C (68°F)		2.502±0.08 kΩ (measured current 0.10 mA)
50°C (122°F)		0.7176±0.034 kΩ (measured current 0.10 mA)



# Fuel Sub Level Sensor

EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)

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## 9. Fuel Sub Level Sensor

### A: REMOVAL

For removal procedure, refer to “FU(H6DO)” section. <Ref. to FU(H6DO)-69, REMOVAL, Fuel Sub Level Sensor.>

### B: INSTALLATION

For installation procedure, refer to “FU(H6DO)” section. <Ref. to FU(H6DO)-70, INSTALLATION, Fuel Sub Level Sensor.>

### C: INSPECTION

For inspection procedures, refer to the “FU(H6DO)” section. <Ref. to FU(H6DO)-70, INSPECTION, Fuel Sub Level Sensor.>

# Fuel Tank Pressure Sensor

EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)

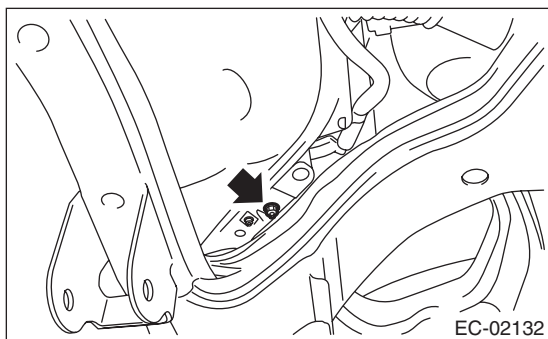
## 10. Fuel Tank Pressure Sensor

### A: REMOVAL

#### WARNING:

Place “NO OPEN FLAMES” signs near the working area.

- 1) Disconnect the ground cable from battery.
- 2) Open the fuel filler lid and remove the fuel filler cap.
- 3) Lift up the vehicle.
- 4) Disconnect the connector from the fuel tank pressure sensor.
- 5) Disconnect the vacuum hose from the fuel tank pressure sensor.
- 6) Remove the fuel tank pressure sensor along with the bracket.

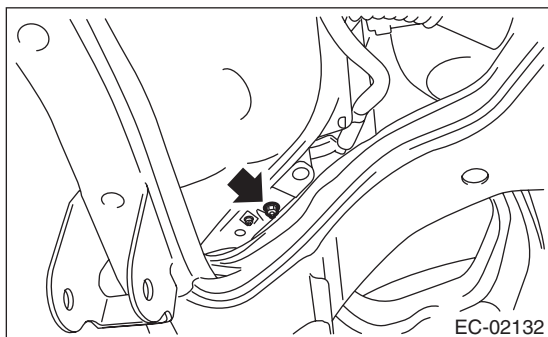


### B: INSTALLATION

Install in the reverse order of removal.

#### Tightening torque:

**7.35 N·m (0.7 kgf·m, 5.4 ft·lb)**



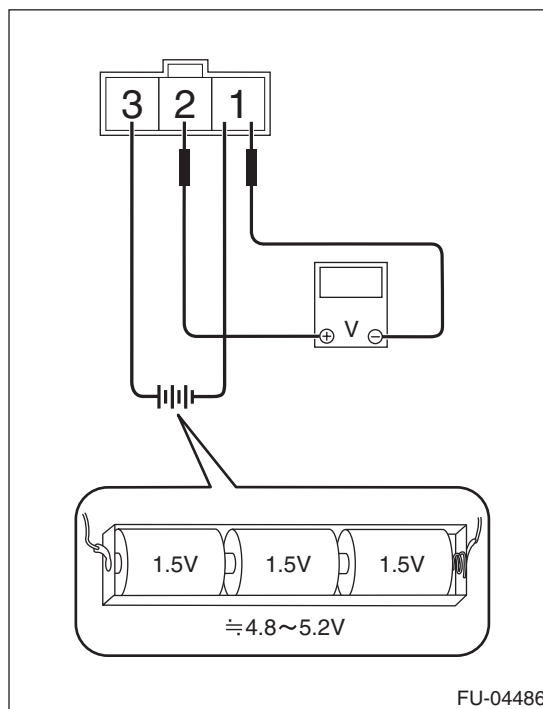
## C: INSPECTION

### 1. FUEL TANK PRESSURE SENSOR

- 1) Check that the fuel tank pressure sensor has no deformation, cracks or other damages.
- 2) Connect dry-cell battery positive terminal to terminal No. 3 and dry-cell battery ground terminal to terminal No. 1, circuit tester positive terminal to terminal No. 2 and the circuit tester negative terminal to terminal No. 1.

#### NOTE:

- Use new dry-cell batteries.
- Using circuit tester, check the voltage of a single dry-cell battery is 1.6 V or more. And also check the voltage of three batteries in series is between 4.8 V and 5.2 V.



- 3) Check the voltage at a normal atmospheric pressure.

#### NOTE:

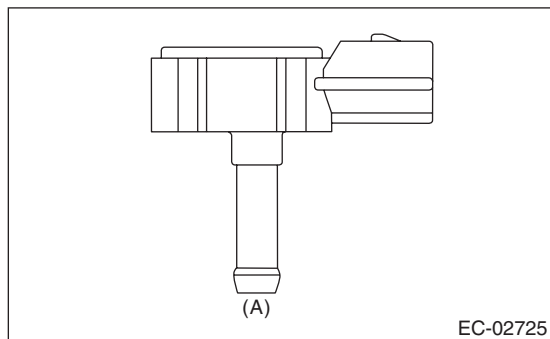
The atmospheric pressure at higher altitude is lower than normal. Therefore, the voltage is lower than the standard value.

Terminal No.	Standard
2 (+) and 1 (-)	Approx. 2.5 V (when 25°C (77°F))

# Fuel Tank Pressure Sensor

EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)

4) Connect the Mighty Vac to the pressure port (A) of fuel tank pressure sensor.



5) Check the voltage when generating vacuum and positive pressure using Mighty Vac.

### CAUTION:

**Do not apply pressure out of the range of  $-10$  —  $20$  kPa ( $-0.1$  —  $0.2$  kgf/cm<sup>2</sup>,  $-1.45$  —  $2.90$  psi). Doing so may damage the fuel tank pressure sensor.**

Pressure	Terminal No.	Standard
$-6.67$ kPa ( $-0.07$ kgf/cm <sup>2</sup> , $-0.97$ psi)	2 (+) and 1 (-)	Approx. $0.5$ V (when $25^{\circ}\text{C}$ ( $77^{\circ}\text{F}$ ))
$6.67$ kPa ( $0.07$ kgf/cm <sup>2</sup> , $0.97$ psi)		Approx. $4.5$ V (when $25^{\circ}\text{C}$ ( $77^{\circ}\text{F}$ ))

## 2. OTHER INSPECTIONS

Check that the hose has no cracks, damage or loose part.

### 11.Drain Filter

#### A: SPECIFICATION

Canister is a non-disassembled part, so do not remove the drain filter from canister. Refer to “Canister” for removal and installation procedure. <Ref. to EC(H6DO)-6, REMOVAL, Canister.> <Ref. to EC(H6DO)-6, INSTALLATION, Canister.>

# Drain Valve

EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)

## 12. Drain Valve

### A: REMOVAL

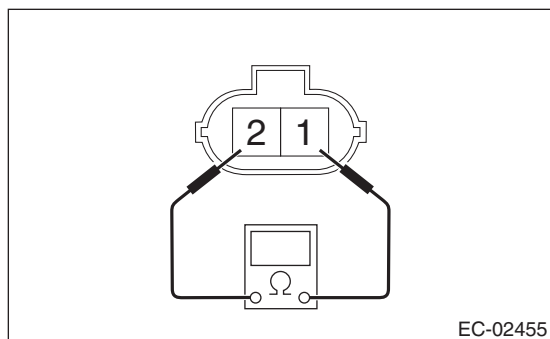
Drain valve is integrated with canister. Refer to “Canister” for removal procedures. <Ref. to EC(H6DO)-6, REMOVAL, Canister.>

### B: INSTALLATION

Refer to “Canister” for installation procedures. <Ref. to EC(H6DO)-6, INSTALLATION, Canister.>

### C: INSPECTION

Check the resistance between drain valve terminals.



Terminal No.	Standard
1 and 2	25 — 30 Ω (when 20°C (68°F))

# PCV Valve

EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)

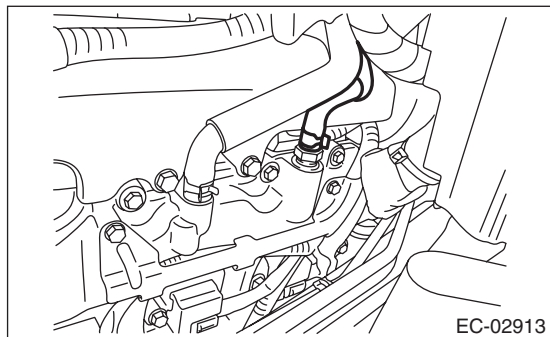
## 13.PCV Valve

### A: REMOVAL

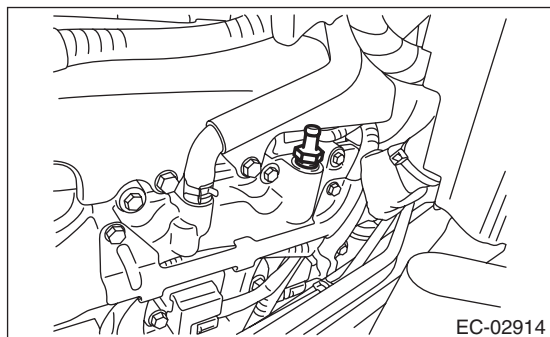
#### CAUTION:

**Do not remove unless the PCV valve is broken.**

- 1) Remove the collector cover.
- 2) Remove the battery and battery carrier. <Ref. to SC(H6DO)-19, REMOVAL, Battery.>
- 3) Disconnect the PCV hose.



- 4) Remove the PCV valve from rocker cover.



### B: INSTALLATION

Install in the reverse order of removal.

#### NOTE:

Apply liquid gasket to the bolt threads of PCV valve.

#### Liquid gasket:

**THREE BOND 1324 (Part No. 004403042) or equivalent**

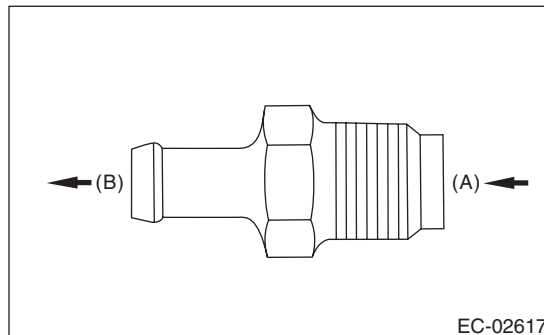
#### Tightening torque:

**25 N·m (2.5 kgf·m, 18.4 ft·lb)**

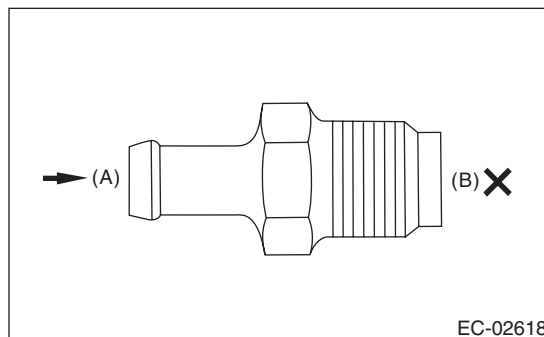
### C: INSPECTION

#### 1. PCV VALVE

- 1) Check that the PCV valve has no deformation, cracks or other damages.
- 2) Check that air is discharged from (B) when air is blown into (A).



- 3) Check that air does not come out from (B) when air is blown into (A).



#### 2. OTHER INSPECTIONS

Check that the PCV hose has no cracks, damage or loose part.

# INTAKE (INDUCTION)

# *IN(H6DO)*

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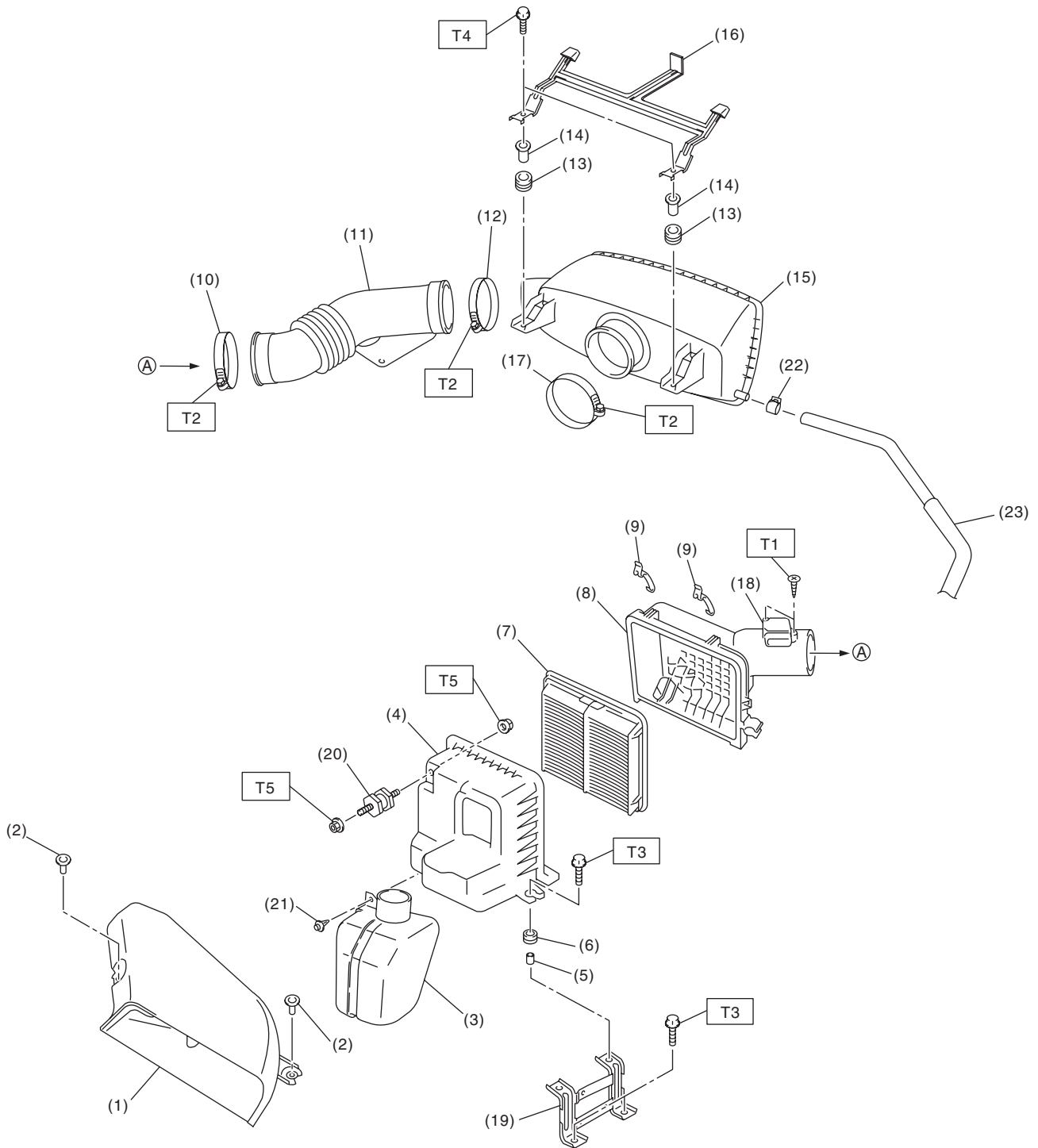
	<b>Page</b>
1. General Description .....	2
2. Air Cleaner Element .....	4
3. Air Cleaner Case .....	6
4. Air Intake Chamber .....	8
5. Air Intake Duct .....	9
6. Resonator Chamber .....	10

# General Description

INTAKE (INDUCTION)

## 1. General Description

### A: COMPONENT



IN-03136



# General Description

INTAKE (INDUCTION)

---

(1) Air intake duct	(11) Intake boot	(21) Clip
(2) Clip	(12) Clamp	(22) Clip
(3) Resonator chamber	(13) Cushion	(23) Blow-by hose
(4) Air cleaner case (front)	(14) Spacer	
(5) Spacer	(15) Air intake chamber	
(6) Cushion	(16) Collector cover bracket	
(7) Air cleaner element	(17) Clamp	
(8) Air cleaner case (rear)	(18) Mass air flow and intake air temperature sensor	
(9) Clip	(19) Air cleaner bracket	
(10) Clamp	(20) Cushion	

---

**Tightening torque:N·m (kgf-m, ft-lb)**

**T1: 1 (0.1, 0.7)**

**T2: 3 (0.3, 2.2)**

**T3: 6 (0.6, 4.4)**

**T4: 6.5 (0.7, 4.8)**

**T5: 7.5 (0.8, 5.5)**

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## B: CAUTION

- Wear appropriate work clothing, including a cap, protective goggles and protective shoes when performing any work.
- 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.
- Vehicle components are extremely hot after driving. Be wary of receiving burns from heated parts.
- Be sure to tighten fasteners including bolts and nuts to the specified torque.
- Place shop jacks or rigid racks at the specified points.
- Before disconnecting connectors of sensors or units, be sure to disconnect the ground cable from the battery.

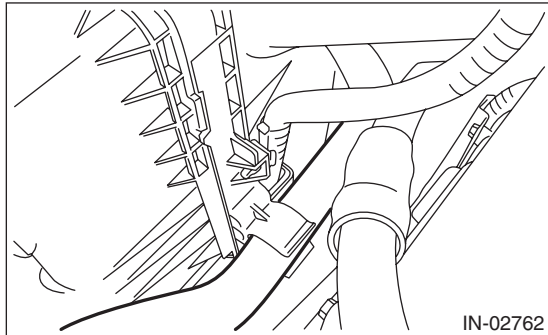
# Air Cleaner Element

INTAKE (INDUCTION)

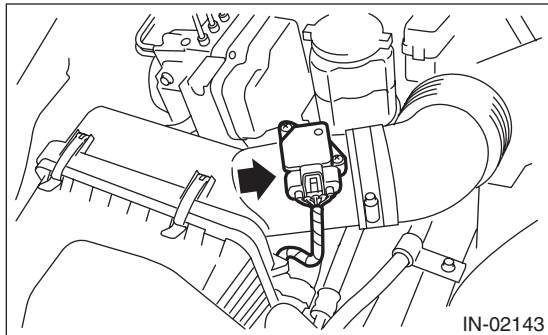
## 2. Air Cleaner Element

### A: REMOVAL

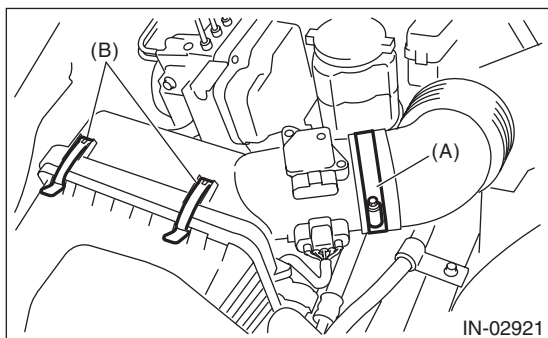
- 1) Disconnect the ground cable from battery.
- 2) Disconnect the power steering oil pressure hose (suction hose) from the clip on the side of air cleaner case (rear).



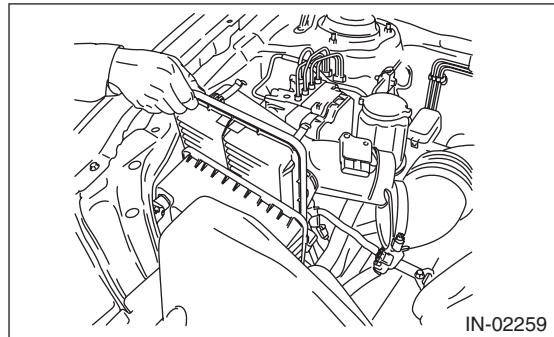
- 3) Disconnect the connectors from the mass air flow and intake air temperature sensor.



- 4) Loosen the clamp (A) which connects the air cleaner case (rear) to intake duct.
- 5) Remove the clips (B) securing the upper side of the air cleaner case.



- 6) Pull the air cleaner case (rear) backward of the vehicle, and remove the air cleaner element.



### B: INSTALLATION

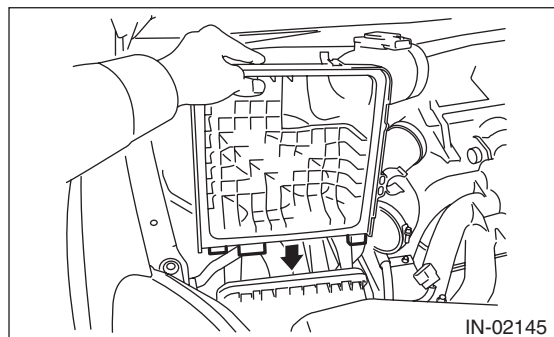
Install in the reverse order of removal.

#### CAUTION:

Be sure to use **SUBARU** genuine air cleaner element depending on the engine type when replacing the air cleaner elements. Using other air cleaner element may affect the engine performance.

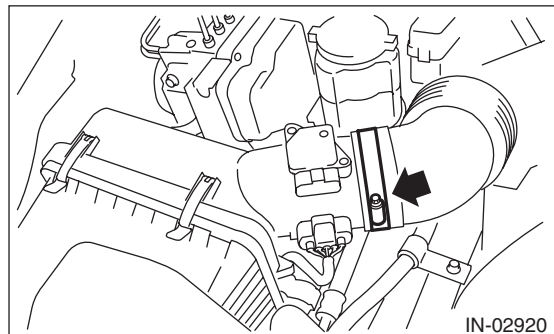
#### NOTE:

- Check that there are no foreign objects in the air cleaner case.
- When installing the air cleaner case (rear), align the protrusion of the air cleaner case to the hole on the air cleaner case (front) to install.



#### Tightening torque:

**3 N·m (0.3 kgf·m, 2.2 ft·lb)**



## **C: INSPECTION**

- 1) Check that the air cleaner element has no deformation, cracks or other damages.
- 2) Check if the air cleaner element is extremely dirty.

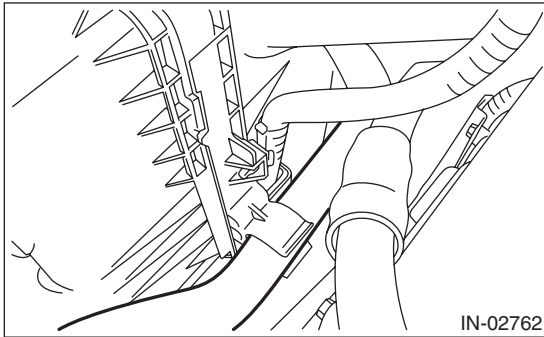
# Air Cleaner Case

## INTAKE (INDUCTION)

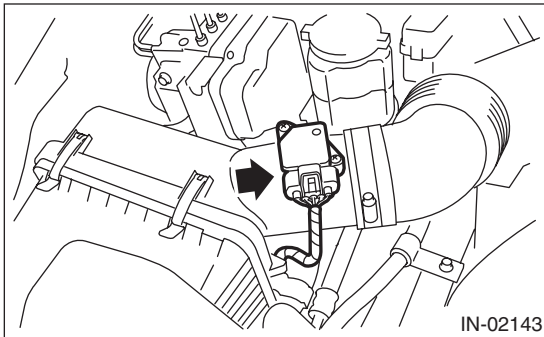
### 3. Air Cleaner Case

#### A: REMOVAL

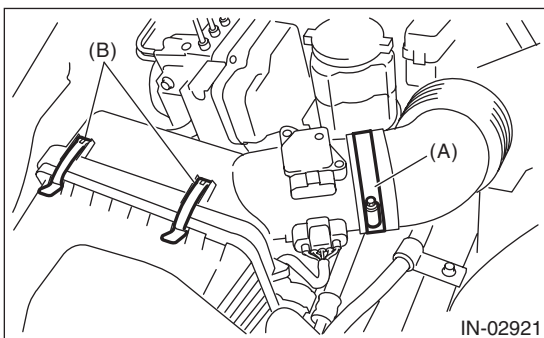
- 1) Disconnect the ground cable from battery.
- 2) Disconnect the power steering oil pressure hose (suction hose) from the clip on the side of air cleaner case (rear).



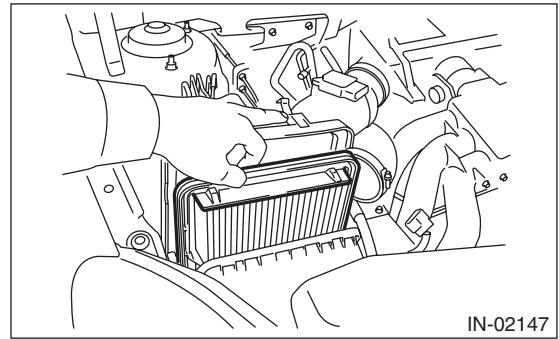
- 3) Disconnect the connectors from the mass air flow and intake air temperature sensor.



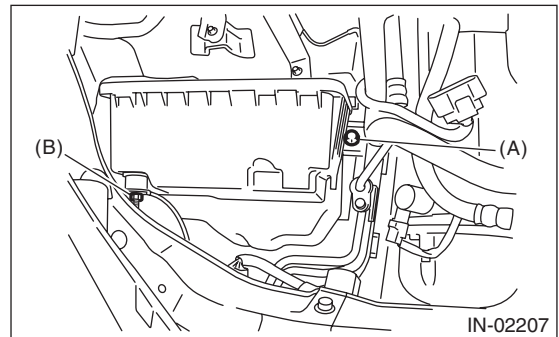
- 4) Loosen the clamp (A) which connects the air cleaner case (rear) to intake duct.
- 5) Remove the clips (B) securing the upper side of the air cleaner case.



- 6) Remove the air cleaner case (rear) and air cleaner element.



- 7) Remove the air intake duct. <Ref. to IN(H6DO)-9, REMOVAL, Air Intake Duct.>
- 8) Remove the bolts (A) and nut (B) which secure the air cleaner case to body.



- 9) Remove the air cleaner case (front).

## B: INSTALLATION

Install in the reverse order of removal.

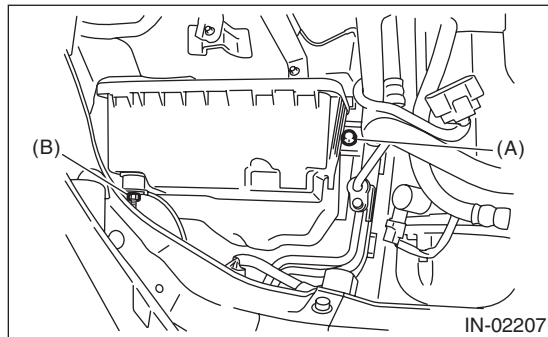
### Tightening torque:

#### Bolt (A):

**6 N·m (0.6 kgf-m, 4.4 ft-lb)**

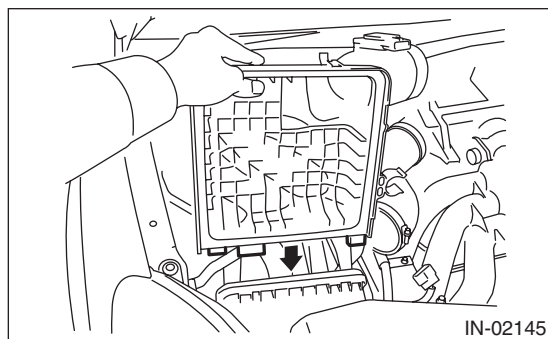
#### Nut (B):

**7.5 N·m (0.8 kgf-m, 5.5 ft-lb)**



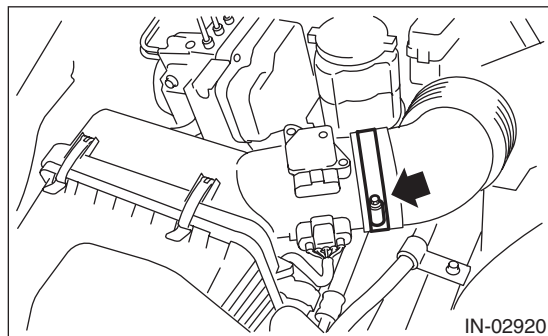
### NOTE:

When installing the air cleaner case (rear), align the protrusion of the air cleaner case (rear) to the hole on the air cleaner case (front) to install.



### Tightening torque:

**3 N·m (0.3 kgf-m, 2.2 ft-lb)**



## C: INSPECTION

- 1) Check that the air cleaner case has no deformation, cracks or other damages.
- 2) Check the intake boot for cracks, damage or looseness.

# Air Intake Chamber

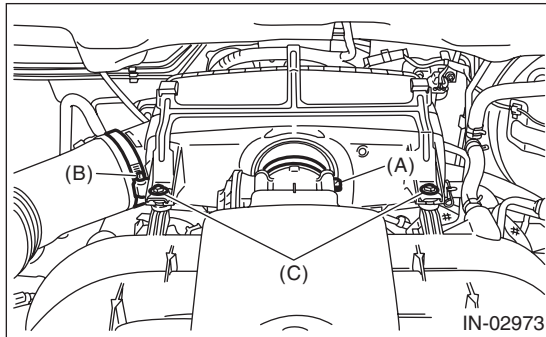
INTAKE (INDUCTION)

---

## 4. Air Intake Chamber

### A: REMOVAL

- 1) Remove the collector cover.
- 2) Loosen the clamp (A) which connects air intake chamber to throttle body.
- 3) Loosen the clamp (B) which connects intake boot to air intake chamber.
- 4) Remove the bolt (C) which secures air intake chamber and collector cover bracket to the stay.



- 5) Disconnect the blow-by hoses, and then remove air intake chamber.

### B: INSTALLATION

Install in the reverse order of removal.

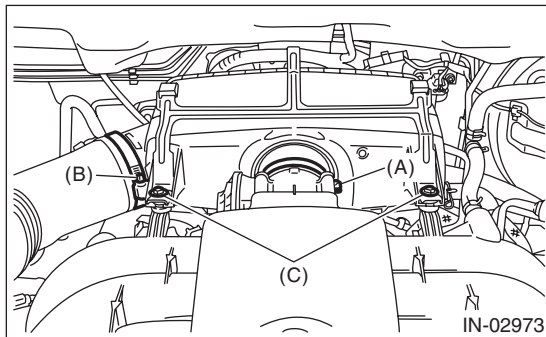
#### *Tightening torque:*

**Clamp (A), (B)**

**3 N·m (0.3 kgf·m, 2.2 ft·lb)**

**Bolt (C)**

**6.5 N·m (0.7 kgf·m, 4.8 ft·lb)**



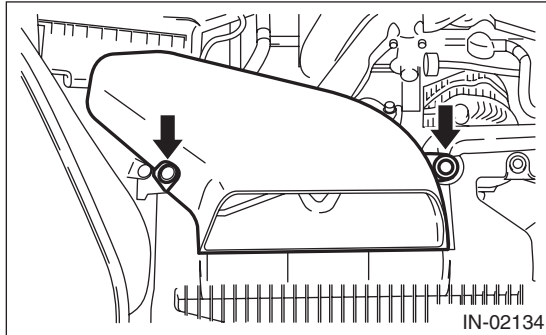
### C: INSPECTION

- 1) Check the intake boot for deformation, cracks or other damages.
- 2) Check that no foreign matter is mixed in air intake chamber.

## 5. Air Intake Duct

### A: REMOVAL

- 1) Remove the clip holding the air intake duct.
- 2) Remove the air intake duct.



### B: INSTALLATION

Install in the reverse order of removal.

### C: INSPECTION

- 1) Check that the air intake duct has no deformation, cracks or other damages.
- 2) Check that no foreign matter is mixed in air intake duct.

## 6. Resonator Chamber

### A: REMOVAL

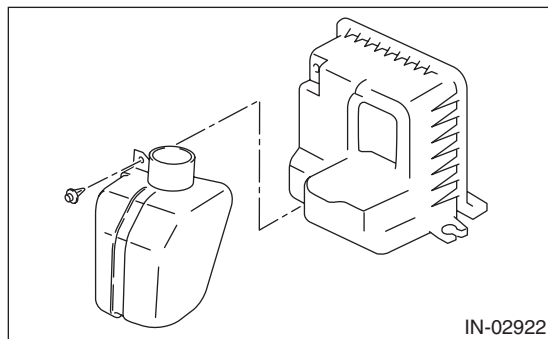
The resonator chamber and air cleaner case are integrated into one unit; therefore, refer to “Air Cleaner Case” for the removal procedure. <Ref. to IN(H6DO)-6, REMOVAL, Air Cleaner Case.>

### B: INSTALLATION

The resonator chamber and air cleaner case are integrated into one unit; therefore, refer to “Air Cleaner Case” for installation procedure. <Ref. to IN(H6DO)-7, INSTALLATION, Air Cleaner Case.>

### C: DISASSEMBLY

1) Remove the clip which connects the resonator chamber and the air cleaner case (front).



2) Separate the resonator chamber and the air cleaner case (front).

### D: ASSEMBLY

Assemble in the reverse order of disassembly.

### E: INSPECTION

Check that the resonator chamber has no deformation, cracks or other damages.



# MECHANICAL

# ME(H6DO)

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# General Description

MECHANICAL

## 1. General Description

### A: SPECIFICATION

Engine	Model		3.6 L		
	Cylinder arrangement		Horizontally opposed, liquid cooled, 6-cylinder, 4-stroke gasoline engine		
	Valve system mechanism		Chain driven, double overhead camshaft, 4-valve/cylinder		
	Bore × Stroke		mm (in)	92 × 91 (3.622 × 3.583)	
	Displacement		cm <sup>3</sup> (cu in)	3,630 (221.5)	
	Compression ratio		10.5		
	Compression (350 rpm and fully open throttle)		kPa (kgf/cm <sup>2</sup> , psi)	Standard	1,275 — 1,471 (13.0 — 15.0, 185 — 213)
	Number of piston rings		Pressure ring: 2, Oil ring: 1		
	Intake valve timing		Open	Max. retard	ATDC 10°
				Min. advance	BTDC 40°
			Close	Max. retard	ABDC 74°
				Min. advance	ABDC 24°
	Exhaust valve timing		Open	Max. retard	BBDC 4°
				Min. advance	BBDC 44°
			Close	Max. retard	ATDC 44°
				Min. advance	ATDC 4°
	Valve clearance		mm (in)	Intake	0.20 <sup>+0.04</sup> <sub>-0.06</sub> (0.0079 <sup>+0.0016</sup> <sub>-0.0024</sub> )
Exhaust				0.35±0.05 (0.0138±0.0020)	
Idle speed ["P" or "N" range]		rpm	No load	Standard	700±100
			A/C ON	Standard	805±100
Ignition order				1 → 6 → 3 → 2 → 5 → 4	
Ignition timing		BTDC/rpm	Standard	15°±8°/700	

NOTE:

OS: Oversize

US: Undersize

Camshaft	Bending limit		mm (in)		0.020 (0.00079)	
	Cam lobe height		mm (in)	Intake	Standard	45.90 — 46.00 (1.8071 — 1.8110)
				Exhaust	Standard	44.65 — 44.75 (1.7579 — 1.7618)
	Cam base circle diameter		mm (in)	Intake	Standard	36.00 (1.4173)
				Exhaust	Standard	36.00 (1.4173)
	Journal O.D.		mm (in)	Front	Standard	37.946 — 37.963 (1.4939 — 1.4946)
				Except for front	Standard	25.946 — 25.963 (1.0215 — 1.0222)
	Oil clearance		mm (in)		Standard	0.037 — 0.072 (0.0015 — 0.0028)
	Thrust clearance		mm (in)	Intake	Standard	0.075 — 0.135 (0.0030 — 0.0053)
				Exhaust	Standard	0.075 — 0.135 (0.0030 — 0.0053)
Cylinder head	Warping limit (Mating surface with cylinder block)		mm (in)		0.020 (0.0008)	
	Standard height		mm (in)		124±0.05 (4.88±0.0020)	
Valve seat	Seating angle between valve and valve seat				90°	
	Contacting width between valve and valve seat		mm (in)	Intake	Standard	1.0 (0.039)
				Exhaust	Standard	1.5 (0.059)

**ME(H6DO)-2**

# General Description

MECHANICAL

Valve guide	Clearance between the valve guide and valve stem	mm (in)	Intake	Standard	0.030 — 0.057 (0.0012 — 0.0022)	
			Exhaust	Standard	0.040 — 0.067 (0.0016 — 0.0026)	
	Inside diameter		mm (in)		5.500 — 5.512 (0.2165 — 0.2170)	
	Valve stem outer diameters	mm (in)	Intake	5.455 — 5.470 (0.2148 — 0.2154)		
			Exhaust	5.445 — 5.460 (0.2144 — 0.2150)		
Valve guide protrusion amount		Intake	mm (in)	8.6 — 9.0 (0.3386 — 0.3543)		
		Exhaust	mm (in)	10.7 — 11.1 (0.4213 — 0.4370)		
Valve	Head edge thickness	mm (in)	Intake	Standard	1.0 (0.039)	
			Exhaust	Standard	1.2 (0.047)	
	Overall length	mm (in)	Intake	103.5 (4.075)		
Exhaust			103.2 (4.063)			
Valve spring	Free length	mm (in)	Intake	49.06 (1.9315)		
			Exhaust	49.06 (1.9315)		
	Tension/spring height	N (kgf, lb)/mm (in)	Set	182 — 210 (18.6 — 21.4, 40.9 — 47.2) / 31.0 (1.220)		
			Lift	316 — 350 (32.2 — 35.7, 71.0 — 78.7) / 21.0 (0.827)		
Squareness				2.5°, 2.1 mm (0.083 in)		
Valve lifter	Outer diameter	mm (in)	Standard	32.959 — 32.975 (1.2976 — 1.2982)		
	Inner diameter of valve lifter hole	mm (in)	Standard	32.994 — 33.016 (1.2990 — 1.2998)		
	Clearance between the valve lifter and valve lifter hole	mm (in)	Standard	0.019 — 0.057 (0.0007 — 0.0022)		
Cylinder block	Warping limit (Mating surface with cylinder head)		mm (in)	0.020 (0.0008)		
	Standard height		mm (in)	202 (7.95)		
	Cylindricity	mm (in)	Limit	0.030 (0.0012)		
	Out-of-roundness	mm (in)	Limit	0.010 (0.0004)		
	Clearance between cylinder and piston at 20°C (68°F)		mm (in)	Standard	-0.010 — 0.010 (-0.0004 — 0.0004)	
Cylinder inner diameter boring limit (diameter)		mm (in)	92.515 (3.6717)			
Piston	Piston grade point		mm (in)	37.3 (1.4685)		
	Outer diameter	mm (in)	Standard	A	92.005 — 92.015 (3.6222 — 3.6226)	
				B	91.995 — 92.005 (3.6218 — 3.6222)	
			0.25 (0.0098) OS		92.245 — 92.265 (3.6317 — 3.6325)	
			0.50 (0.0197) OS		92.495 — 92.515 (3.6415 — 3.6423)	
Inner diameter of piston pin hole		mm (in)	Standard	22.000 — 22.006 (0.8661 — 0.8664)		
Piston pin	Degree of fit			Piston pin must be fitted into position with thumb at 20°C (68°F).		
	Outer diameter	mm (in)	Standard	21.994 — 22.000 (0.8659 — 0.8661)		
	Clearance between piston and piston pin	mm (in)	Standard	0.004 — 0.008 (0.0002 — 0.0003)		
Piston ring	Piston ring gap	mm (in)	Top ring	Standard	0.20 — 0.35 (0.0079 — 0.0138)	
			Second ring	Standard	0.40 — 0.50 (0.0157 — 0.0197)	
			Oil ring	Standard	0.20 — 0.50 (0.0079 — 0.0197)	
	Clearance between piston ring and piston ring groove	mm (in)	Top ring	Standard	0.040 — 0.080 (0.0016 — 0.0031)	
			Second ring	Standard	0.030 — 0.070 (0.0012 — 0.0028)	
Oil ring			Standard	0.065 — 0.165 (0.0026 — 0.0065)		

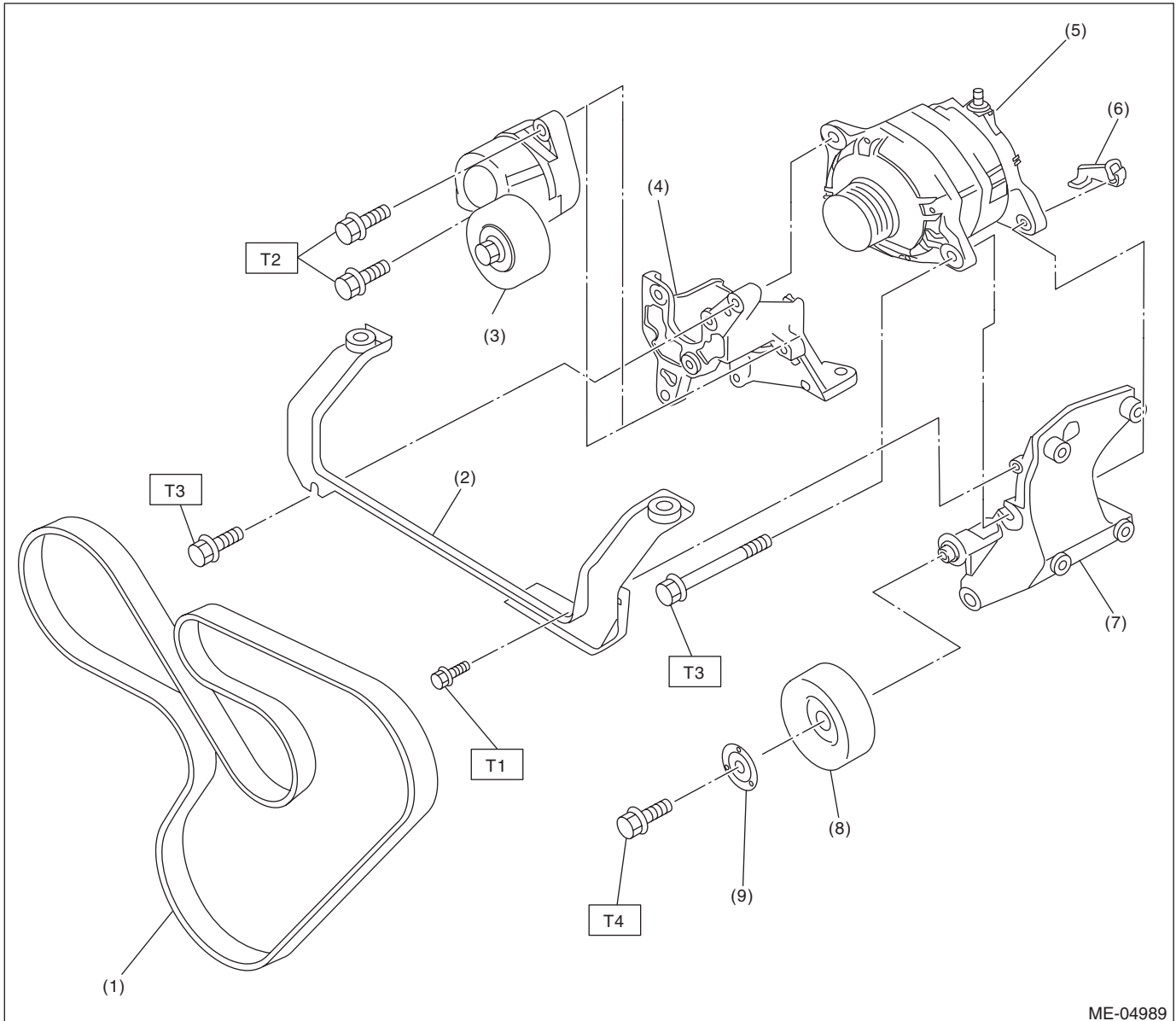
# General Description

## MECHANICAL

Connecting rod and connecting rod bearing	Bend or twist per 100 mm (3.94 in) in length		mm (in)	Limit	0.10 (0.0039 in)	
	Thrust clearance		mm (in)	Standard	0.070 — 0.330 (0.0028 — 0.0130)	
	Oil clearance		mm (in)	Standard	0.016 — 0.043 (0.0006 — 0.0017)	
	Bearing size (Thickness at center) mm (in)		Standard		1.489 — 1.505 (0.0586 — 0.0593)	
			0.03 (0.0012) US		1.507 — 1.515 (0.0593 — 0.0596)	
0.05 (0.0020) US			1.517 — 1.525 (0.0597 — 0.0600)			
0.25 (0.0098) US			1.617 — 1.625 (0.0637 — 0.0640)			
Bushing of small end	Clearance between piston pin and bushing		mm (in)	Standard	0 — 0.022 (0 — 0.0009)	
Crankshaft and crankshaft bearing	Bending limit		mm (in)		0.035 (0.0014)	
	Crank pin	Out-of-roundness	mm (in)	Limit	0.005 (0.0002)	
		Cylindricity	mm (in)	Limit	0.006 (0.0002)	
		Grinding limit	mm (in)		51.734 (2.0368)	
	Crank journal	Out-of-roundness	mm (in)	Limit	0.005 (0.0002)	
		Cylindricity	mm (in)	Limit	0.006 (0.0002)	
		Grinding limit	mm (in)		63.742 (2.5095)	
	Crank pin outer diameter		Standard		51.976 — 52.000 (2.0463 — 2.0472)	
			0.03 (0.0012) US		51.954 — 51.970 (2.0454 — 2.0461)	
			0.05 (0.0020) US		51.934 — 51.950 (2.0446 — 2.0453)	
			0.25 (0.0098) US		51.734 — 51.750 (2.0368 — 2.0374)	
	Crank journal outer diameter		#1, #3, #5, #7	Standard		63.992 — 64.016 (2.5194 — 2.5203)
				0.03 (0.0012) US		63.962 — 63.978 (2.5182 — 2.5188)
				0.05 (0.0020) US		63.942 — 63.958 (2.5174 — 2.5180)
				0.25 (0.0098) US		63.742 — 63.758 (2.5095 — 2.5102)
			#2, #4, #6	Standard		63.992 — 64.016 (2.5194 — 2.5203)
				0.03 (0.0012) US		63.962 — 63.978 (2.5182 — 2.5188)
				0.05 (0.0020) US		63.942 — 63.958 (2.5174 — 2.5180)
				0.25 (0.0098) US		63.742 — 63.758 (2.5095 — 2.5102)
	Bearing size (Thickness at center)		#1, #3, #5	Standard		1.996 — 2.013 (0.0786 — 0.0793)
				0.03 (0.0012) US		2.011 — 2.014 (0.0792 — 0.0793)
				0.05 (0.0020) US		2.021 — 2.024 (0.0796 — 0.0797)
				0.25 (0.0098) US		2.121 — 2.124 (0.0835 — 0.0836)
			#2, #4, #6	Standard		1.996 — 2.013 (0.0786 — 0.0793)
				0.03 (0.0012) US		2.015 — 2.018 (0.0793 — 0.0794)
				0.05 (0.0020) US		2.025 — 2.028 (0.0797 — 0.0798)
				0.25 (0.0098) US		2.125 — 2.128 (0.0837 — 0.0838)
			#7	Standard		1.992 — 2.009 (0.0784 — 0.0791)
				0.03 (0.0012) US		2.011 — 2.014 (0.0792 — 0.0793)
				0.05 (0.0020) US		2.021 — 2.024 (0.0796 — 0.0797)
				0.25 (0.0098) US		2.121 — 2.124 (0.0835 — 0.0836)
	Thrust clearance		mm (in)	Standard	0.030 — 0.115 (0.0012 — 0.0045)	
Oil clearance		mm (in)	Standard	0.010 — 0.030 (0.0004 — 0.0012)		

## B: COMPONENT

### 1. V-BELT



ME-04989

- |                                 |                         |
|---------------------------------|-------------------------|
| (1) V-belt                      | (6) Generator plate     |
| (2) Collector cover bracket     | (7) A/C compressor stay |
| (3) Belt tension adjuster ASSY  | (8) Idler pulley        |
| (4) Power steering pump bracket | (9) Idler pulley cover  |
| (5) Generator                   |                         |

**Tightening torque: N·m (kgf·m, ft·lb)**

**T1: 6.4 (0.7, 4.7)**

**T2: 20 (2.0, 14.8)**

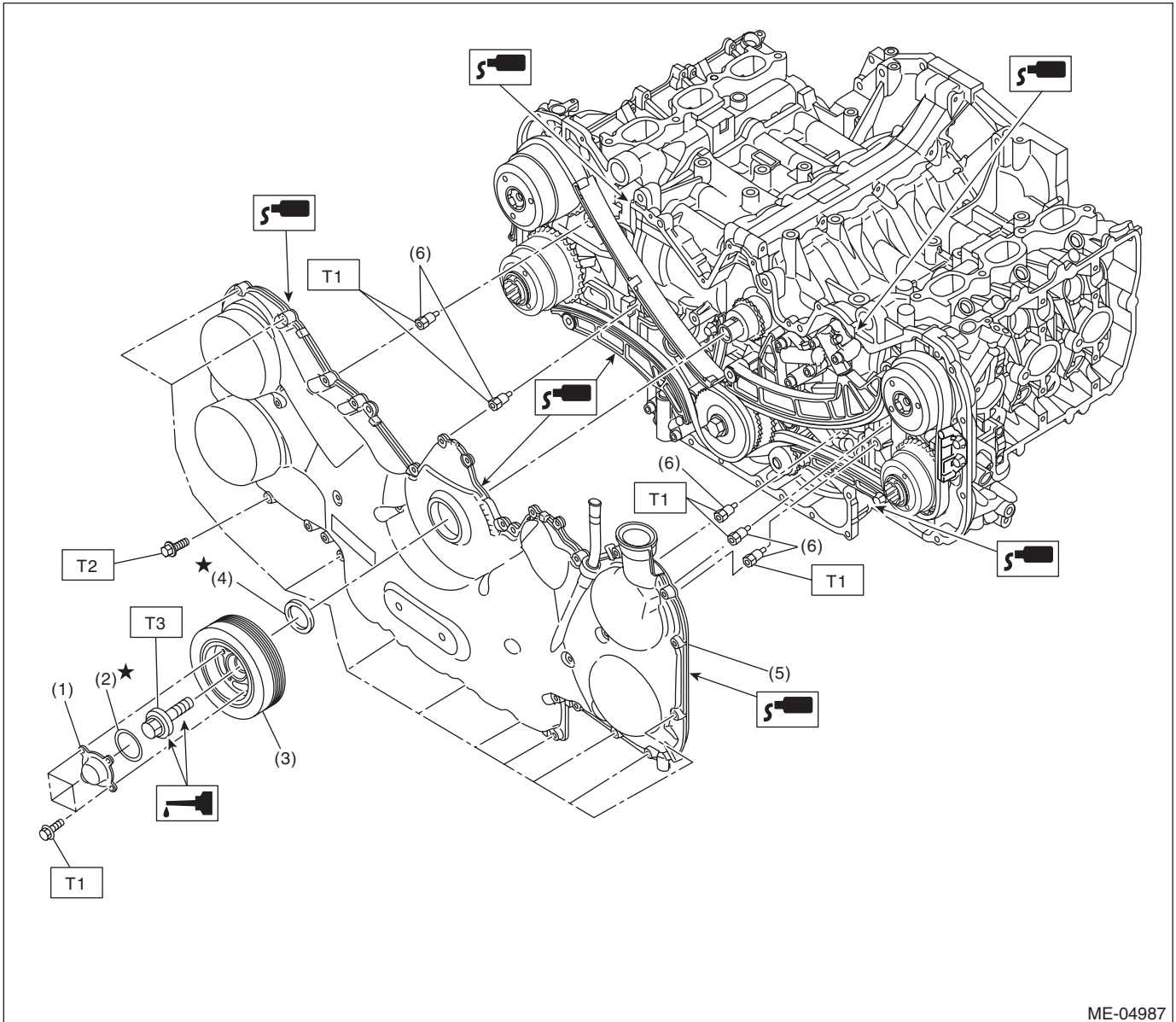
**T3: 25 (2.5, 18.4)**

**T4: 33 (3.4, 24.3)**

# General Description

MECHANICAL

## 2. TIMING CHAIN COVER



ME-04987

- |                        |                 |
|------------------------|-----------------|
| (1) Crank pulley cover | (4) Oil seal    |
| (2) O-ring             | (5) Chain cover |
| (3) Crank pulley       | (6) Bolt        |

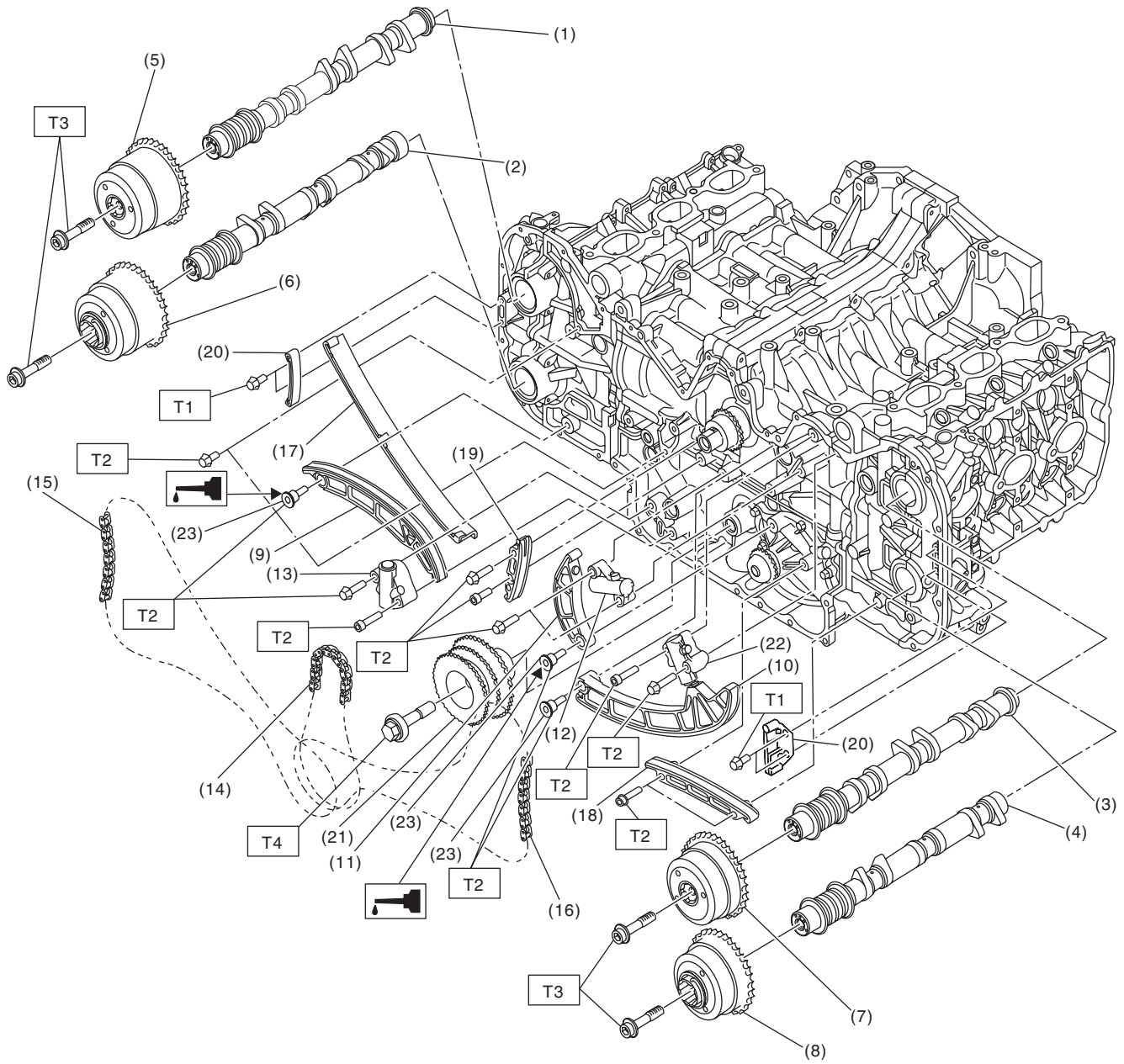
**Tightening torque: N·m (kgf·m, ft·lb)**

**T1: 6.4 (0.7, 4.7)**

**T2: 10 (1.0, 7.4)**

**T3: 195 (19.9, 143.8)**

## 3. TIMING CHAIN



ME-04428

# General Description

## MECHANICAL

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(1) Intake camshaft (RH)	(11) Chain tensioner lever (Main)	(21) Idler sprocket
(2) Exhaust camshaft (RH)	(12) Chain tensioner (Main)	(22) Chain tensioner (LH)
(3) Intake camshaft (LH)	(13) Chain tensioner (RH)	(23) Chain tensioner lever shaft
(4) Exhaust camshaft (LH)	(14) Timing chain (Main)	
(5) Intake cam sprocket (RH)	(15) Timing chain (RH)	
(6) Exhaust cam sprocket (RH)	(16) Timing chain (LH)	
(7) Intake cam sprocket (LH)	(17) Chain guide (RH)	
(8) Exhaust cam sprocket (LH)	(18) Chain guide (LH)	
(9) Chain tensioner lever (RH)	(19) Chain guide (Main)	
(10) Chain tensioner lever (LH)	(20) Chain guide (Between cams)	

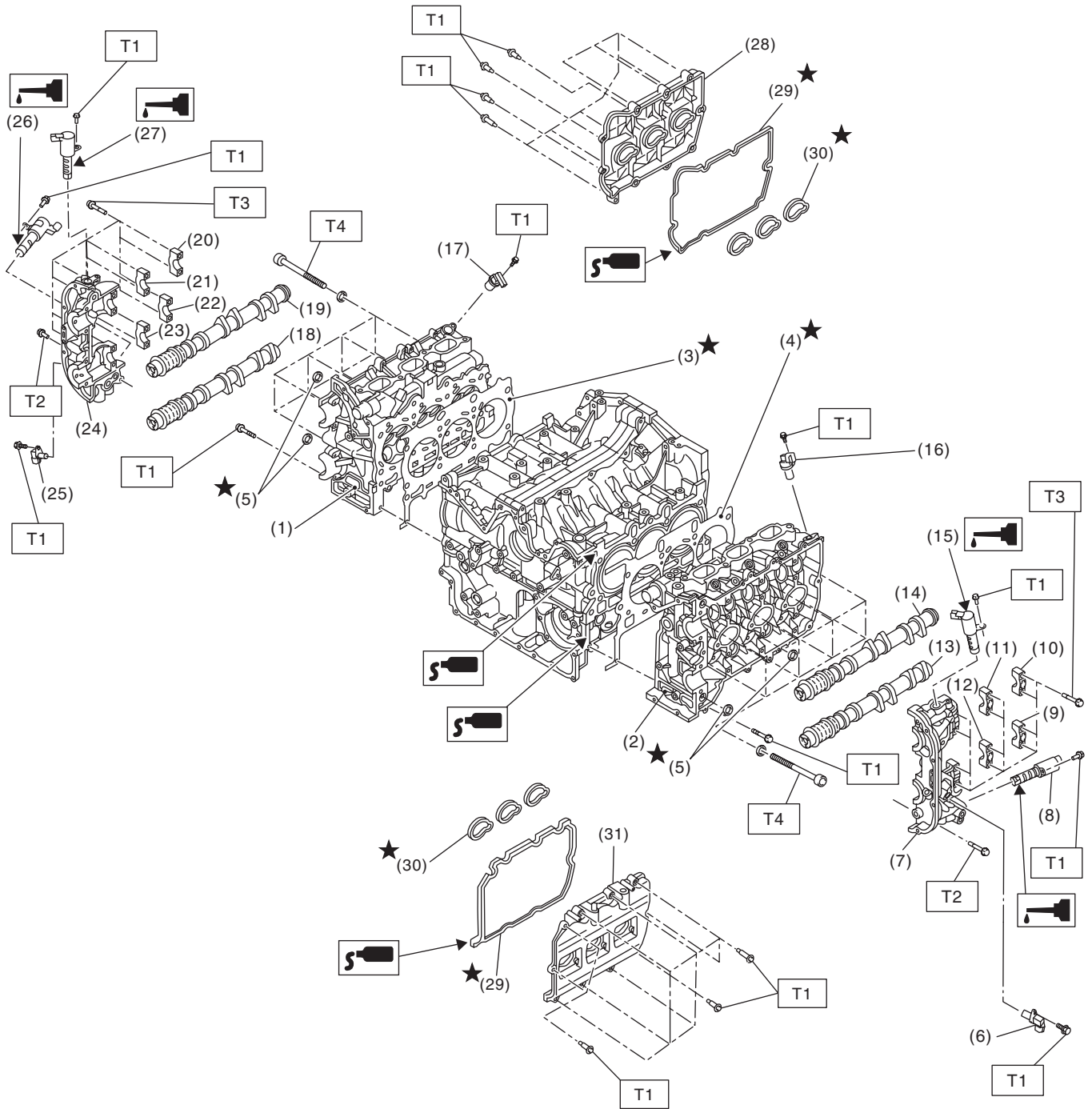
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**Tightening torque:N-m (kgf-m, ft-lb)****T1: 6.4 (0.7, 4.7)****T2: 16 (1.6, 11.8)****T3: <Ref. to ME(H6DO)-72, Cam Sprocket.>****T4: 120 (12.2, 88.5)**

---



## 4. CYLINDER HEAD AND CAMSHAFT



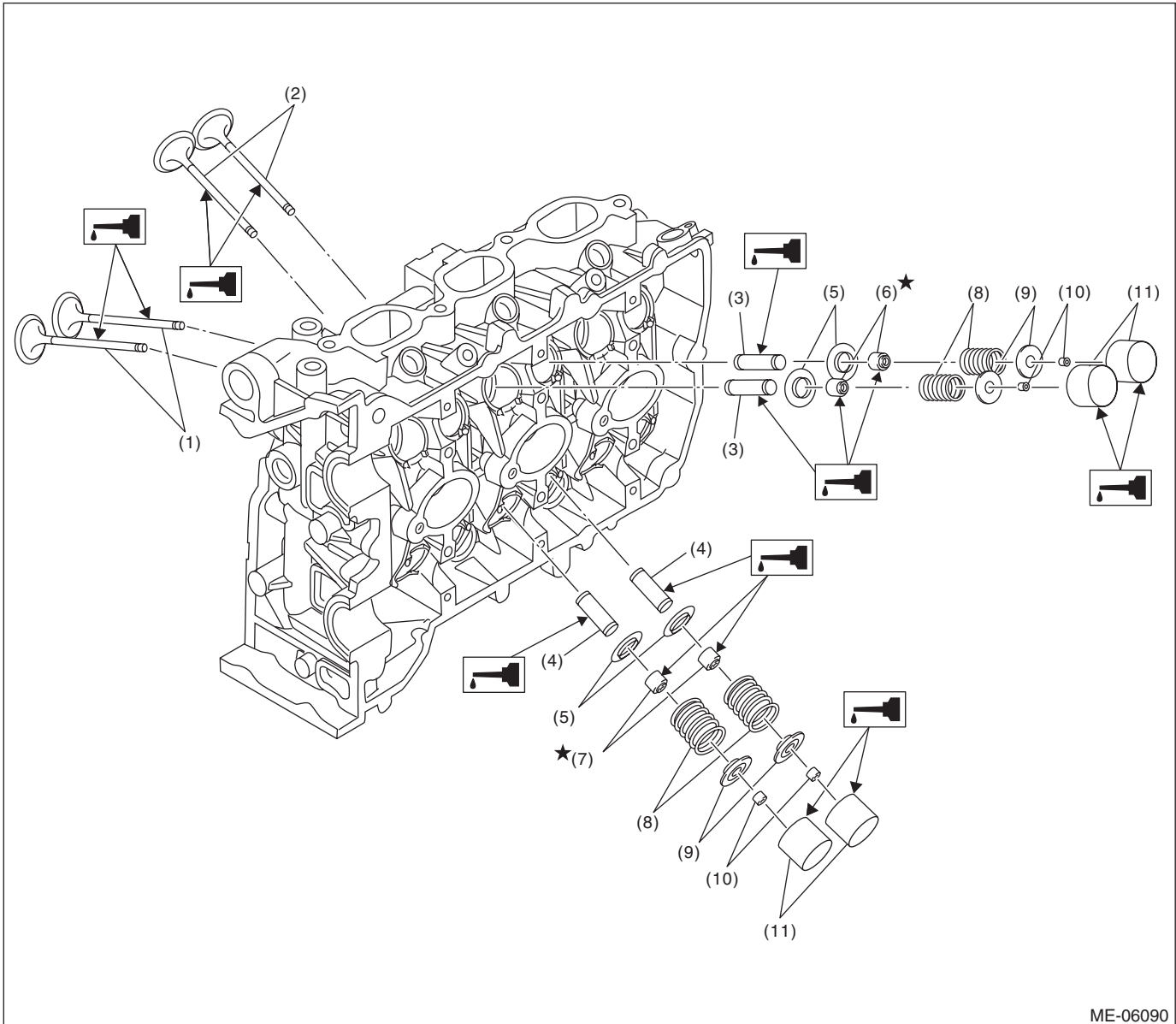
ME-04916

# General Description

## MECHANICAL

(1) Cylinder head (RH)	(14) Intake camshaft (LH)	(27) Intake oil flow control solenoid valve (RH)
(2) Cylinder head (LH)	(15) Intake oil flow control solenoid valve (LH)	(28) Rocker cover (RH)
(3) Cylinder head gasket (RH)	(16) Intake camshaft position sensor (LH)	(29) Gasket
(4) Cylinder head gasket (LH)	(17) Intake camshaft position sensor (RH)	(30) Gasket
(5) O-ring	(18) Exhaust camshaft (RH)	(31) Rocker cover (LH)
(6) Exhaust camshaft position sensor (LH)	(19) Intake camshaft (RH)	
(7) Front camshaft cap (LH)	(20) Intake camshaft cap (Rear RH)	<b>Tightening torque:N·m (kgf-m, ft-lb)</b>
(8) Exhaust oil flow control solenoid valve (LH)	(21) Intake camshaft cap (Center RH)	<b>T1: 6.4 (0.7, 4.7)</b>
(9) Exhaust camshaft cap (Rear LH)	(22) Exhaust camshaft cap (Rear RH)	<b>T2: 9.75 (1.0, 7.2)</b>
(10) Intake camshaft cap (Rear LH)	(23) Exhaust camshaft cap (Center RH)	<b>T3: 16 (1.6, 11.8)</b>
(11) Intake camshaft cap (Center LH)	(24) Front camshaft cap (RH)	<b>T4: &lt;Ref. to ME(H6DO)-83, Cylinder Head.&gt;</b>
(12) Exhaust camshaft cap (Center LH)	(25) Exhaust camshaft position sensor (RH)	
(13) Exhaust camshaft (LH)	(26) Exhaust oil flow control solenoid valve (RH)	

## 5. CYLINDER HEAD AND VALVE ASSEMBLY



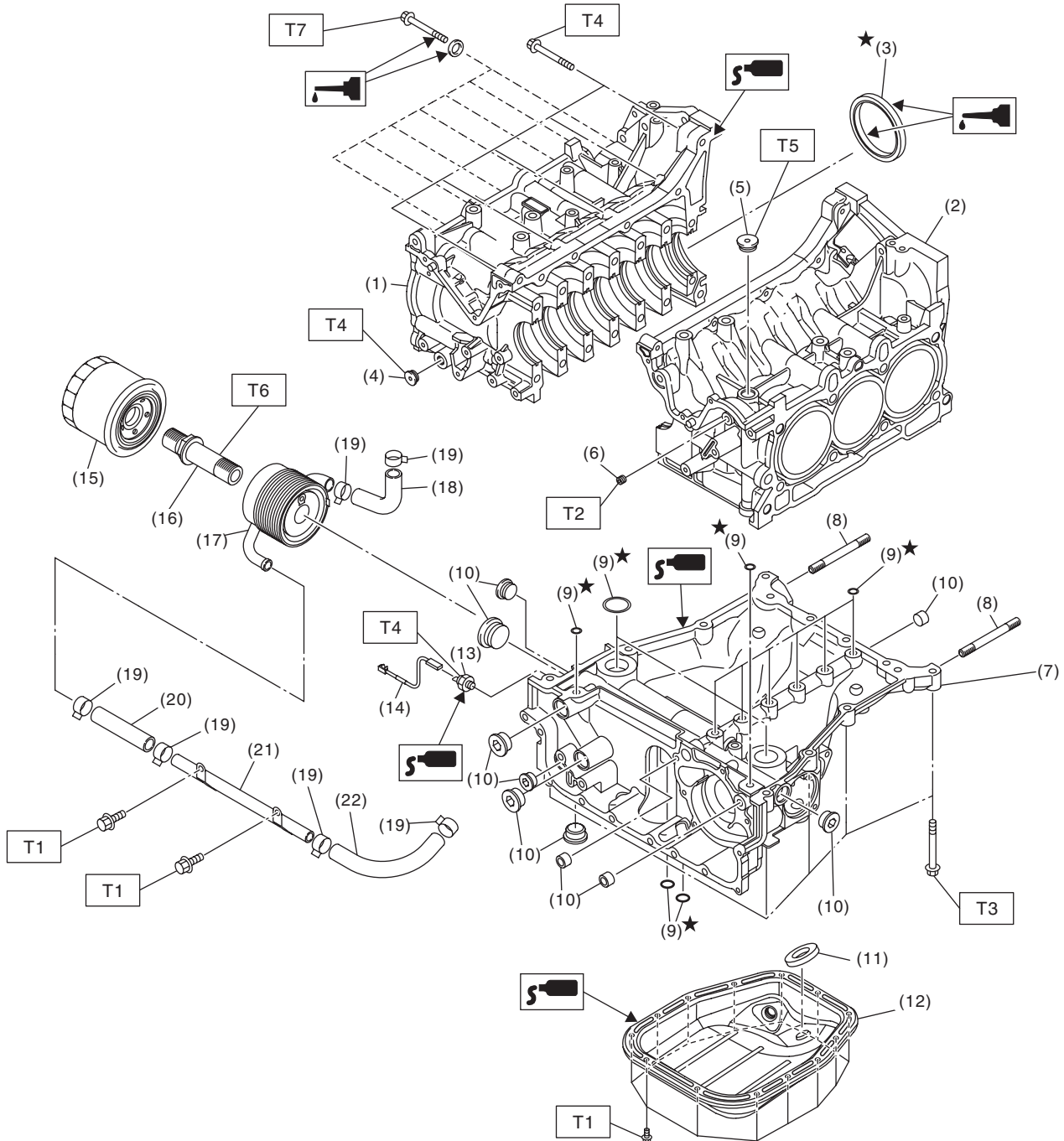
ME-06090

- |                           |                         |                           |
|---------------------------|-------------------------|---------------------------|
| (1) Intake valve          | (5) Valve spring seat   | (9) Valve spring retainer |
| (2) Exhaust valve         | (6) Stem seal (Intake)  | (10) Valve collet         |
| (3) Valve guide (Intake)  | (7) Stem seal (Exhaust) | (11) Valve lifter         |
| (4) Valve guide (Exhaust) | (8) Valve spring        |                           |

# General Description

MECHANICAL

## 6. CYLINDER BLOCK



ME-04988

ME(H6DO)-12

# General Description

MECHANICAL

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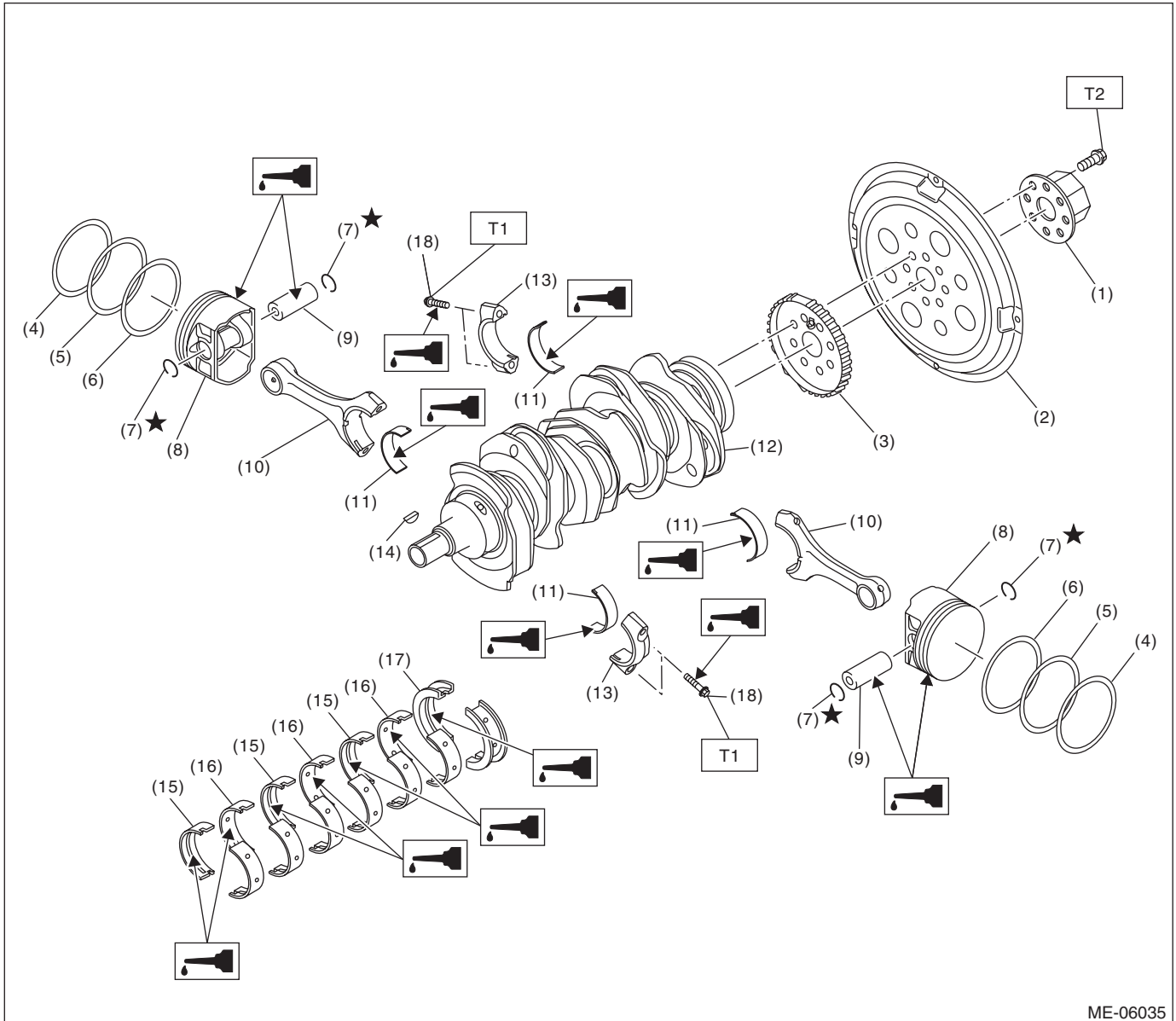
(1) Cylinder block (RH)	(12) Oil pan lower	<b>Tightening torque:N·m (kgf-m, ft-lb)</b> <b>T1: 6.4 (0.7, 4.7)</b> <b>T2: 17 (1.7, 12.5)</b> <b>T3: 18 (1.8, 13.3)</b> <b>T4: 25 (2.5, 18.4)</b> <b>T5: 37 (3.8, 27.3)</b> <b>T6: 54 (5.5, 39.8)</b> <b>T7: &lt;Ref. to ME(H6DO)-95, Cylinder Block.&gt;</b>
(2) Cylinder block (LH)	(13) Oil pressure switch	
(3) Oil seal	(14) Oil pressure switch harness	
(4) Plug	(15) Oil filter	
(5) Plug	(16) Oil cooler connector	
(6) Orifice	(17) Oil cooler	
(7) Oil pan upper	(18) Hose	
(8) Stud bolt	(19) Clamp	
(9) O-ring	(20) Hose	
(10) Plug	(21) Oil cooler pipe	
(11) Magnet	(22) Hose	

---

# General Description

MECHANICAL

## 7. CRANKSHAFT AND PISTON



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

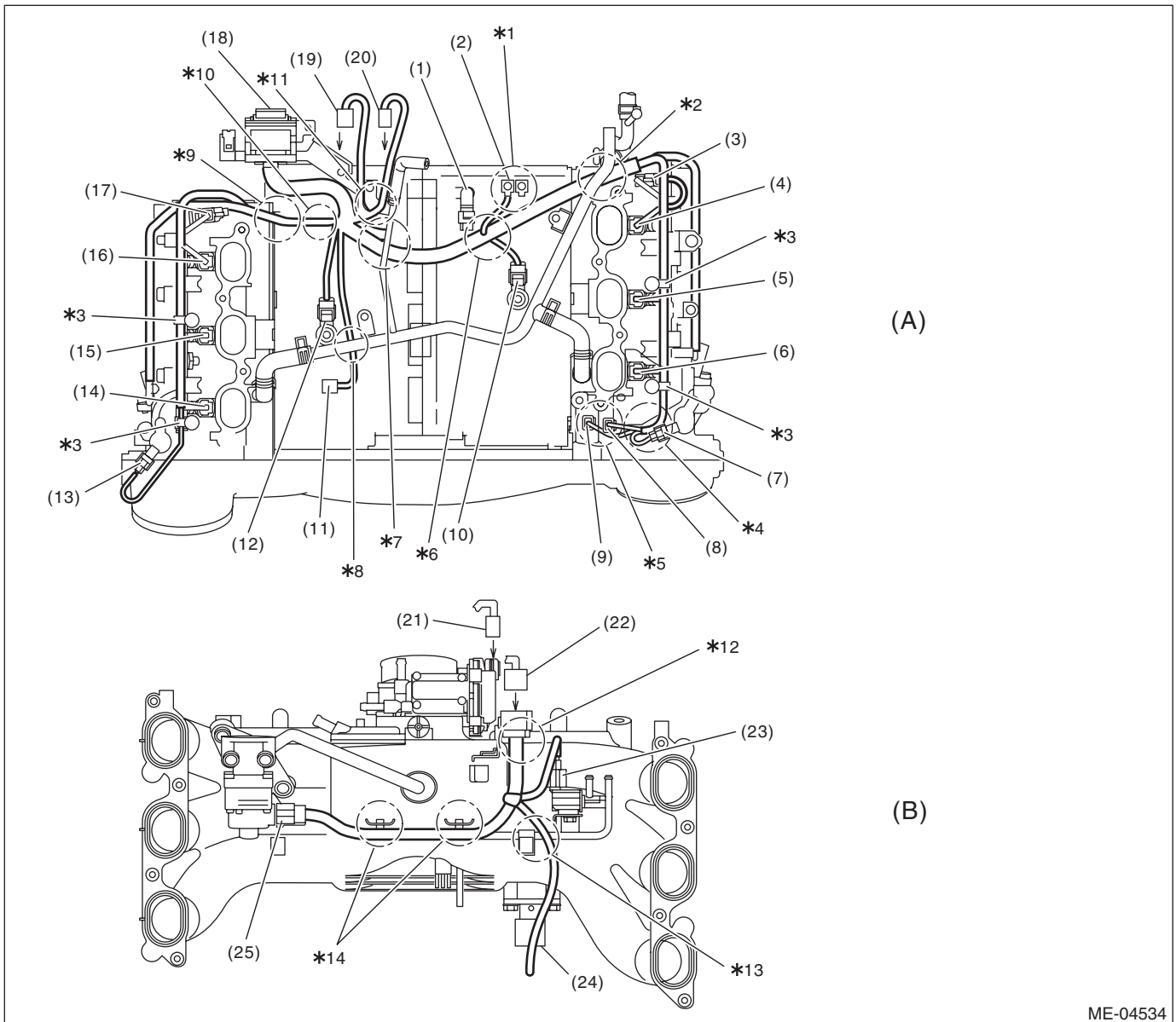
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**Tightening torque: N·m (kgf·m, ft·lb)**  
**T1: 60 (6.1, 44.3)**  
**T2: <Ref. to 5AT-61, INSTALLATION, Drive Plate.>**

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## 8. ENGINE HARNESS

Engine harness assembly diagram 1



ME-04534

# General Description

## MECHANICAL

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(A) Cylinder block upper face	(B) Intake manifold back surface		
(1) Crankshaft position sensor connector	(10) Knock sensor LH connector	(19) Upper/lower connection connector (To intake manifold)	
(2) Engine ground	(11) Power steering switch connector	(20) Electronic throttle control connector (To intake manifold)	
(3) Intake camshaft position sensor LH connector	(12) Knock sensor RH connector	(21) Electronic throttle control connector (From upper part of the cylinder block)	
(4) #6 injector connector	(13) Intake oil flow control solenoid valve RH connector	(22) Upper/lower connection connector (From upper part of the cylinder block)	
(5) #4 injector connector	(14) #1 injector connector	(23) Purge control solenoid valve connector	
(6) #2 injector connector	(15) #3 injector connector	(24) Manifold absolute pressure sensor connector	
(7) Intake oil flow control solenoid valve LH connector	(16) #5 injector connector	(25) EGR valve connector	
(8) Oil temperature sensor connector	(17) Intake camshaft position sensor RH connector		
(9) Engine coolant temperature sensor connector	(18) Engine harness docking connector		

\*1: Install so that engine ground terminals face the rear side of vehicle.

\*2: Route under the heater pipe.

\*3: Attach the engine harness fixing clip to the fuel pipe stay.

\*4: Route from the cutout portion on the fuel pipe protector LH.

\*5: Be careful not to mix up the connectors of oil temperature sensor and engine coolant temperature sensor.

\*6: Route between crankshaft position sensor and knock sensor LH.

\*7: Route under the heater pipe.

\*8: Route under the heater pipe.

\*9: Route under the fuel pipe.

\*10: Attach the engine harness fixing clip to the fixing boss on the cylinder block.

\*11: Route over the heater pipe stay.

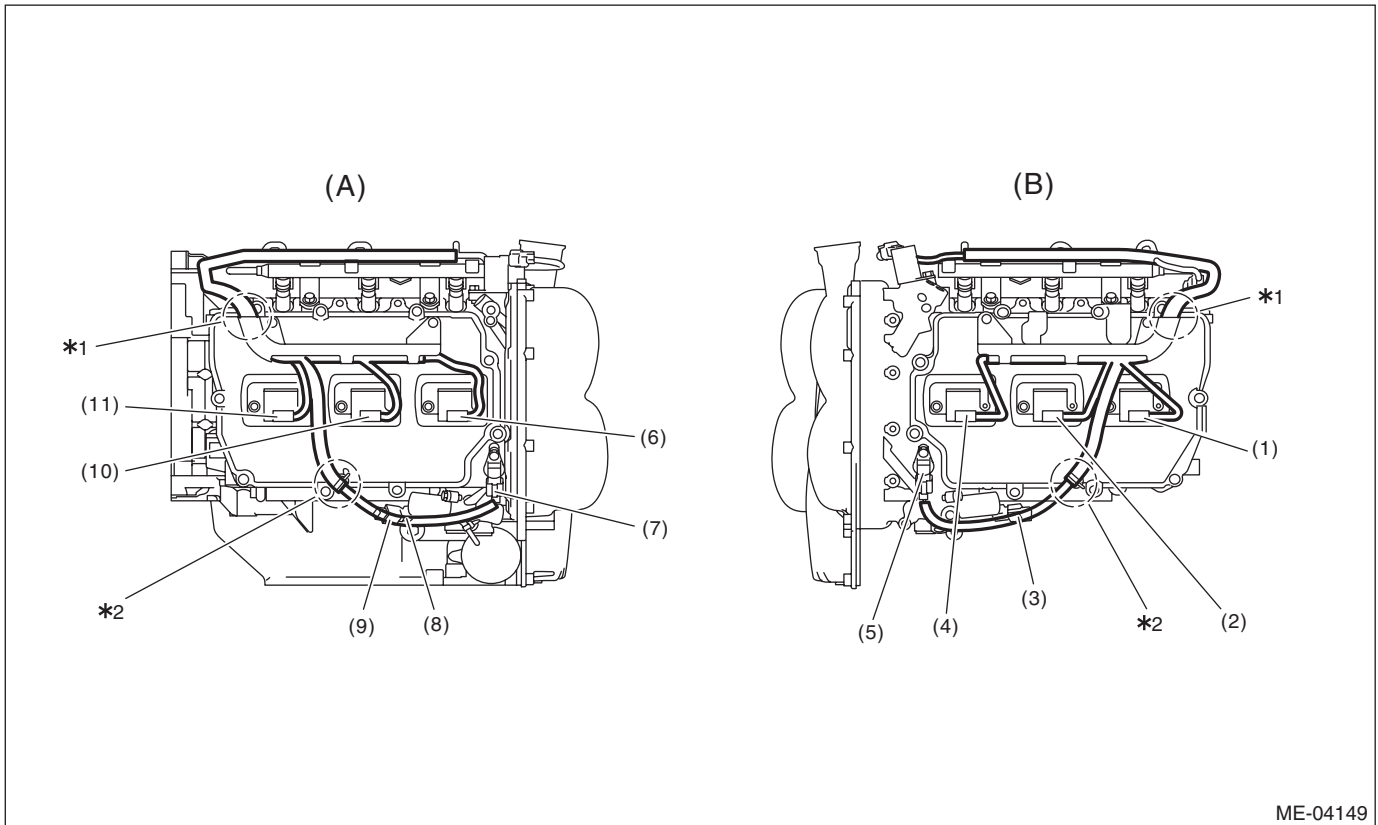
\*12: Securely install the engine harness fixing stay.

\*13: Route outside the fuel pipe.

\*14: Attach the engine harness fixing clip to the fixing stay on the intake manifold.



## Engine harness assembly diagram 2



ME-04149

(A) Right side of the engine

(B) Left side of the engine

- |  |   |  |
|--|---|--|
| (1) #6 ignition coil connector                           | (5) Exhaust camshaft position sensor LH connector | (9) Exhaust oil flow control valve solenoid RH connector |
| (2) #4 ignition coil connector                           | (6) #1 injector connector                         | (10) #3 ignition coil connector                          |
| (3) Exhaust oil flow control valve solenoid LH connector | (7) Exhaust camshaft position sensor RH connector | (11) #5 ignition coil connector                          |
| (4) #2 ignition coil connector                           | (8) Oil pressure switch connector                 |  |

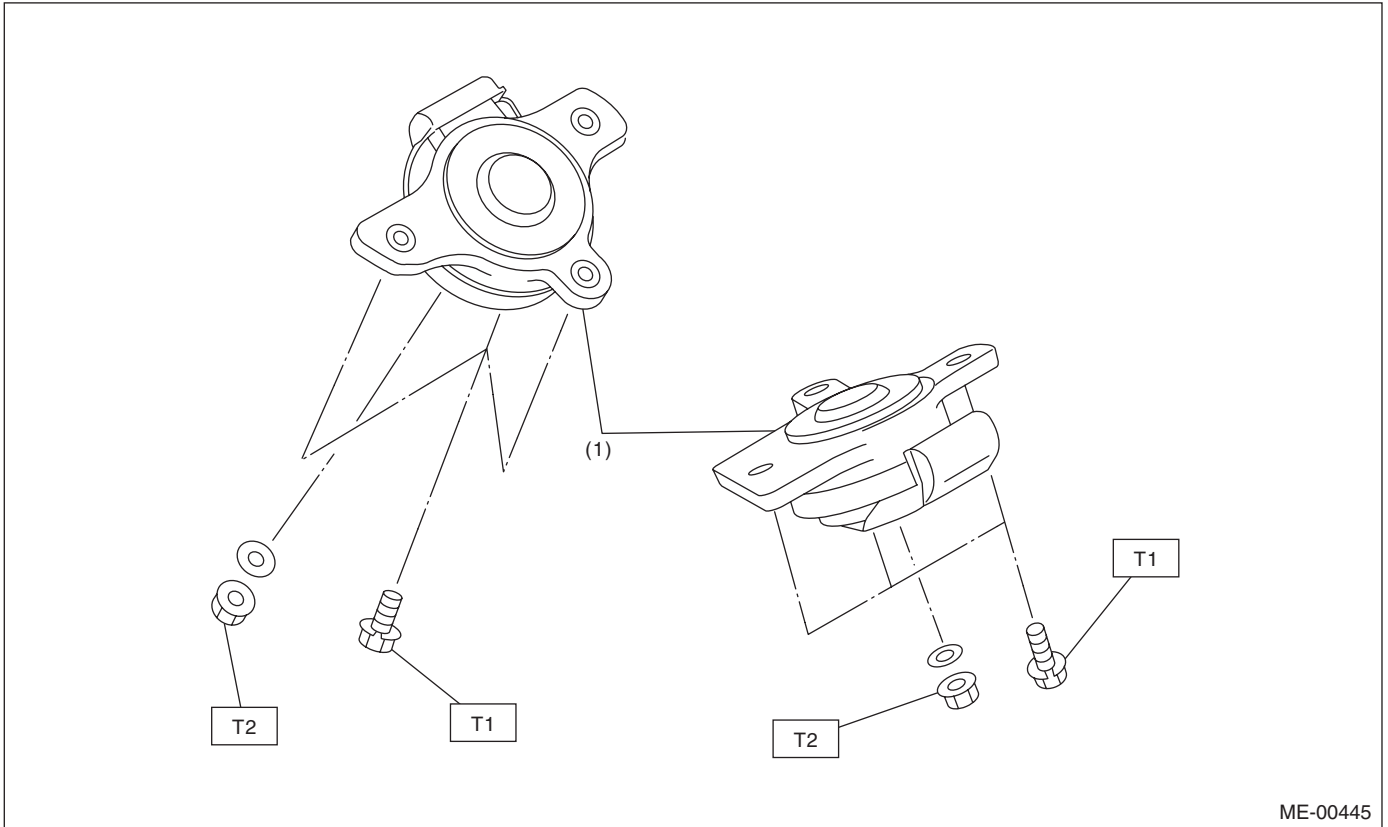
\*1: Align the engine harness stay end with the end of engine harness identification tape.

\*2: Attach the engine harness fixing clip to the fixing boss on the rocker cover.

# General Description

MECHANICAL

## 9. ENGINE MOUNTING



ME-00445

(1) Front cushion rubber

**Tightening torque: N·m (kgf-m, ft-lb)**

**T1: 35 (3.6, 25.8)**

**T2: 75 (7.6, 55.3)**

## C: CAUTION

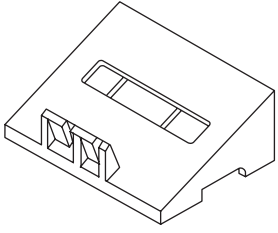
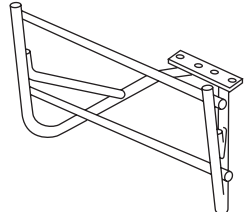
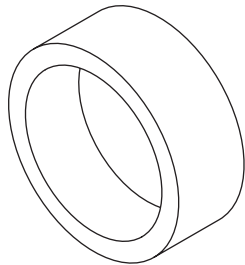
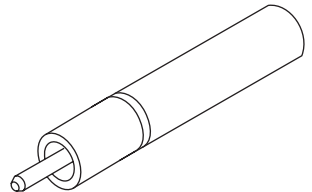
- Wear appropriate work clothing, including a cap, protective goggles and protective shoes when performing any work.
- Remove contamination including dirt and corrosion before removal, installation or disassembly.
- Keep the disassembled parts in order and protect them from dust and dirt.
- Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
- Vehicle components are extremely hot after driving. Be wary of receiving burns from heated parts.
- Be sure to tighten fasteners including bolts and nuts to the specified torque.
- Place shop jacks or rigid racks at the specified points.
- Before disconnecting connectors of sensors or units, be sure to disconnect the ground cable from the battery.
- All parts should be thoroughly cleaned, paying special attention to engine oil passages, pistons and bearings.
- Before applying liquid gasket, completely remove the old liquid gasket and degrease it.
- Rotating parts and sliding parts such as piston, bearing and gear should be coated with oil prior to assembly.
- 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 parts as required.
- Even if necessary inspections have been made in advance, proceed with assembly work while making rechecks.
- Remove or install the 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 not to stain seats and windows with coolant or oil. Place a cover over fender, 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.

# General Description

MECHANICAL

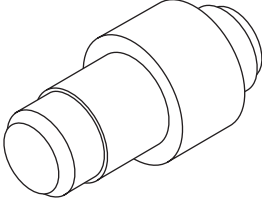
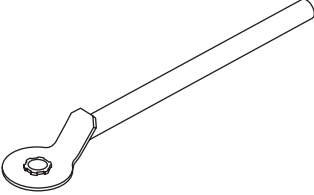
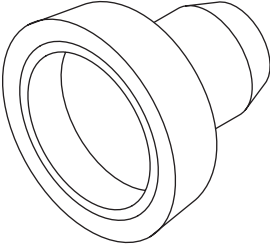
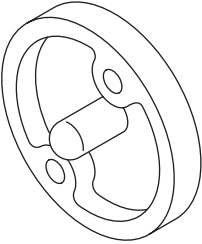
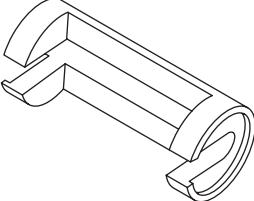
## D: PREPARATION TOOL

### 1. SPECIAL TOOL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18250AA010	18250AA010	CYLINDER HEAD TABLE	<ul style="list-style-type: none"><li>• Used for replacing valve guides.</li><li>• Used for removing and installing valve spring.</li></ul>
 ST18232AA000	18232AA000	ENGINE STAND	Used for disassembling and assembling engine.
 ST-398744300	398744300	PISTON GUIDE	Used for installing piston in cylinder.
 ST18261AA010	18261AA010	VALVE OIL SEAL GUIDE	Used for press-fitting of intake valve guide oil seals and exhaust valve guide oil seals.

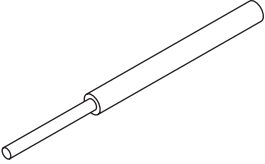
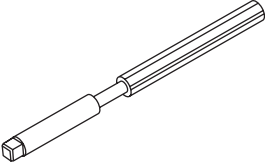
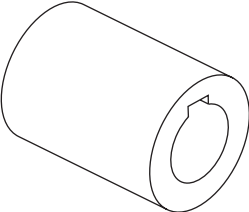
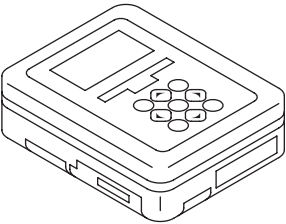
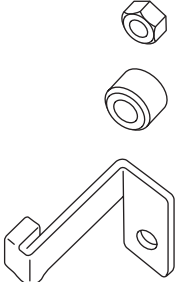
# General Description

MECHANICAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p style="text-align: center;">ST18350AA000</p>	18350AA000	CONNECTING ROD BUSHING REMOVER AND INSTALLER	Used for removing and installing connecting rod bushing.
 <p style="text-align: center;">ST-499977500</p>	499977500	CAM SPROCKET WRENCH	Used for removing and installing cam sprocket.
 <p style="text-align: center;">ST-499587200</p>	499587200	CRANKSHAFT OIL SEAL INSTALLER	<ul style="list-style-type: none"> <li>• Used for installing crankshaft oil seal.</li> <li>• Used together with CRANKSHAFT OIL SEAL GUIDE (499597100).</li> </ul>
 <p style="text-align: center;">ST-499597100</p>	499597100	CRANKSHAFT OIL SEAL GUIDE	<ul style="list-style-type: none"> <li>• Used for installing crankshaft oil seal.</li> <li>• Used together with CRANKSHAFT OIL SEAL INSTALLER (499587200).</li> </ul>
 <p style="text-align: center;">ST-499718000</p>	499718000	VALVE SPRING REMOVER	Used for removing and installing valve spring.

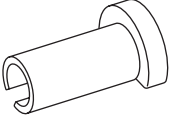
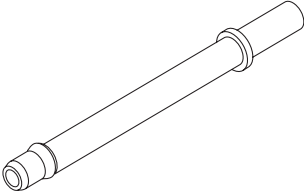
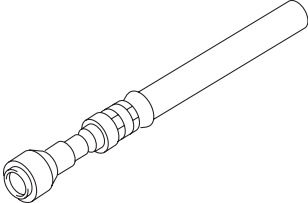
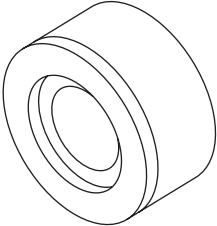
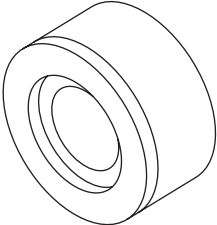
# General Description

## MECHANICAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p style="text-align: center;">ST-499765700</p>	499765700	VALVE GUIDE REMOVER	Used for removing valve guides.
 <p style="text-align: center;">ST-499765900</p>	499765900	VALVE GUIDE REAMER	Used for reaming valve guides.
 <p style="text-align: center;">ST18252AA000</p>	18252AA000	CRANKSHAFT SOCKET	Used for rotating crankshaft.
 <p style="text-align: center;">ST1B022XU0</p>	1B022XU0	SUBARU SELECT MONITOR III KIT	Used for various inspections.
 <p style="text-align: center;">ST-498277200</p>	498277200	STOPPER SET	Used for installing automatic transmission assembly to engine.

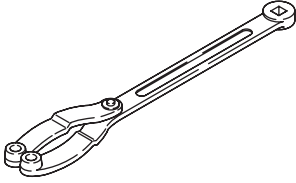
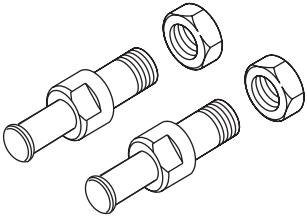
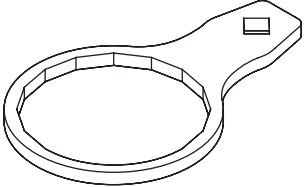
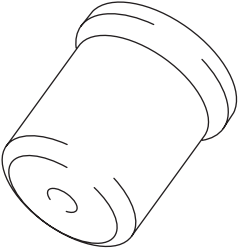
# General Description

MECHANICAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>ST42099AE000</p>	42099AE000	QUICK CON- NECTOR RELEASE	Used for disconnecting quick connector of the engine compartment.
 <p>ST18471AA000</p>	18471AA000	FUEL PIPE ADAPTER	Used for measuring fuel pressure.
 <p>ST42075AG690</p>	42075AG690	FUEL HOSE	<ul style="list-style-type: none"> <li>• Used for measuring fuel pressure.</li> <li>• This is the SUBARU genuine part.</li> </ul>
 <p>ST18251AA050</p>	18251AA050	VALVE GUIDE ADJUSTER	Used for installing intake valve guides.
 <p>ST18251AA060</p>	18251AA060	VALVE GUIDE ADJUSTER	Used for installing exhaust valve guides.

# General Description

## MECHANICAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p style="text-align: center;">ST18355AA000</p>	18355AA000	PULLEY WRENCH	<ul style="list-style-type: none"> <li>• Used for removing and installing the crank pulley.</li> <li>• Used for removing and installing the idler sprocket.</li> <li>• Used together with PULLEY WRENCH PIN SET (18334AA000).</li> </ul>
 <p style="text-align: center;">ST18334AA000</p>	18334AA000	PULLEY WRENCH PIN SET	<ul style="list-style-type: none"> <li>• Used for removing and installing the crank pulley.</li> <li>• Used for removing and installing the idler sprocket.</li> <li>• Used together with PULLEY WRENCH (18355AA000).</li> </ul>
 <p style="text-align: center;">ST18332AA020</p>	18332AA020	OIL FILTER WRENCH	Used for removing and installing oil filter.
 <p style="text-align: center;">ST-499585700</p>	499585700	OIL SEAL GUIDE	Used for installing the chain cover oil seal.

## 2. GENERAL TOOL

TOOL NAME	REMARKS
Compression gauge	Used for inspecting compression pressure.
Timing light	Used for inspecting the ignition timing.
Vacuum gauge	Used for inspecting intake manifold vacuum.
Oil pressure gauge	Used for inspecting engine oil pressure.
Fuel pressure gauge	Used for inspecting fuel pressure.
TORX® socket (E12)	Used for removing and installing connecting rod cap.



## 2. Compression

### A: INSPECTION

#### CAUTION:

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

- 1) Remove the collector cover.
- 2) After warming-up the engine, turn the ignition switch to OFF.
- 3) Make sure that the battery is fully charged.
- 4) Release the fuel pressure. <Ref. to FU(H6DO)-59, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
- 5) Remove all spark plugs. <Ref. to IG(H6DO)-4, REMOVAL, Spark Plug.>
- 6) Fully open the throttle valve.
- 7) Check the starter motor for satisfactory performance and operation.
- 8) Secure the compression gauge tightly against the spark plug hole.

#### NOTE:

When using a screw-in type compression gauge, the screw should be less than 18 mm (0.71 in) long.

- 9) Crank the engine by the starter motor, and read the maximum value on the gauge when the needle of gauge is steady.

#### NOTE:

- Perform at least two measurements per cylinder, and make sure that the values are correct.
- If the compression pressure is out of standard, check or adjust the pistons, valves and cylinders.

#### **Compression (350 rpm and fully open throttle):**

##### **Standard**

**1,275 — 1,471 kPa (13.0 — 15.0 kgf/cm<sup>2</sup>,  
185 — 213 psi)**

##### **Limit**

**1,128 kPa (11.5 kgf/cm<sup>2</sup>, 164 psi)**

##### **Difference between cylinders**

**49 kPa (0.5 kgf/cm<sup>2</sup>, 7 psi) or less**

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

## 3. Idle Speed

### A: INSPECTION

1) Before checking the idle speed, check the following item:

(1) Check the air cleaner element is free from clogging, ignition timing is correct, spark plugs are in good condition, and hoses are connected properly.

(2) Check the malfunction indicator light does not illuminate.

2) Warm up the engine.

3) Read the engine idle speed using Subaru Select Monitor. <Ref. to EN(H6DO)(diag)-37, READ CURRENT DATA FOR ENGINE (NORMAL MODE), OPERATION, Subaru Select Monitor.>

#### NOTE:

- Idle speed cannot be adjusted manually, because the idle speed is automatically adjusted.
- If idle speed is out of standard, refer to the General Diagnosis Table under "Engine Control System". <Ref. to EN(H6DO)(diag)-2, Basic Diagnostic Procedure.>

(1) Check the idle speed when no-loaded. (Headlight, heater fan, rear defroster, radiator fan, A/C and etc. are OFF)

***Idle speed (No load and gears in "P" or "N" range):***

#### ***Standard***

***700±100 rpm***

(2) Check the idle speed when loaded. (Turn the A/C switch to "ON" and operate the compressor for at least one minute before measurement.)

***Idle speed (A/C ON and gear in "P" or "N" range):***

#### ***Standard***

***805±100 rpm***

## 4. Ignition Timing

### A: INSPECTION

#### CAUTION:

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

#### 1. METHOD WITH SUBARU SELECT MONITOR

1) Before checking the ignition timing, check the following item:

- (1) Check the air cleaner element is free from clogging, spark plugs are in good condition, and hoses are connected properly.
- (2) Check the malfunction indicator light does not illuminate.

2) Warm up the engine.

3) Read the ignition timing using Subaru Select Monitor. <Ref. to EN(H6DO)(diag)-37, READ CURRENT DATA FOR ENGINE (NORMAL MODE), OPERATION, Subaru Select Monitor.>

#### NOTE:

If ignition timing is out of standard, check the ignition control system. Refer to "Engine Control System". <Ref. to EN(H6DO)(diag)-2, Basic Diagnostic Procedure.>

#### Ignition timing [BTDC/rpm]:

##### Standard

$15^{\circ} \pm 8^{\circ} / 700$

#### 2. METHOD WITH TIMING LIGHT

1) Before checking the ignition timing, check the following item:

- (1) Check the air cleaner element is free from clogging, spark plugs are in good condition, and hoses are connected properly.
- (2) Check the malfunction indicator light does not illuminate.

2) Warm up the engine.

3) Stop the engine, and turn the ignition switch to OFF.

4) Remove the collector cover.

5) Disconnect the ground cable from battery.

6) Remove the air intake duct. <Ref. to IN(H6DO)-9, REMOVAL, Air Intake Duct.>

7) Disconnect the connector from mass air flow and intake air temperature sensor.

8) Remove the air cleaner case and element.

9) Connect the timing light to the power wire of #1 ignition coil.

10) Install the connectors of air cleaner case, element, and the mass air flow and intake air temperature sensor.

11) Connect the battery ground terminal.

12) Start the engine, turn the timing light to the crank pulley, and check the ignition timing through the chain cover gauge.

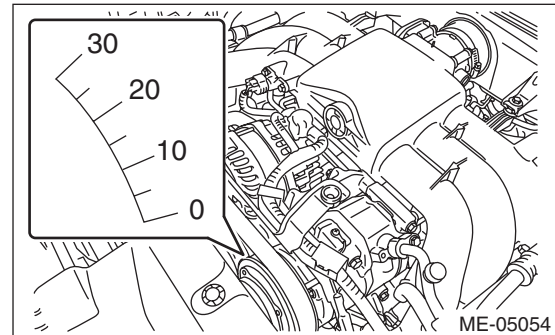
#### NOTE:

If ignition timing is out of standard, check the ignition control system. Refer to "Engine Control System". <Ref. to EN(H6DO)(diag)-2, Basic Diagnostic Procedure.>

#### Ignition timing [BTDC/rpm]:

##### Standard

$15^{\circ} \pm 8^{\circ} / 700$



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

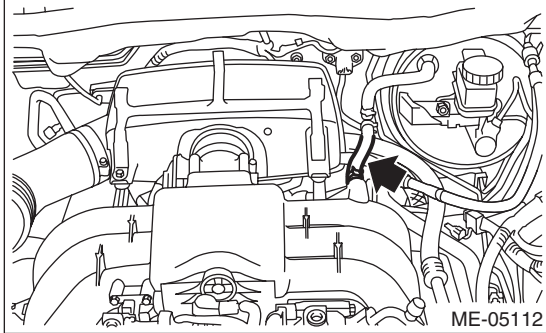
# Intake Manifold Vacuum

MECHANICAL

## 5. Intake Manifold Vacuum

### A: INSPECTION

- 1) Warm up the engine.
- 2) Remove the collector cover.
- 3) Disconnect the brake booster vacuum hose from the intake manifold, and install the vacuum gauge.



- 4) Keep the engine at idle speed and read the vacuum gauge indication.

#### NOTE:

Condition of engine inside can be diagnosed by observing the behavior of the vacuum gauge needle as described in table below.

#### **Intake manifold vacuum (at idling, A/C OFF):**

##### **Standard**

**Less than  $-60.0$  kPa ( $-450$  mmHg,  $-17.72$  inHg)**

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

Diagnosis of engine condition by measurement of intake manifold vacuum	
Vacuum gauge indication	Possible engine condition
1. Needle is steady but lower than standard value. This tendency becomes more evident as engine temperature rises.	Leakage around intake manifold gasket, disconnection or damage of vacuum hose
2. Needle intermittently drops to position lower than standard value.	Leakage around cylinder
3. Needle drops suddenly and intermittently from standard value.	Sticky valve
4. 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
5. Needle vibrates above and below standard value in narrow range.	Defective ignition system

## 6. Engine Oil Pressure

### A: INSPECTION

- 1) Disconnect the ground cable from battery.
- 2) Remove the oil pressure switch from the oil pan upper. <Ref. to LU(H6DO)-14, REMOVAL, Oil Pressure Switch.>
- 3) Connect the oil pressure gauge hose to the oil pan upper.
- 4) Connect the battery ground terminal.
- 5) Start the engine, and check the oil pressure.

#### NOTE:

- If the oil pressure is out of specification, check oil pump, oil filter and lubrication line. <Ref. to LU(H6DO)-17, General Diagnostic Table.>
- If the oil pressure warning light is ON and oil pressure is within specification, check the oil pressure switch. <Ref. to LU(H6DO)-7, Oil Pressure System.>

***Oil pressure (at oil temperature of 120°C (248°F)):***

#### ***Standard***

***98 kPa (1.0 kgf/cm<sup>2</sup>, 14 psi) or more  
(at 600 rpm)***

***392 kPa (4.0 kgf/cm<sup>2</sup>, 57 psi) or more  
(at 6,000 rpm)***

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

## 7. Fuel Pressure

### A: INSPECTION

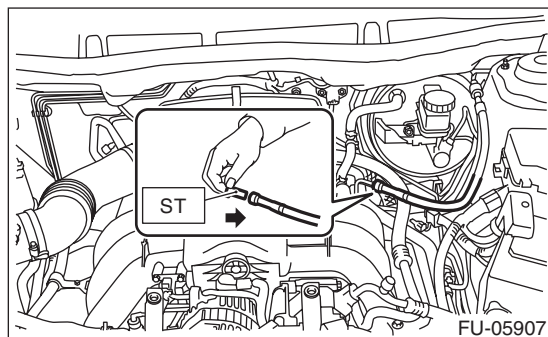
#### CAUTION:

- Before removing the fuel pressure gauge, release the fuel pressure.
- Be careful not to spill fuel.
- Catch the fuel from hoses using a container or cloth.

- 1) Remove the collector cover.
- 2) Release the fuel pressure. <Ref. to FU(H6DO)-59, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
- 3) Open the fuel filler lid and remove the fuel filler cap.
- 4) Disconnect the fuel delivery hose and connect the fuel pressure gauge.

- (1) Disconnect the fuel delivery hose using the ST.

ST 42099AE000 QUICK CONNECTOR RELEASE



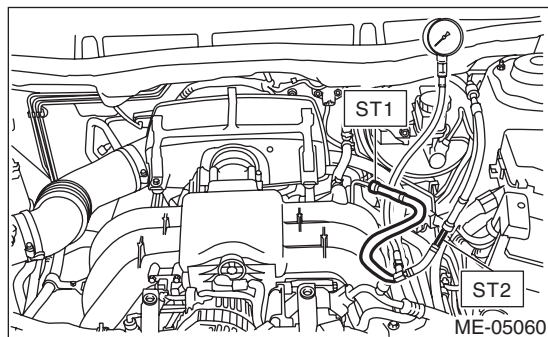
- (2) Connect the fuel pressure gauge with ST1 and ST2.

#### NOTE:

ST1 is a SUBARU genuine part.

ST1 42075AG690 FUEL HOSE

ST2 18471AA000 FUEL PIPE ADAPTER



- 5) Start the engine.

- 6) Check the fuel pressure after warming up the engine.

#### NOTE:

- The fuel pressure gauge registers 10 to 20 kPa (0.1 to 0.2 kgf/cm<sup>2</sup>, 1 to 3 psi) higher than standard values during high-altitude operations.
- Check or replace the fuel pump and fuel delivery line if the fuel pressure is out of the standard.

#### Fuel pressure:

##### Standard

**340 — 400 kPa (3.5 — 4.1 kgf/cm<sup>2</sup>, 49.3 — 58 psi)**

## 8. Valve Clearance

### A: INSPECTION

**CAUTION:**

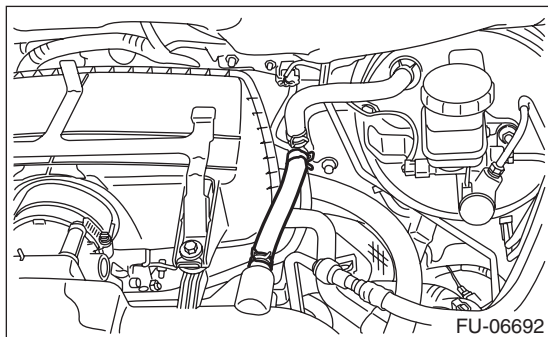
If engine oil is spilt onto the exhaust pipe, wipe it off with cloth to avoid emission of smoke or causing a fire.

**NOTE:**

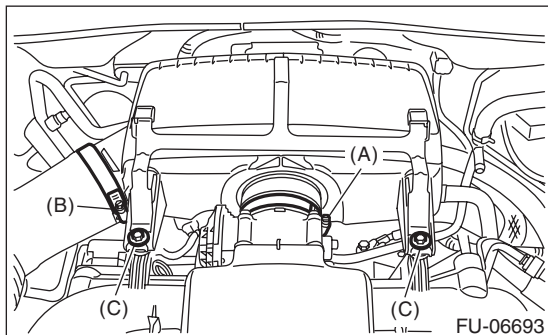
Inspection of valve clearance should be performed while engine is cold.

- 1) Remove the collector cover.
- 2) Disconnect the ground cable from battery.
- 3) Lift up the vehicle.
- 4) Remove the under cover. <Ref. to EI-18, REMOVAL, Front Under Cover.>
- 5) Lower the vehicle.
- 6) When inspecting the valve clearances for #1, #3 and #5

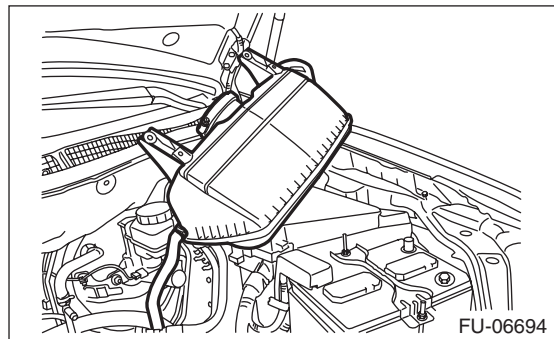
- (1) Disconnect the brake booster vacuum hose from the intake manifold.



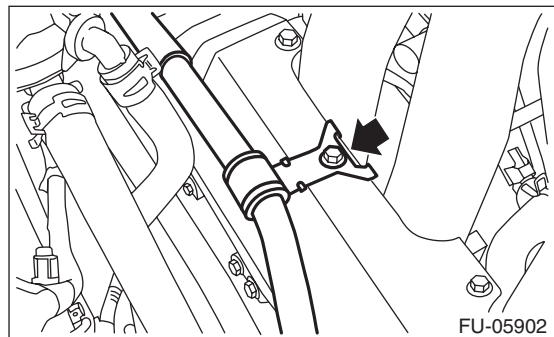
- (2) Loosen the clamp (A) which connects air intake chamber to throttle body.
- (3) Loosen the clamp (B) which connects intake boot to air intake chamber.
- (4) Loosen the bolt (C) which secures air intake chamber and collector cover bracket to the stay.



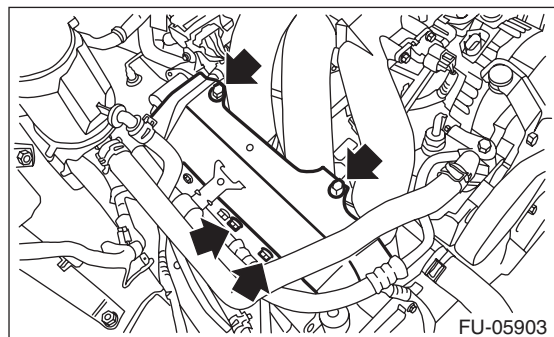
- (5) Remove the air intake chamber, and move it to the left side wheel apron.



- (6) Remove the air cleaner case and intake boot. <Ref. to IN(H6DO)-6, REMOVAL, Air Cleaner Case.>
- (7) Remove the feed hose from the fuel pipe protector (RH).



- (8) Remove the fuel pipe protector (RH).



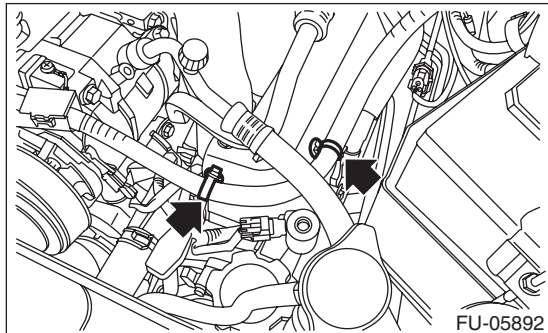
- (9) Disconnect the connector of oil pressure switch.
- (10) Remove the ignition coil. <Ref. to IG(H6DO)-7, REMOVAL, Ignition Coil.>
- (11) Remove the rocker cover (RH). <Ref. to ME(H6DO)-74, REMOVAL, Camshaft.>

# Valve Clearance

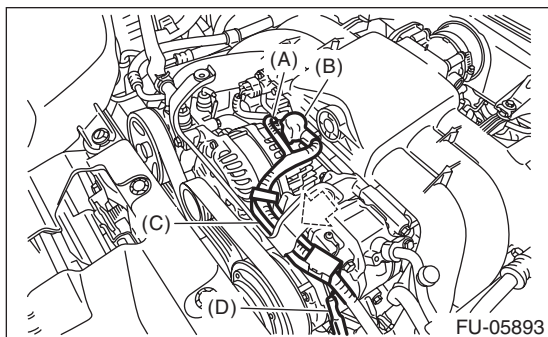
## MECHANICAL

7) When inspecting the valve clearances for #2, #4 and #6

- (1) Remove the battery and battery carrier. <Ref. to SC(H6DO)-19, REMOVAL, Battery.>
- (2) Remove two fixing clips on the fuel pipe protector (LH).



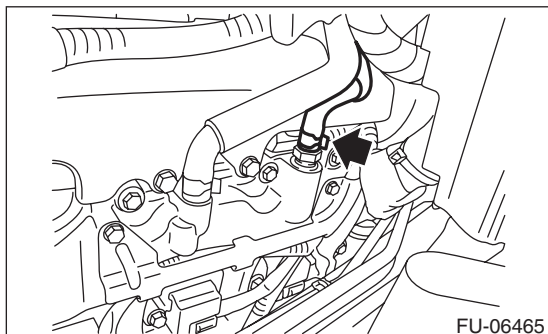
- (3) Generator connector
- (4) Generator terminal B
- (5) Remove the harness cover from collector cover bracket.
- (6) Magnet clutch connector



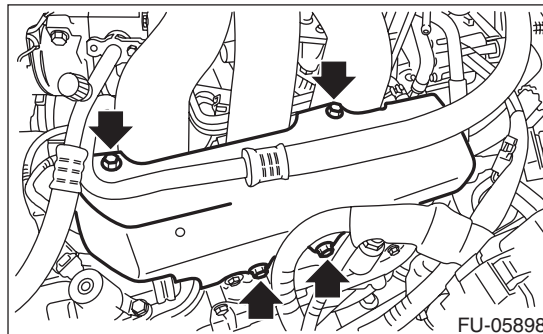
- (A) Generator connector
- (B) Terminal B
- (C) Remove the harness cover from collector cover bracket.
- (D) Magnet clutch connector

(7) Slide the harness and connector to the battery side.

(8) Disconnect the PCV hose from rocker cover (LH).



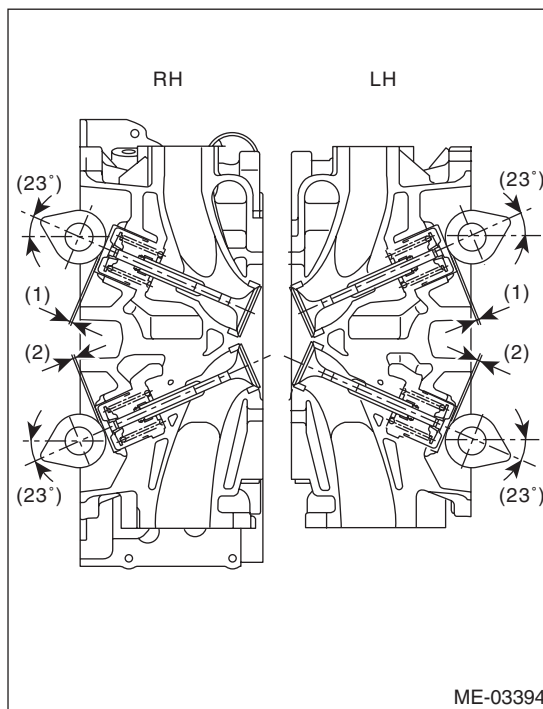
(9) Remove the fuel pipe protector (LH).



(10) Remove the ignition coil. <Ref. to IG(H6DO)-7, REMOVAL, Ignition Coil.>

(11) Remove the rocker cover (LH). <Ref. to ME(H6DO)-74, REMOVAL, Camshaft.>

8) Turn the crankshaft clockwise until the camshaft is set to position shown in the figure.



- (1) Valve clearance (Intake side)
- (2) Valve clearance (Exhaust side)

9) Measure the clearance of intake valve and exhaust valve using thickness gauge (A).

### NOTE:

- Measure it within the range of  $\pm 30^\circ$  from specified position shown in the figure.
- Insert a thickness gauge in a direction as horizontal as possible with respect to the valve lifter.
- If the measured value is not within specification, take notes of the value in order to adjust the valve clearance later on.



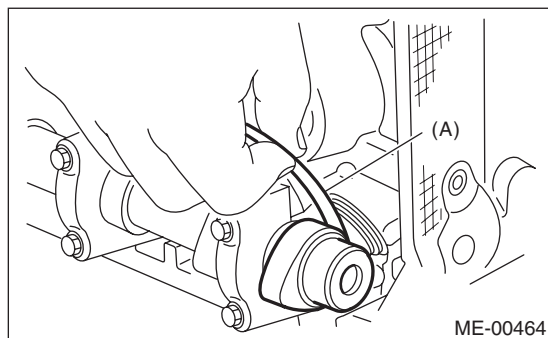
## Valve clearance (inspection value):

### Intake

$0.20^{+0.04} -0.06$  mm ( $0.0079^{+0.0016} -0.0024$  in)

### Exhaust

$0.35 \pm 0.05$  mm ( $0.0138 \pm 0.0020$  in)



10) If necessary, adjust the valve clearance. <Ref. to ME(H6DO)-33, ADJUSTMENT, Valve Clearance.>

11) Further turn the crank pulley clockwise and then measure the valve clearances again.

12) After inspection, install the related parts in the reverse order of removal. <Ref. to ME(H6DO)-76, INSTALLATION, Camshaft.>

## B: ADJUSTMENT

### 1. INTAKE SIDE

1) Remove the engine from vehicle. <Ref. to ME(H6DO)-35, REMOVAL, Engine Assembly.>

2) Measure all the valve clearances. <Ref. to ME(H6DO)-31, INSPECTION, Valve Clearance.>

#### NOTE:

Record each valve clearance after measurement.

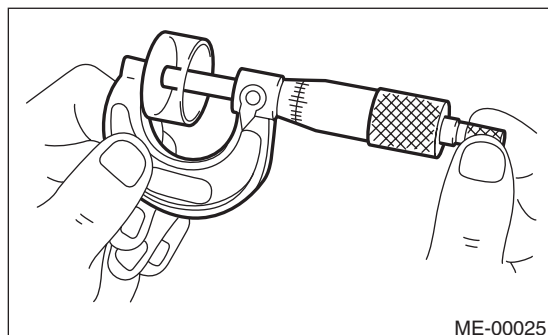
3) Remove the timing chain assembly. <Ref. to ME(H6DO)-54, REMOVAL, Timing Chain Assembly.>

4) Remove the cam sprocket. <Ref. to ME(H6DO)-72, REMOVAL, Cam Sprocket.>

5) Remove the camshaft. <Ref. to ME(H6DO)-74, REMOVAL, Camshaft.>

6) Remove the valve lifter.

7) Measure the thickness of valve lifter using micrometer.



8) Select a valve lifter of suitable thickness using the measured valve clearance and valve lifter thickness, and install it.

#### NOTE:

Use a new valve lifter.

Unit: mm (in)
$S = (V + T) - 0.20$ (0.0079)
S: Valve lifter thickness required
V: Measured valve clearance
T: Current valve lifter thickness

9) Install the camshaft. <Ref. to ME(H6DO)-76, INSTALLATION, Camshaft.>

10) Install the cam sprocket. <Ref. to ME(H6DO)-72, INSTALLATION, Cam Sprocket.>

11) Install the timing chain assembly. <Ref. to ME(H6DO)-60, INSTALLATION, Timing Chain Assembly.>

12) Measure all valve clearance again at this time. If the valve clearance is not within the adjustment value, repeat the procedure from step 3).

## Valve clearance (adjustment value):

$0.20^{+0.04} -0.06$  mm ( $0.0079^{+0.0016} -0.0024$  in)

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

#### NOTE:

Refer to "Camshaft" when installing the rocker cover. <Ref. to ME(H6DO)-76, INSTALLATION, Camshaft.>

### 2. EXHAUST SIDE

1) Remove the engine from vehicle. <Ref. to ME(H6DO)-35, REMOVAL, Engine Assembly.>

2) Measure all the valve clearances. <Ref. to ME(H6DO)-31, INSPECTION, Valve Clearance.>

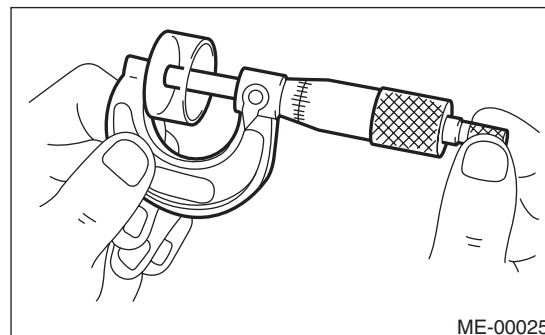
#### NOTE:

Record each valve clearance after measurement.

3) Remove the camshaft. <Ref. to ME(H6DO)-74, REMOVAL, Camshaft.>

4) Remove the valve lifter.

5) Measure the thickness of valve lifter using micrometer.



# Valve Clearance

## MECHANICAL

---

6) Select a valve lifter of suitable thickness using the measured valve clearance and valve lifter thickness, and install it.

### NOTE:

Use a new valve lifter.

Unit: mm (in)
$S = (V + T) - 0.35$ (0.0138)
S: Valve lifter thickness required V: Measured valve clearance T: Current valve lifter thickness

7) Install the camshaft. <Ref. to ME(H6DO)-76, INSTALLATION, Camshaft.>

8) Install the cam sprocket. <Ref. to ME(H6DO)-72, INSTALLATION, Cam Sprocket.>

9) Install the timing chain assembly. <Ref. to ME(H6DO)-60, INSTALLATION, Timing Chain Assembly.>

10) Measure all valve clearance again at this time. If the valve clearance is not within the adjustment value, repeat the procedure from step 3).

### **Valve clearance (adjustment value):**

**$0.35 \pm 0.05$  mm ( $0.0138 \pm 0.0020$  in)**

11) After adjustment, install the related parts in the reverse order of removal.

### NOTE:

Refer to "Camshaft" when installing the rocker cover. <Ref. to ME(H6DO)-76, INSTALLATION, Camshaft.>

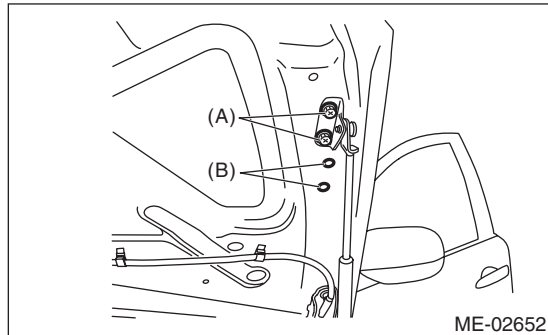
## 9. Engine Assembly

### A: REMOVAL

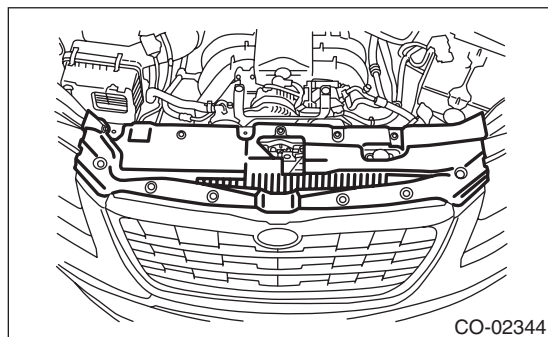
1) Change the bolt mounting position from (A) to (B), then completely open the front hood.

#### Tightening torque:

**7.5 N·m (0.8 kgf·m, 5.5 ft·lb)**

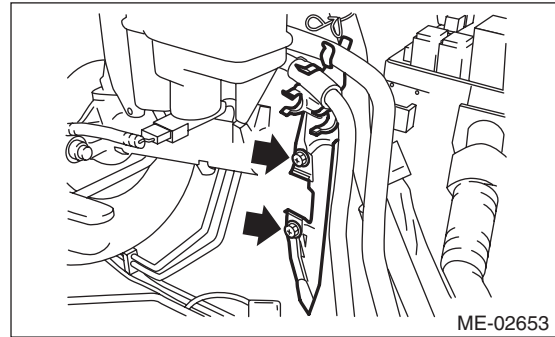


- 2) Remove the collector cover.
- 3) Collect the refrigerant from A/C system. <Ref. to AC-21, PROCEDURE, Refrigerant Recovery Procedure.>
- 4) Release the fuel pressure. <Ref. to FU(H6DO)-59, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
- 5) Remove the battery from vehicle. <Ref. to SC(H6DO)-19, REMOVAL, Battery.>
- 6) Remove the air intake duct, air cleaner case and air intake chamber. <Ref. to IN(H6DO)-9, REMOVAL, Air Intake Duct.> <Ref. to IN(H6DO)-6, REMOVAL, Air Cleaner Case.> <Ref. to IN(H6DO)-8, REMOVAL, Air Intake Chamber.>
- 7) Remove the front upper cover.



- 8) Remove the front bumper. <Ref. to EI-22, FRONT BUMPER FACE, REMOVAL, Front Bumper.>
- 9) Remove the radiator main fan & fan motor and radiator sub fan & fan motor. <Ref. to CO(H6DO)-23, REMOVAL, Radiator Main Fan and Fan Motor.> <Ref. to CO(H6DO)-27, REMOVAL, Radiator Sub Fan and Fan Motor.>
- 10) Remove the radiator. <Ref. to CO(H6DO)-17, REMOVAL, Radiator.>

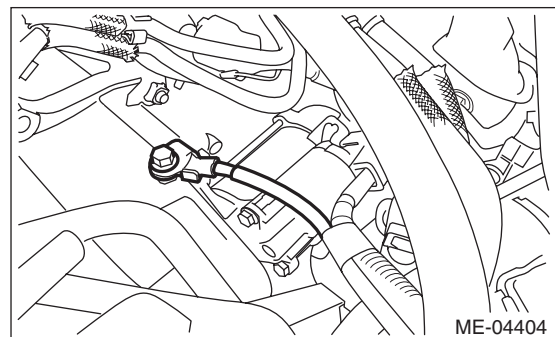
11) Remove the fuel hose bracket.



12) Remove the V-belts. <Ref. to ME(H6DO)-45, REMOVAL, V-belt.>

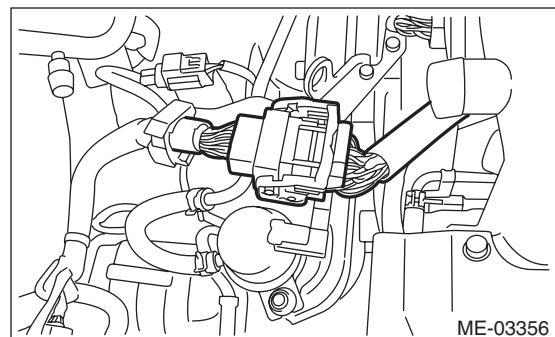
13) Disconnect the A/C pressure hoses from A/C compressor. <Ref. to AC-39, REMOVAL, Hose and Pipe.>

14) Remove the engine ground.



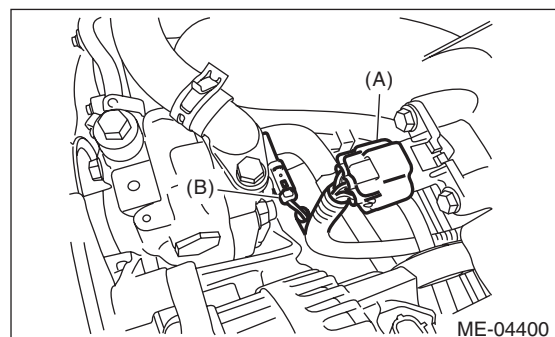
15) Disconnect the following connector.

(1) Engine harness connectors



(2) Generator connector, terminal B and magnet clutch connector

(3) Manifold absolute pressure sensor connector (A) and power steering pump connector (B)



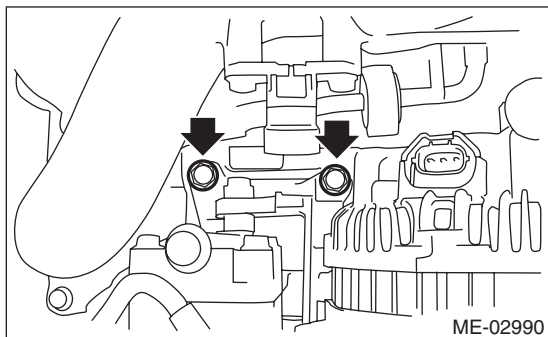
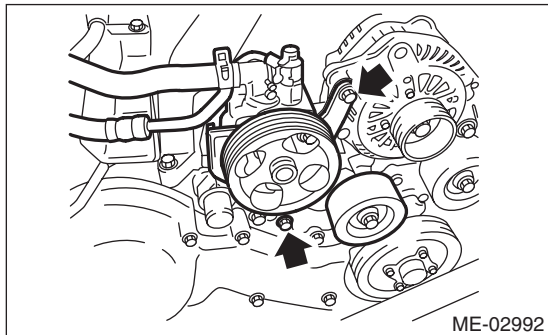
# Engine Assembly

## MECHANICAL

16) Remove the power steering pump together with the bracket.

### NOTE:

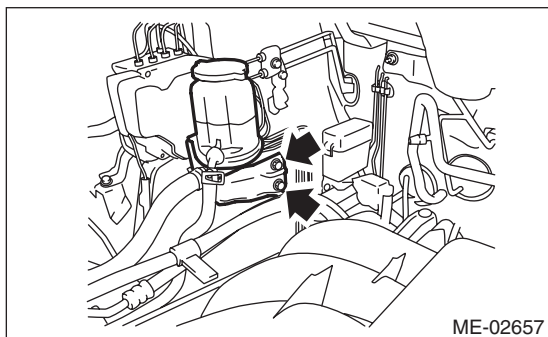
Do not disconnect the hose and pipe from the power steering pump body.



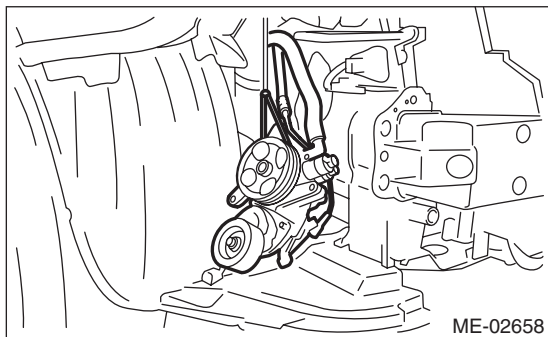
17) Remove the power reserve tank together with the bracket.

### NOTE:

Do not disconnect the hose from the reservoir tank body.

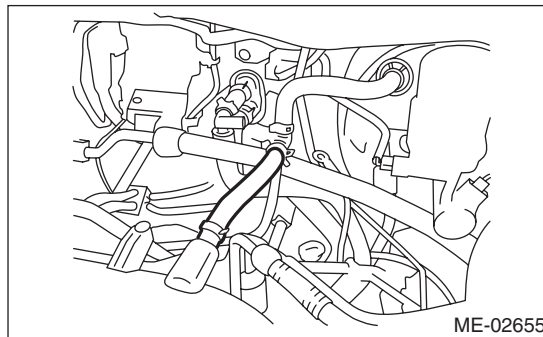


18) Suspend the power steering pump using wire, etc.



19) Disconnect the following hoses.

(1) Brake booster vacuum hose



(2) Heater inlet and outlet hoses

20) Remove the bolts which hold the vacuum pump bracket to the engine. <Ref. to BR-10, BRAKE VACUUM PUMP, COMPONENT, General Description.>

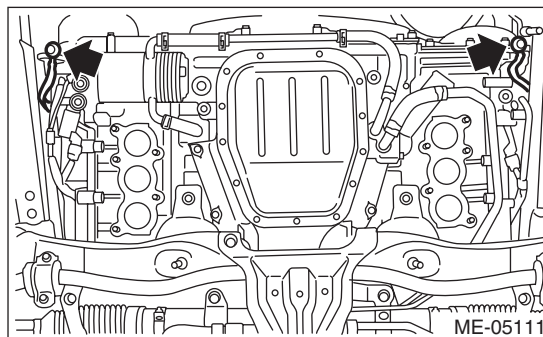
21) Lift up the vehicle.

22) Remove the front exhaust pipe. <Ref. to EX(H6DO)-5, REMOVAL, Front Exhaust Pipe.>

### NOTE:

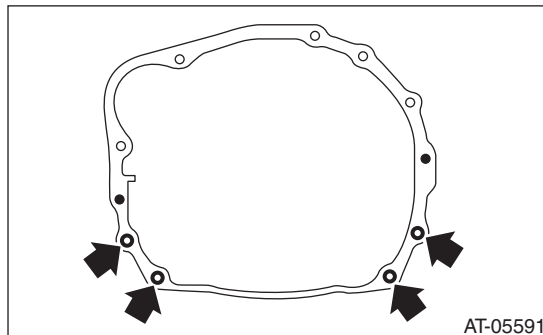
Be careful not to let the front exhaust pipe interfere with water pipes on engine side.

23) Remove the ground cable from the underside of chain cover.

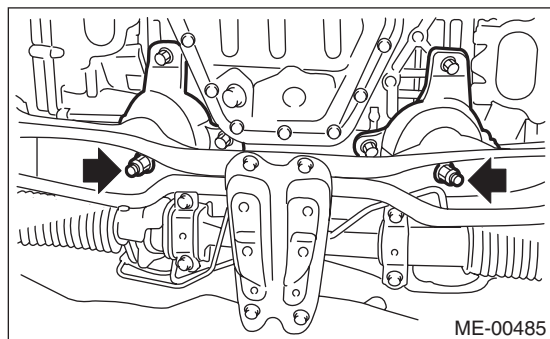


24) Remove the bolts which hold the vacuum pump bracket to the transmission, then remove the vacuum pump together with the bracket. <Ref. to BR-10, BRAKE VACUUM PUMP, COMPONENT, General Description.>

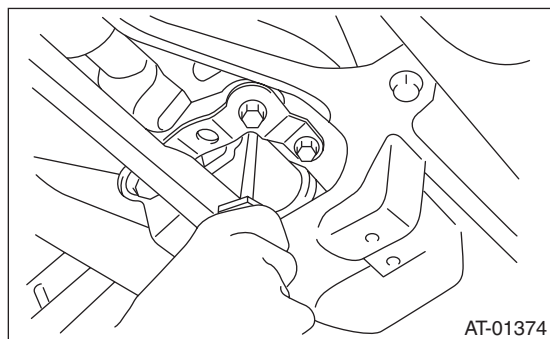
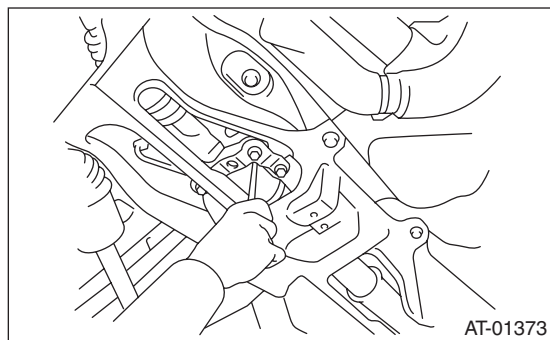
25) Remove the bolts and nuts which hold lower side of transmission to engine.



26) Remove the nuts which install front cushion rubber onto front crossmember.



27) Remove the two clutch housing cover securing bolts.



28) Lower the vehicle.

29) Remove the throttle body from the intake manifold.

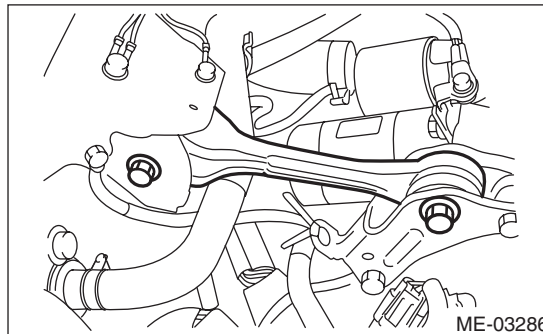
**NOTE:**

Do not disconnect the inlet and outlet hoses of engine coolant.

30) Separate the torque converter clutch from drive plate.

- (1) Remove the service hole plug.
- (2) Rotate the clank pulley to align the drive plate to the service hole, and remove four bolts.

31) Remove the pitching stopper.



32) Disconnect the fuel delivery hose and evaporation hose.

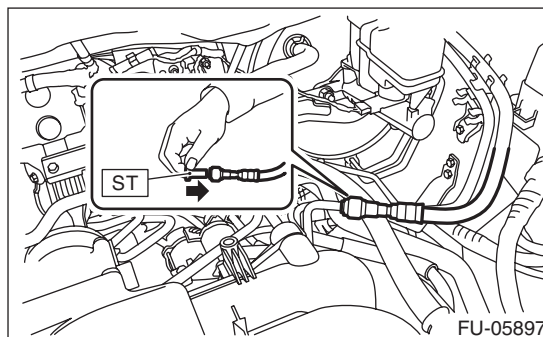
**CAUTION:**

- Be careful not to spill fuel.
- Catch the fuel from hoses using a container or cloth.

(1) Disconnect the connector of fuel pipe by pushing the ST in the direction of arrow.

ST 42099AE000 QUICK CONNECTOR RELEASE

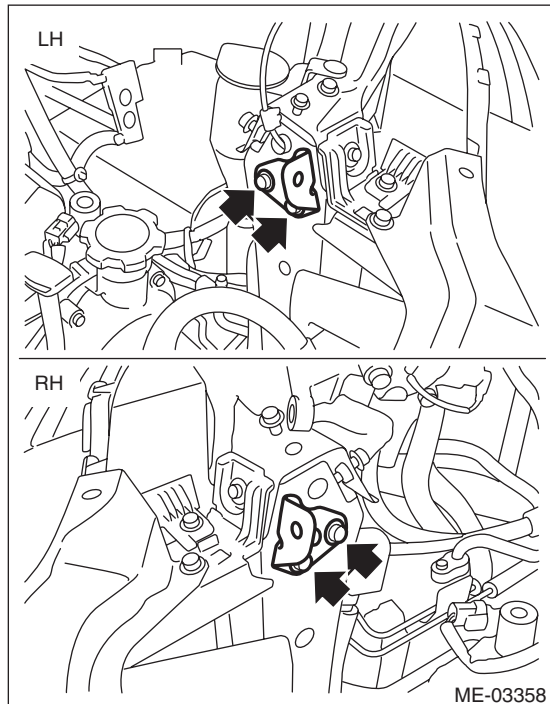
(2) Remove the clamp and disconnect the evaporation hose.



# Engine Assembly

## MECHANICAL

33) Remove the radiator center bracket.

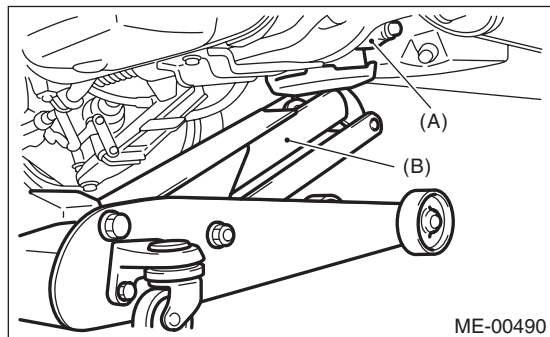


34) Support the engine with a lifting device and wire ropes.

35) Support the transmission with a garage jack.

### CAUTION:

Be sure to perform this procedure to prevent the transmission from lowering by its own weight.



(A) Transmission

(B) Garage jack

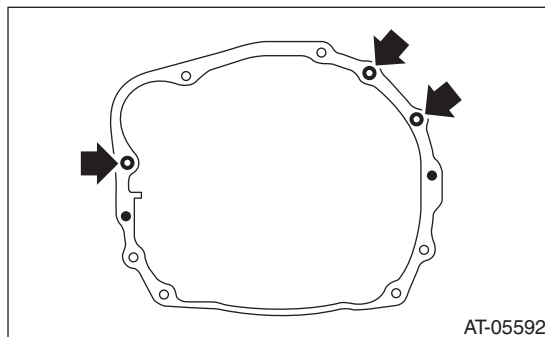
36) Separate the engine and transmission.

### CAUTION:

Before removing the engine away from transmission, check to be sure no work has been overlooked.

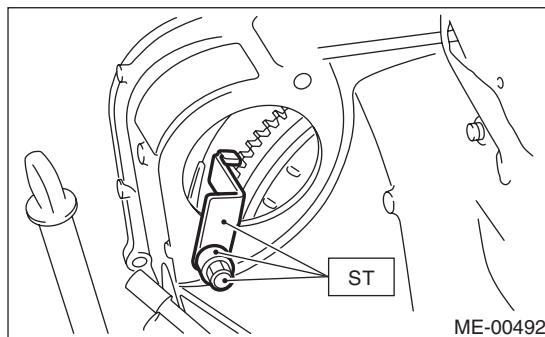
(1) Remove the starter. <Ref. to SC(H6DO)-6, REMOVAL, Starter.>

(2) Remove the bolts which hold upper side of transmission to engine.



37) Attach the ST to converter case.

ST 498277200 STOPPER SET



38) Remove the engine from vehicle.

(1) Slightly raise the engine.

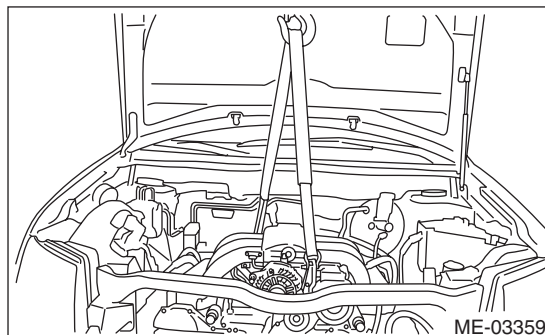
(2) Raise the transmission with garage jack.

(3) Move the engine horizontally until main shaft is withdrawn from clutch cover.

(4) Slowly move the engine away from engine compartment.

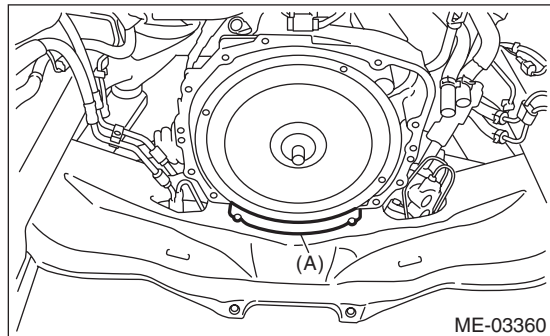
### NOTE:

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



39) Remove the engine mounting.

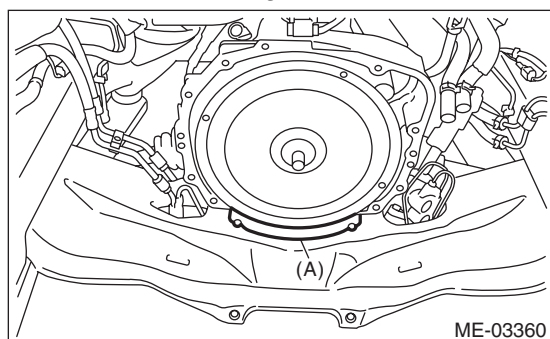
40) Remove the clutch housing cover from vehicle.



(A) Clutch housing cover

## B: INSTALLATION

1) Set the clutch housing cover to the vehicle.



(A) Clutch housing cover

2) Install the engine mount.

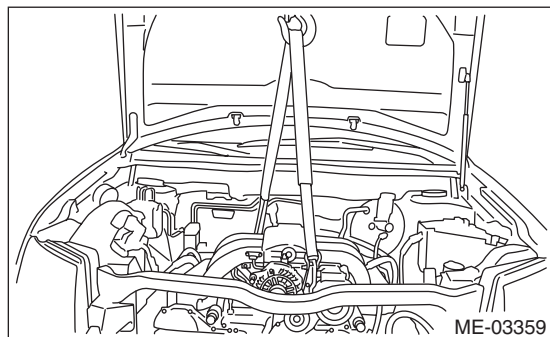
**Tightening torque:**

**35 N·m (3.6 kgf-m, 25.8 ft-lb)**

3) Position the engine in engine compartment and align it with transmission.

**NOTE:**

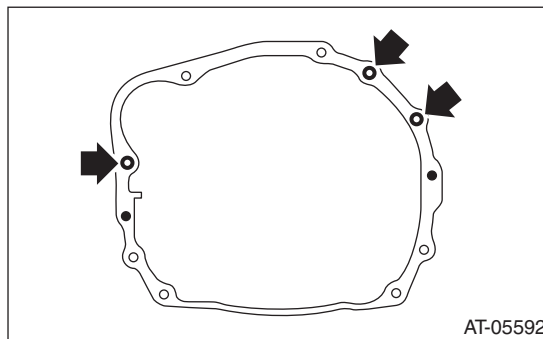
Be careful not to damage adjacent parts or body panels with crank pulley, oil level gauge, etc.



4) Tighten the bolts which hold upper side of transmission to engine.

**Tightening torque:**

**50 N·m (5.1 kgf-m, 36.9 ft-lb)**



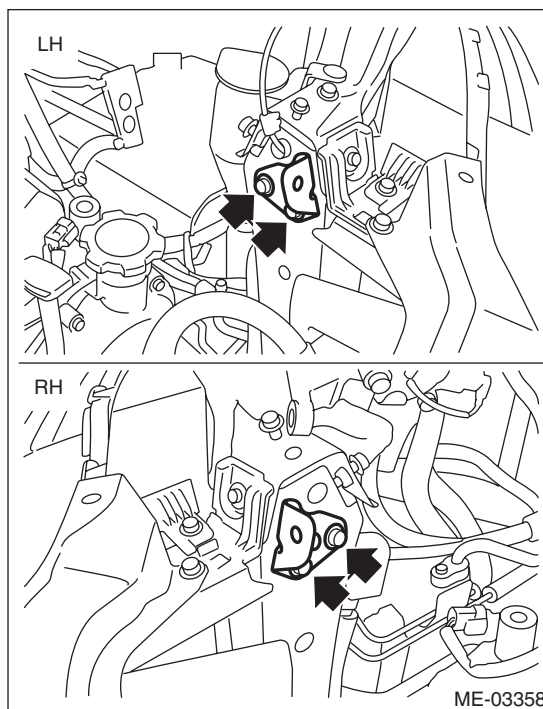
5) Remove the lifting device and wire ropes.

6) Remove the garage jack.

7) Install the radiator center bracket.

**Tightening torque:**

**18 N·m (1.8 kgf-m, 13.3 ft-lb)**

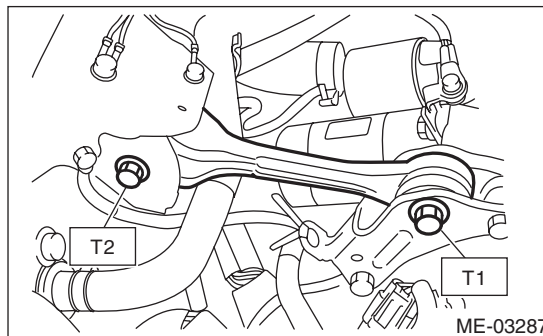


8) Install the pitching stopper.

**Tightening torque:**

**T1: 50 N·m (5.1 kgf-m, 36.9 ft-lb)**

**T2: 58 N·m (5.9 kgf-m, 42.8 ft-lb)**



# Engine Assembly

## MECHANICAL

9) Remove the ST from converter case.

### NOTE:

Be careful not to drop the ST into the converter case when removing the ST.

10) Install the starter. <Ref. to SC(H6DO)-6, INSTALLATION, Starter.>

11) Connect the torque converter clutch to the drive plate.

(1) Rotate the clank pulley to align the drive plate to the service hole, and tighten four bolts.

### Tightening torque:

**25 N-m (2.5 kgf-m, 18.4 ft-lb)**

(2) Install the service hole plug.

12) Install the throttle body to intake manifold.

### NOTE:

Use a new gasket.

### Tightening torque:

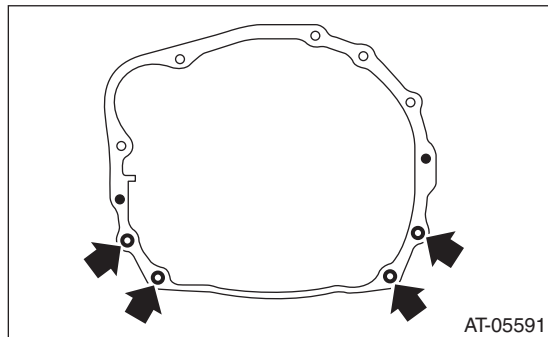
**8 N-m (0.8 kgf-m, 5.9 ft-lb)**

13) Lift up the vehicle.

14) Tighten the bolts and nuts which hold lower side of the transmission to engine.

### Tightening torque:

**50 N-m (5.1 kgf-m, 36.9 ft-lb)**



15) Tighten the bolts which holds the vacuum pump bracket to the transmission. <Ref. to BR-10, BRAKE VACUUM PUMP, COMPONENT, General Description.>

### Tightening torque:

**25 N-m (2.5 kgf-m, 18.4 ft-lb)**

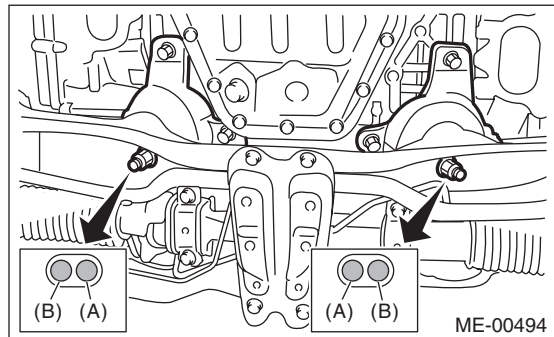
16) Tighten the nuts which install the front cushion rubber onto crossmember.

### NOTE:

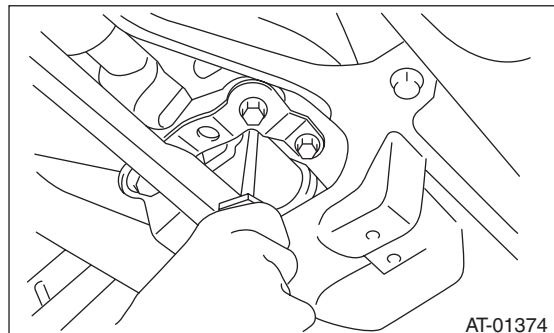
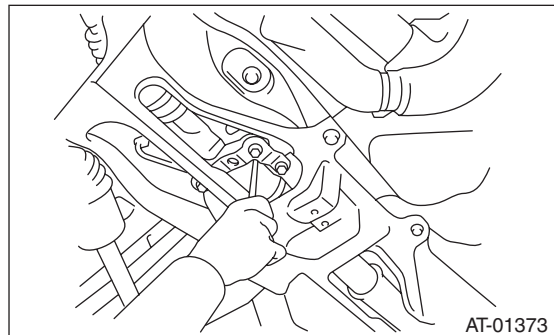
Make sure the front cushion rubber mounting bolts (A) and locator (B) are securely installed.

### Tightening torque:

**75 N-m (7.6 kgf-m, 55.3 ft-lb)**



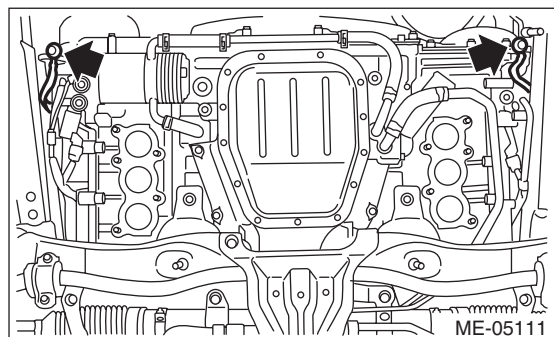
17) Install the clutch housing cover securing bolts.



18) Install the ground cable to the underside of chain cover.

### Tightening torque:

**7.5 N-m (0.8 kgf-m, 5.5 ft-lb)**



19) Install the front exhaust pipe. <Ref. to EX(H6DO)-5, INSTALLATION, Front Exhaust Pipe.>

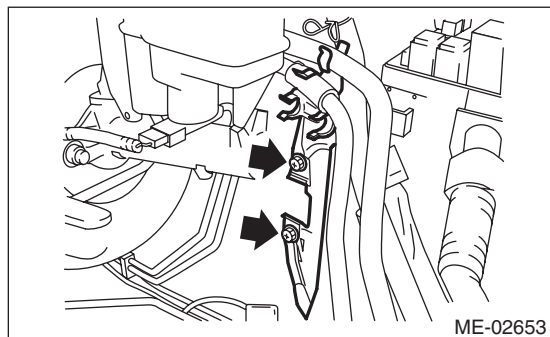
20) Lower the vehicle.



21) Install the fuel hose bracket.

**Tightening torque:**

**7.5 N·m (0.8 kgf-m, 5.5 ft-lb)**



ME-02653

22) Tighten the bolts which holds the vacuum pump bracket to the engine. <Ref. to BR-10, BRAKE VACUUM PUMP, COMPONENT, General Description.>

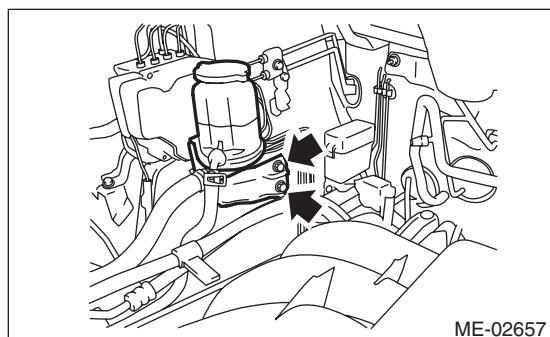
**Tightening torque:**

**25 N·m (2.5 kgf-m, 18.4 ft-lb)**

23) Install the reservoir tank.

**Tightening torque:**

**33 N·m (3.4 kgf-m, 24.3 ft-lb)**



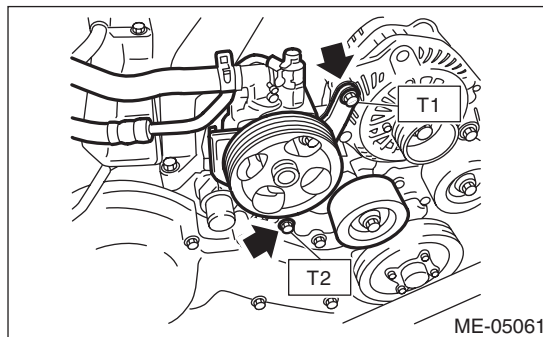
ME-02657

24) Install the power steering pump.

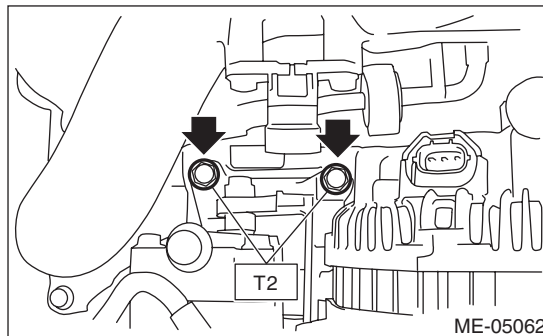
**Tightening torque:**

**T1: 25 N·m (2.5 kgf-m, 18.4 ft-lb)**

**T2: 33 N·m (3.4 kgf-m, 24.3 ft-lb)**



ME-05061



ME-05062

25) Connect the following hoses.

- (1) Fuel delivery hose and evaporation hose

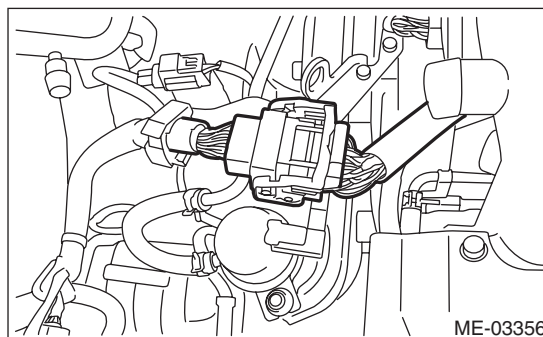
**NOTE:**

If fuel hoses or clamps are damaged, replace them with new parts.

- (2) Heater inlet and outlet hoses
- (3) Brake booster vacuum hose

26) Connect the following connectors.

- (1) Engine harness connectors



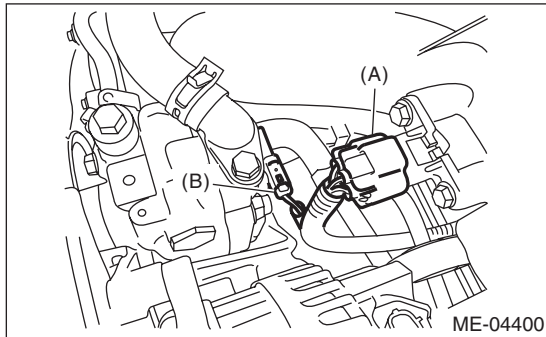
ME-03356

- (2) Generator connector, terminal B and magnet clutch connector

# Engine Assembly

## MECHANICAL

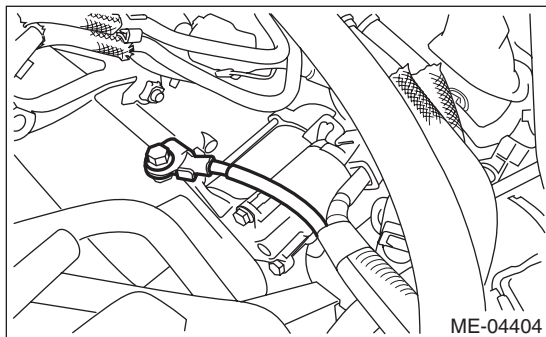
- (3) Manifold absolute pressure sensor connector (A) and power steering pump connector (B)



- 27) Install the engine ground.

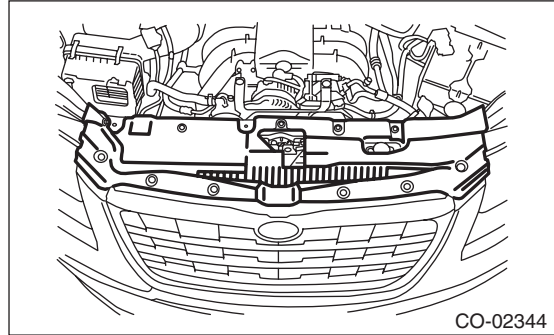
### **Tightening torque:**

**14 N·m (1.4 kgf·m, 10.3 ft·lb)**



- 28) Install the A/C pressure hoses. <Ref. to AC-41, INSTALLATION, Hose and Pipe.>  
29) Install the V-belts. <Ref. to ME(H6DO)-45, INSTALLATION, V-belt.>  
30) Install the radiator to vehicle. <Ref. to CO(H6DO)-19, INSTALLATION, Radiator.>  
31) Install the radiator main fan & fan motor and radiator sub fan & fan motor. <Ref. to CO(H6DO)-24, INSTALLATION, Radiator Main Fan and Fan Motor.> <Ref. to CO(H6DO)-27, INSTALLATION, Radiator Sub Fan and Fan Motor.>  
32) Install the front bumper. <Ref. to EI-23, FRONT BUMPER FACE, INSTALLATION, Front Bumper.>  
33) Install the battery to the vehicle. <Ref. to SC(H6DO)-19, INSTALLATION, Battery.>  
34) Fill engine coolant. <Ref. to CO(H6DO)-12, FILLING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>  
35) Check the ATF level and replenish it if necessary. <Ref. to 5AT-28, INSPECTION, Automatic Transmission Fluid.>  
36) Charge the A/C system with refrigerant. <Ref. to AC-22, PROCEDURE, Refrigerant Charging Procedure.>

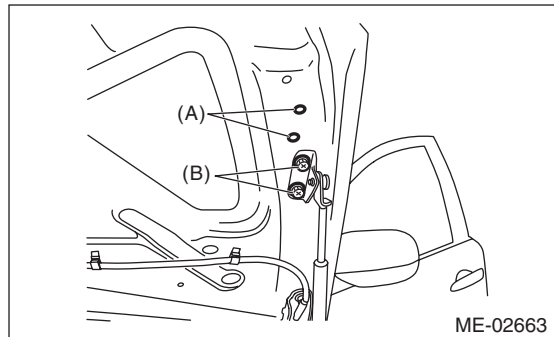
- 37) Install the front upper cover.



- 38) Install the air intake duct, air cleaner case and air intake chamber. <Ref. to IN(H6DO)-9, INSTALLATION, Air Intake Duct.> <Ref. to IN(H6DO)-7, INSTALLATION, Air Cleaner Case.> <Ref. to IN(H6DO)-8, INSTALLATION, Air Intake Chamber.>  
39) Install the collector cover.  
40) Change the bolt mounting position from (B) to (A), then close the front hood.

### **Tightening torque:**

**7.5 N·m (0.8 kgf·m, 5.5 ft·lb)**



- 41) Lower the vehicle from lift.

## **C: INSPECTION**

- 1) Check that the pipes, hoses, connectors and clips are securely connected.
- 2) Check the engine coolant is at specified level.
- 3) Check that the ATF is at specified level.
- 4) Start the engine, and then check exhaust gas and engine coolant. And check for fuel leakage, noise, vibrations, etc.

## 10.Engine Mounting

### A: REMOVAL

- 1) Remove the engine from vehicle. <Ref. to ME(H6DO)-35, REMOVAL, Engine Assembly.>
- 2) Remove the engine mounting from engine assembly.

### B: INSTALLATION

Install in the reverse order of removal.

#### *Tightening torque:*

*35 N·m (3.6 kgf-m, 25.8 ft-lb)*

### C: INSPECTION

Make sure that no crack or other damages do not exist.

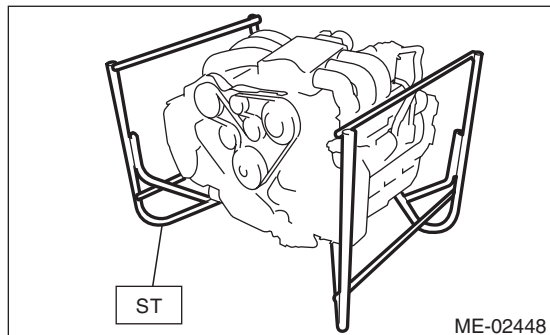
## 11. Preparation for Overhaul

### A: REMOVAL

1) Remove the engine from vehicle. <Ref. to ME(H6DO)-35, REMOVAL, Engine Assembly.>

2) Set the engine on ST.

ST 18232AA000 ENGINE STAND



3) Before servicing overhaul, remove the sensor, pipe and hose that installed to engine.

(1) Remove the intake manifold. <Ref. to FU(H6DO)-22, REMOVAL, Intake Manifold.>

(2) Remove the generator. <Ref. to SC(H6DO)-13, REMOVAL, Generator.>

(3) Remove the A/C compressor. <Ref. to AC-34, REMOVAL, Compressor.>

(4) Disconnect the water pipe and hose.

(5) Disconnect the engine harness.

(6) Remove the spark plug. <Ref. to IG(H6DO)-4, REMOVAL, Spark Plug.>

(7) Remove the camshaft position sensor. <Ref. to FU(H6DO)-33, REMOVAL, Camshaft Position Sensor.>

(8) Remove the crankshaft position sensor. <Ref. to FU(H6DO)-31, REMOVAL, Crankshaft Position Sensor.>

(9) Remove the knock sensor. <Ref. to FU(H6DO)-36, REMOVAL, Knock Sensor.>

(10) Remove the engine coolant temperature sensor. <Ref. to FU(H6DO)-30, REMOVAL, Engine Coolant Temperature Sensor.>

(11) Remove the oil temperature sensor. <Ref. to FU(H6DO)-47, REMOVAL, Oil Temperature Sensor.>

(12) Remove the oil flow control solenoid valve. <Ref. to FU(H6DO)-45, REMOVAL, Oil Flow Control Solenoid Valve.>

(13) Remove the oil pressure switch. <Ref. to LU(H6DO)-14, REMOVAL, Oil Pressure Switch.>

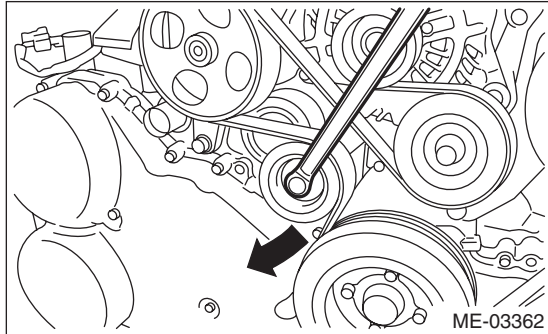
(14) Remove the oil filter. <Ref. to LU(H6DO)-15, REMOVAL, Engine Oil Filter.>

(15) Remove the oil cooler. <Ref. to LU(H6DO)-16, REMOVAL, Oil Cooler.>

## 12.V-belt

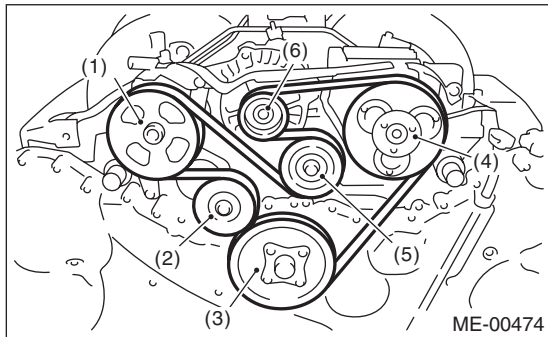
### A: REMOVAL

- 1) Remove the collector cover.
- 2) Remove the air intake duct.
- 3) Install the tool to belt tension adjuster assembly installation bolt.
- 4) Rotate the tool clockwise and loosen the V-belt to remove.



### B: INSTALLATION

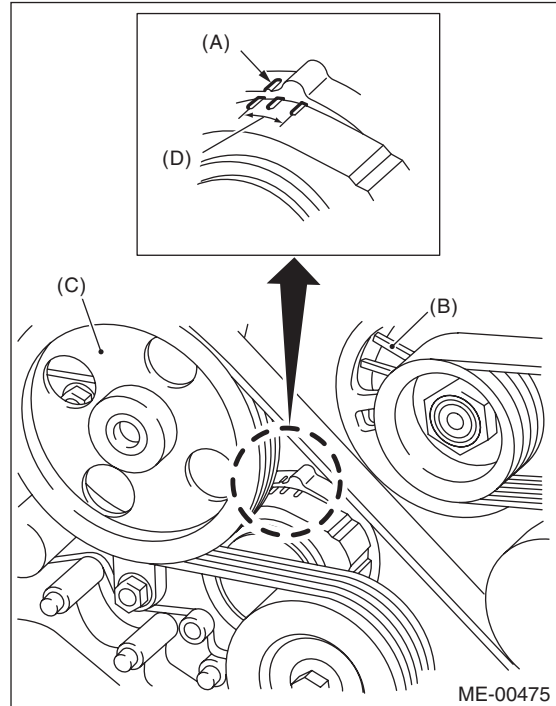
Install in the reverse order of removal.



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

### C: INSPECTION

- 1) Replace the V-belt, if cracks, fraying or wear is found.
- 2) Make sure that the V-belt automatic belt tension indicator (A) is within the range (D).



- (A) Indicator
- (B) Generator
- (C) Power steering oil pump pulley
- (D) Service limit

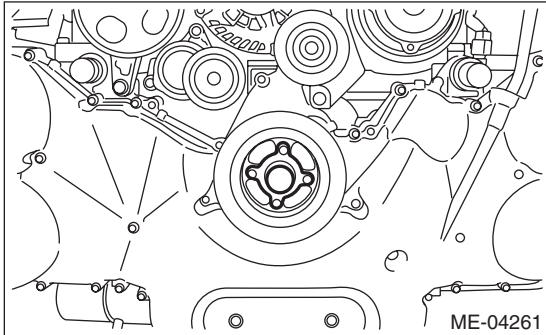
# Crank Pulley

MECHANICAL

## 13. Crank Pulley

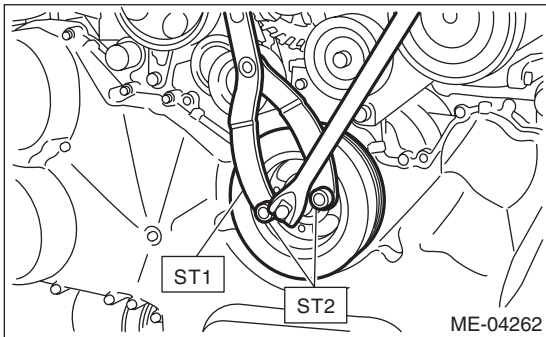
### A: REMOVAL

- 1) Remove the V-belts. <Ref. to ME(H6DO)-45, REMOVAL, V-belt.>
- 2) Remove the crank pulley cover.



- 3) Use the ST to lock the crank pulley, and remove the crank pulley bolt.

ST1 18355AA000 PULLEY WRENCH  
ST2 18334AA000 PULLEY WRENCH PIN SET



- 4) Remove the crank pulley.

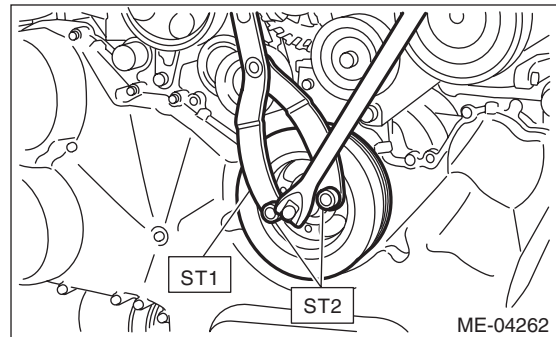
### B: INSTALLATION

- 1) Clean the crankshaft thread using compressed air.
- 2) Install the crank pulley.
- 3) Apply engine oil to the crank pulley bolt seat and thread.
- 4) Use the ST to lock the crank pulley, and tighten the crank pulley bolt.

ST1 18355AA000 PULLEY WRENCH  
ST2 18334AA000 PULLEY WRENCH PIN SET

#### Tightening torque:

**195 N·m (19.9 kgf·m, 143.8 ft·lb)**



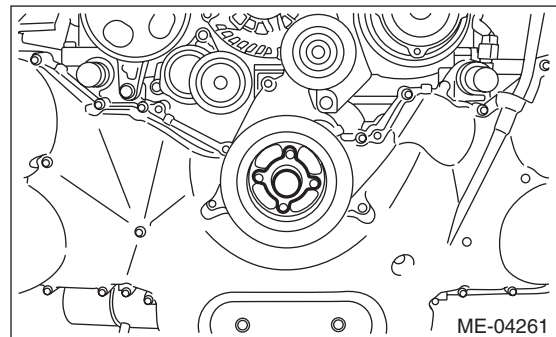
- 5) Install the O-ring, and install the crank pulley cover.

#### NOTE:

Use new O-rings.

#### Tightening torque:

**6.4 N·m (0.7 kgf·m, 4.7 ft·lb)**



- 6) Install the V-belts. <Ref. to ME(H6DO)-45, INSTALLATION, V-belt.>

### C: INSPECTION

- 1) Check for oil leaks in the crank pulley cover.
- 2) Check the crank pulley for looseness.

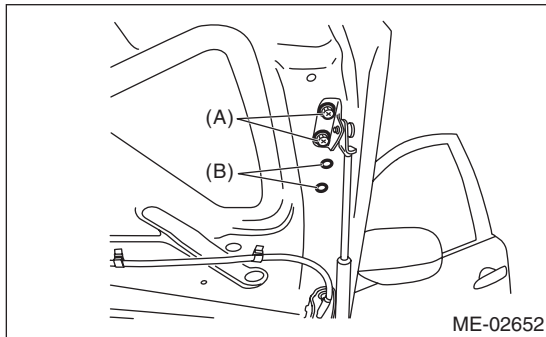
## 14.Chain Cover

### A: REMOVAL

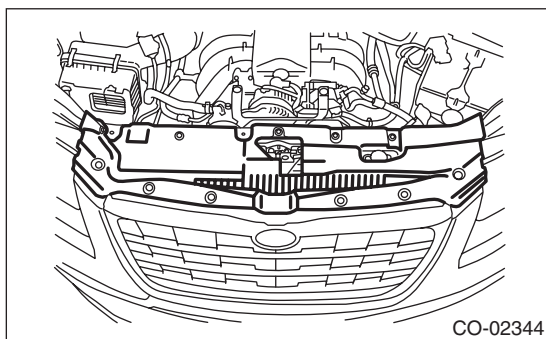
- 1) Lift up the vehicle.
- 2) Remove the under cover. <Ref. to EI-18, REMOVAL, Front Under Cover.>
- 3) Drain the engine oil. <Ref. to LU(H6DO)-9, REPLACEMENT, Engine Oil.>
- 4) Drain engine coolant. <Ref. to CO(H6DO)-12, DRAINING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>
- 5) Lower the vehicle.
- 6) Change the bolt mounting position from (A) to (B), then completely open the front hood.

#### Tightening torque:

**7.5 N·m (0.8 kgf-m, 5.5 ft-lb)**

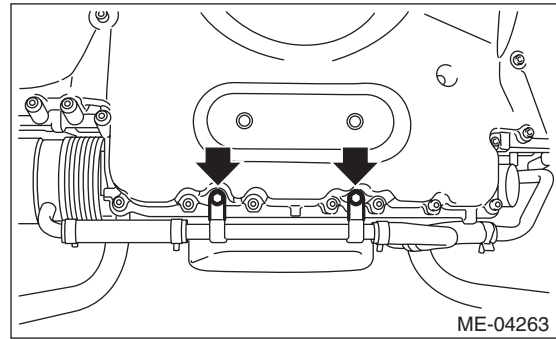


- 7) Remove the air intake duct. <Ref. to IN(H6DO)-9, REMOVAL, Air Intake Duct.>
- 8) Remove the V-belts. <Ref. to ME(H6DO)-45, REMOVAL, V-belt.>
- 9) Remove the crank pulley. <Ref. to ME(H6DO)-46, REMOVAL, Crank Pulley.>
- 10) Remove the front upper cover.



- 11) Remove the reservoir tank. <Ref. to CO(H6DO)-28, REMOVAL, Reservoir Tank.>
- 12) Remove the radiator main fan & fan motor and radiator sub fan & fan motor. <Ref. to CO(H6DO)-23, REMOVAL, Radiator Main Fan and Fan Motor.>
- 13) Remove the radiator. <Ref. to CO(H6DO)-17, REMOVAL, Radiator.>

- 14) Remove the oil cooler pipe from the chain cover.



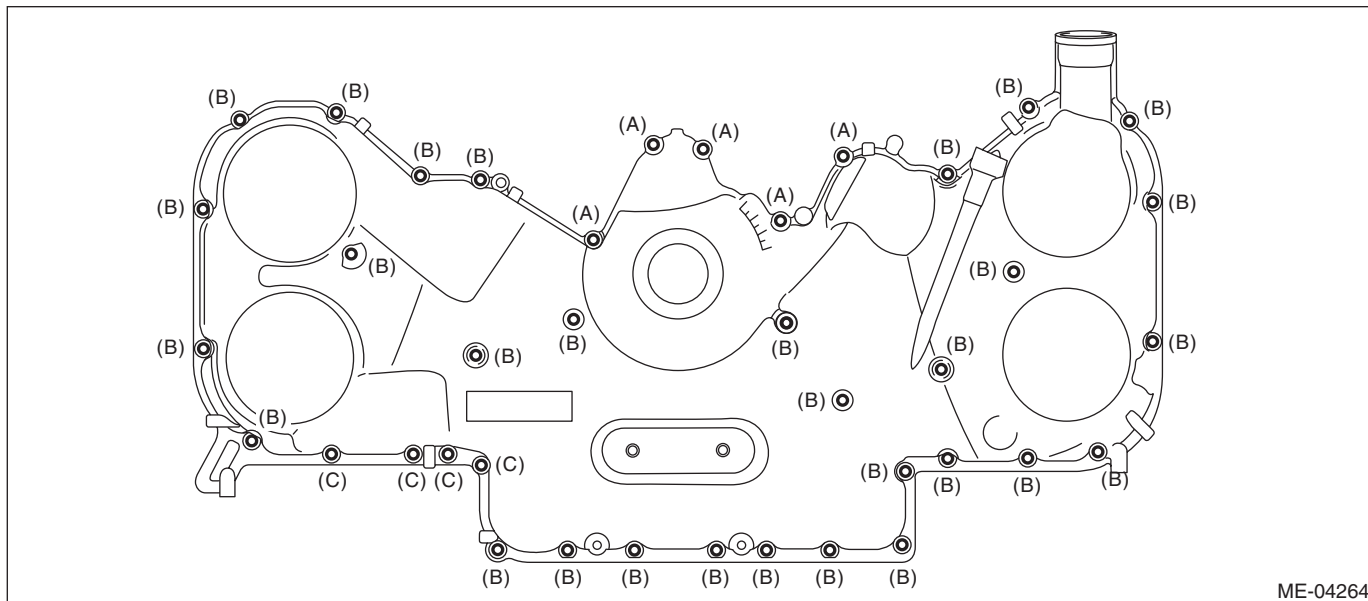
# Chain Cover

## MECHANICAL

15) Remove the chain cover.

### NOTE:

Chain cover installation bolt has three different sizes. To prevent the confusion in installation, keep these bolts on container individually.



(A) M6 x 21

(B) M6 x 30

(C) M6 x 53

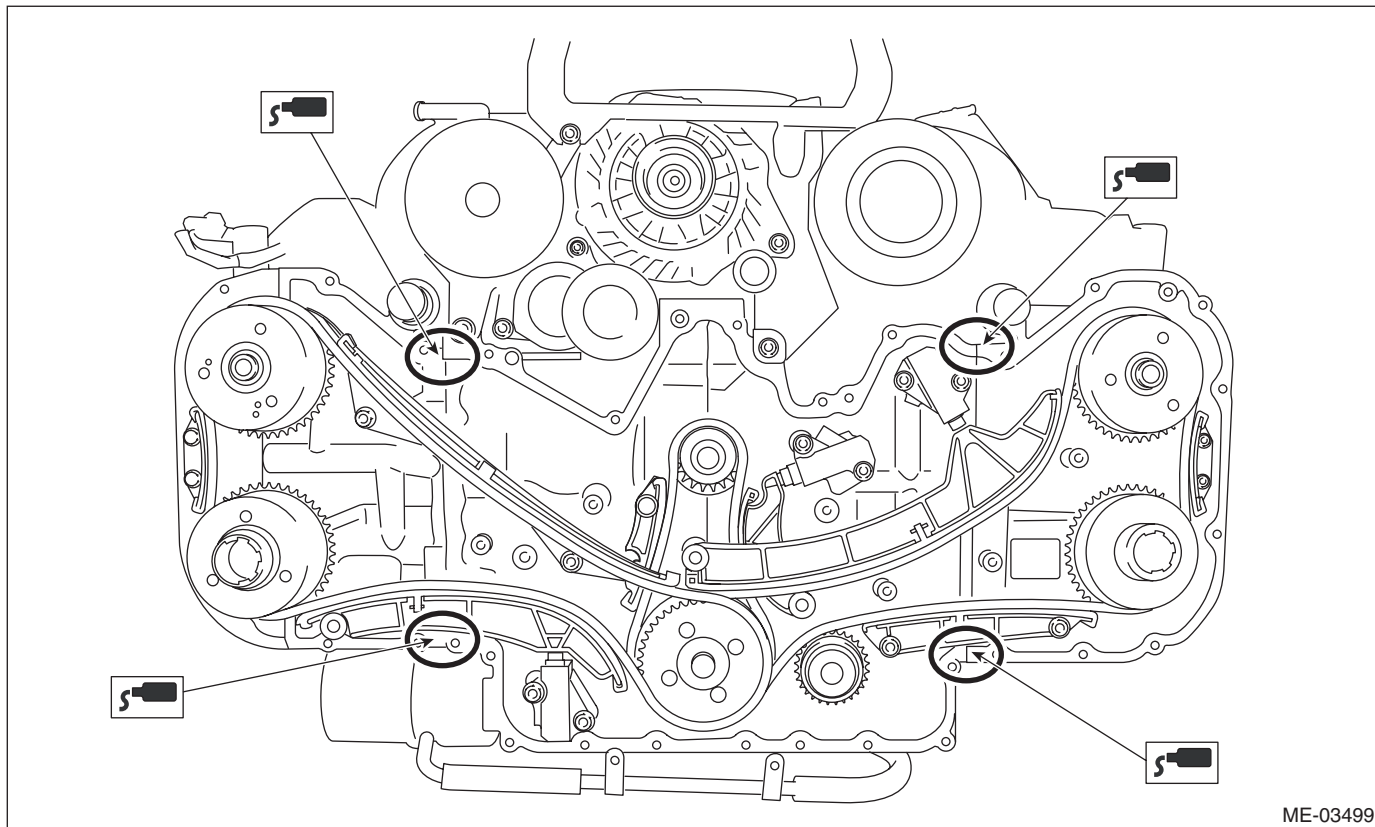


## B: INSTALLATION

1) Apply liquid gasket to the mating surfaces of the cylinder block, cylinder head and oil pan upper as shown in the figure.

### **Liquid gasket:**

**THREE BOND 1217G (Part No. K0877Y0100) or equivalent**



ME-03499

# Chain Cover

## MECHANICAL

2) Apply liquid gasket to the mating surface of the chain cover.

### NOTE:

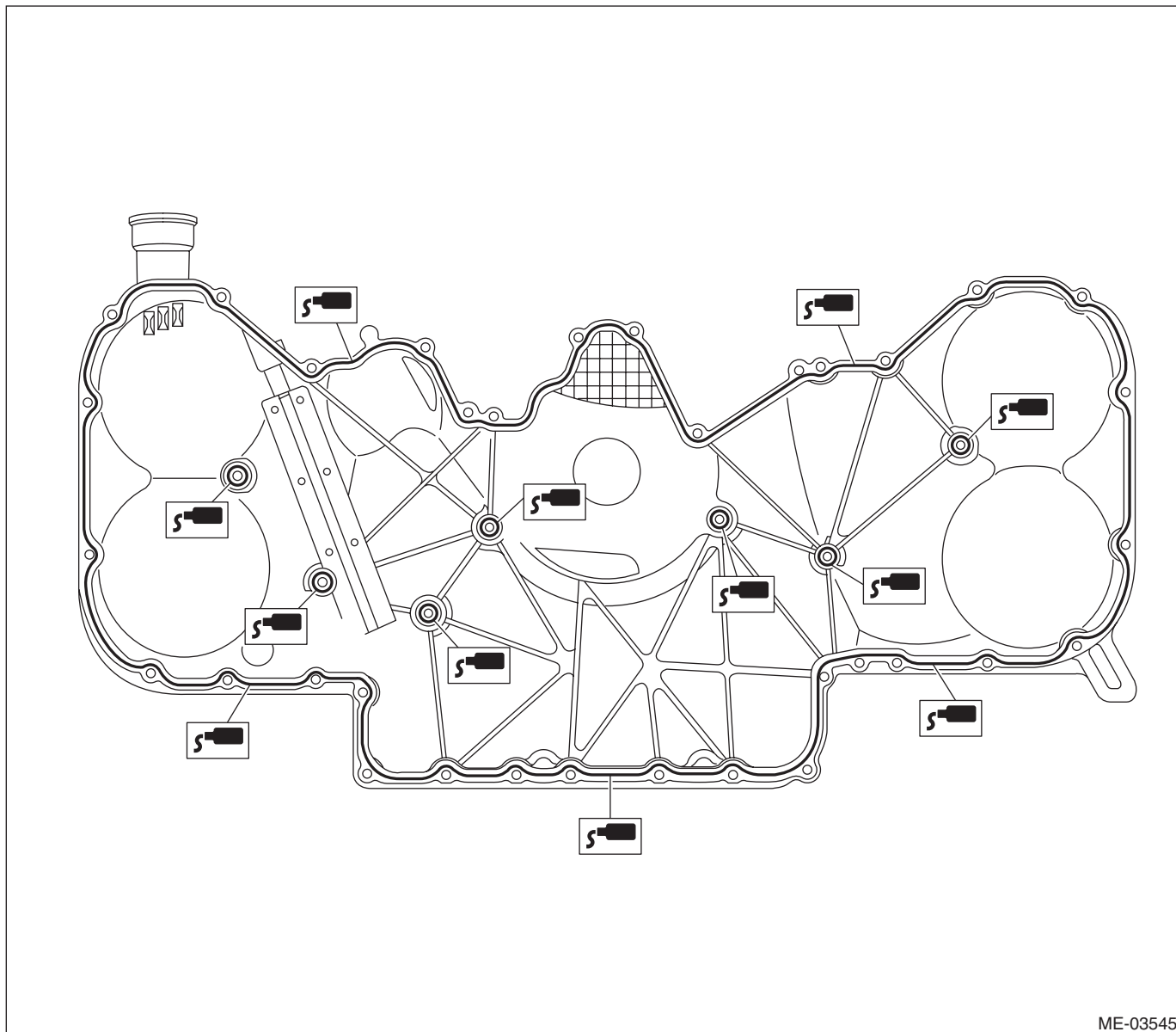
Install within 5 min. after applying liquid gasket.

### Liquid gasket:

**THREE BOND 1217G (Part No. K0877Y0100) or equivalent**

### Liquid gasket applying diameter:

**$3.5 \pm 0.5$  mm ( $0.138 \pm 0.020$  in)**



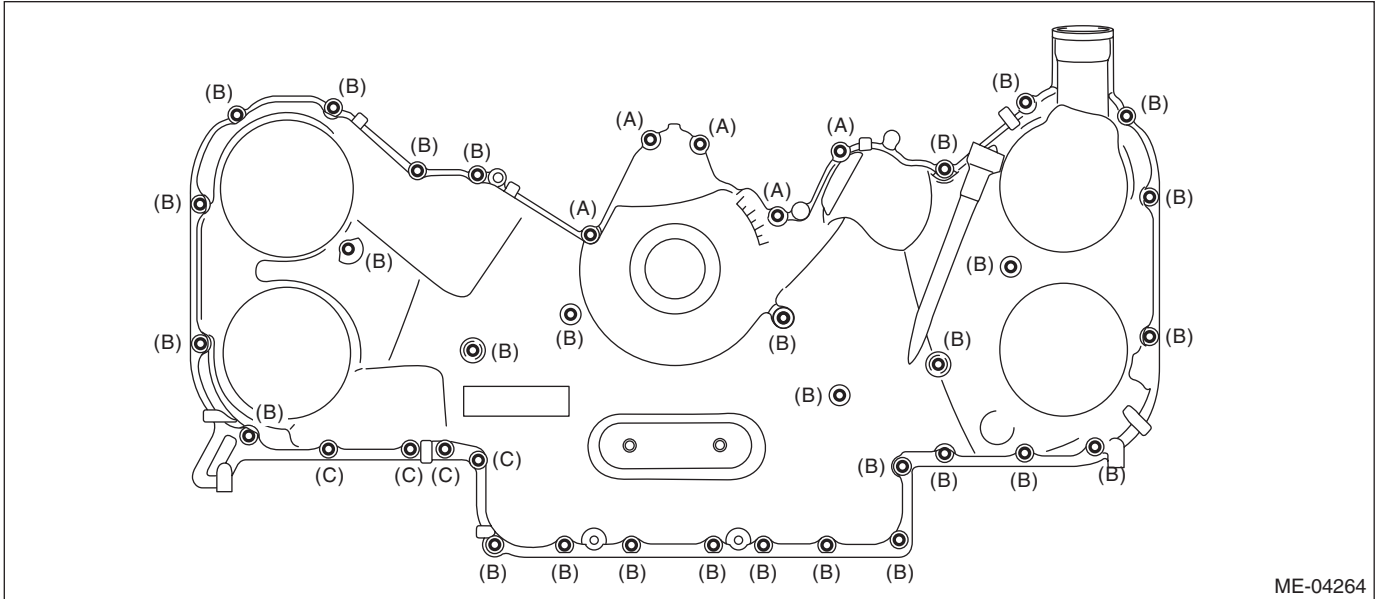
ME-03545

# Chain Cover

3) Install the chain cover and temporarily tighten the bolts.

**CAUTION:**

**Do not install the bolts in wrong place.**



ME-04264

(A) M6 × 21

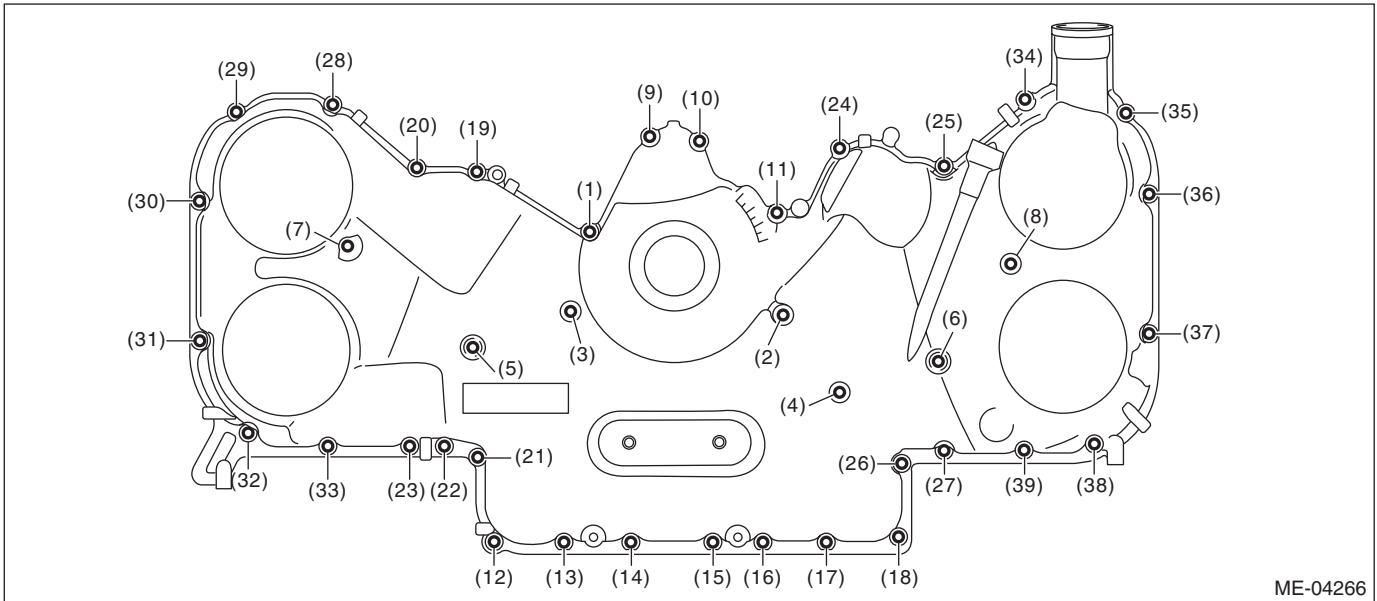
(B) M6 × 30

(C) M6 × 53

4) Tighten the bolts in the numerical order as shown in the figure.

**Tightening torque:**

**10 N·m (1.0 kgf·m, 7.4 ft·lb)**



ME-04266

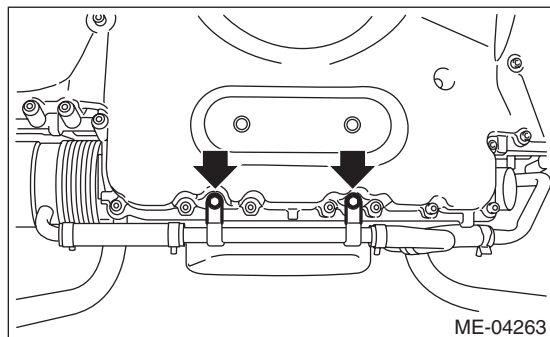
# Chain Cover

## MECHANICAL

5) Install the oil cooler pipe to the chain cover.

### Tightening torque:

**6.4 N·m (0.7 kgf-m, 4.7 ft-lb)**

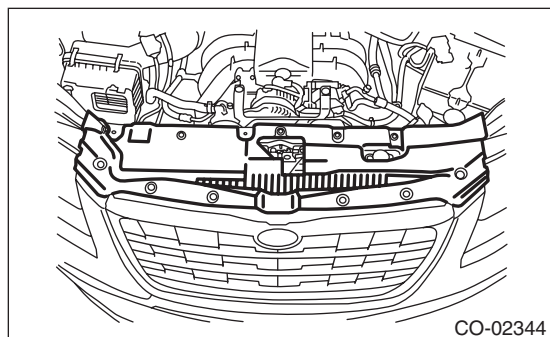


6) Install the radiator. <Ref. to CO(H6DO)-19, INSTALLATION, Radiator.>

7) Install the radiator main & fan motor and radiator sub fan & fan motor. <Ref. to CO(H6DO)-24, INSTALLATION, Radiator Main Fan and Fan Motor.>

8) Install the reservoir tank. <Ref. to CO(H6DO)-28, REMOVAL, Reservoir Tank.>

9) Install the front upper cover.



10) Install the crank pulley. <Ref. to ME(H6DO)-46, INSTALLATION, Crank Pulley.>

11) Install the V-belts. <Ref. to ME(H6DO)-45, INSTALLATION, V-belt.>

12) Install the air intake duct. <Ref. to IN(H6DO)-9, INSTALLATION, Air Intake Duct.>

13) Fill engine coolant. <Ref. to CO(H6DO)-12, FILLING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>

14) Fill engine oil. <Ref. to LU(H6DO)-9, REPLACEMENT, Engine Oil.>

15) Make sure there is no oil leaks in the chain cover mating surface.

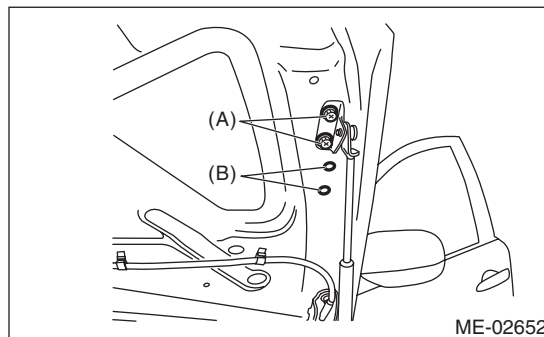
16) Install the under cover. <Ref. to EI-18, INSTALLATION, Front Under Cover.>

17) Install the collector cover.

18) Change the bolt mounting position from (B) to (A), and completely close the front hood.

### Tightening torque:

**7.5 N·m (0.8 kgf-m, 5.5 ft-lb)**



## C: INSPECTION

1) Check the chain cover surface for scratches or dents.

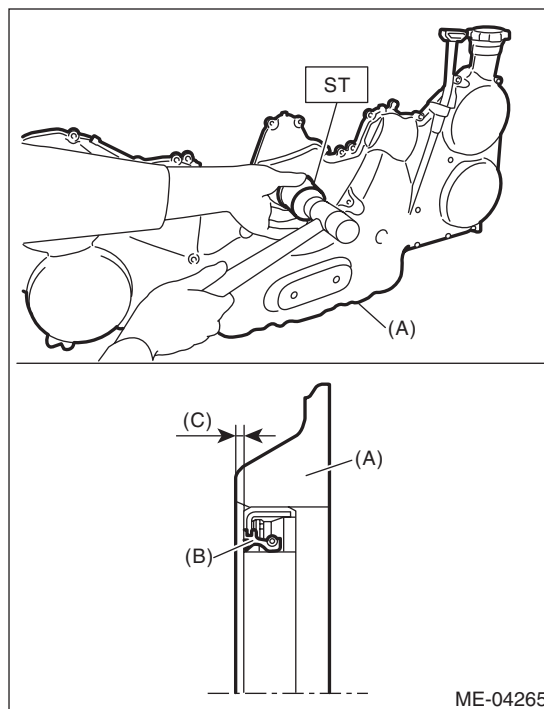
2) Check for oil leakage on the chain cover mating surface and installation part of crank pulley.

If there is an oil leak from the oil seal, perform replacement with a new oil seal.

ST 499585700 OIL SEAL GUIDE

### Oil seal press-fit position:

**Chain cover end face — Position of  $-1\text{ mm}$  ( $-0.039\text{ in}$ ) from the chain cover end face**



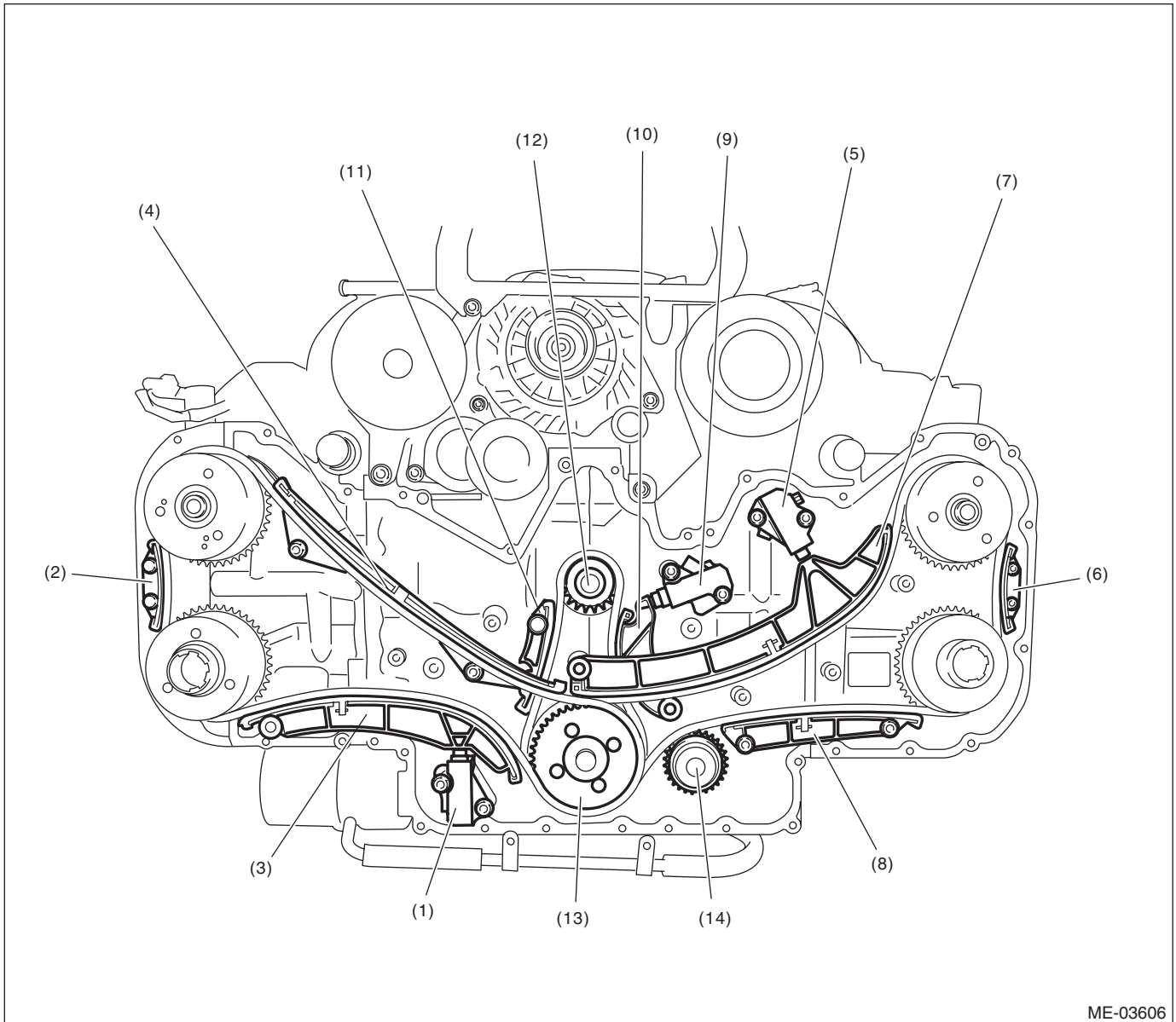
(A) Chain cover

(B) Oil seal

(C) Oil seal press-fit position (Chain cover end face — Position of  $-1\text{ mm}$  ( $-0.039\text{ in}$ ) from the chain cover end face)

## 15. Timing Chain Assembly

### A: LOCATION



- |                                    |                                    |                          |
|------------------------------------|------------------------------------|--------------------------|
| (1) Chain tensioner (RH)           | (6) Chain guide (LH: between cams) | (11) Chain guide (Main)  |
| (2) Chain guide (RH: between cams) | (7) Chain tensioner lever (LH)     | (12) Crank sprocket      |
| (3) Chain tensioner lever (RH)     | (8) Chain guide (LH)               | (13) Idler sprocket      |
| (4) Chain guide (RH)               | (9) Chain tensioner (Main)         | (14) Water pump sprocket |
| (5) Chain tensioner (LH)           | (10) Chain tensioner lever (Main)  |                          |

# Timing Chain Assembly

MECHANICAL

## B: REMOVAL

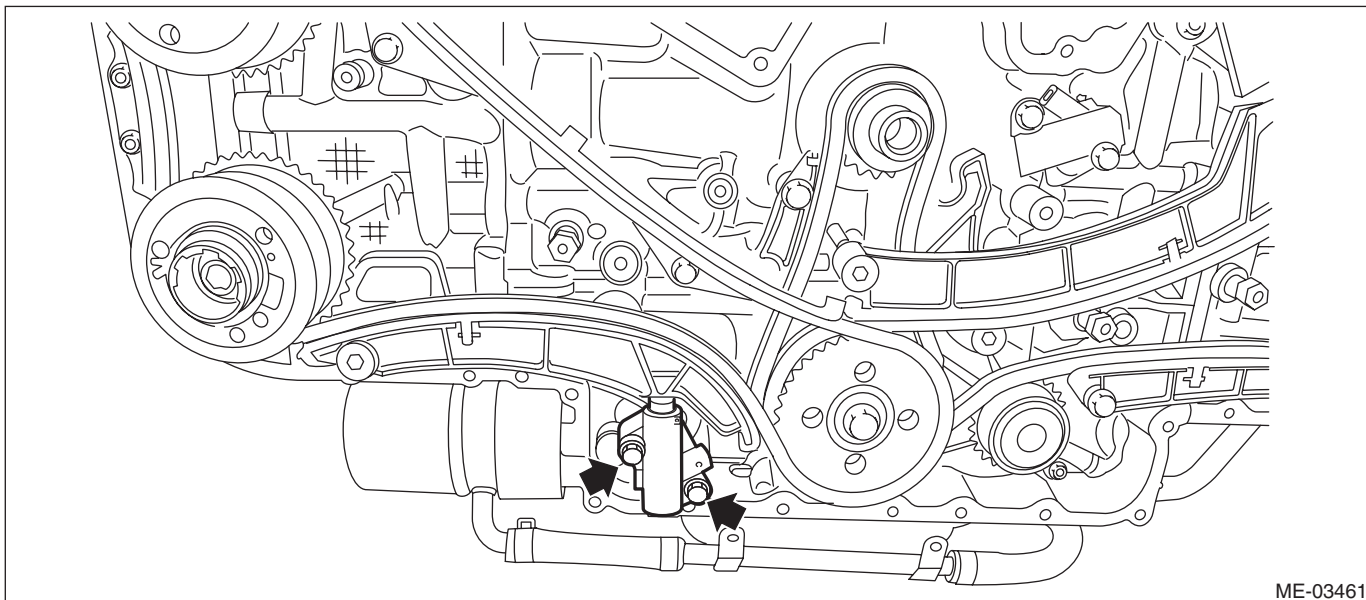
### NOTE:

To avoid mixing the timing chain component parts, separate each part after their removal.

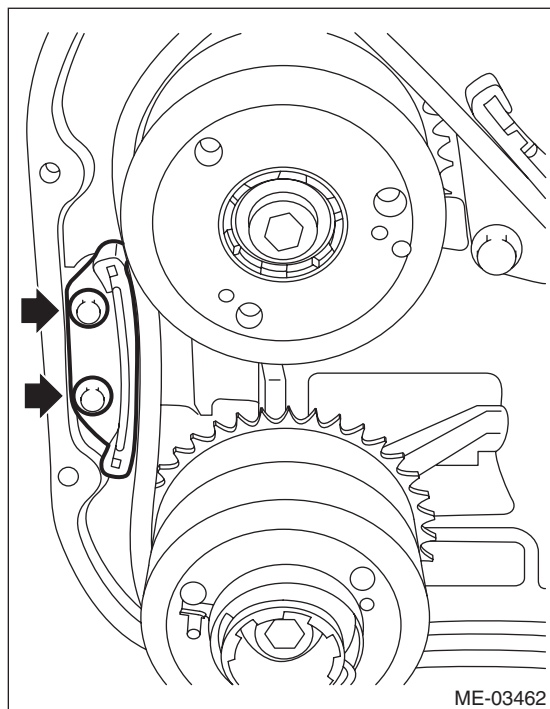
- 1) Drain the engine oil. <Ref. to LU(H6DO)-9, REPLACEMENT, Engine Oil.>
- 2) Remove the radiator. <Ref. to CO(H6DO)-17, REMOVAL, Radiator.>
- 3) Remove the V-belts. <Ref. to ME(H6DO)-45, REMOVAL, V-belt.>
- 4) Remove the crank pulley. <Ref. to ME(H6DO)-46, REMOVAL, Crank Pulley.>
- 5) Remove the chain cover. <Ref. to ME(H6DO)-47, REMOVAL, Chain Cover.>
- 6) Remove the chain tensioner (RH).

### NOTE:

During removal of chain tensioner (RH) from chain tensioner lever (RH), press the plunger by hand to prevent it from popping out.



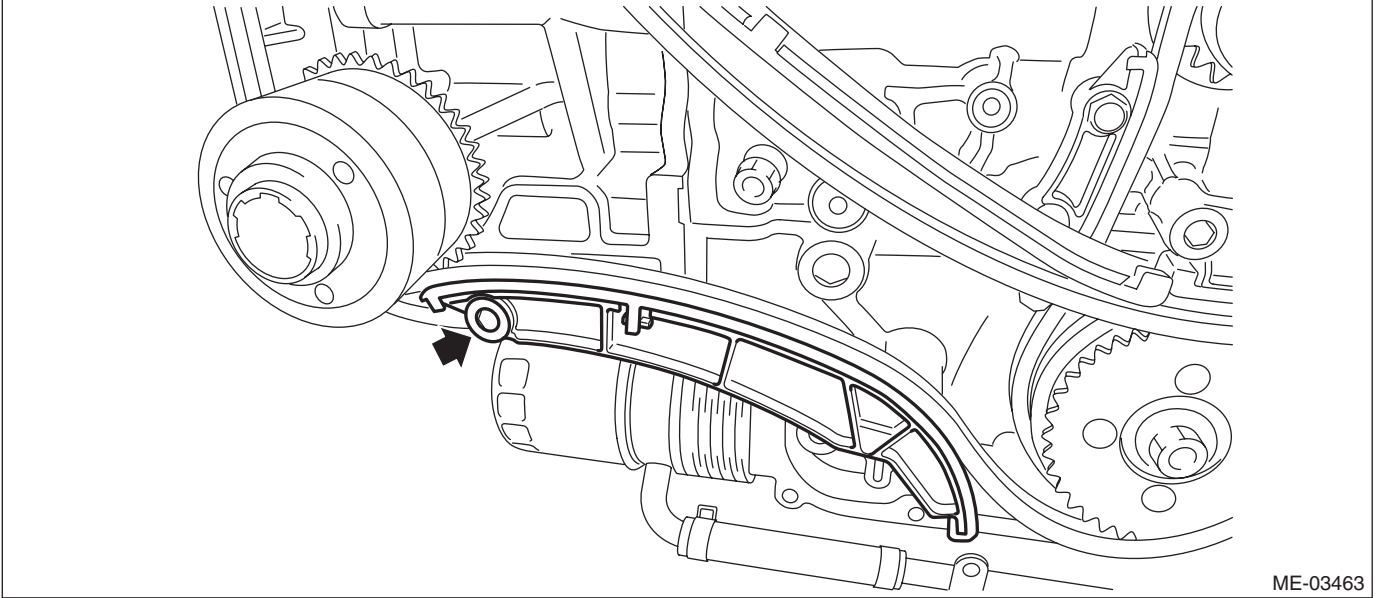
- 7) Remove the chain guide (RH: between cams).



# Timing Chain Assembly

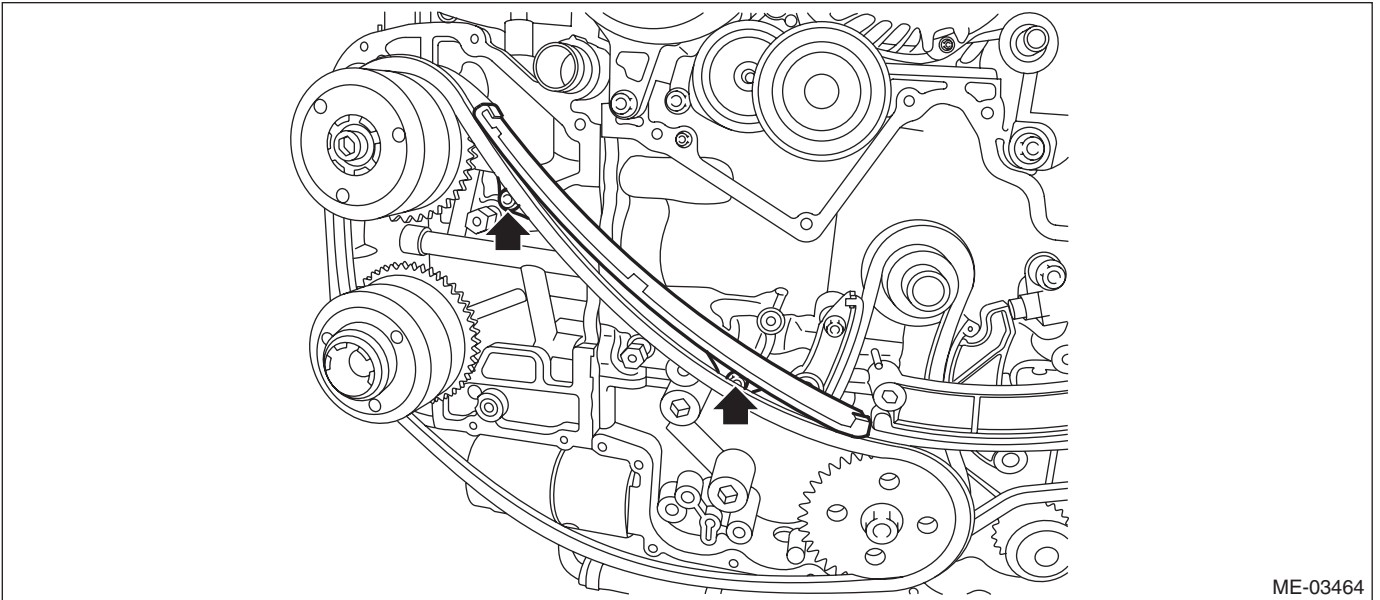
MECHANICAL

8) Remove the chain tensioner lever (RH).



ME-03463

9) Remove the chain guide (RH).



ME-03464

10) Remove the timing chain (RH).

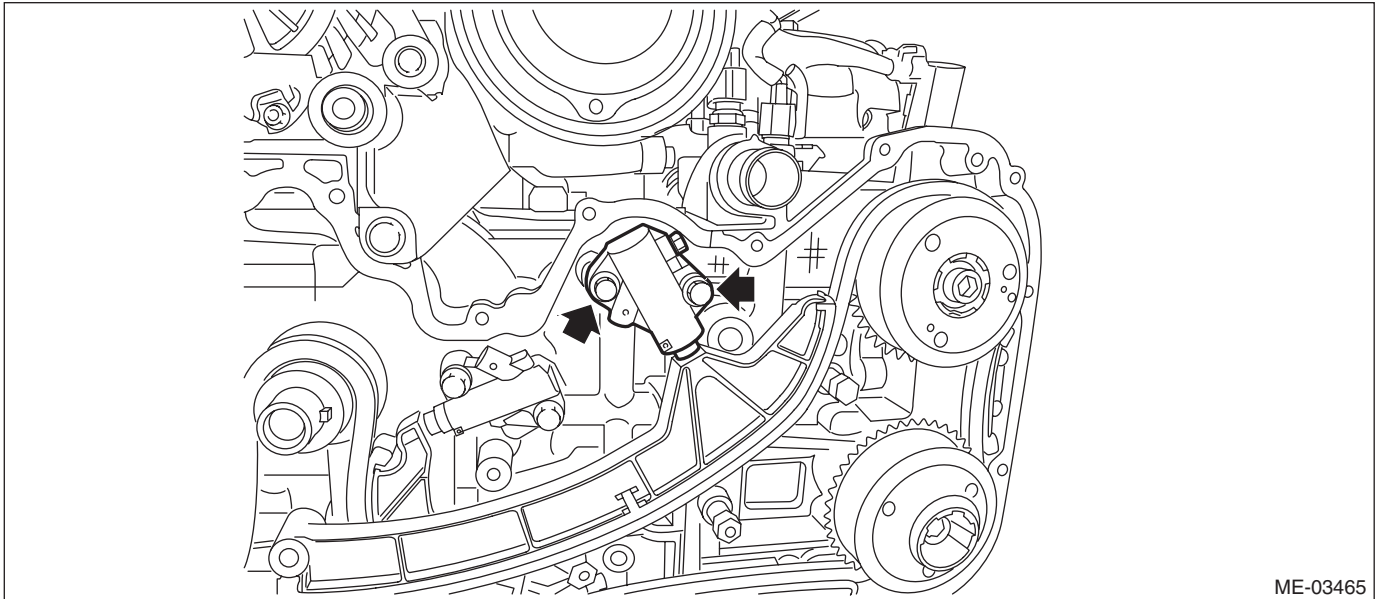
# Timing Chain Assembly

## MECHANICAL

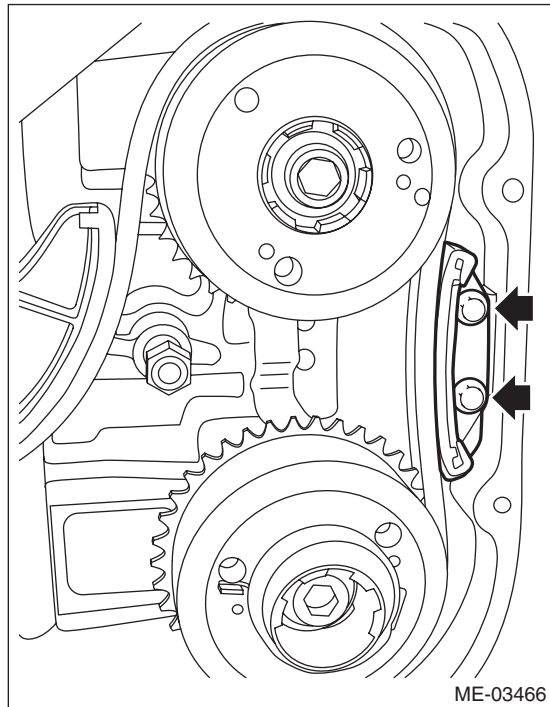
11) Remove the chain tensioner (LH).

### NOTE:

During removal of chain tensioner (LH) from chain tensioner lever (LH), press the plunger by hand to prevent it from popping out.



12) Remove the chain guide (LH: between cams).

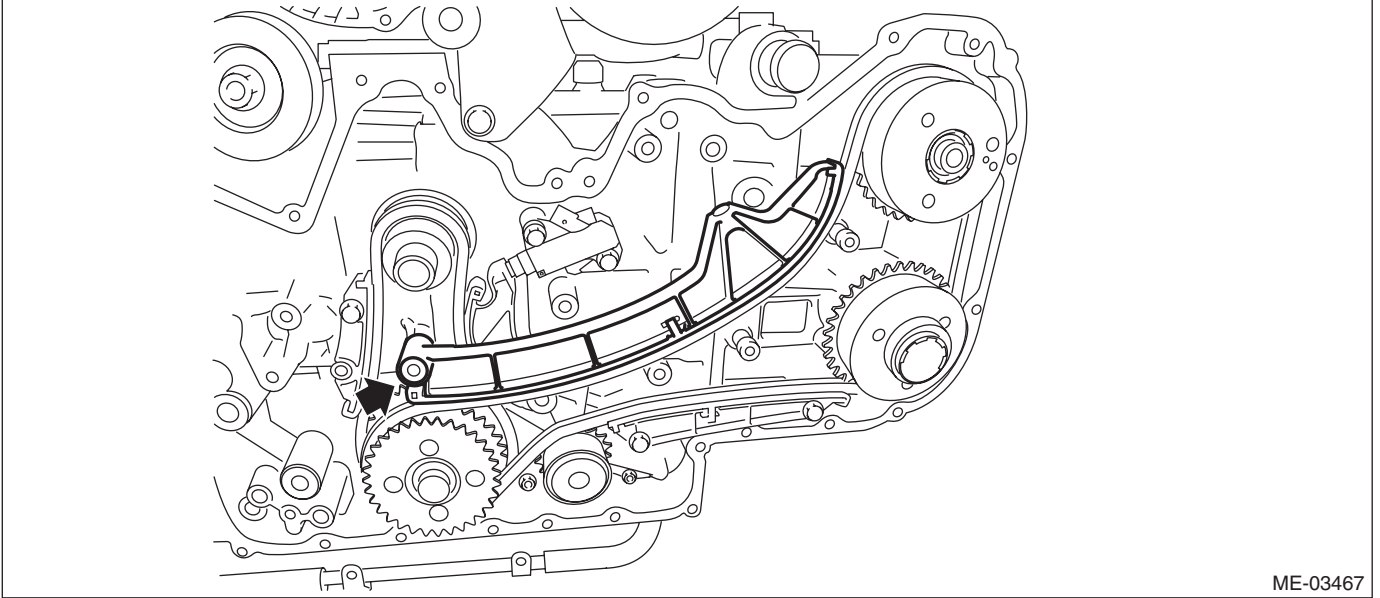




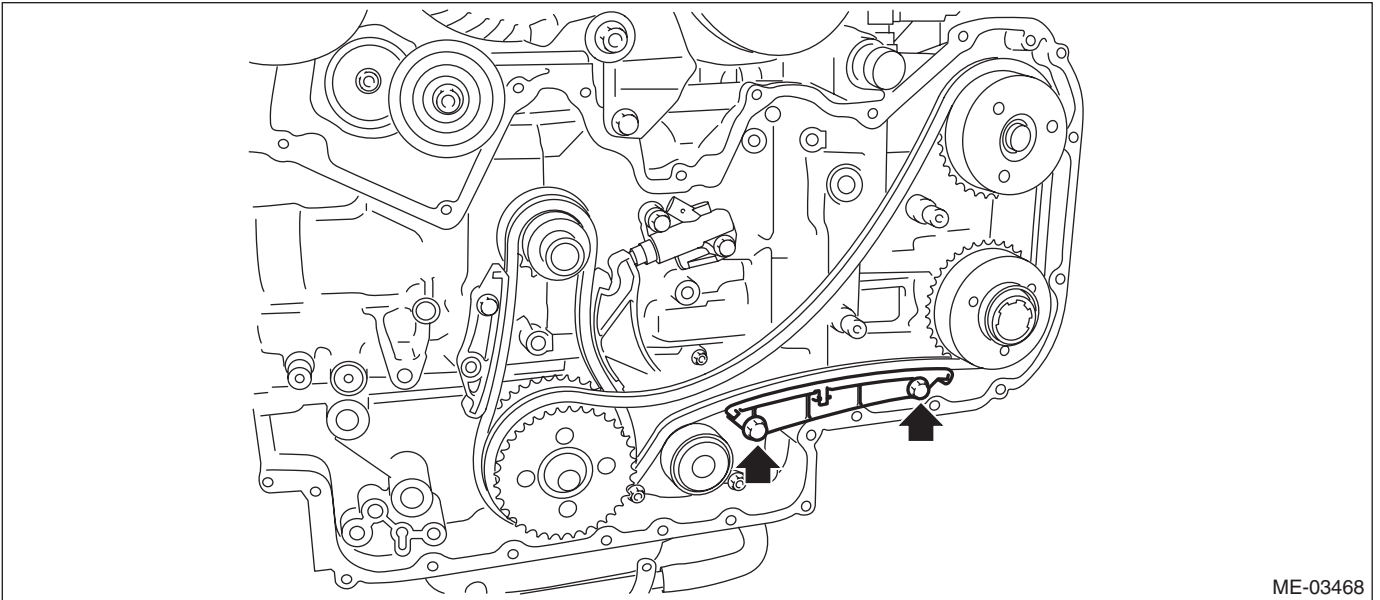
# Timing Chain Assembly

MECHANICAL

13) Remove the chain tensioner lever (LH).



14) Remove the chain guide (LH).



15) Remove the timing chain (LH).

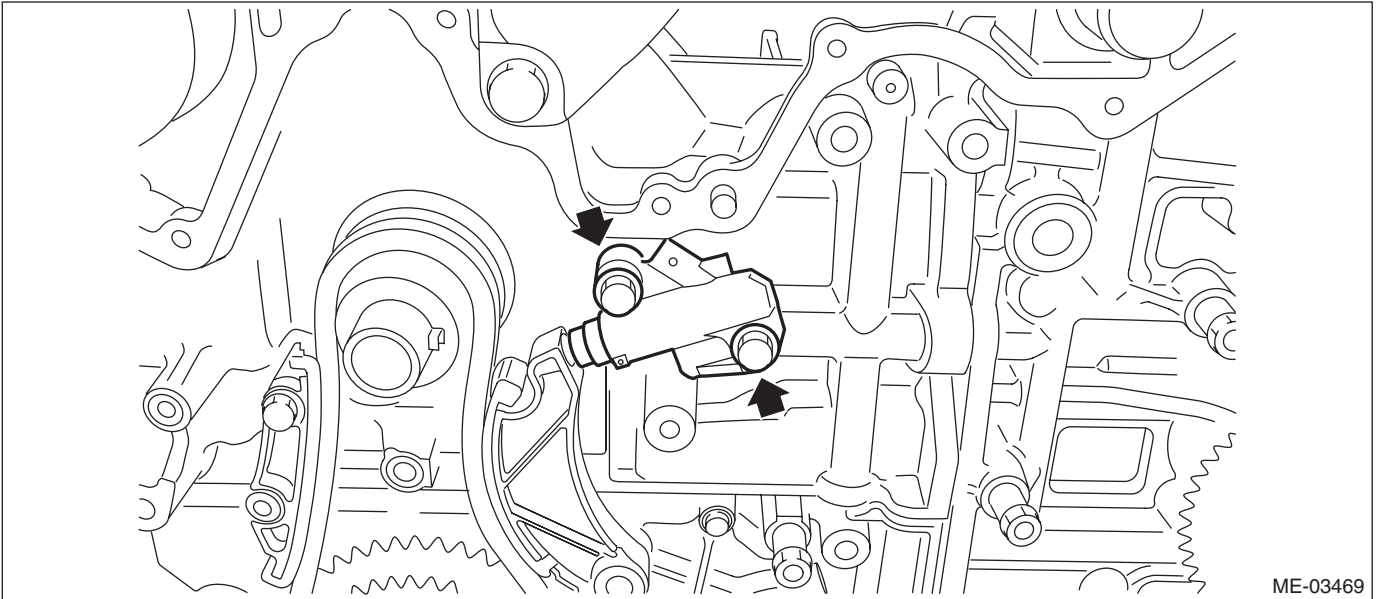
# Timing Chain Assembly

## MECHANICAL

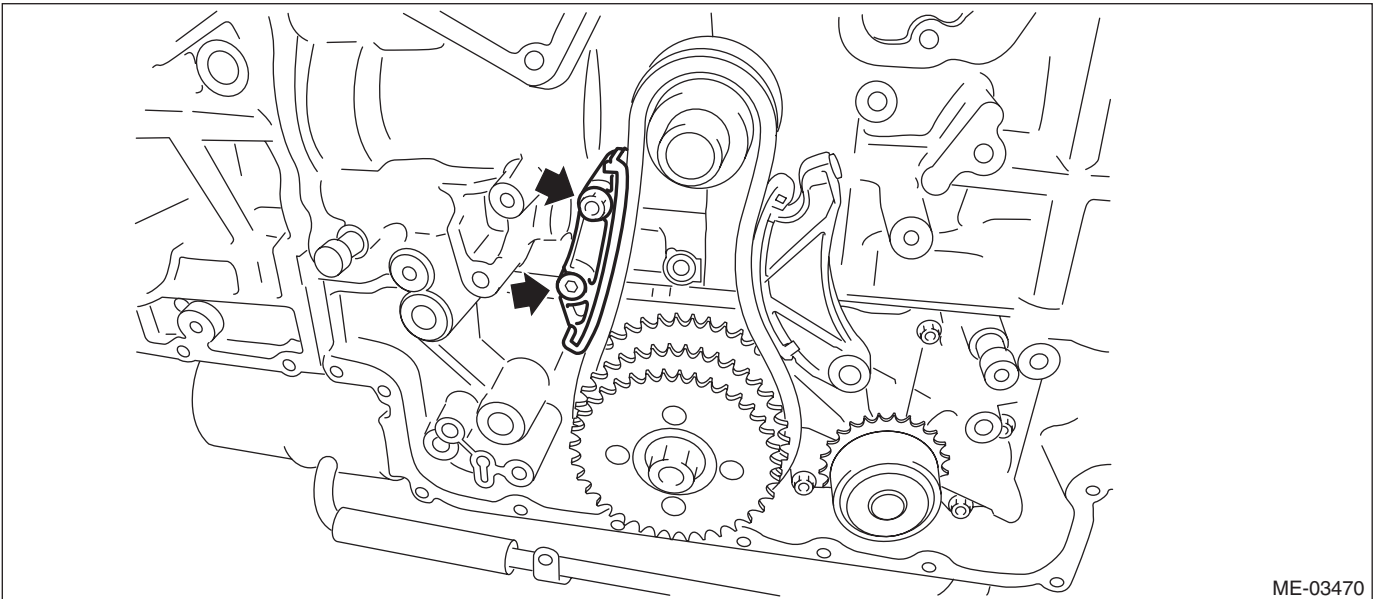
16) Remove the chain tensioner (main).

### NOTE:

During removal of chain tensioner (main) from chain tensioner lever (main), press the plunger by hand to prevent it from popping out.



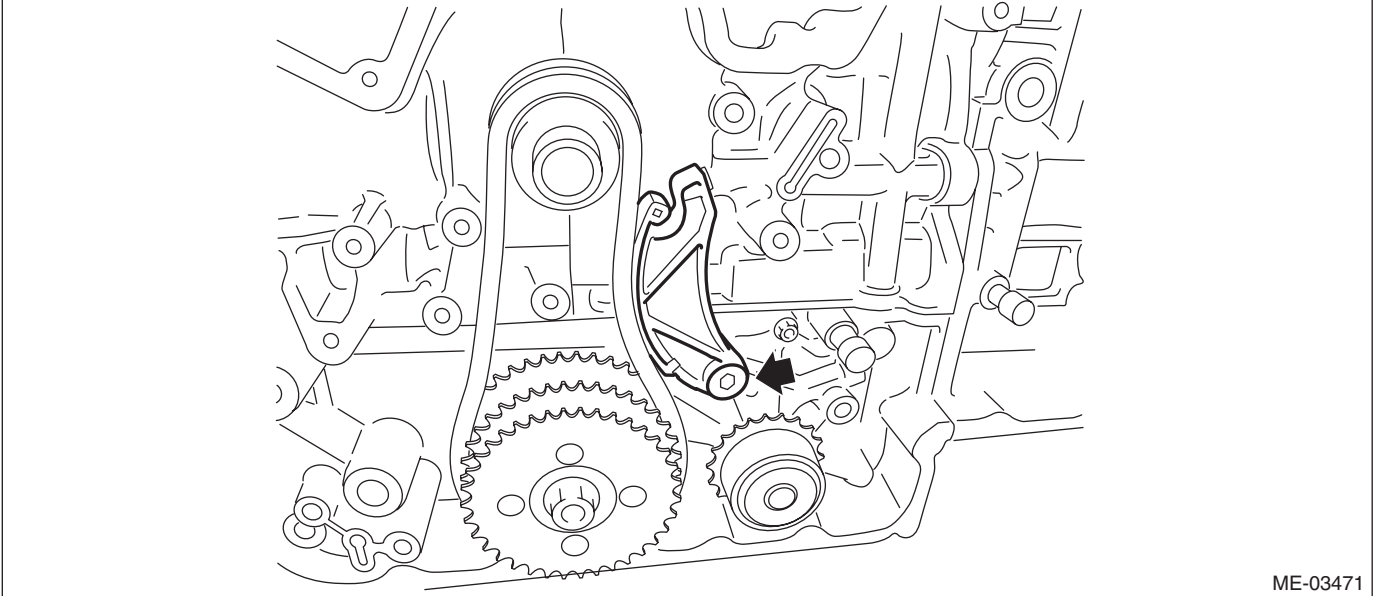
17) Remove the chain guide (main).



# Timing Chain Assembly

MECHANICAL

18) Remove the chain tensioner lever (main).



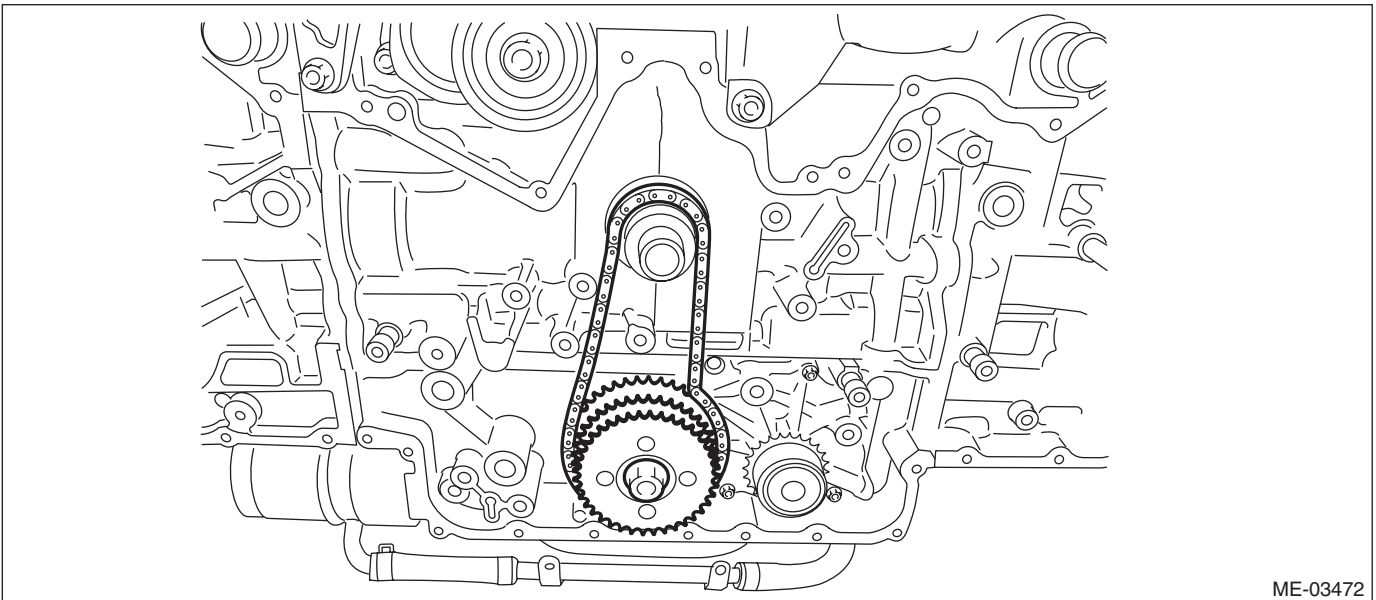
ME-03471

19) Use the ST to lock the idler sprocket, and loosen the idler sprocket bolt.

ST1 18355AA000 PULLEY WRENCH

ST2 18334AA000 PULLEY WRENCH PIN SET

20) Remove the idler sprocket, and then remove the idler sprocket and timing chain (main).



ME-03472

# Timing Chain Assembly

MECHANICAL

## C: INSTALLATION

NOTE:

- Be careful that the foreign matter is not into or onto assembled component during installation.
- Apply engine oil to all component parts of the timing chain.

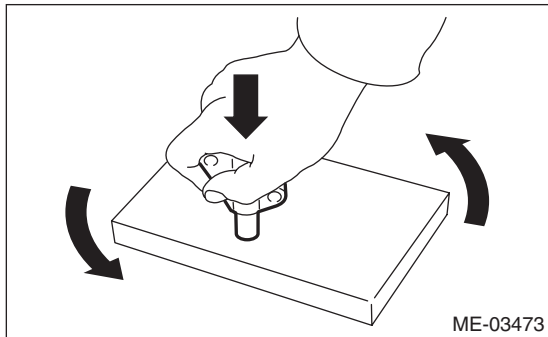
1) Prepare to attach the chain tensioner.

(1) Insert the screw, spring pin and plunger into the tensioner body.

(2) As shown in the figure, turn the rubber mat counterclockwise while holding the chain tensioner from above by hand.

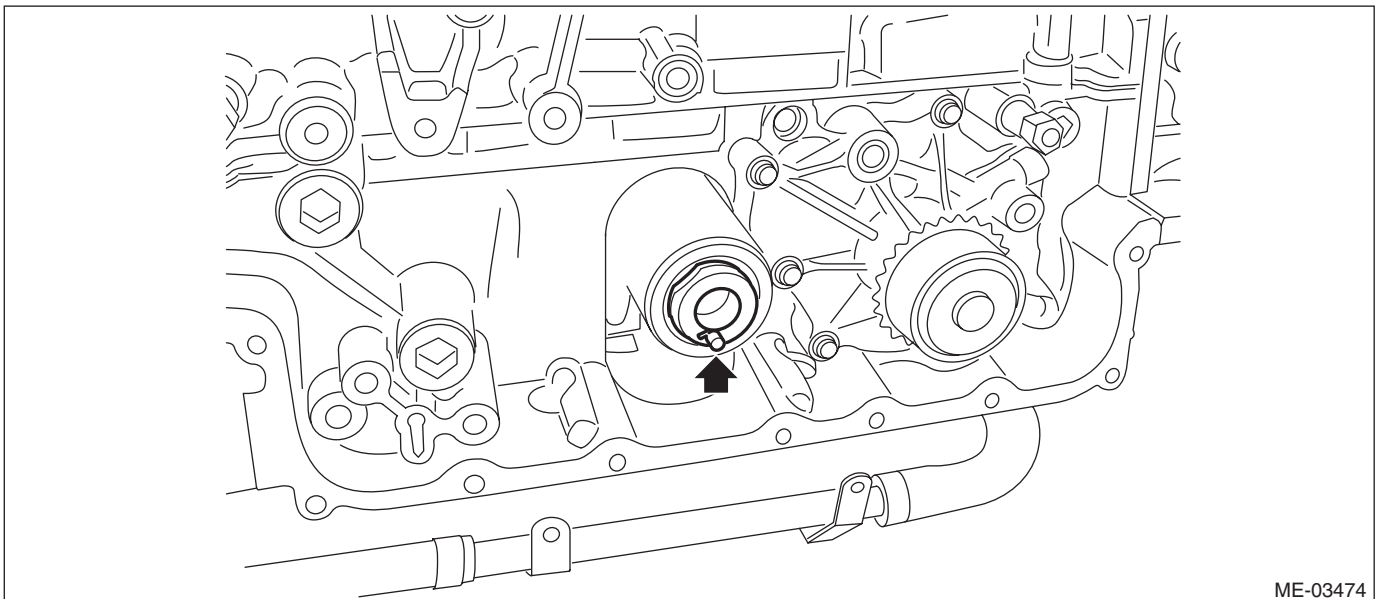
NOTE:

Degrease the contact surface between the plunger head and rubber mat, so that they do not slip.



(3) Insert the stopper pin into the hole on the chain tensioner body.

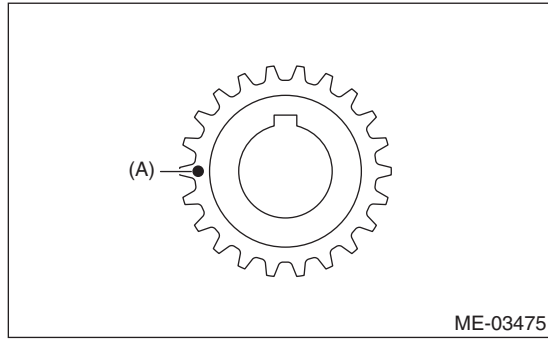
2) Align the position of oil pump shaft knock pin to six o'clock position as shown in the figure.



# Timing Chain Assembly

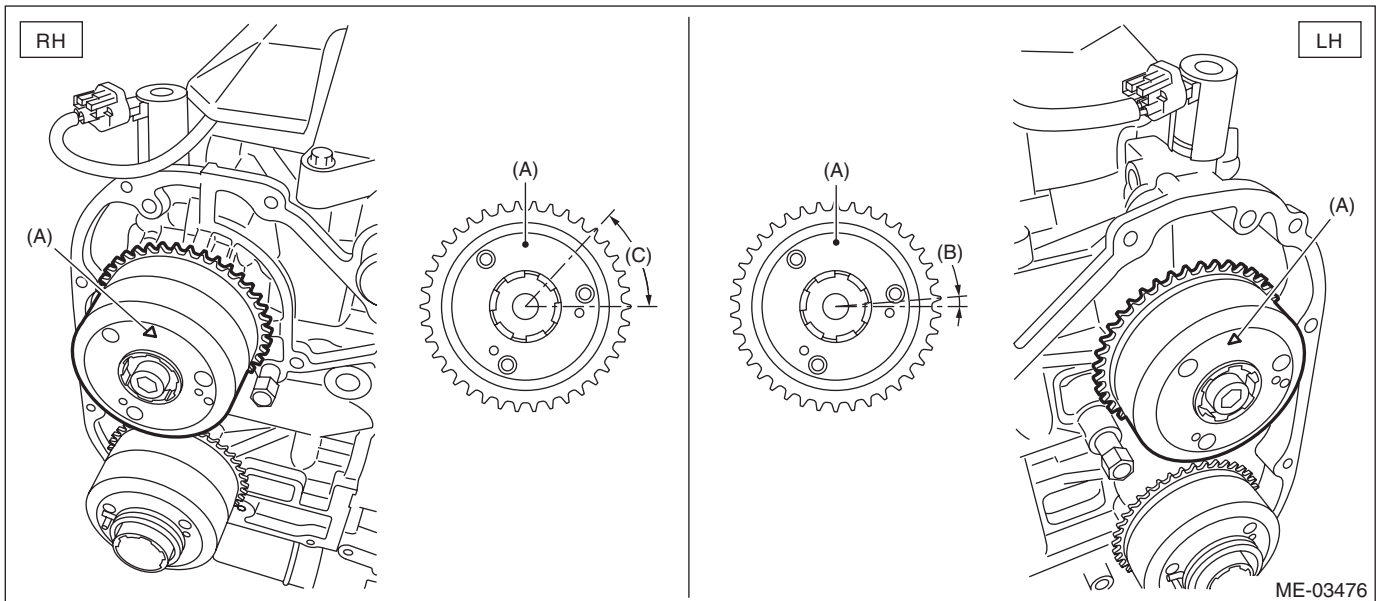
MECHANICAL

- 3) Using ST, align the "Top mark" on crank sprocket to nine o'clock position as shown in the figure.  
ST 18252AA000 CRANKSHAFT SOCKET



(A) Top mark

- 4) Align the intake cam sprocket to twelve o'clock position as shown in the figure.  
ST 499977500 CAM SPROCKET WRENCH



(A) Align the marking (top mark) to twelve o'clock position.

(B) 6°

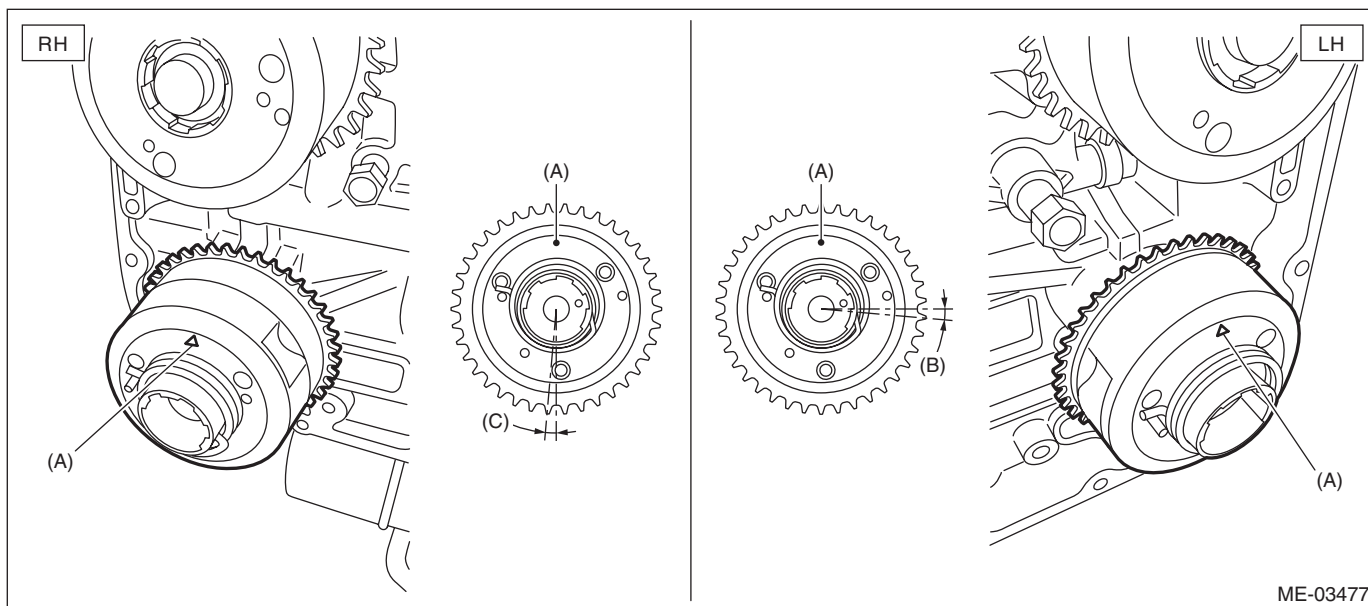
(C) 47°

# Timing Chain Assembly

## MECHANICAL

5) Align the exhaust cam sprocket to twelve o'clock position as shown in the figure.

ST 499977500 CAM SPROCKET WRENCH



(A) Align the marking (top mark) to twelve o'clock position.

(B) 5.5°

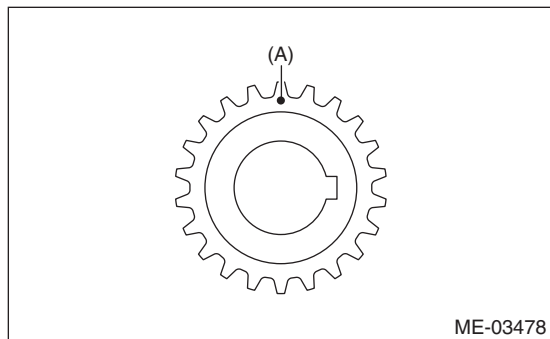
(C) 3.5°

6) Using ST, align the "Top mark" on crank sprocket to twelve o'clock position as shown in the figure.

### NOTE:

- The #1 piston is positioned at TDC.
- Do not rotate the crankshaft and cam sprocket before completing timing chain installation.
- Crank sprocket key is located at three o'clock position.

ST 18252AA000 CRANKSHAFT SOCKET



(A) Top mark

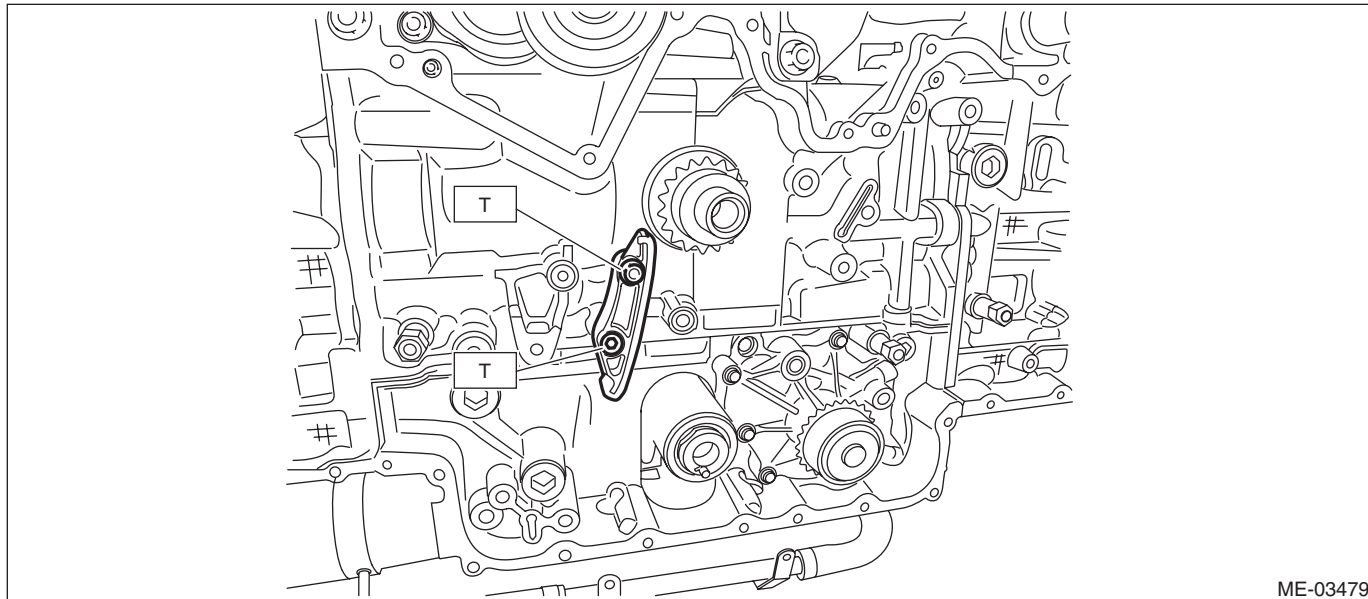
# Timing Chain Assembly

MECHANICAL

7) Install the chain guide (main).

**Tightening torque:**

**16 N·m (1.6 kgf·m, 11.8 ft·lb)**



8) Install the idler sprocket and timing chain (main).

(1) Match the timing chain mark (gold) to the timing mark position of the idler sprocket.

(2) Align the idler sprocket timing mark at six o'clock position, and install the idler sprocket and timing chain.

(3) Make sure that the timing chain mark (gold) is located at twelve o'clock position on the crank sprocket.

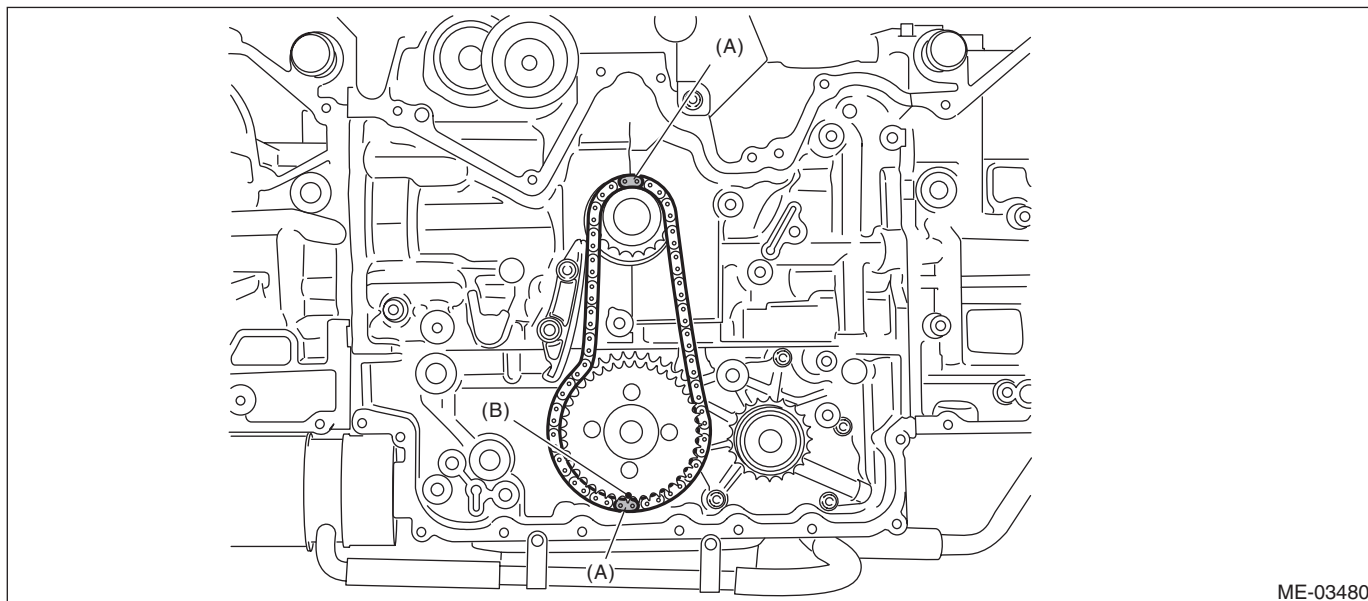
(4) Install the idler sprocket bolt.

ST1 18355AA000 PULLEY WRENCH

ST2 18334AA000 PULLEY WRENCH PIN SET

**Tightening torque:**

**120 N·m (12.2 kgf·m, 88.5 ft·lb)**



(A) Gold

(B) Timing mark

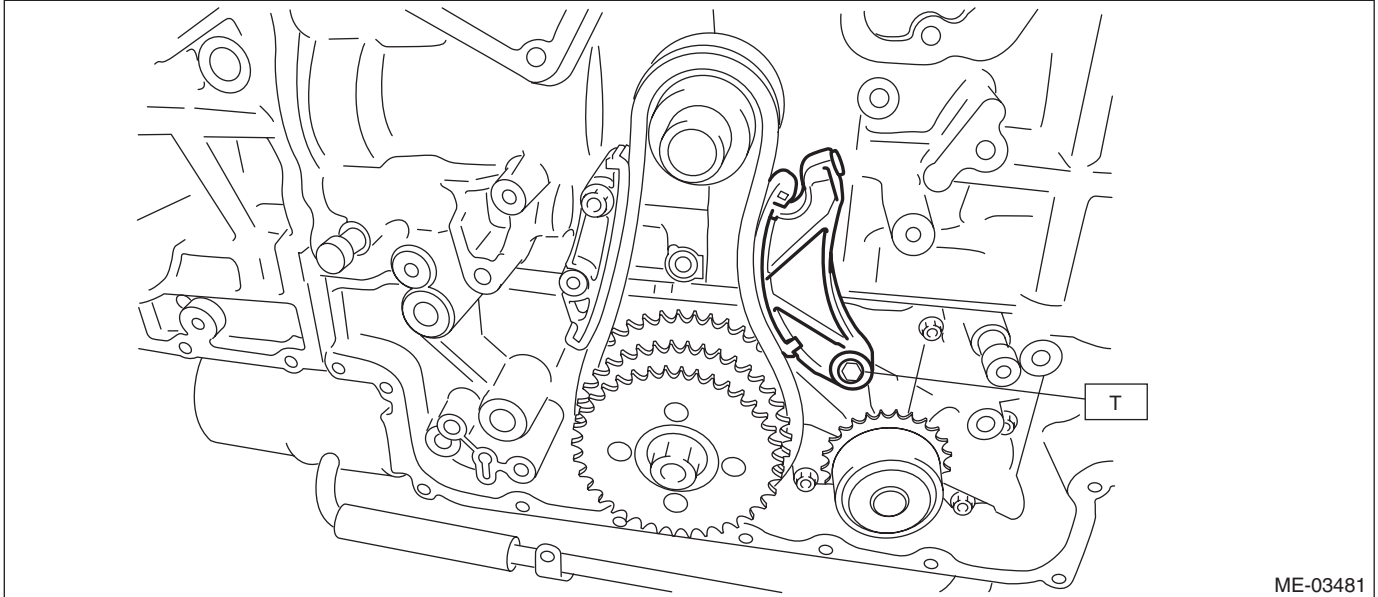
# Timing Chain Assembly

## MECHANICAL

9) Install the chain tensioner lever (main).

**Tightening torque:**

**16 N·m (1.6 kgf·m, 11.8 ft·lb)**



ME-03481

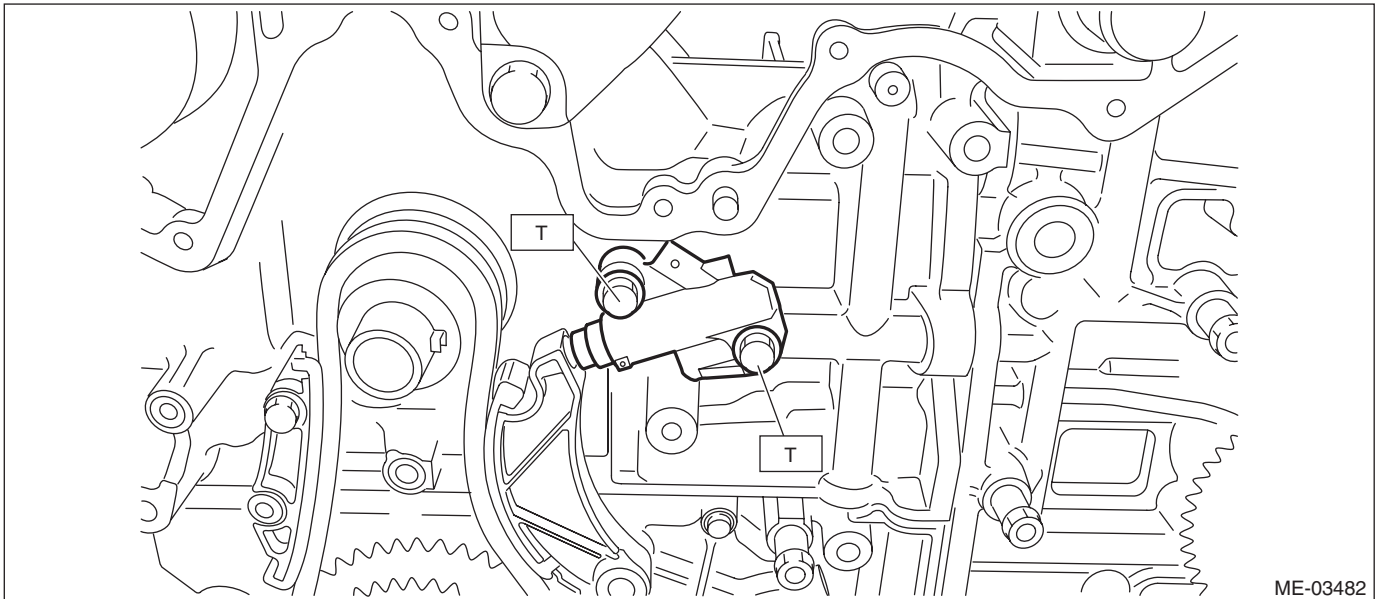
10) Install the chain tensioner (main) and pull out the stopper pin.

**NOTE:**

The timing chain (main) line will be complete.

**Tightening torque:**

**16 N·m (1.6 kgf·m, 11.8 ft·lb)**



ME-03482



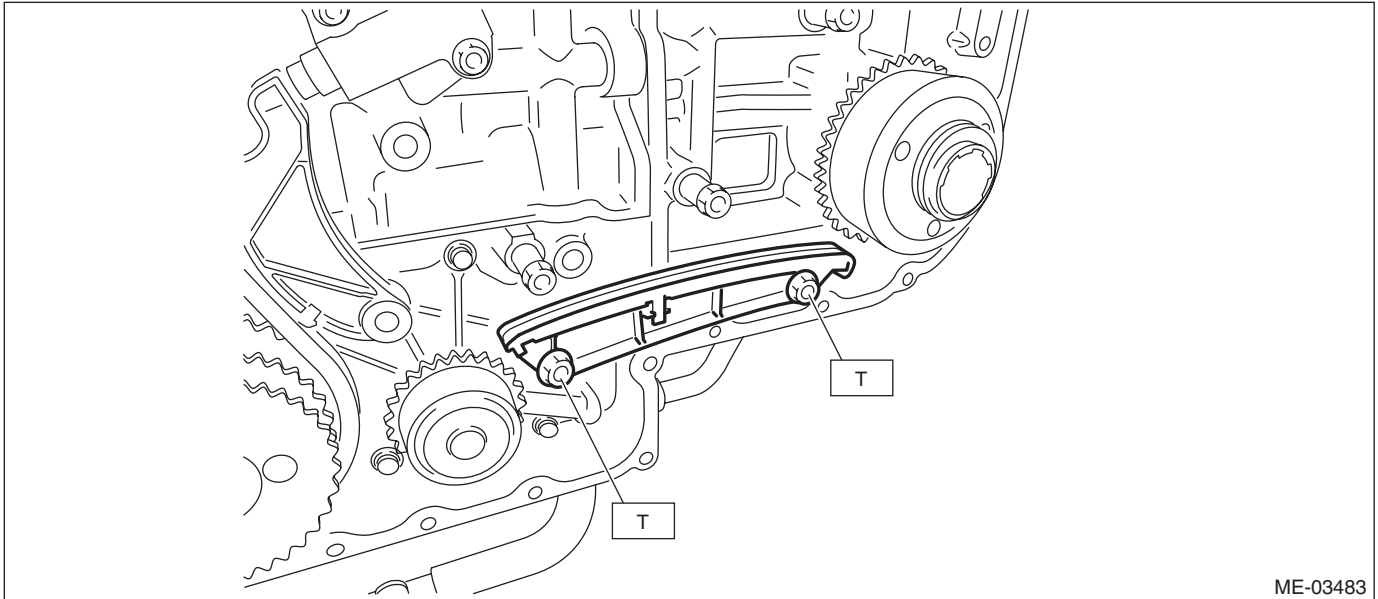
# Timing Chain Assembly

MECHANICAL

11) Install the chain guide (LH).

**Tightening torque:**

**16 N·m (1.6 kgf·m, 11.8 ft·lb)**

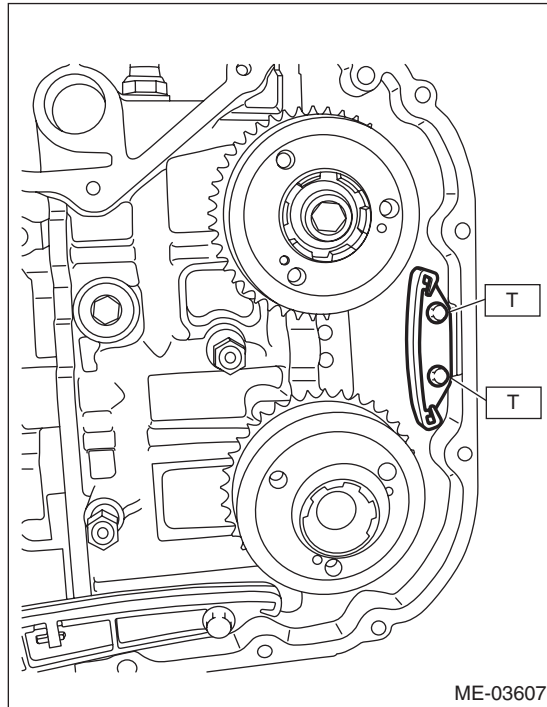


ME-03483

12) Install the chain guide (LH: between cams).

**Tightening torque:**

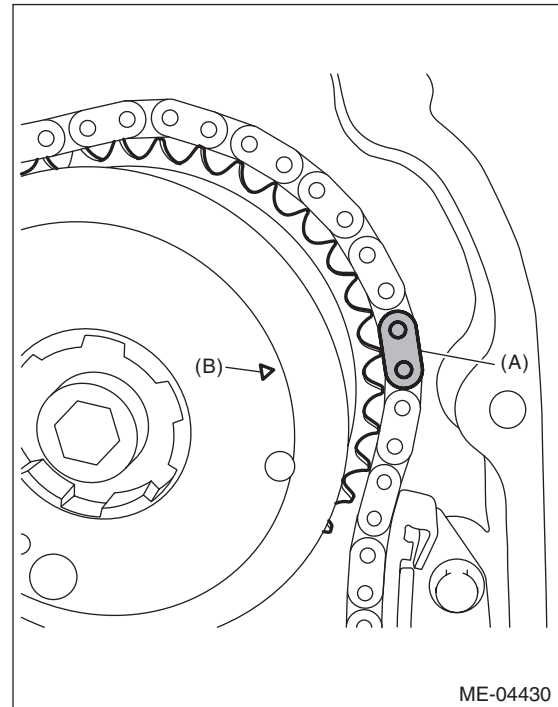
**6.4 N·m (0.7 kgf·m, 4.7 ft·lb)**



ME-03607

13) Install timing chain (LH).

(1) Match the timing mark of intake cam sprocket (LH) to the timing chain mark (blue).



ME-04430

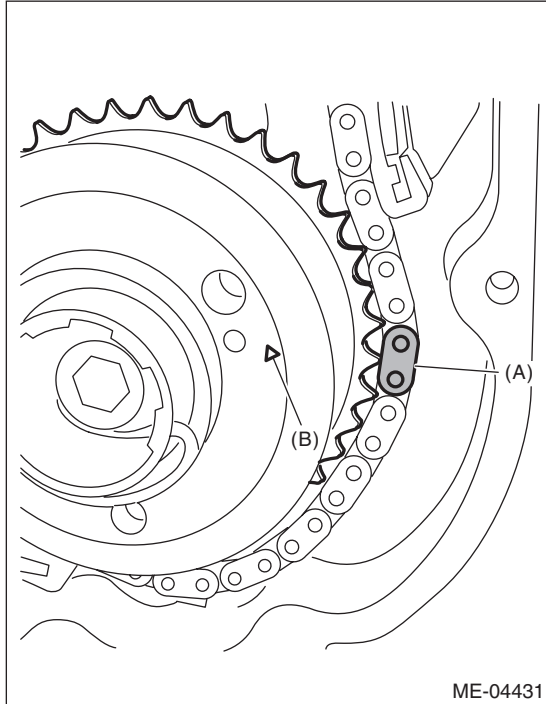
(A) Blue

(B) Timing mark

# Timing Chain Assembly

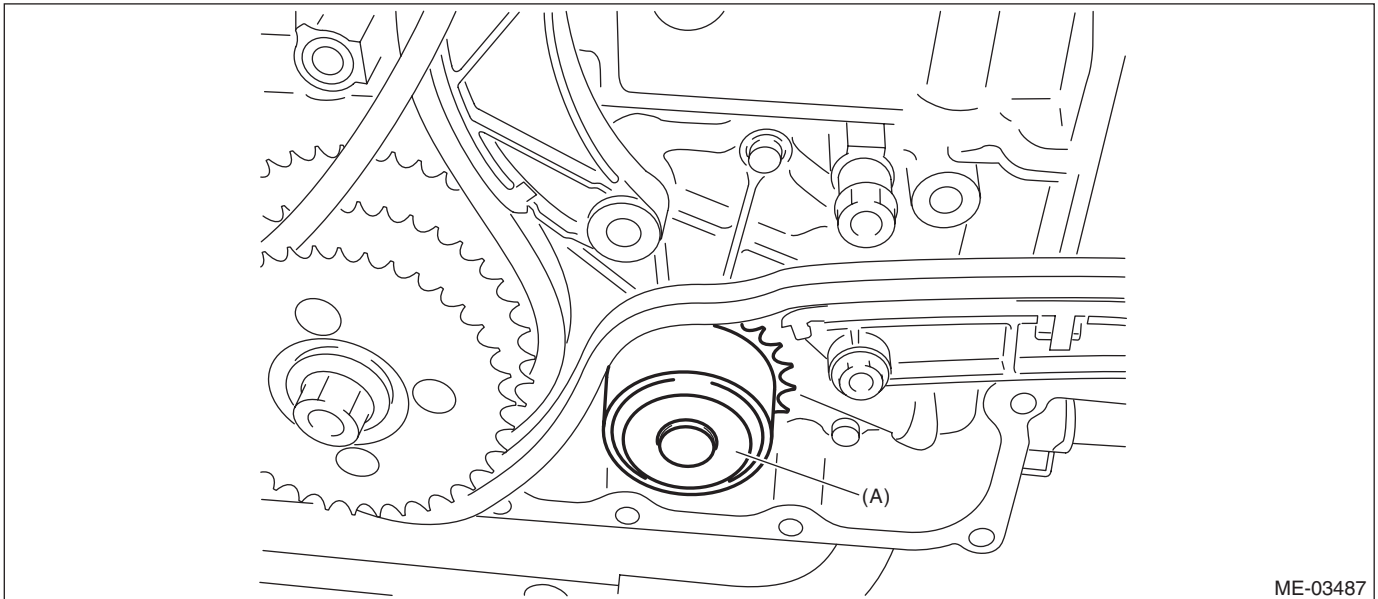
MECHANICAL

(2) Match the timing mark of exhaust cam sprocket (LH) to the timing chain mark (blue).



- (A) Blue
- (B) Timing mark

(3) Install the timing chain to the water pump sprocket.

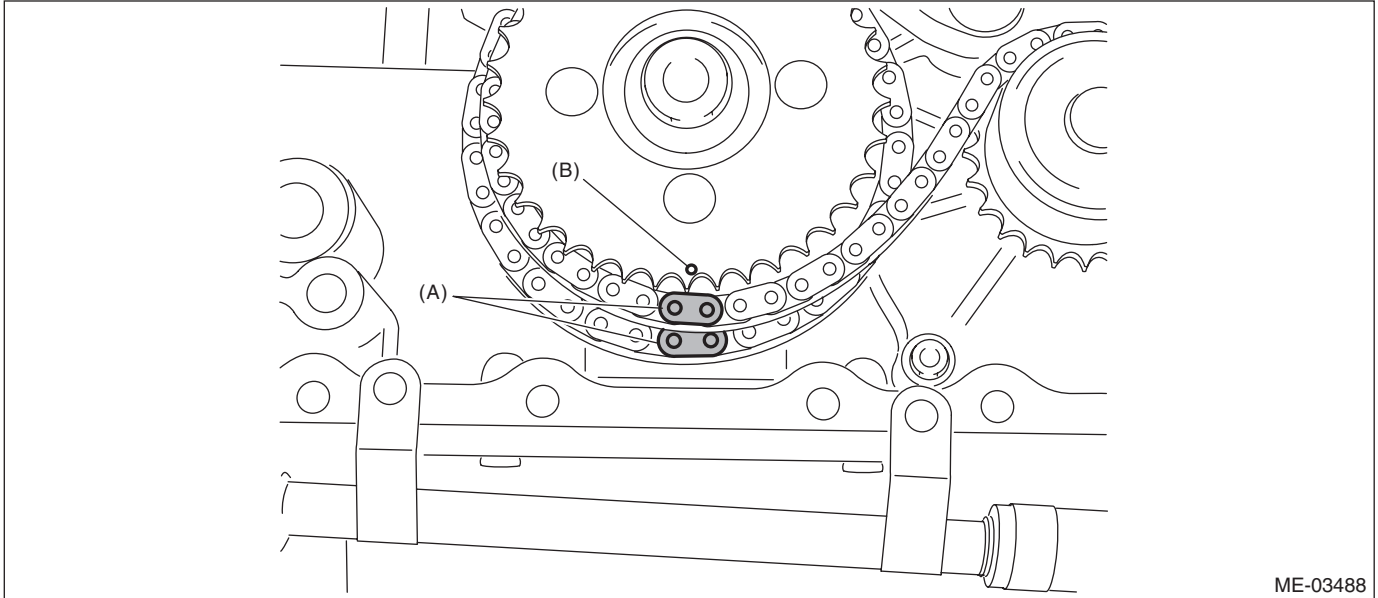


- (A) Water pump sprocket

# Timing Chain Assembly

MECHANICAL

(4) Match the timing mark of idler sprocket to the timing chain mark (gold).



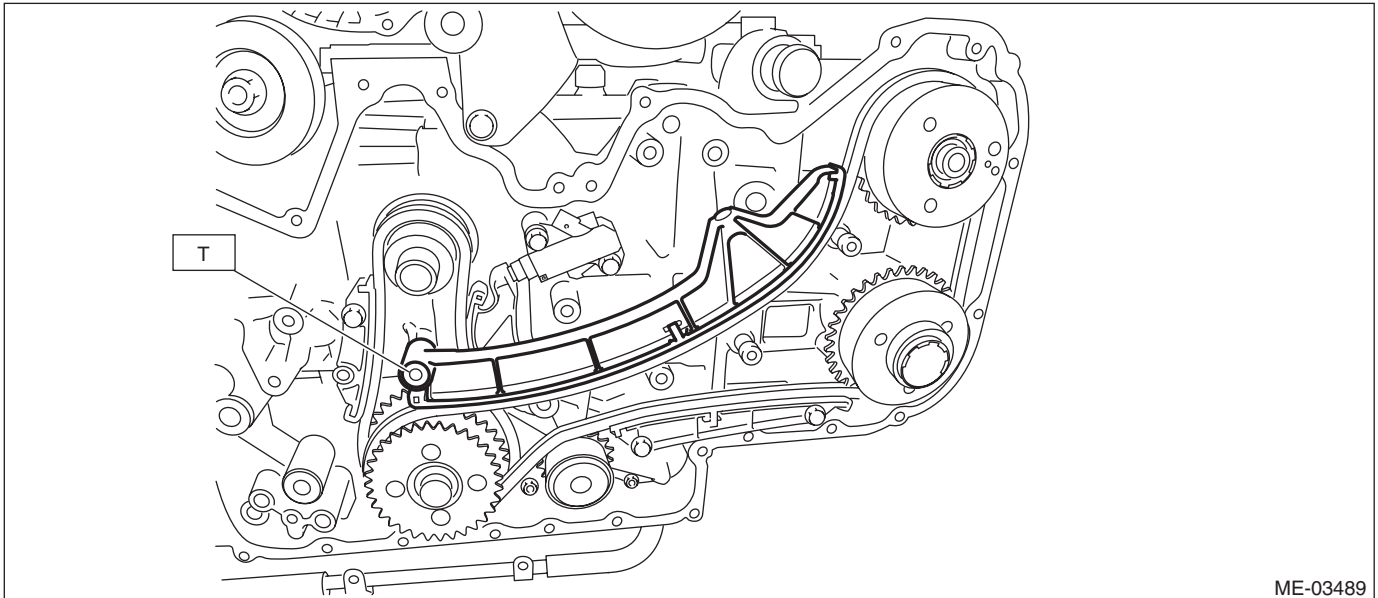
(A) Gold

(B) Timing mark

14) Install the chain tensioner lever (LH).

**Tightening torque:**

**16 N·m (1.6 kgf-m, 11.8 ft-lb)**



# Timing Chain Assembly

## MECHANICAL

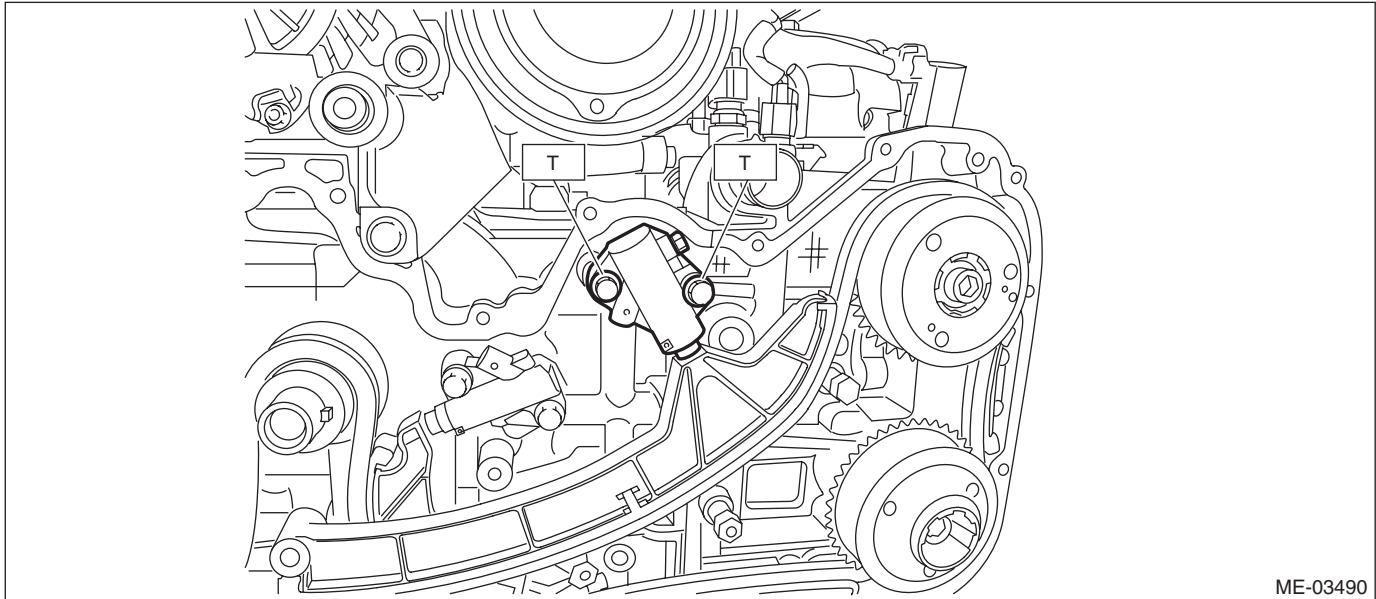
15) Install the chain tensioner (LH) and pull out the stopper pin.

### NOTE:

- Make sure that there is a bolt attached on the side face of the chain tensioner housing.
- The timing chain (LH) line will be complete.

### **Tightening torque:**

**16 N·m (1.6 kgf·m, 11.8 ft·lb)**

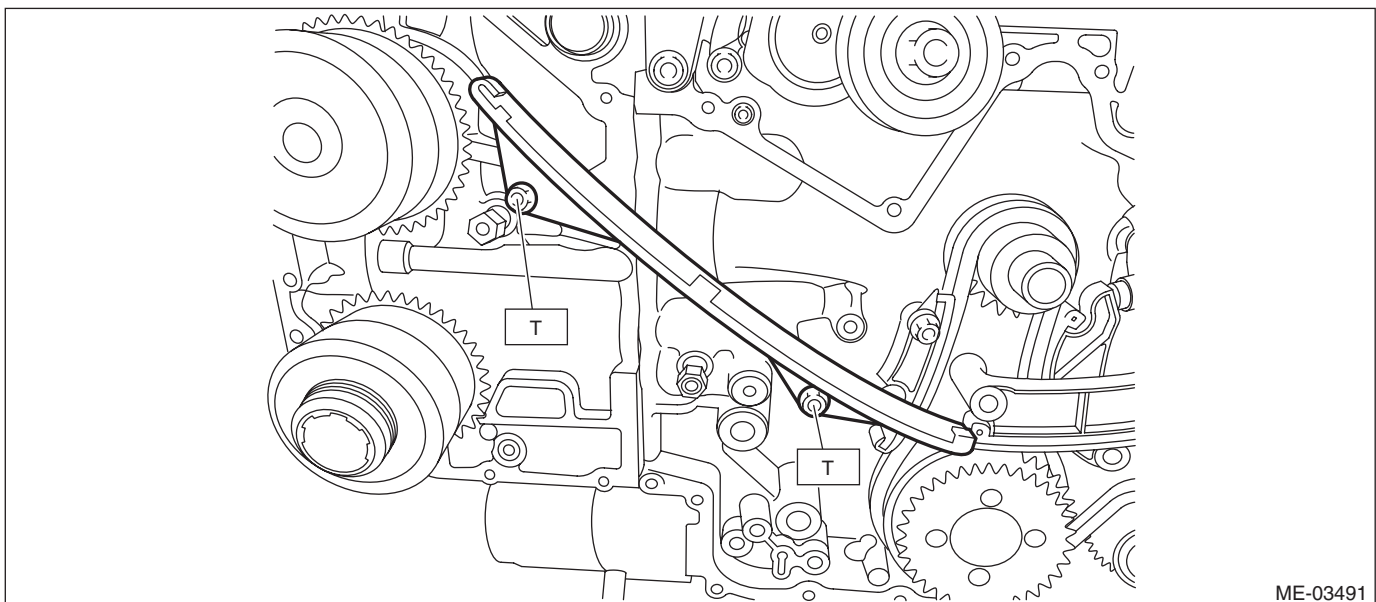


ME-03490

16) Install the chain guide (RH).

### **Tightening torque:**

**16 N·m (1.6 kgf·m, 11.8 ft·lb)**



ME-03491

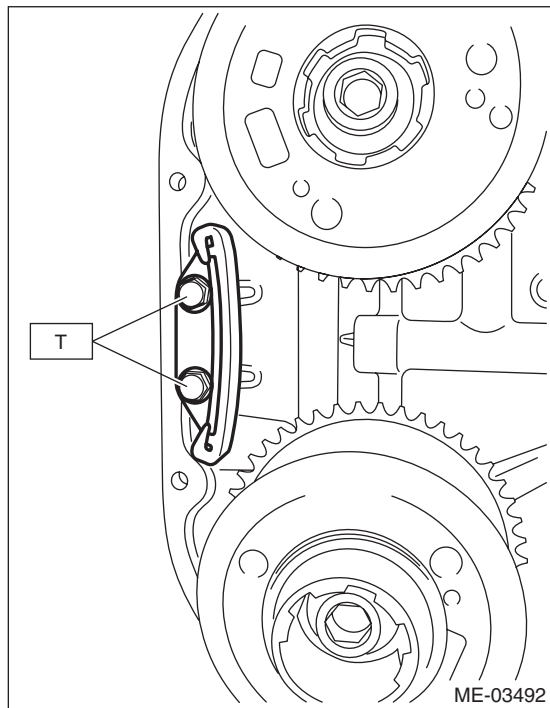
# Timing Chain Assembly

MECHANICAL

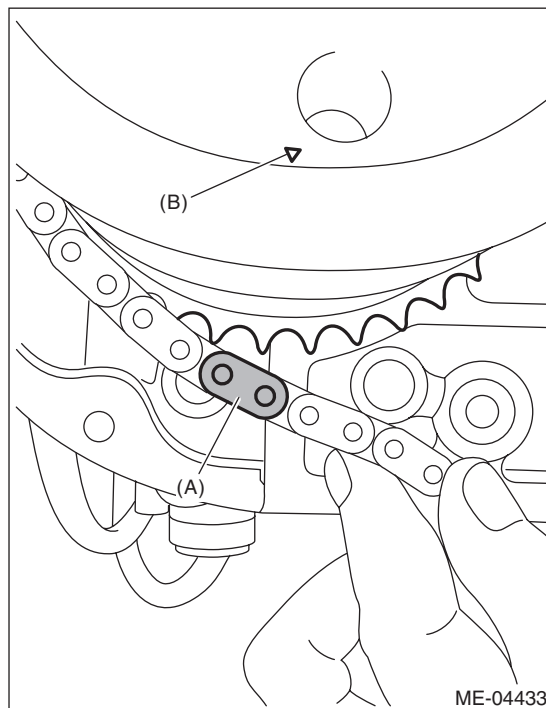
17) Install the chain guide (RH: between cams).

**Tightening torque:**

**6.4 N·m (0.7 kgf·m, 4.7 ft·lb)**



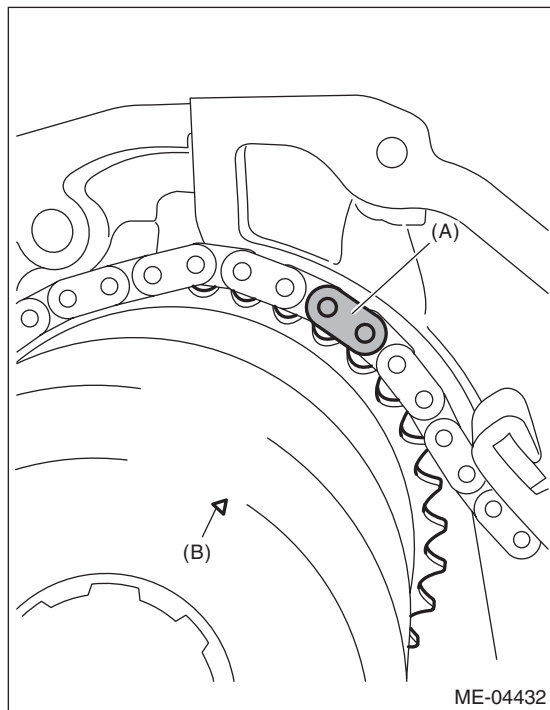
(2) Match the timing mark of exhaust cam sprocket (RH) to the timing chain mark (blue).



- (A) Blue
- (B) Timing mark

18) Install timing chain (RH).

(1) Match the timing mark of intake cam sprocket (RH) to the timing chain mark (blue).

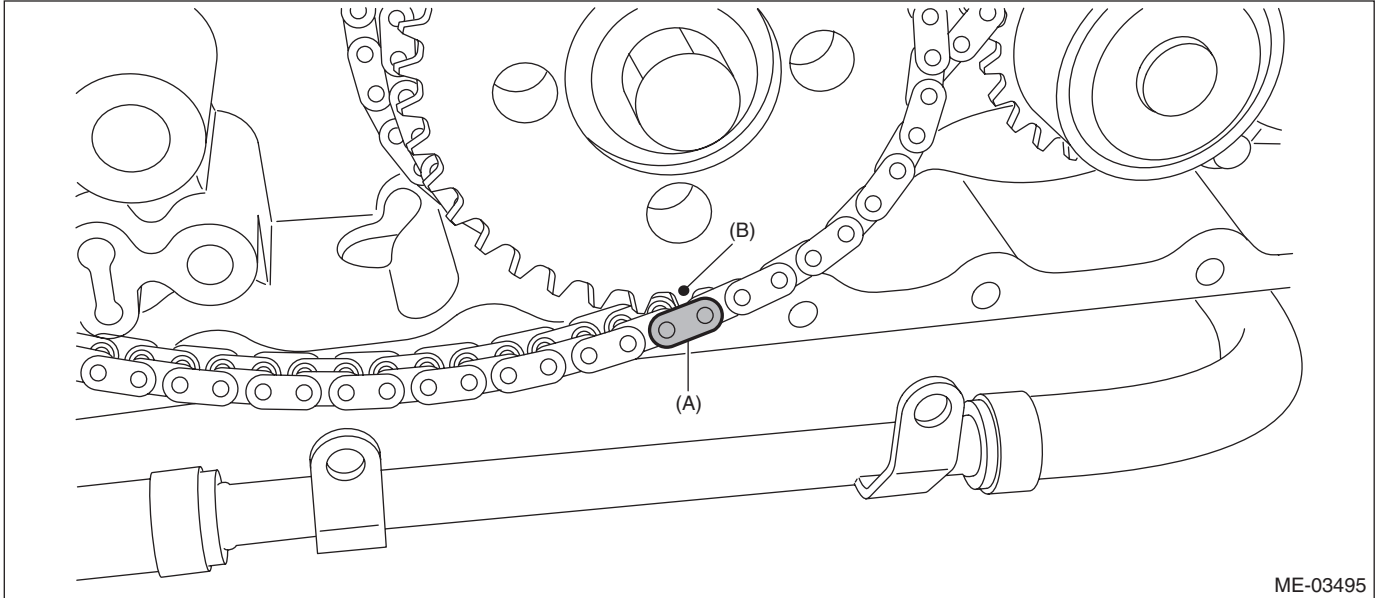


- (A) Blue
- (B) Timing mark

# Timing Chain Assembly

## MECHANICAL

(3) Match the timing mark of idler sprocket to the timing chain mark (gold).



ME-03495

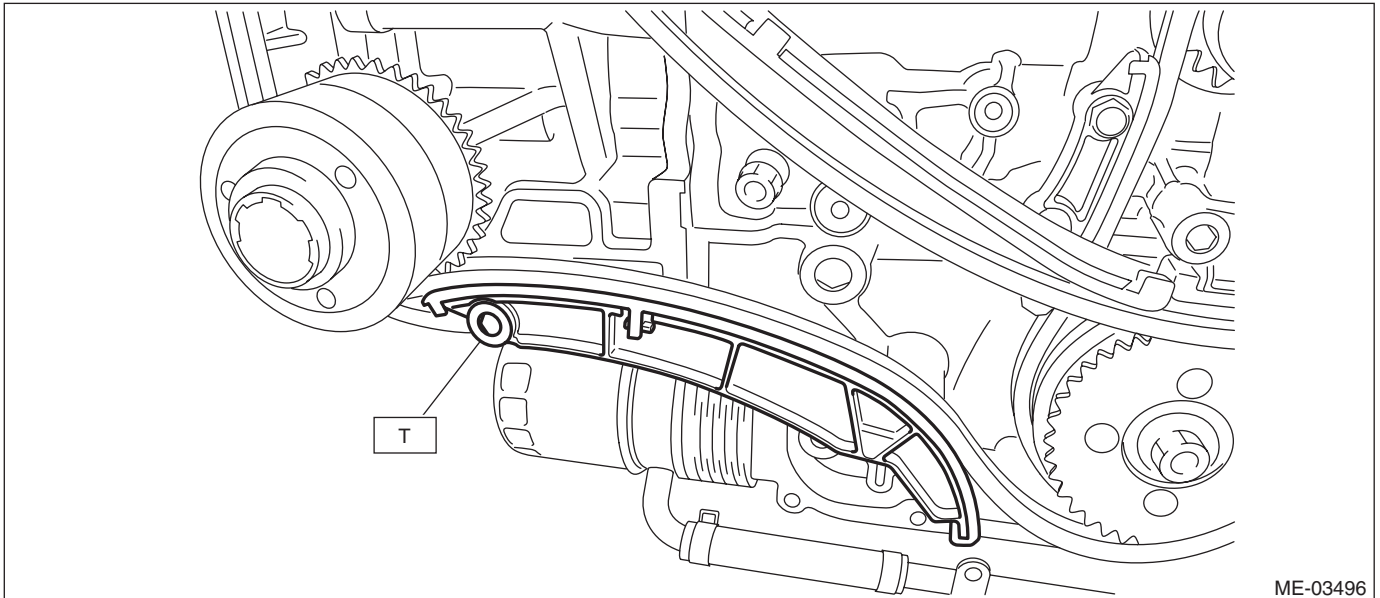
(A) Gold

(B) Timing mark

19) Install the chain tensioner lever (RH).

**Tightening torque:**

**16 N·m (1.6 kgf·m, 11.8 ft·lb)**



ME-03496

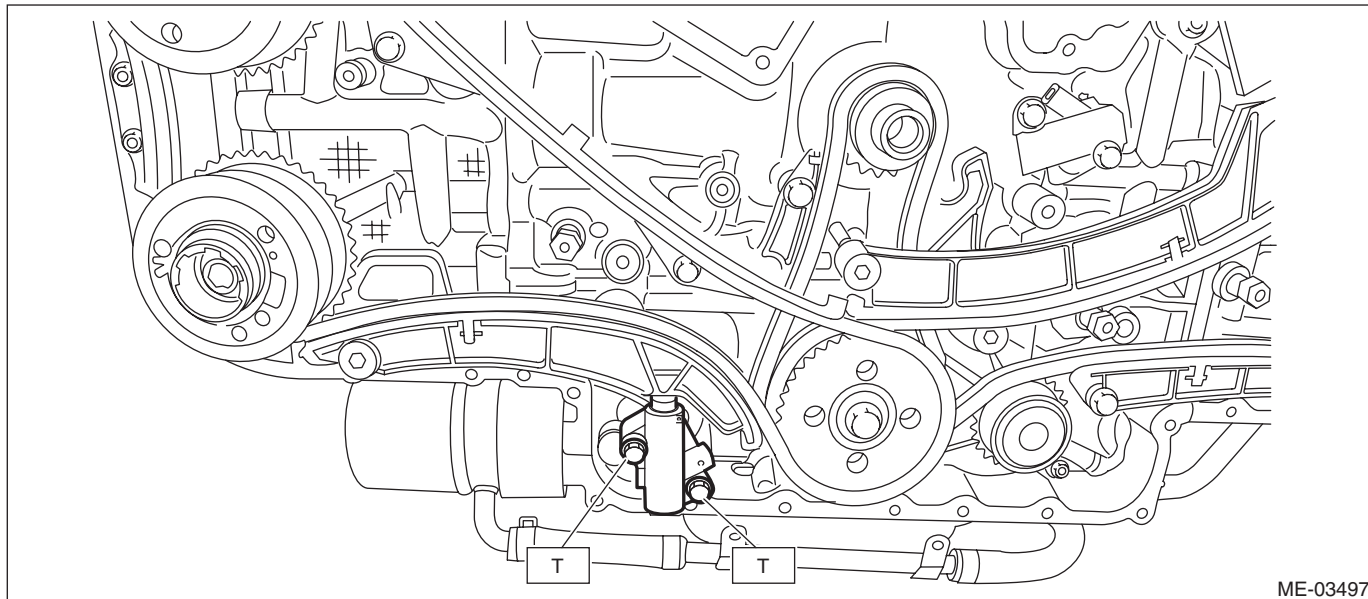
20) Install the chain tensioner (RH) and pull out the stopper pin.

**NOTE:**

The timing chain (RH) line will be complete.

**Tightening torque:**

**16 N·m (1.6 kgf-m, 11.8 ft-lb)**



ME-03497

21) After installation, perform the following confirmations.

**CAUTION:**

**Always make sure to perform this confirmation.**

- (1) Make sure that the timing mark of idler sprocket is aligned to three timing chain marks (gold).
  - (2) Make sure that the twelve o'clock position on the crank sprocket is aligned to the timing chain (main) mark (gold).
  - (3) Make sure that the LH side cam sprocket timing mark is aligned to the timing chain mark (blue).
  - (4) Make sure that the RH side cam sprocket timing mark is aligned to the timing chain mark (blue).
  - (5) Make sure that all bolts are tightened at the specified torque.
- 22) Using the ST, turn the crankshaft in the direction of engine rotation, and make sure that there are no abnormal conditions.

**CAUTION:**

**Always make sure to perform this confirmation.**

- 23) Install the chain cover. <Ref. to ME(H6DO)-49, INSTALLATION, Chain Cover.>
- 24) Install the crank pulley. <Ref. to ME(H6DO)-46, INSTALLATION, Crank Pulley.>
- 25) Install the V-belts. <Ref. to ME(H6DO)-45, INSTALLATION, V-belt.>
- 26) Fill engine oil. <Ref. to LU(H6DO)-9, REPLACEMENT, Engine Oil.>
- 27) Make sure there is no oil leaks in the chain cover mating surface.
- 28) Install the radiator. <Ref. to CO(H6DO)-19, INSTALLATION, Radiator.>

# Cam Sprocket

MECHANICAL

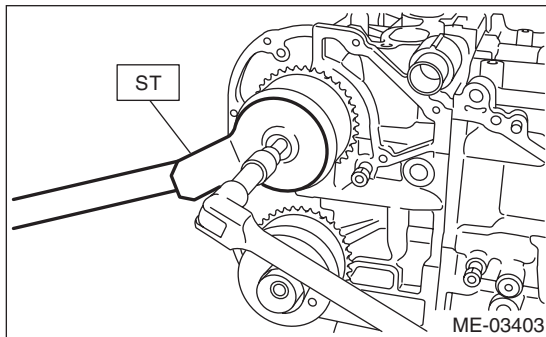
## 16. Cam Sprocket

### A: REMOVAL

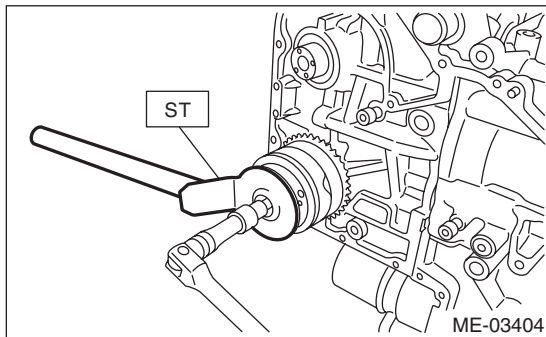
- 1) Remove the V-belts. <Ref. to ME(H6DO)-45, REMOVAL, V-belt.>
- 2) Remove the crank pulley. <Ref. to ME(H6DO)-46, REMOVAL, Crank Pulley.>
- 3) Remove the chain cover. <Ref. to ME(H6DO)-47, REMOVAL, Chain Cover.>
- 4) Remove the timing chain assembly. <Ref. to ME(H6DO)-54, REMOVAL, Timing Chain Assembly.>
- 5) Remove the cam sprocket. To lock the camshaft, use the ST.

ST 499977500 CAM SPROCKET WRENCH

- IN side



- EX side



### B: INSTALLATION

- 1) Install the cam sprocket. To lock the camshaft, use the ST.

#### Tightening torque:

**29.5 N·m (3.0 kgf-m, 21.8 ft-lb)**

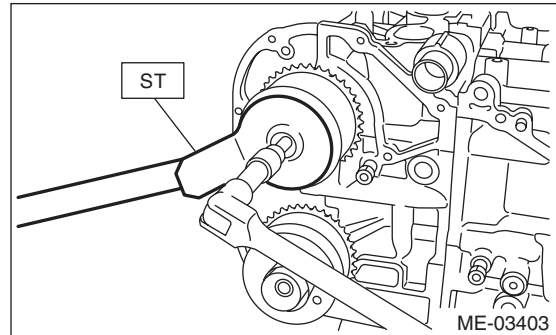
- 2) Further tighten the bolt.

#### Tightening angle:

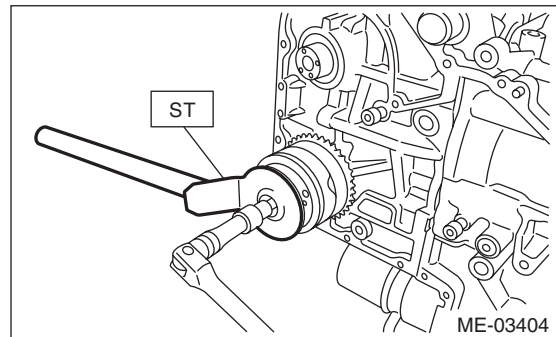
**45° ±5°**

ST 499977500 CAM SPROCKET WRENCH

- IN side



- EX side



- 3) Install the timing chain assembly. <Ref. to ME(H6DO)-60, INSTALLATION, Timing Chain Assembly.>

4) Install the chain cover. <Ref. to ME(H6DO)-49, INSTALLATION, Chain Cover.>

5) Install the crank pulley. <Ref. to ME(H6DO)-46, INSTALLATION, Crank Pulley.>

6) Install the V-belts. <Ref. to ME(H6DO)-45, INSTALLATION, V-belt.>

### C: INSPECTION

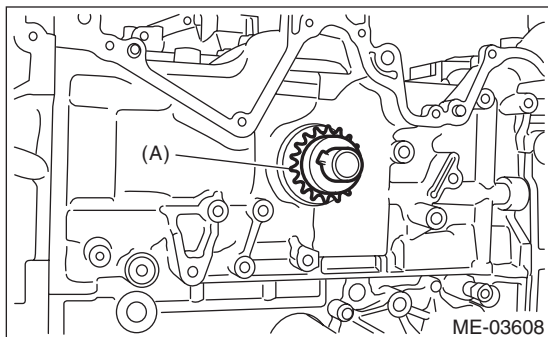
- 1) Check the cam sprocket teeth for abnormal wear and scratches.
- 2) Make sure there is no free play between cam sprocket and key.



## 17. Crank Sprocket

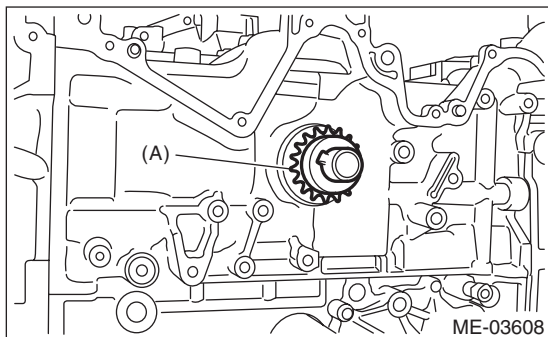
### A: REMOVAL

- 1) Remove the V-belts. <Ref. to ME(H6DO)-45, REMOVAL, V-belt.>
- 2) Remove the crank pulley. <Ref. to ME(H6DO)-46, REMOVAL, Crank Pulley.>
- 3) Remove the chain cover. <Ref. to ME(H6DO)-47, REMOVAL, Chain Cover.>
- 4) Remove the timing chain assembly. <Ref. to ME(H6DO)-54, REMOVAL, Timing Chain Assembly.>
- 5) Remove the crank sprocket (A).



### B: INSTALLATION

- 1) Install the crank sprocket (A).



- 2) Install the timing chain assembly. <Ref. to ME(H6DO)-60, INSTALLATION, Timing Chain Assembly.>
- 3) Install the chain cover. <Ref. to ME(H6DO)-49, INSTALLATION, Chain Cover.>
- 4) Install the crank pulley. <Ref. to ME(H6DO)-46, INSTALLATION, Crank Pulley.>
- 5) Install the V-belts. <Ref. to ME(H6DO)-45, INSTALLATION, V-belt.>

### C: INSPECTION

- 1) Check the crank sprocket teeth for abnormal wear and scratches.
- 2) Make sure there is no free play between crank sprocket and key.

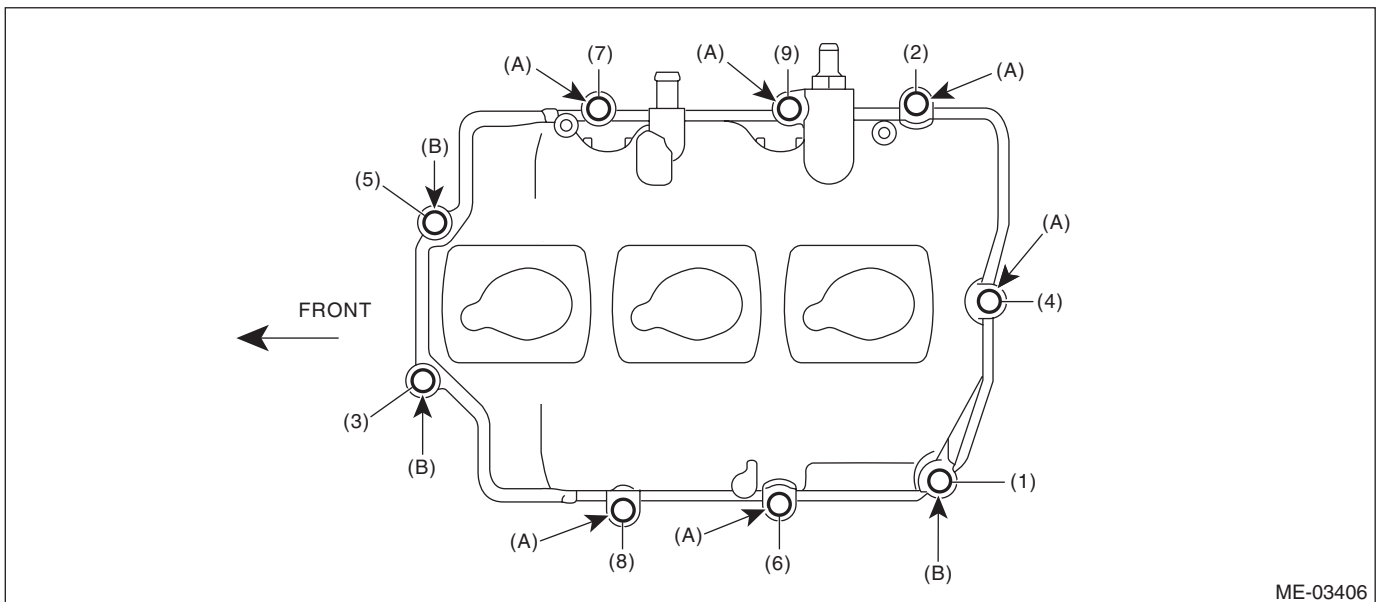
# Camshaft

MECHANICAL

## 18. Camshaft

### A: REMOVAL

- 1) Remove the engine from vehicle. <Ref. to ME(H6DO)-35, REMOVAL, Engine Assembly.>
- 2) Remove the crank pulley. <Ref. to ME(H6DO)-46, REMOVAL, Crank Pulley.>
- 3) Remove the chain cover. <Ref. to ME(H6DO)-47, REMOVAL, Chain Cover.>
- 4) Remove the timing chain assembly. <Ref. to ME(H6DO)-54, REMOVAL, Timing Chain Assembly.>
- 5) Remove the cam sprocket. <Ref. to ME(H6DO)-72, REMOVAL, Cam Sprocket.>
- 6) Remove the crank sprocket. <Ref. to ME(H6DO)-73, REMOVAL, Crank Sprocket.>
- 7) Remove the exhaust oil flow control solenoid valve. <Ref. to FU(H6DO)-45, REMOVAL, Oil Flow Control Solenoid Valve.>
- 8) Remove the camshaft position sensor. <Ref. to FU(H6DO)-33, REMOVAL, Camshaft Position Sensor.>
- 9) Loosen the rocker cover bolts in the order indicated in the figure, and remove the rocker cover.
  - LH side

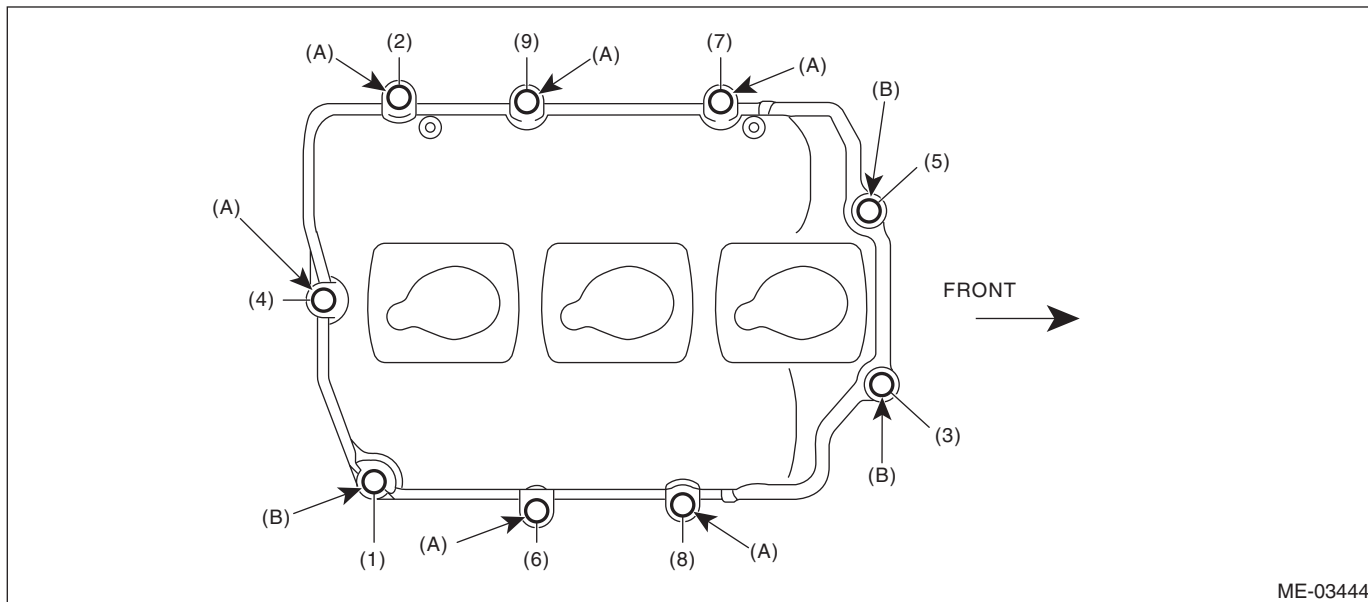


ME-03406

(A) M6 × 39.5

(B) M6 × 26.3

- RH side

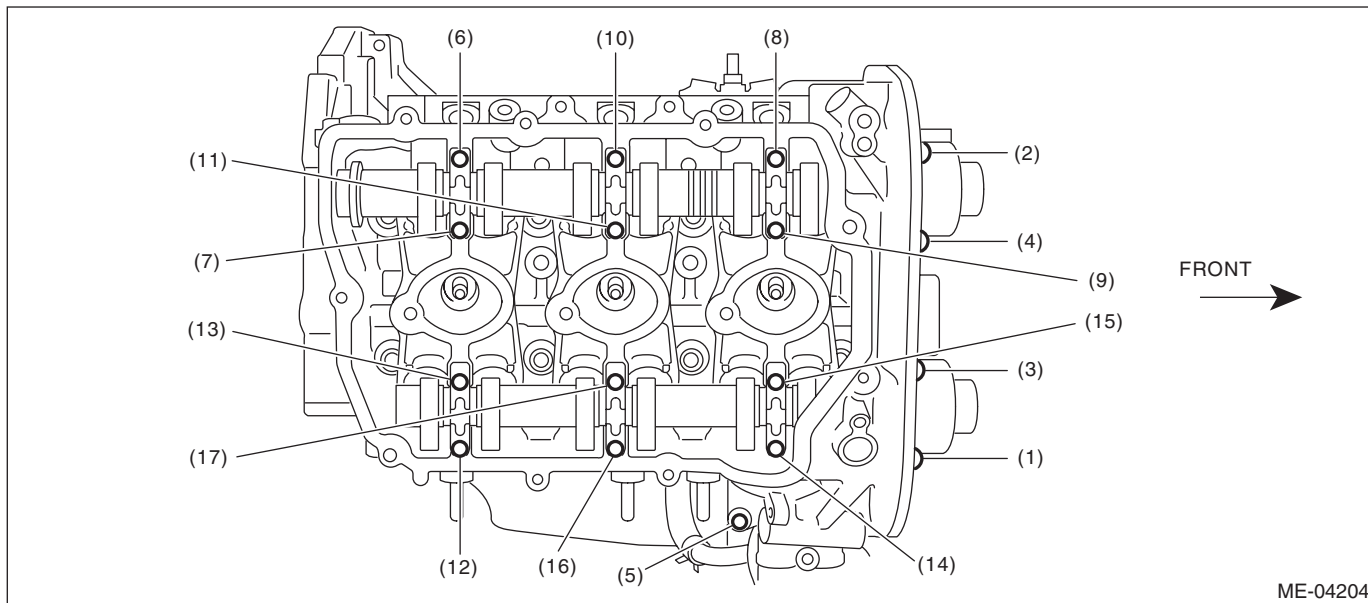


ME-03444

(A) M6 × 39.5

(B) M6 × 26.3

10) Loosen the camshaft cap bolts equally, a little at a time in numerical sequence as shown in the figure.



ME-04204

11) Remove the camshaft caps and camshaft (RH).

**NOTE:**

Arrange camshaft caps in order so that they can be installed in their original positions.

12) Similarly, remove the camshafts (LH) and related parts.

# Camshaft

MECHANICAL

## B: INSTALLATION

- 1) Apply engine oil to camshaft journals, and install the camshaft.
- 2) Install the camshaft cap.

(1) Apply liquid gasket sparingly to back side of the front camshaft cap as shown in the figure.

NOTE:

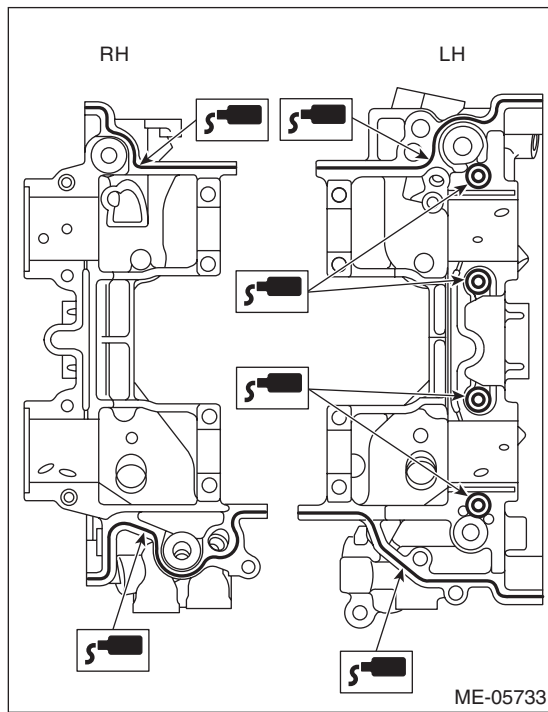
- Install within 5 min. after applying liquid gasket.
- Do not apply liquid gasket excessively. Applying excessively may cause excess gasket to come out and flow toward cam journal, resulting in engine seizure.

**Liquid gasket:**

**THREE BOND 1217G (Part No. K0877Y0100) or equivalent**

**Liquid gasket applying diameter:**

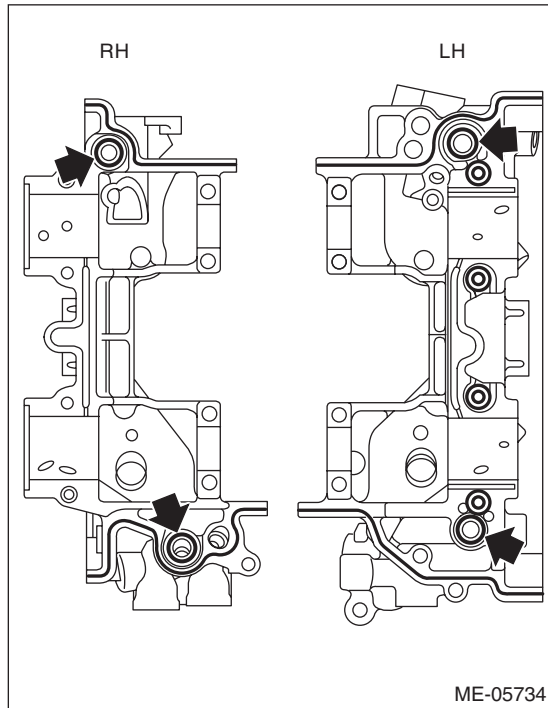
**$2.0 \pm 0.5$  mm ( $0.079 \pm 0.020$  in)**



(2) Install the O-ring to the front camshaft cap.

**NOTE:**

Use new O-rings.



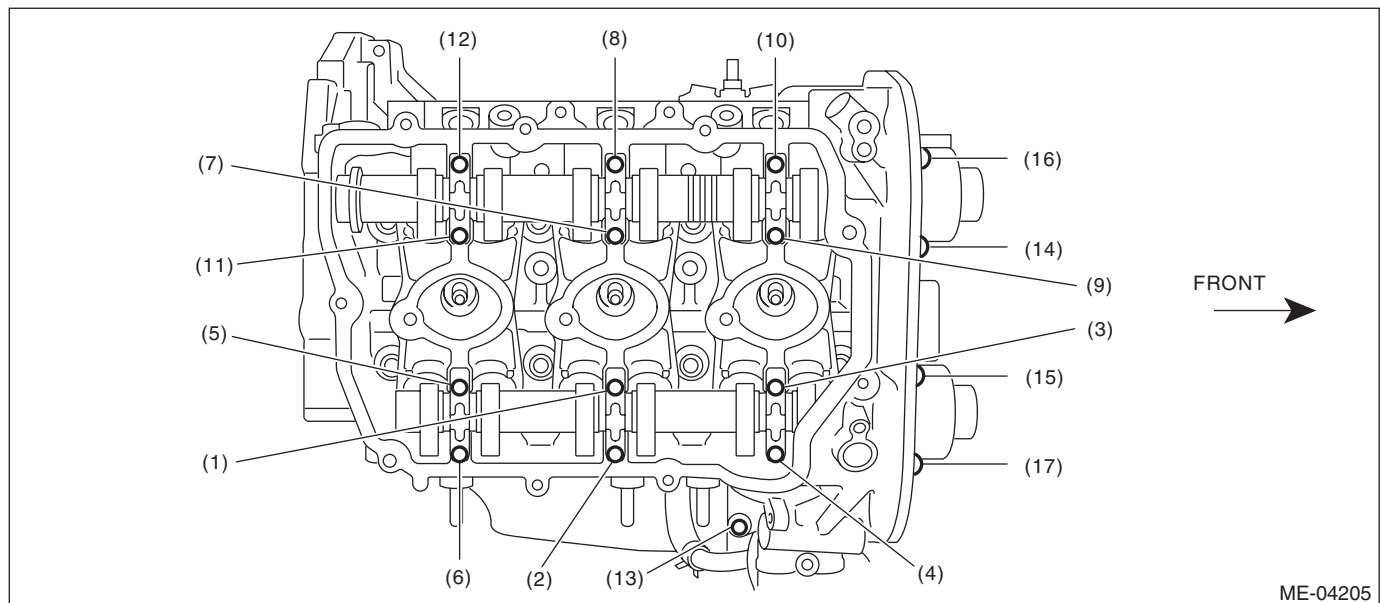
(3) Apply a thin coat of engine oil to the cap journal surface, and install the camshaft cap to the camshaft.

(4) Gradually tighten the camshaft cap in at least two stages in the numerical order shown in the figure, then tighten to specified torque.

**Tightening torque:**

**(1) — (12): 16 N·m (1.6 kgf·m, 11.8 ft·lb)**

**(13) — (17): 9.75 N·m (1.0 kgf·m, 7.2 ft·lb)**



(5) After tightening the camshaft cap, ensure the camshaft rotates only slightly while holding it at base circle.

# Camshaft

## MECHANICAL

3) Install the rocker cover.

(1) Install the rocker cover gasket to the rocker cover.

### NOTE:

Use a new rocker cover gasket.

(2) Apply liquid gasket sparingly to the mating surface of cylinder head and rocker cover as shown in the figure.

### NOTE:

- Install within 5 min. after applying liquid gasket.
- Do not apply liquid gasket excessively. Applying excessively may cause excess gasket to come out and flow toward cam journal, resulting in engine seizure.

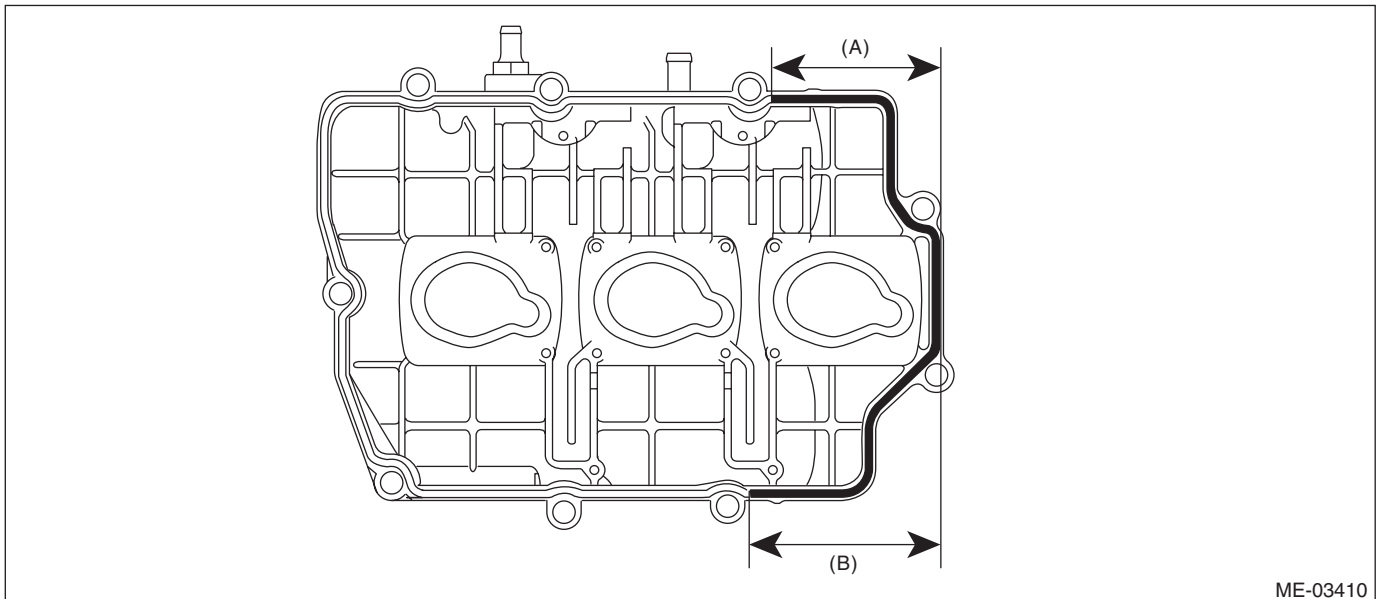
### **Liquid gasket:**

**THREE BOND 1217G (Part No. K0877Y0100) or equivalent**

### **Liquid gasket applying diameter:**

**$3.5 \pm 0.5$  mm ( $0.138 \pm 0.020$  in)**

- LH side

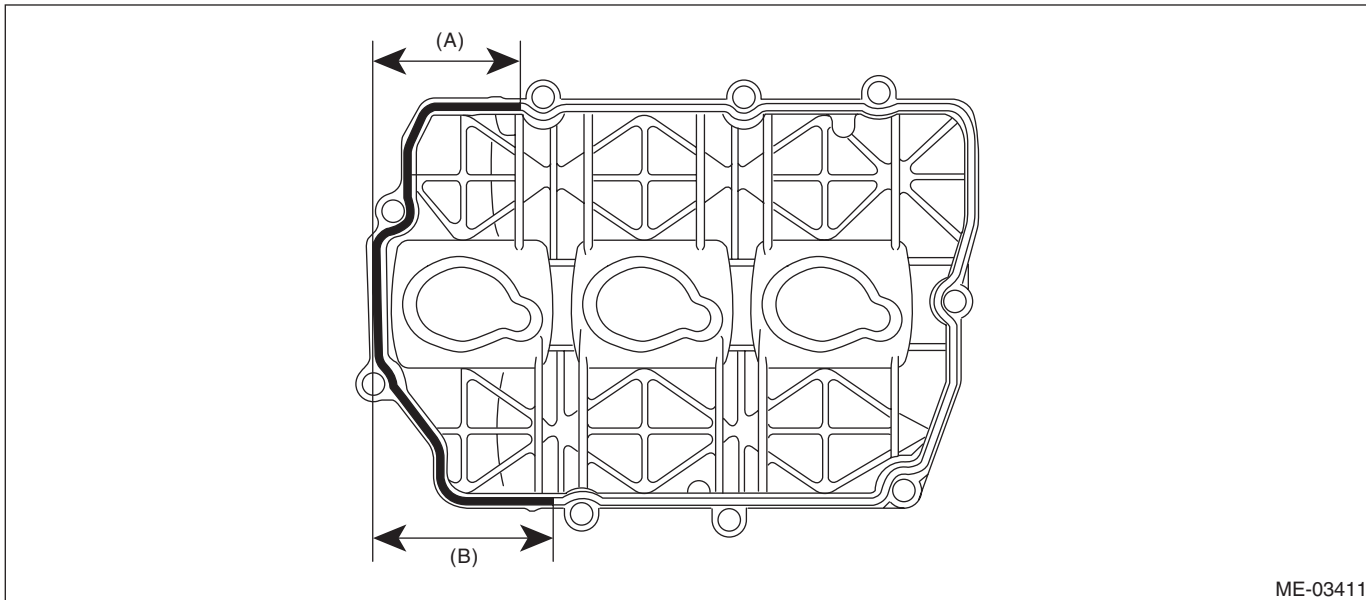


ME-03410

(A) 90 mm (3.543 in) or more

(B) 105 mm (4.134 in) or more

- RH side



ME-03411

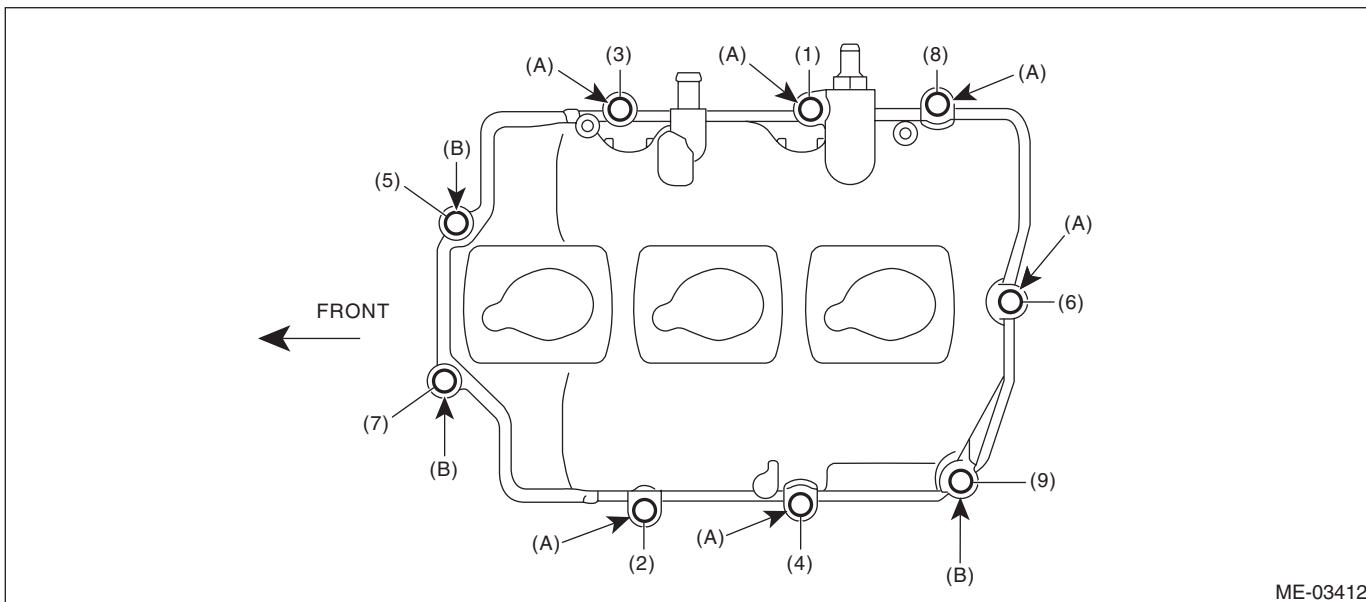
- (A) 80 mm (3.150 in) or more      (B) 100 mm (3.937 in) or more

(3) Tighten the rocker cover bolts in the numerical order as shown in the figure.

**Tightening torque:**

**6.4 N·m (0.7 kgf·m, 4.7 ft·lb)**

- LH side



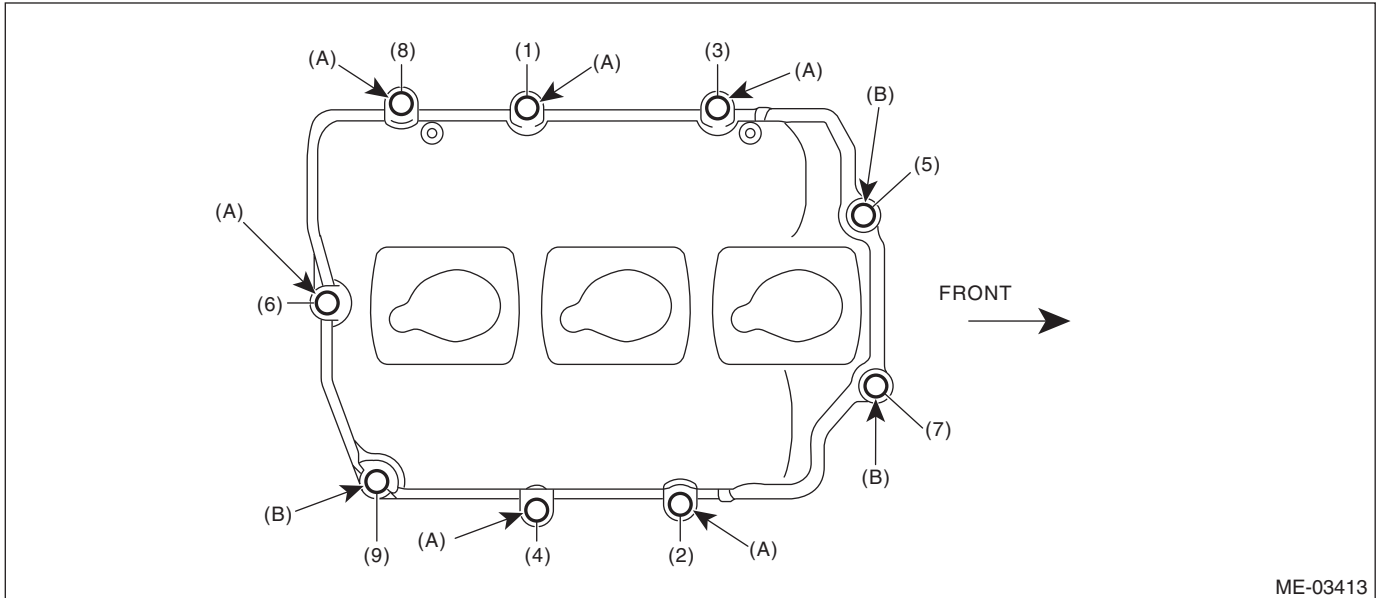
ME-03412

- (A) M6 × 39.5      (B) M6 × 26.3

# Camshaft

## MECHANICAL

- RH side



(A) M6 × 39.5

(B) M6 × 26.3

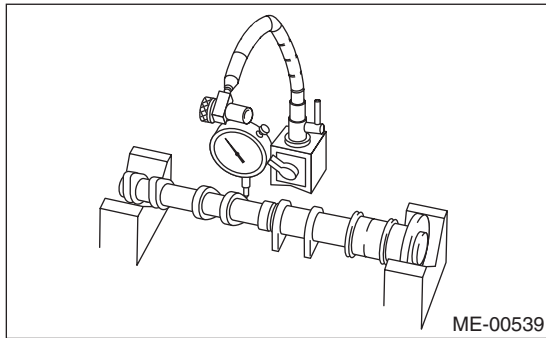
- 4) Install the crank sprocket. <Ref. to ME(H6DO)-73, INSTALLATION, Crank Sprocket.>
- 5) Install the cam sprocket. <Ref. to ME(H6DO)-72, INSTALLATION, Cam Sprocket.>
- 6) Install the timing chain assembly. <Ref. to ME(H6DO)-60, INSTALLATION, Timing Chain Assembly.>
- 7) Install the chain cover. <Ref. to ME(H6DO)-49, INSTALLATION, Chain Cover.>
- 8) Install the crank pulley. <Ref. to ME(H6DO)-46, INSTALLATION, Crank Pulley.>
- 9) Install the engine to the vehicle. <Ref. to ME(H6DO)-39, INSTALLATION, Engine Assembly.>



## C: INSPECTION

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

**Camshaft bend limit:**  
**0.020 mm (0.00079 in)**



2) Check the journal for damage and wear. Replace if faulty.

3) Check the cutout portion used for camshaft sensor for damage. Replace if faulty.

4) Check the cam face condition; remove the minor faults by grinding with oil stone. Replace if there is uneven wear or others.

5) Measure the cam lobe height "H" and cam base circle diameter "A". If it exceeds the standard or offset wear occurs, replace it.

**Cam lobe height H:**

**Standard**

**Intake**

**45.90 — 46.00 mm (1.8071 — 1.8110 in)**

**Exhaust**

**44.65 — 44.75 mm (1.7579 — 1.7618 in)**

**Cam base circle diameter A:**

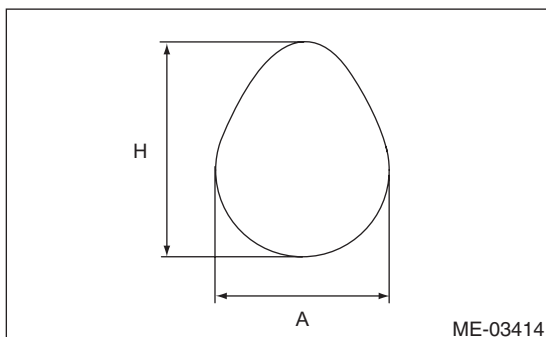
**Standard**

**Intake**

**36.00 mm (1.4173 in)**

**Exhaust**

**36.00 mm (1.4137 in)**



6) Measure the outside diameter of camshaft journal. If the journal diameter is not within specification, check the oil clearance.

	Camshaft journal	
	Front	Except for front
Standard mm (in)	37.946 — 37.963 (1.4939 — 1.4946)	25.946 — 25.963 (1.0215 — 1.0222)

# Camshaft

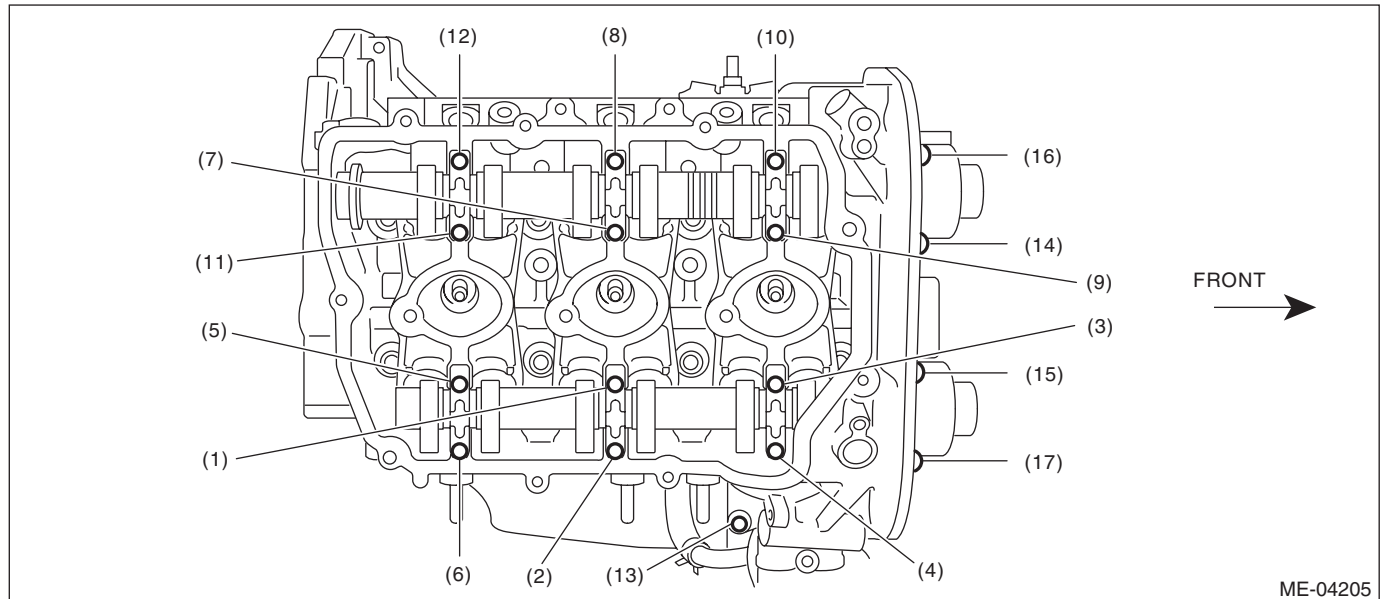
## MECHANICAL

### 7) Measure the oil clearance of camshaft journal.

- (1) Clean the camshaft cap and cylinder head camshaft journal.
- (2) Place the camshaft on cylinder head. (Without installing the valve lifter)
- (3) Place a plastigauge across each camshaft journals.
- (4) Gradually tighten the camshaft cap in at least two stages in the numerical order shown in the figure, then tighten to specified torque. Do not turn the camshaft.

### Tightening torque:

- (1) — (12): **16 N·m (1.6 kgf·m, 11.8 ft·lb)**  
(13) — (17): **9.75 N·m (1.0 kgf·m, 7.2 ft·lb)**



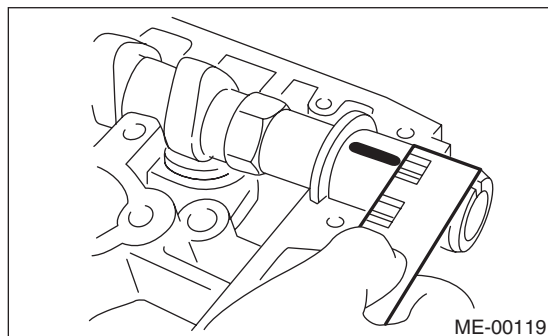
ME-04205

- (5) Remove the camshaft cap.
- (6) Measure the widest point of the plastigauge on each journal. If oil clearance exceeds the standard, replace the camshaft. If necessary, replace the camshaft caps and cylinder head as a set.

### Camshaft oil clearance:

#### Standard

**0.037 — 0.072 mm (0.0015 — 0.0028 in)**



ME-00119

- (7) Completely remove the plastigauge.

- 8) Measure the thrust clearance with setting the dial gauge at end surface of camshaft. If the thrust clearance is not within the standard or there is off-set wear, replace the camshaft caps and cylinder head as a set. If necessary replace the camshaft.

### Camshaft thrust clearance:

#### Standard

##### Intake

**0.075 — 0.135 mm (0.0030 — 0.0053 in)**

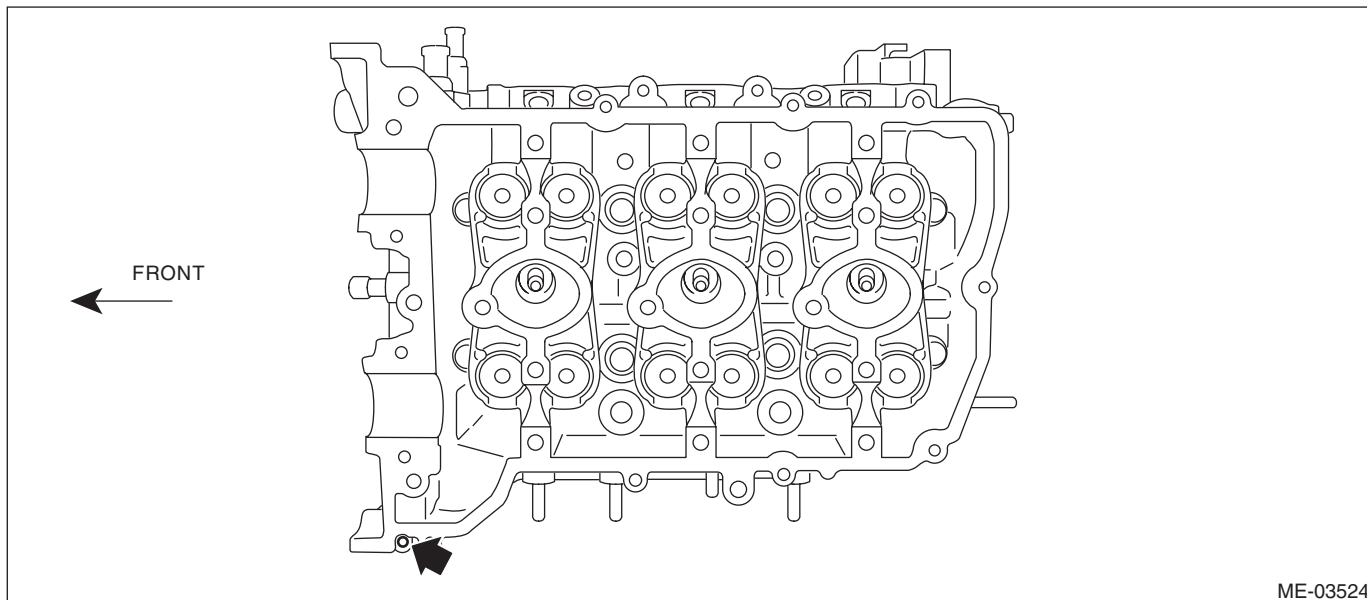
##### Exhaust

**0.075 — 0.135 mm (0.0030 — 0.0053 in)**

## 19. Cylinder Head

### A: REMOVAL

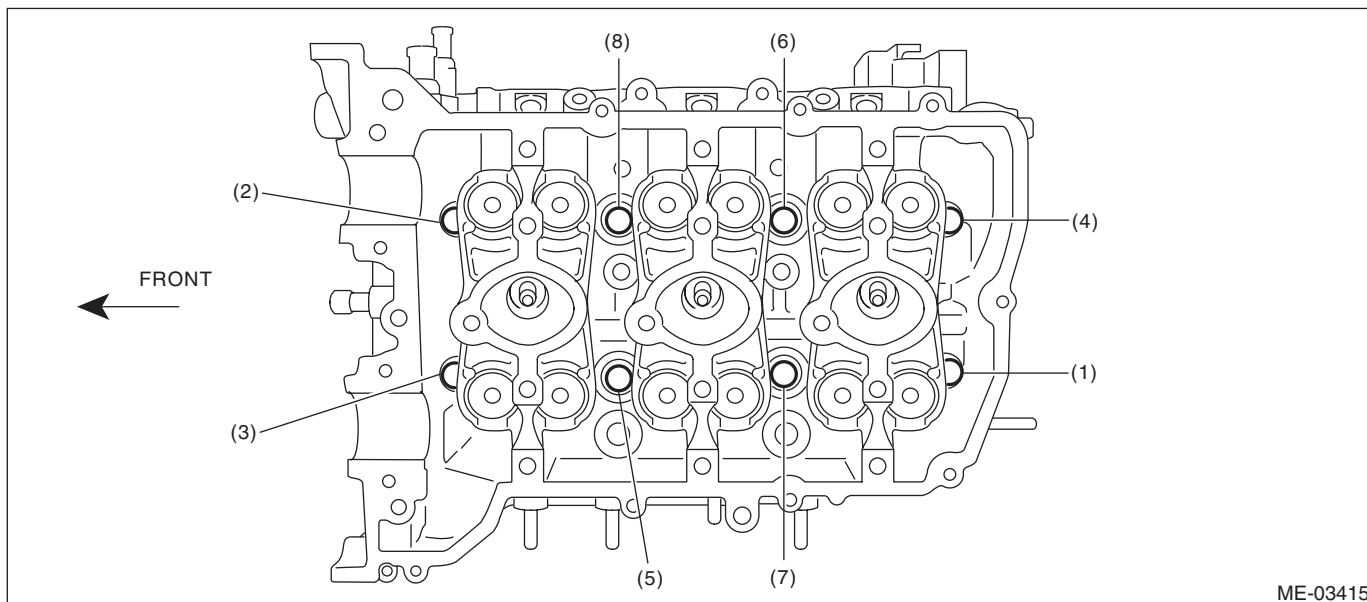
- 1) Remove the engine from vehicle. <Ref. to ME(H6DO)-35, REMOVAL, Engine Assembly.>
- 2) Remove the crank pulley. <Ref. to ME(H6DO)-46, REMOVAL, Crank Pulley.>
- 3) Remove the chain cover. <Ref. to ME(H6DO)-47, REMOVAL, Chain Cover.>
- 4) Remove the timing chain assembly. <Ref. to ME(H6DO)-54, REMOVAL, Timing Chain Assembly.>
- 5) Remove the cam sprocket. <Ref. to ME(H6DO)-72, REMOVAL, Cam Sprocket.>
- 6) Remove the crank sprocket. <Ref. to ME(H6DO)-73, REMOVAL, Crank Sprocket.>
- 7) Remove the camshaft. <Ref. to ME(H6DO)-74, REMOVAL, Camshaft.>
- 8) Remove the seal bolt shown in the figure.



- 9) Remove the cylinder head bolts in the numerical order as shown in the figure.

**NOTE:**

Leave bolts (2) and (4) engaged by three or four threads to prevent the cylinder head from falling.



- 10) While tapping the cylinder head with a plastic hammer, separate it from cylinder block.
- 11) Remove the bolts (2) and (4) to remove cylinder head.

# Cylinder Head

## MECHANICAL

12) Remove the cylinder head gasket.

### CAUTION:

**Be careful not to scratch the mating surface of cylinder head and cylinder block.**

13) Similarly, remove the cylinder head (RH).

## B: INSTALLATION

1) Apply liquid gasket to the mating surface of cylinder block shown in the figure.

### NOTE:

- Install within 5 min. after applying liquid gasket.
- Do not apply liquid gasket excessively. If too much is applied, remove any liquid gasket that is squeezed out.

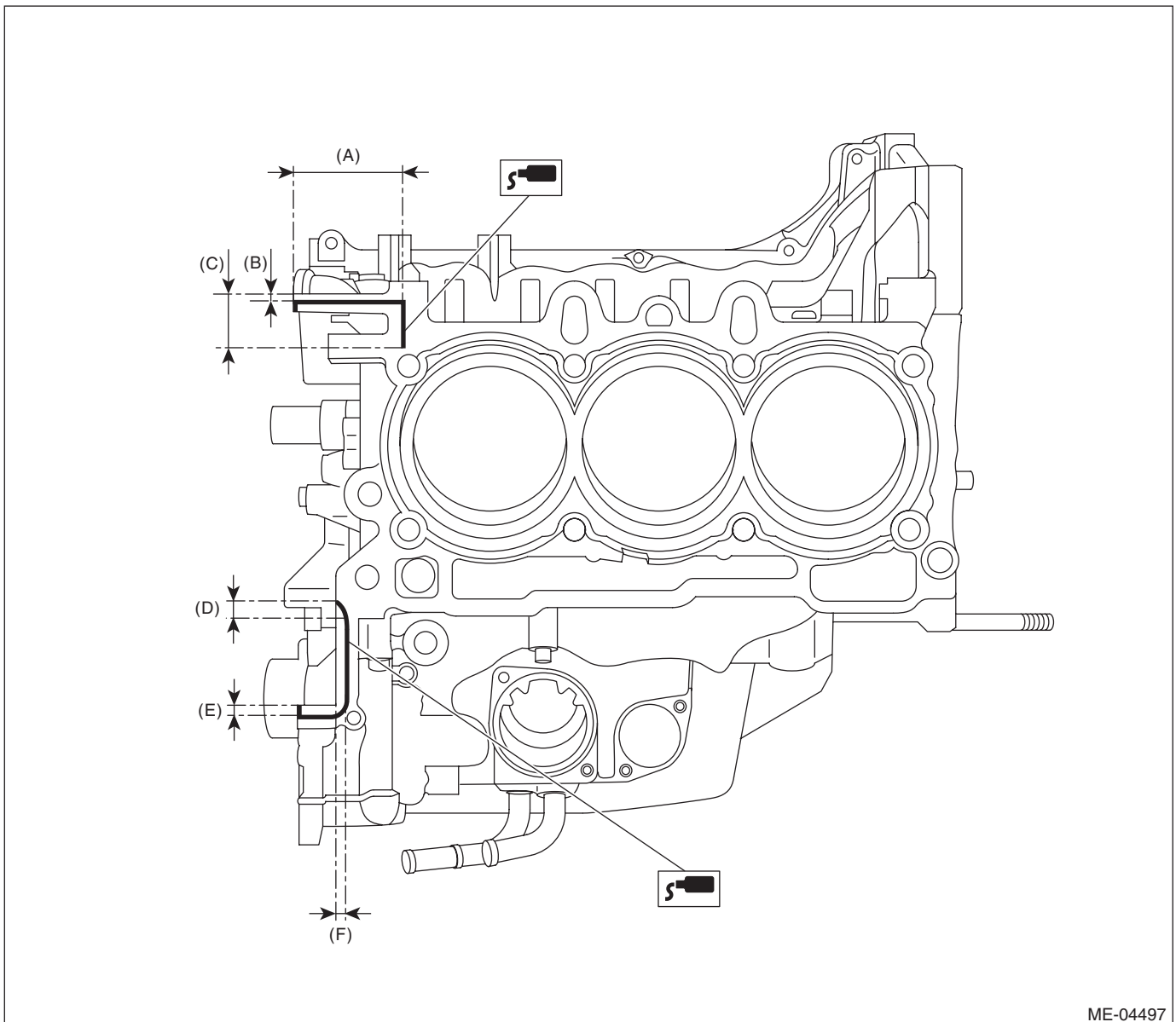
### Liquid gasket:

**THREE BOND 1217G (Part No. K0877Y0100) or equivalent**

### Liquid gasket applying diameter:

**$3.5 \pm 1.0$  mm ( $0.138 \pm 0.039$  in)**

- LH side



ME-04497

(A) 59 mm (2.323 in)  
(B) 2 mm (0.079 in)

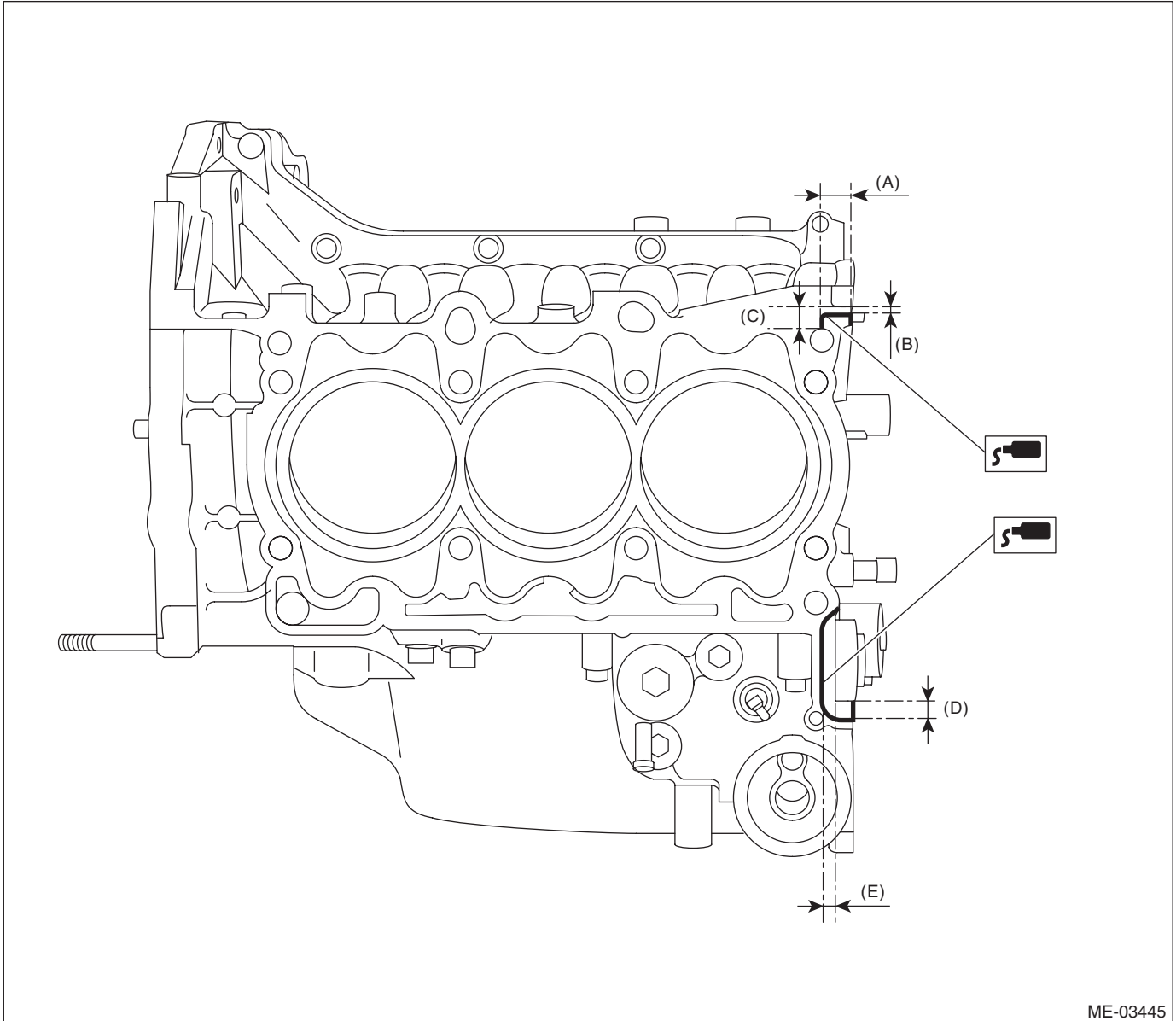
(C) 20 mm (0.787 in)  
(D) 7 mm (0.276 in)

(E) 4 mm (0.157 in)  
(F) 4 mm (0.157 in)

# Cylinder Head

MECHANICAL

- RH side



(A) 17 mm (0.669 in)

(B) 2 mm (0.079 in)

(C) 9 mm (0.354 in)

(D) 4 mm (0.157 in)

(E) 4 mm (0.157 in)

2) Install the cylinder head gaskets LH and RH onto the cylinder block.

NOTE:

Use a new cylinder head gasket.

# Cylinder Head

## MECHANICAL

3) Apply liquid gasket to the mating surface of cylinder head gasket shown in the figure.

### NOTE:

- Install within 5 min. after applying liquid gasket.
- Do not apply liquid gasket excessively. If too much is applied, remove any liquid gasket that is squeezed out.

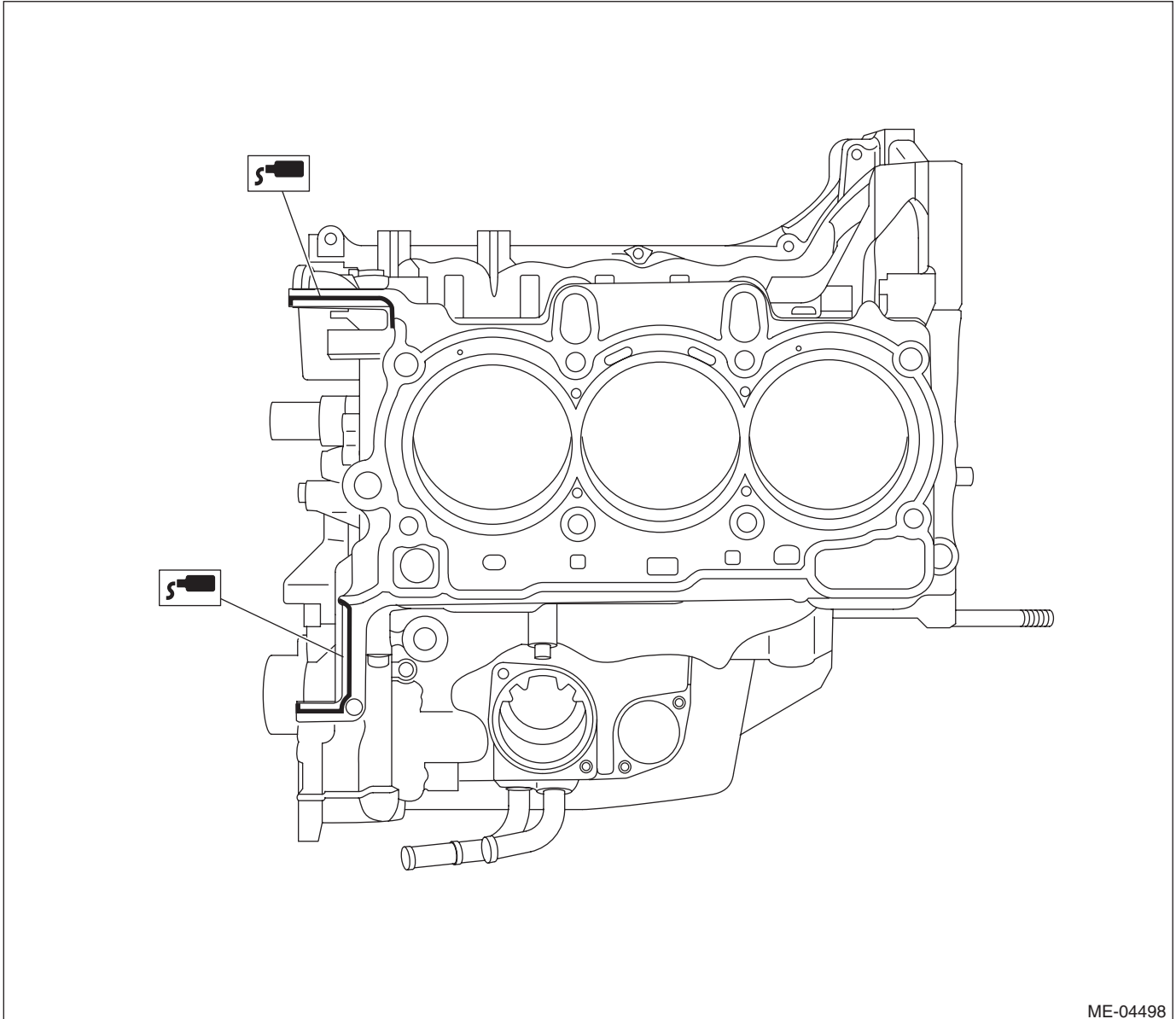
### Liquid gasket:

**THREE BOND 1217G (Part No. K0877Y0100) or equivalent**

### Liquid gasket applying diameter:

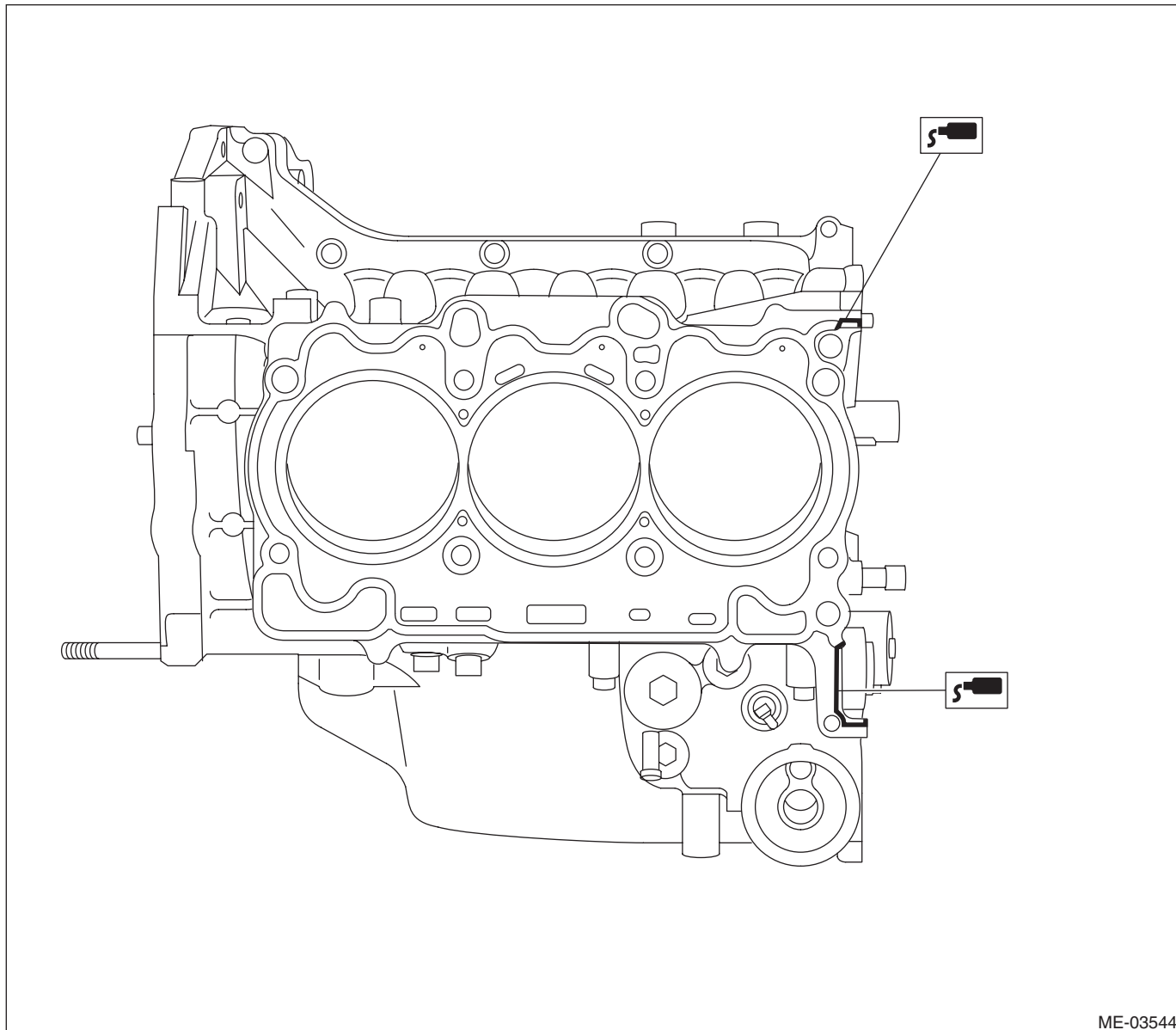
**$3.5 \pm 1.0$  mm ( $0.138 \pm 0.039$  in)**

- LH side



ME-04498

- RH side



ME-03544

4) Attach the cylinder head to the cylinder block.

**CAUTION:**

**Be careful not to scratch the mating surface of cylinder head and cylinder block.**

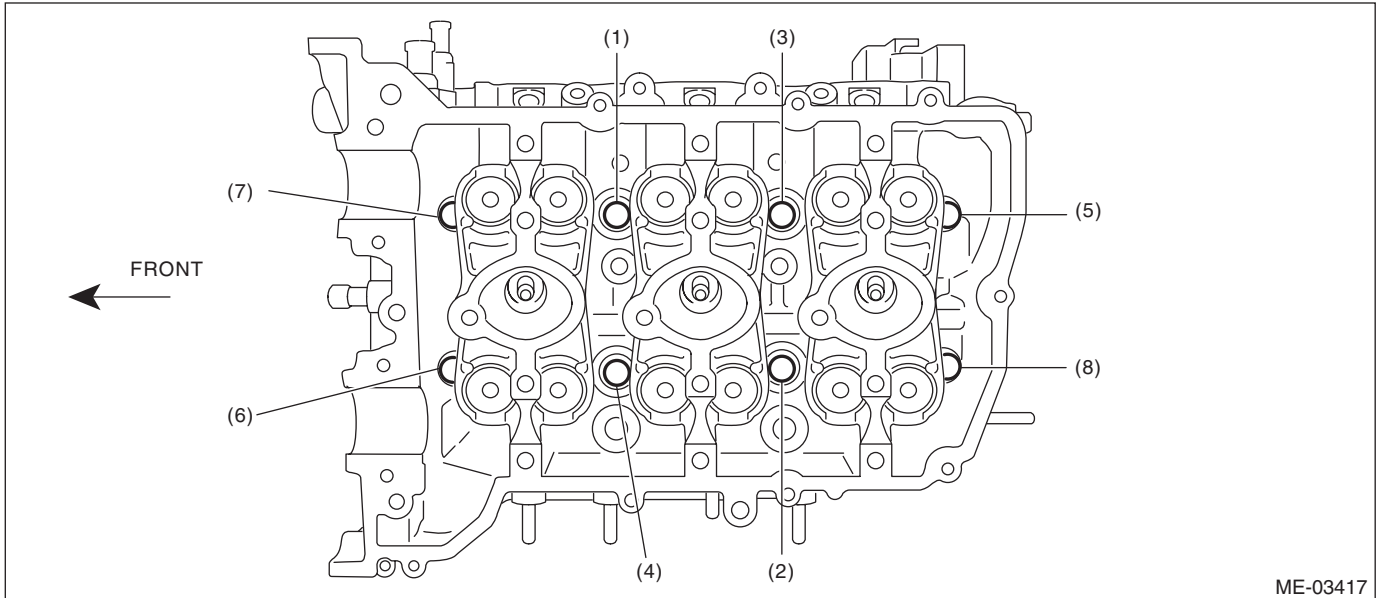
5) Tighten the cylinder head bolts.

- (1) Apply a thin coat of engine oil to washers and cylinder head bolt threads.
- (2) Mount the cylinder head onto the cylinder block, then tighten the bolts with a torque of 20 N·m (2.0 kgf-m, 14.8 ft-lb) in the order indicated in the figure.
- (3) Tighten the bolts with a torque of 50 N·m (5.1 kgf-m, 36.9 ft-lb) in the order indicated in the figure.
- (4) Loosen all the bolts by 180° in the reverse order of installing, and loosen them further by 180°.
- (5) Tighten the bolts with torque of 20 N·m (2.0 kgf-m, 14.8 ft-lb) in numerical sequence as shown in the figure.
- (6) Tighten the bolts (1) — (4) in the order indicated with a torque of 48 N·m (4.9 kgf-m, 35.4 ft-lb).
- (7) Tighten the bolts (5) — (8) in the order indicated with a torque of 44 N·m (4.5 kgf-m, 32.5 ft-lb).
- (8) Tighten all bolts 90° in the numerical order as shown in the figure.

# Cylinder Head

## MECHANICAL

(9) Tighten the bolt (1) — (4) by 45° in the numerical order.



6) Install the seal bolt shown in the figure.

### NOTE:

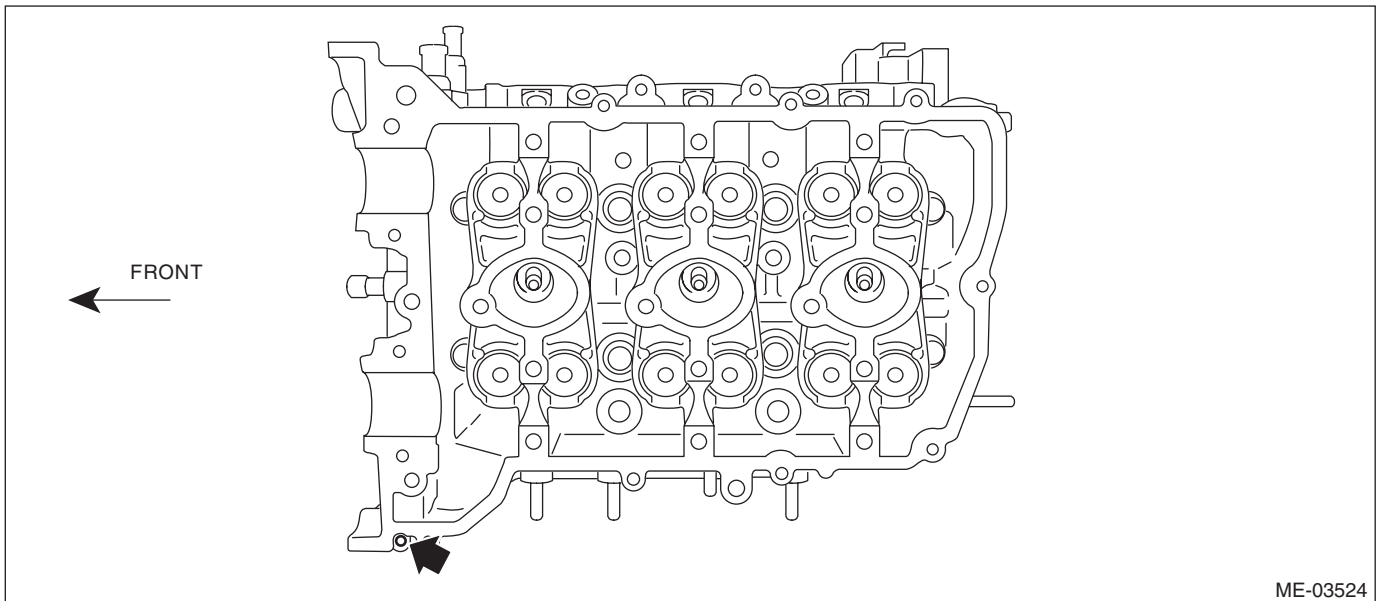
Before installing seal bolts, apply a sealing material to bolt threads.

### Seal material:

**THREE BOND 1324 (Part No. 004403042) or equivalent**

### Tightening torque:

**6.4 N·m (0.7 kgf-m, 4.7 ft-lb)**



7) Install the camshaft. <Ref. to ME(H6DO)-76, INSTALLATION, Camshaft.>

8) Install the crank sprocket. <Ref. to ME(H6DO)-73, INSTALLATION, Crank Sprocket.>

9) Install the cam sprocket. <Ref. to ME(H6DO)-72, INSTALLATION, Cam Sprocket.>

10) Install the timing chain assembly. <Ref. to ME(H6DO)-60, INSTALLATION, Timing Chain Assembly.>

11) Install the chain cover. <Ref. to ME(H6DO)-49, INSTALLATION, Chain Cover.>

12) Install the crank pulley. <Ref. to ME(H6DO)-46, INSTALLATION, Crank Pulley.>

13) Install the engine to the vehicle. <Ref. to ME(H6DO)-39, INSTALLATION, Engine Assembly.>



## C: DISASSEMBLY

1) Set the cylinder head on ST.

ST 18250AA010 CYLINDER HEAD TABLE

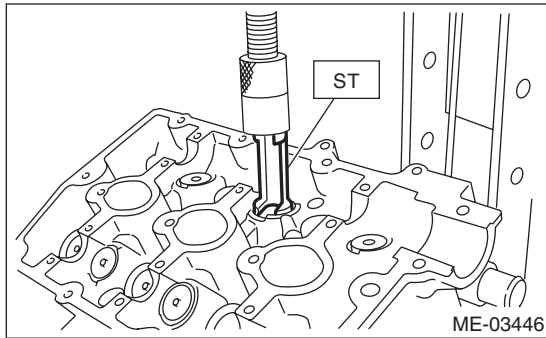
2) Remove the valve lifter.

3) Compress the valve spring using ST, and remove the valve spring retainer key, each valve and valve spring.

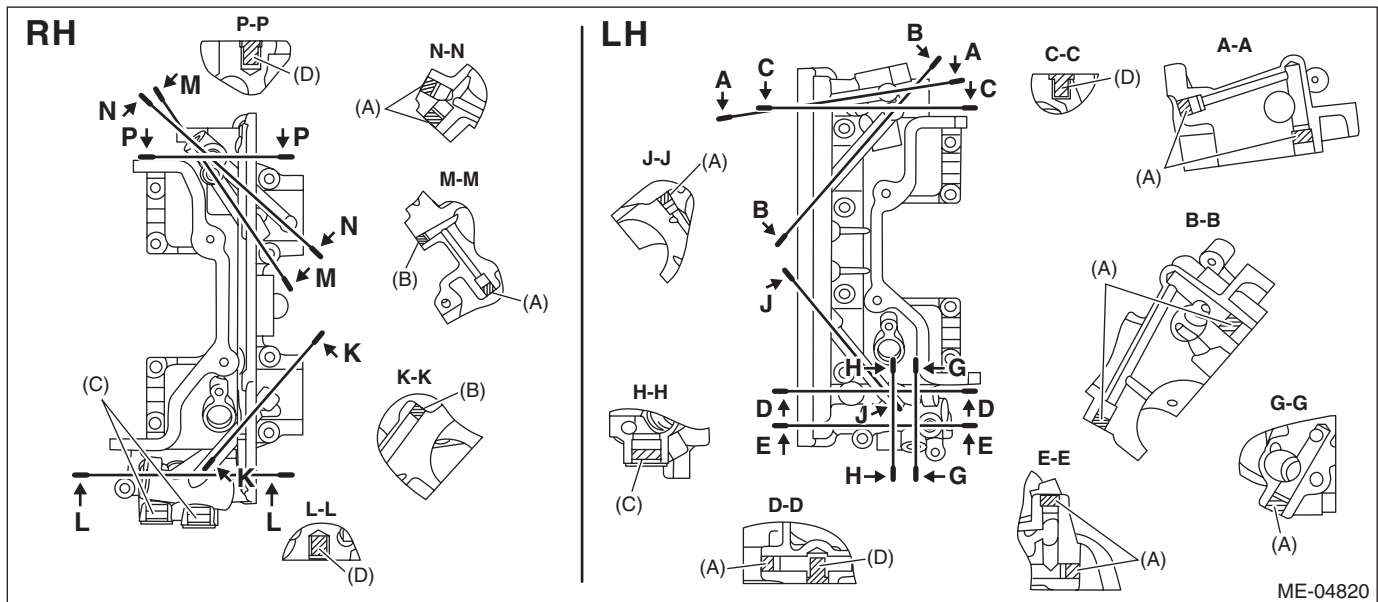
ST 499718000 VALVE SPRING REMOVER

NOTE:

- Mark each valve to prevent confusion.
- Pay careful attention not to damage the lips of intake valve oil seals and exhaust valve oil seals.
- Keep all the removed parts in order for re-installing in their original positions.
- For removal and installation procedures of the valve guide, intake valve oil seal and exhaust valve oil seal, refer to "INSPECTION". <Ref. to ME(H6DO)-92, VALVE GUIDE, INSPECTION, Cylinder Head.> <Ref. to ME(H6DO)-94, INTAKE AND EXHAUST VALVE OIL SEAL, INSPECTION, Cylinder Head.>



4) Remove the plug and filter from the front camshaft cap as necessary.



- (A) Plug (PT 1/8)  
 (B) Plug (PT 1/16)

(C) Plug (M16 × 1.5)

(D) Filter

# Cylinder Head

MECHANICAL

## D: ASSEMBLY

1) Install the valve spring and valve.

(1) Set the cylinder head on ST.

ST 18250AA010 CYLINDER HEAD TABLE

(2) Coat the stem of each valve with engine oil and insert the valve into valve guide.

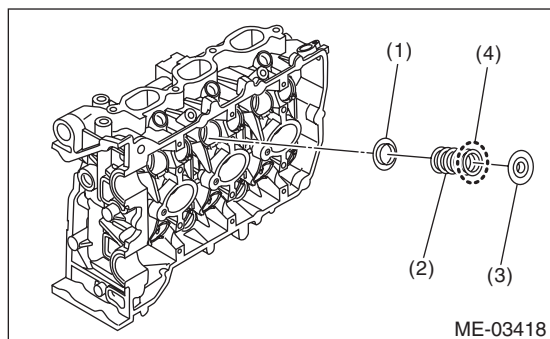
NOTE:

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

(3) Install the valve spring and retainer.

NOTE:

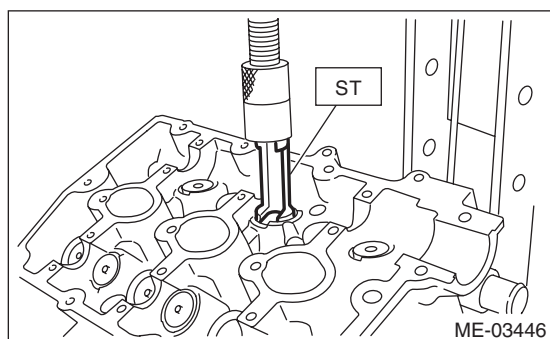
- Be sure to install the valve spring with its close-coiled end facing the seat on cylinder head.
- Install the valve spring with the painted side facing to retainer.



- (1) Seat
- (2) Valve spring
- (3) Retainer
- (4) Painted face

(4) Set the ST on valve spring.

ST 499718000 VALVE SPRING REMOVER



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

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

2) Apply oil to the surface of valve lifter.

3) Install the valve lifter.

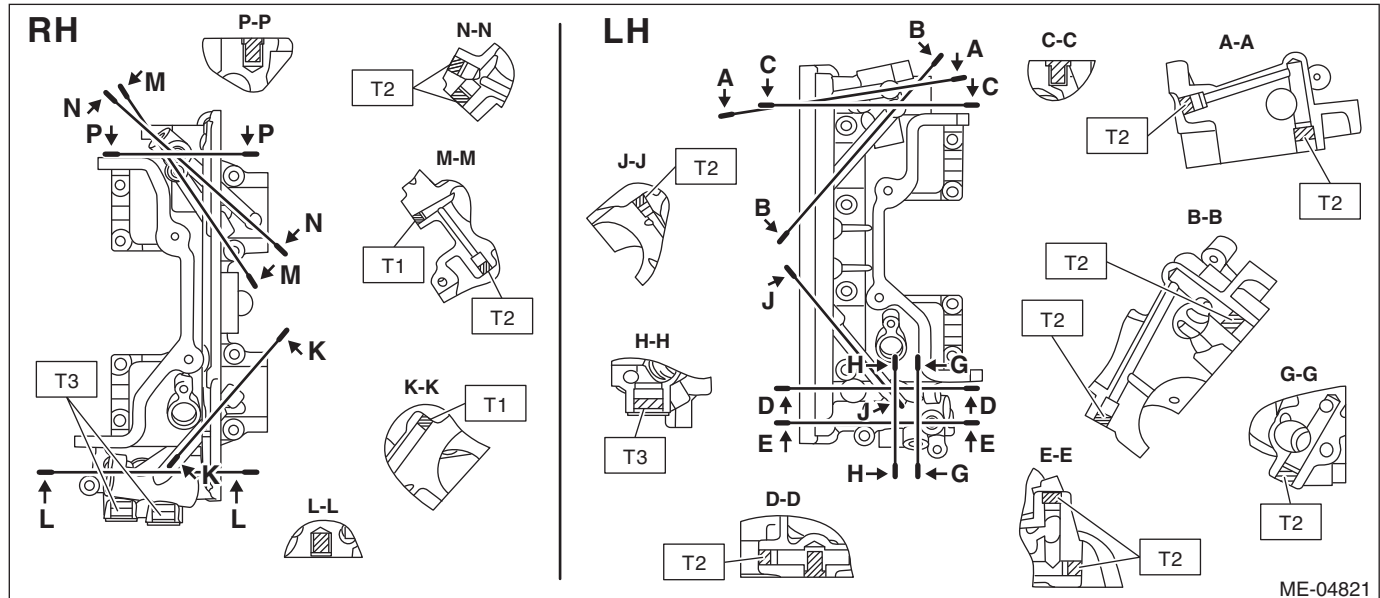
4) Install the plug and filter to the front camshaft cap as necessary.

**Tightening torque:**

**T1: 9 N·m (0.9 kgf·m, 6.6 ft·lb)**

**T2: 17 N·m (1.7 kgf·m, 12.5 ft·lb)**

**T3: 23 N·m (2.3 kgf·m, 17.0 ft·lb)**



## E: INSPECTION

### 1. CYLINDER HEAD

1) Make sure that there are no cracks or other damages. Perform visual check, and use liquid penetrant tester on the important sections. Check that there are no marks of gas leaking or water leaking on gasket installing surface.

2) Set the cylinder head on ST.

ST 18250AA010 CYLINDER HEAD TABLE

3) Check for warpage at mating surface between the cylinder block and cylinder head using a straight edge (A) and thickness gauge (B). If the warpage exceeds limit, replace the cylinder head.

**Warping limit:**

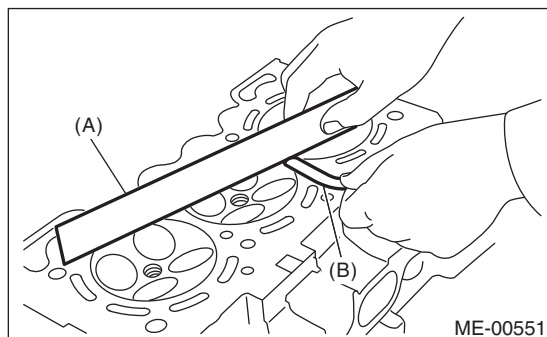
**0.020 mm (0.0008 in)**

**Standard height of cylinder head:**

**124±0.05 mm (4.88±0.0020 in)**

**NOTE:**

Uneven torque for the cylinder head bolts can cause warpage. When reinstalling, pay special attention to the torque so as to tighten evenly.



# Cylinder Head

MECHANICAL

## 2. VALVE SEAT

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

**Contacting width of valve seat *W*:**

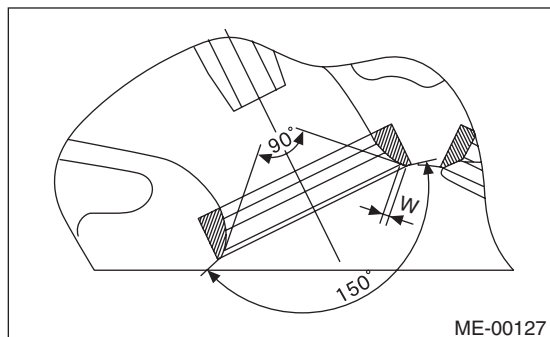
**Standard**

**Intake**

**1.0 mm (0.039 in)**

**Exhaust**

**1.5 mm (0.059 in)**



## 3. VALVE GUIDE

1) Check the clearance between valve guide and valve stem. The clearance can be checked by measuring respectively the outer diameter of valve stem with a micrometer and the inner diameter of valve guide with a caliper gauge.

**Clearance between the valve guide and valve stem:**

**Standard**

**Intake**

**0.030 — 0.057 mm (0.0012 — 0.0022 in)**

**Exhaust**

**0.040 — 0.067 mm (0.0016 — 0.0026 in)**

2) If the clearance between valve guide and valve stem exceeds the standard, replace the valve guide or valve itself, whichever shows the greater amount of wear or damage. See the following procedure for valve guide replacement.

**Valve guide inner diameter:**

**5.500 — 5.512 mm (0.2165 — 0.2170 in)**

**Valve stem outer diameters:**

**Intake**

**5.455 — 5.470 mm (0.2148 — 0.2154 in)**

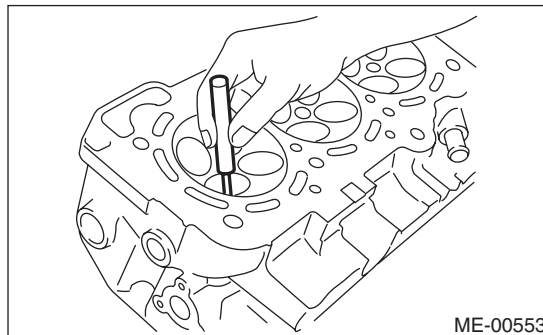
**Exhaust**

**5.445 — 5.460 mm (0.2144 — 0.2150 in)**

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

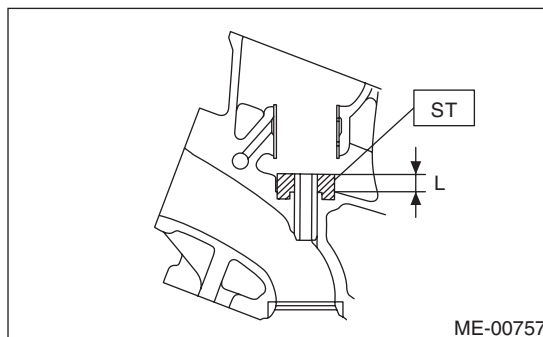
(2) Insert the ST2 into valve guide and press it down to remove the valve guide.

ST1 18250AA010 CYLINDER HEAD TABLE  
ST2 499765700 VALVE GUIDE REMOVER



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

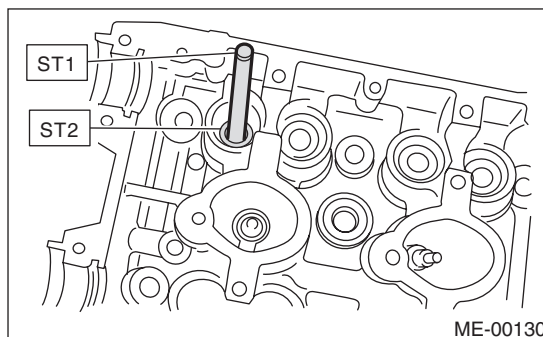
ST 18251AA050 VALVE GUIDE ADJUSTER (INTAKE SIDE)  
ST 18251AA060 VALVE GUIDE ADJUSTER (EXHAUST SIDE)



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

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

ST1 499765700 VALVE GUIDE REMOVER  
ST2 18251AA050 VALVE GUIDE ADJUSTER (INTAKE SIDE)  
ST2 18251AA060 VALVE GUIDE ADJUSTER (EXHAUST SIDE)



(6) Check the valve guide protrusion amount "L".

**Valve guide protrusion amount L:**

**Intake**

**8.6 — 9.0 mm (0.3386 — 0.3543 in)**

**Exhaust**

**10.7 — 11.1 mm (0.4213 — 0.4370 in)**

(7) Ream the inside of valve guide using ST. Put the ST in valve guide, and rotate the ST slowly clockwise while pushing it lightly. Bring the ST back while rotating it clockwise.

ST 499765900 VALVE GUIDE REAMER

**NOTE:**

- Apply engine oil to the ST when reaming.
- If the inner surface of valve guide is damaged, the edge of ST should be slightly ground with oil stone.
- If the inner surface of valve guide becomes lustrous and the ST does not chip, use a new ST or remedy the ST.

(8) After reaming, clean the valve guide to remove chips.

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

#### 4. INTAKE AND EXHAUST VALVE

1) Check the flange and stem of the valve, and replace the valve with new one if damaged, worn, or deformed, "H" exceeds the standard, or if there is uneven wear.

**Head edge thickness H:**

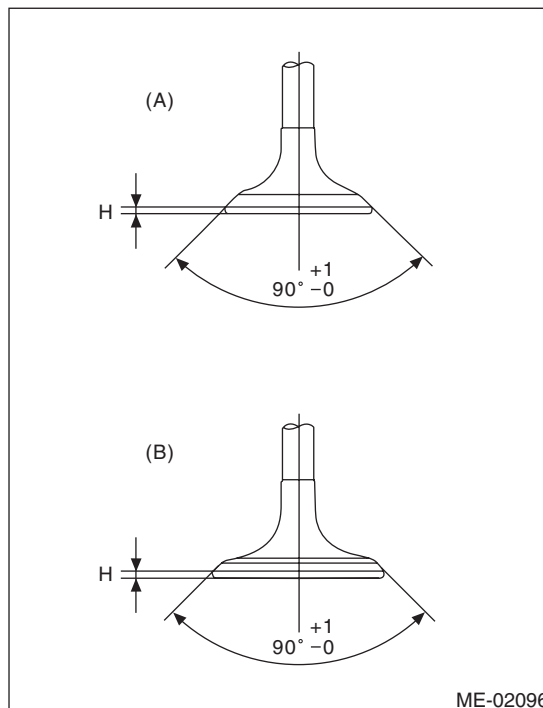
**Standard**

**Intake (A)**

**1.0 mm (0.039 in)**

**Exhaust (B)**

**1.2 mm (0.047 in)**



2) Put a small amount of grinding compound on the valve seat surface, and lap the valve and valve seat surface. Install a new valve oil seal after lapping.

**NOTE:**

It is possible to differentiate between the intake valve and the exhaust valve by their overall length.

**Valve overall length:**

**Intake**

**103.5 mm (4.075 in)**

**Exhaust**

**103.2 mm (4.063 in)**

# Cylinder Head

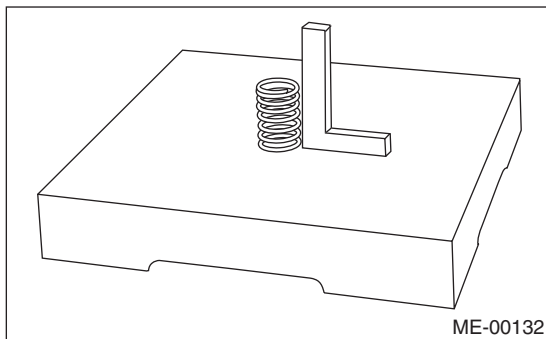
## MECHANICAL

### 5. VALVE SPRING

1) Check the valve springs for damage, free length, and tension. Replace the valve spring if it is not within the standard value presented in the table.

2) To measure the squareness of the valve spring, stand the valve spring on a surface plate and measure its deflection at the top of the spring using a try square.

Free length	mm (in)	49.06 (1.9315)
Tension/spring height N (kgf, lb)/mm (in)	Set	182 — 210 (18.6 — 21.4, 40.9 — 47.2) /31.0 (1.220 in)
	Lift	316 — 350 (32.2 — 35.7, 71.0 — 78.7) /21.0 (0.827 in)
Squareness	2.5°, 2.1 mm (0.083 in) or less	



### 6. INTAKE AND EXHAUST VALVE OIL SEAL

1) For the following, replace the oil seal with a new part.

- When the lip is damaged.
- When the spring is out of the specified position.
- When readjusting the surfaces of valve and valve seat.
- When replacing the valve guide.

2) Set the cylinder head on ST1.

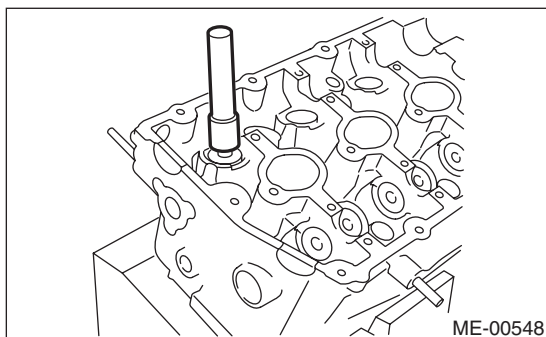
3) Using the ST2, press in the oil seal.

ST1 18250AA010 CYLINDER HEAD TABLE

ST2 18261AA010 VALVE OIL SEAL GUIDE

NOTE:

- Apply engine oil to oil seal before press-fitting.
- When press-fitting the oil seal, do not use a hammer to strike in.



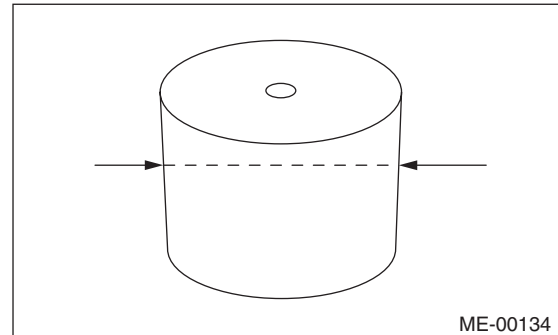
### 7. VALVE LIFTER

1) Check the valve lifter visually.

2) Measure the outer diameter of valve lifter.

**Outer diameter of valve lifter:**

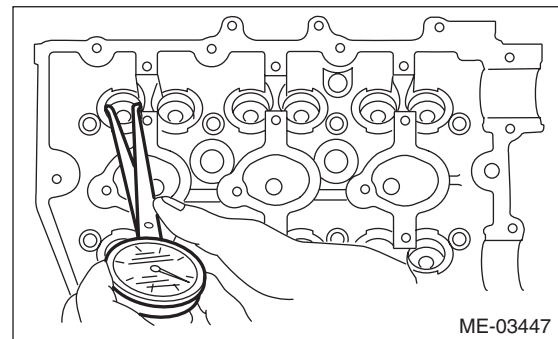
**32.959 — 32.975 mm (1.2976 — 1.2982 in)**



3) Measure the inner diameter of valve lifter hole of cylinder head.

**Inner diameter of valve lifter hole:**

**32.994 — 33.016 mm (1.2990 — 1.2998 in)**



4) Check the clearance between valve lifter and valve lifter hole. The clearance can be checked by measuring the outer diameter of valve lifter and the inner diameter of valve lifter hole. If it exceeds the standard or offset wear occurs, replace the cylinder head.

**Clearance between the valve lifter and valve lifter hole:**

**Standard**

**0.019 — 0.057 mm (0.0007 — 0.0022 in)**

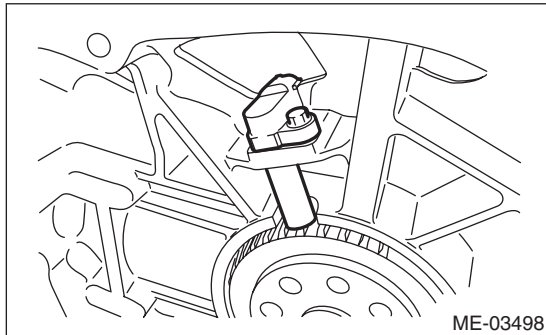
## 20. Cylinder Block

### A: REMOVAL

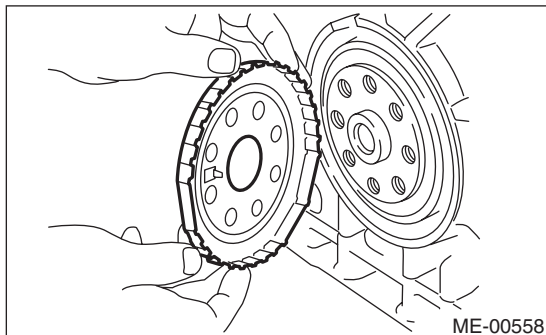
**NOTE:**

Before conducting this procedure, drain the engine oil completely.

- 1) Remove the engine from vehicle. <Ref. to ME(H6DO)-35, REMOVAL, Engine Assembly.>
- 2) Remove the crank pulley. <Ref. to ME(H6DO)-46, REMOVAL, Crank Pulley.>
- 3) Remove the chain cover. <Ref. to ME(H6DO)-47, REMOVAL, Chain Cover.>
- 4) Remove the timing chain assembly. <Ref. to ME(H6DO)-54, REMOVAL, Timing Chain Assembly.>
- 5) Remove the cam sprocket. <Ref. to ME(H6DO)-72, REMOVAL, Cam Sprocket.>
- 6) Remove the crank sprocket. <Ref. to ME(H6DO)-73, REMOVAL, Crank Sprocket.>
- 7) Remove the camshaft. <Ref. to ME(H6DO)-74, REMOVAL, Camshaft.>
- 8) Remove the cylinder head. <Ref. to ME(H6DO)-83, REMOVAL, Cylinder Head.>
- 9) Remove the drive plate. <Ref. to 5AT-61, REMOVAL, Drive Plate.>
- 10) Remove the crankshaft position sensor.

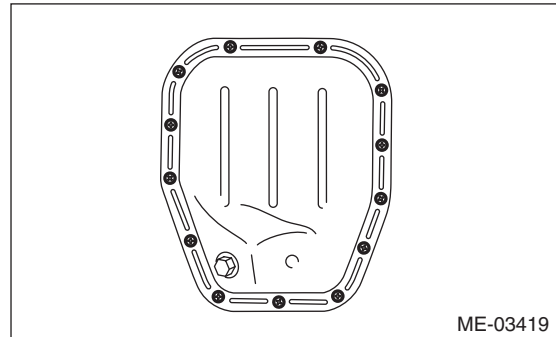


- 11) Remove the crankshaft position sensor plate.



- 12) Rotate the engine to set oil pan upper.

- 13) Remove the bolts which secure oil pan lower to oil pan upper.

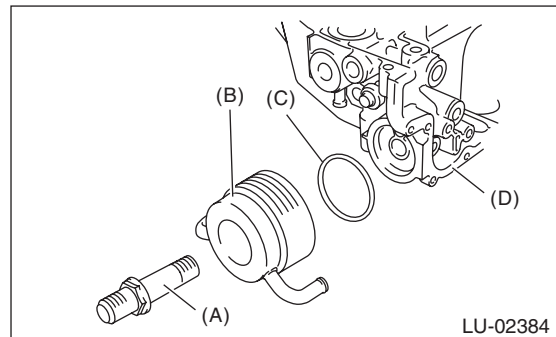


- 14) Insert an oil pan cutter blade into the gap between oil pan upper and oil pan lower, and remove the oil pan lower.

**CAUTION:**

**Do not use a screwdriver or similar tools in place of oil pan cutter.**

- 15) Remove the oil cooler connector and remove the oil cooler.



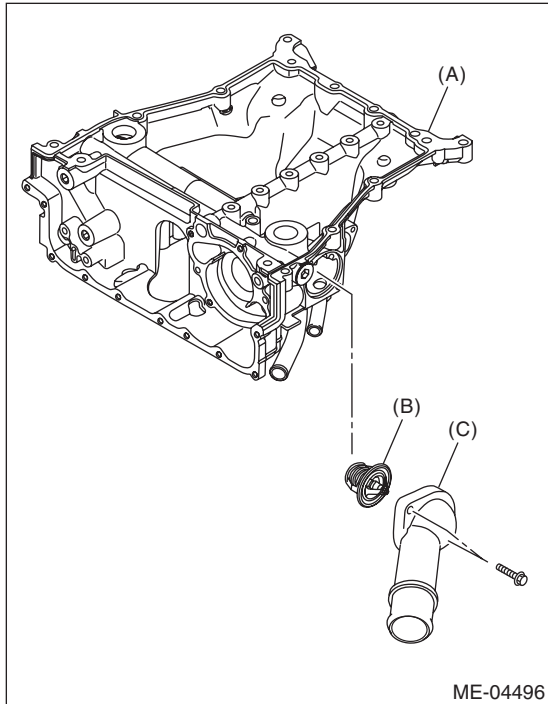
- (A) Oil cooler connector
- (B) Oil cooler
- (C) O-ring
- (D) Oil pan upper

- 16) Remove the oil pump. <Ref. to LU(H6DO)-12, REMOVAL, Oil Pump.>

# Cylinder Block

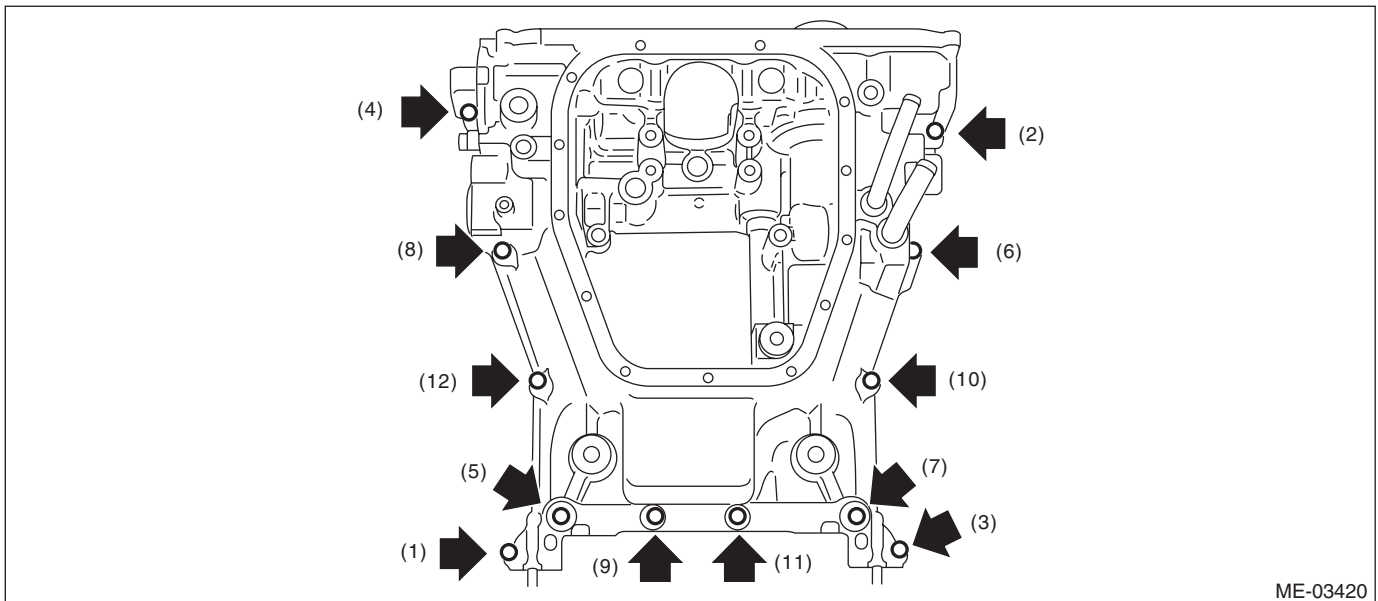
## MECHANICAL

17) Remove the thermostat cover, and then remove the thermostat.



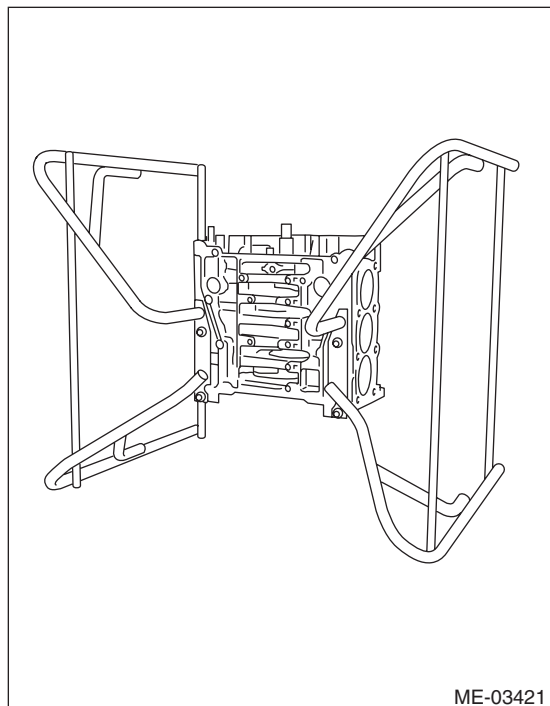
- (A) Oil pan upper
- (B) Thermostat
- (C) Thermostat cover

18) Remove the oil pan upper.



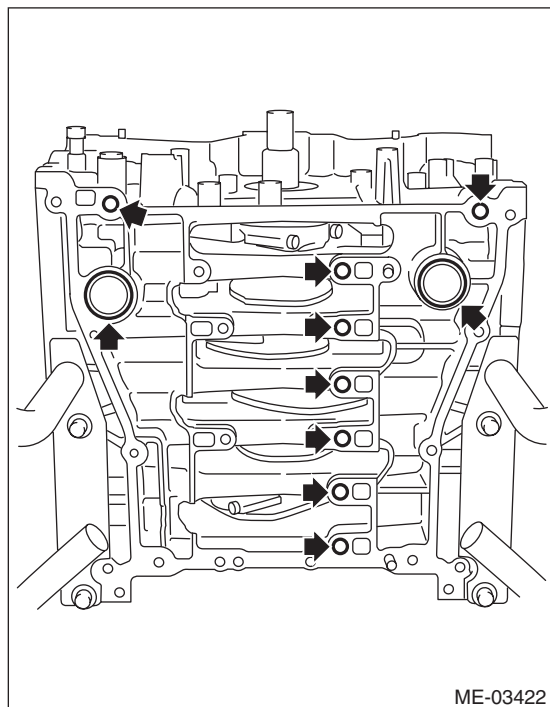


19) Face the front of the engine up, standing the engine on one end.



ME-03421

20) Remove ten O-rings from the underside of the cylinder block.



ME-03422

21) Mark the direction of front and the number of connecting rod caps.

22) Remove the #1 and #4 connecting rod caps and pistons from the cylinder block.

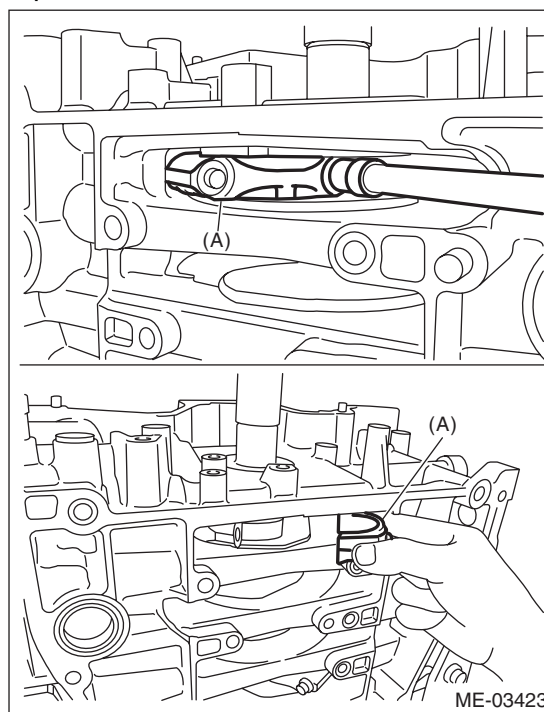
**NOTE:**

- Use 3/8 inch (9.5 sq.) for the extension and TORX® socket (E12).
- After removing the two connecting rod connection bolts, turning the crankshaft (ST) counterclockwise will remove the connecting rod cap.
- Mark each connecting rod cap and piston with connecting rod cap number and piston number.
- The removal of all connecting rod caps and pistons are performed in three separate steps. First, remove the #1 and #4 connecting rod caps and pistons simultaneously, then the #2 and #5 connecting rod caps and pistons simultaneously, and then the #3 and #6 connecting rod caps and pistons simultaneously.

(1) Using the ST, turn the crankshaft and set the #1 piston at the mid point between TDC and BDC.

**ST 18252AA000 CRANKSHAFT SOCKET**

(2) Remove the two #1 connecting rod cap connection bolts, and remove the connecting rod cap.



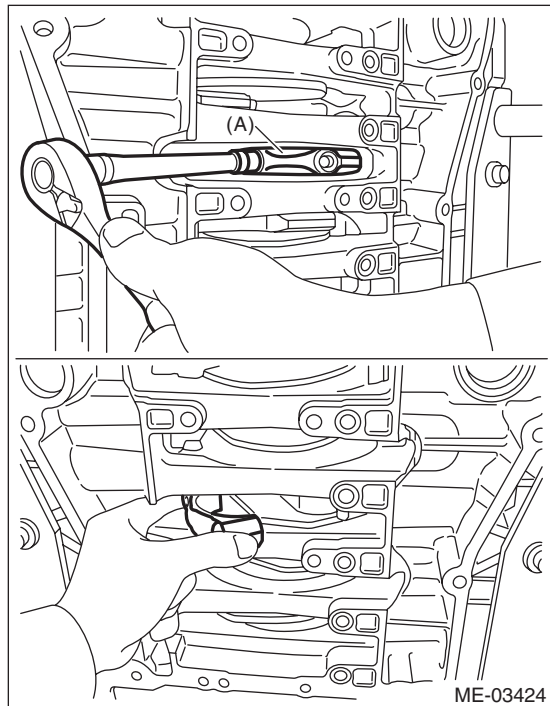
ME-03423

(A) #1 connecting rod cap

# Cylinder Block

## MECHANICAL

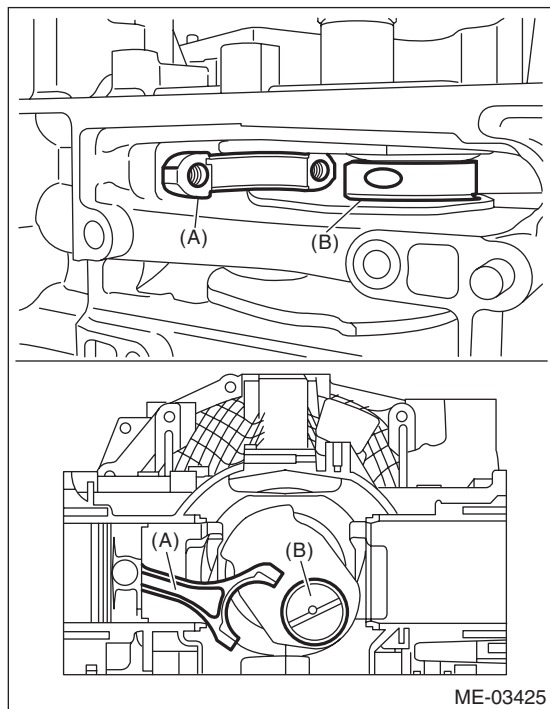
(3) Remove the two #4 connecting rod cap connection bolts, and remove the connecting rod cap.



(A) #4 connecting rod cap

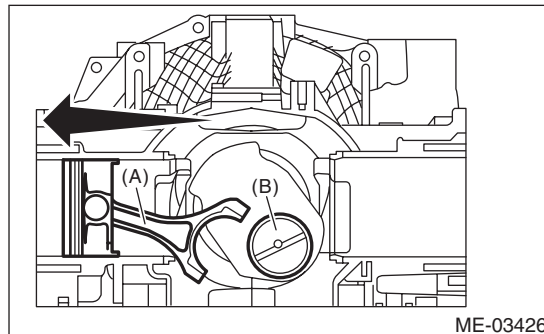
(4) Using the ST, turn the crankshaft and separate the positions of the crank pin and the large end of the #1 connecting rod.

ST 18252AA000 CRANKSHAFT SOCKET



(A) #1 connecting rod  
(B) Crank pin

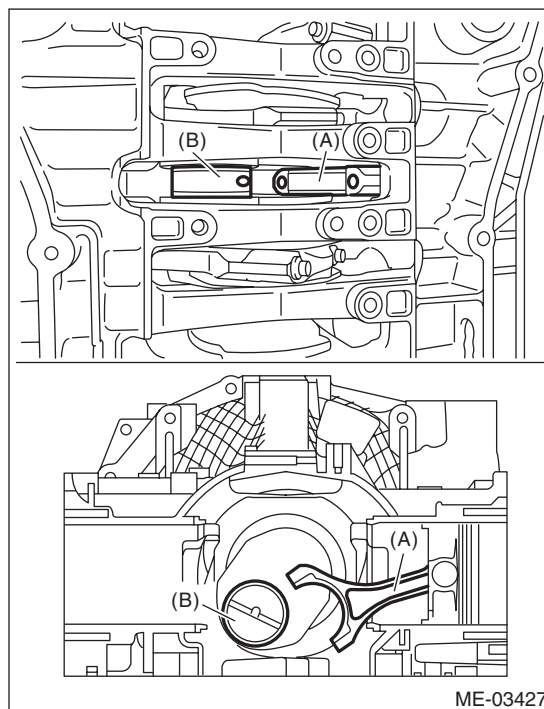
(5) Push the #1 connecting rod in the direction of the arrow, and remove the #1 piston and connecting rod from the cylinder block.



(A) #1 connecting rod  
(B) Crank pin

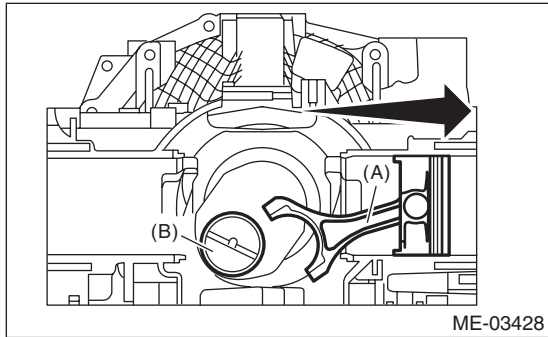
(6) Using the ST, turn the crankshaft and separate the positions of the crank pin and the large end of the #4 connecting rod.

ST 18252AA000 CRANKSHAFT SOCKET



(A) #4 connecting rod  
(B) Crank pin

(7) Push the #4 connecting rod in the direction of the arrow, and remove the #4 piston and connecting rod from the cylinder block.

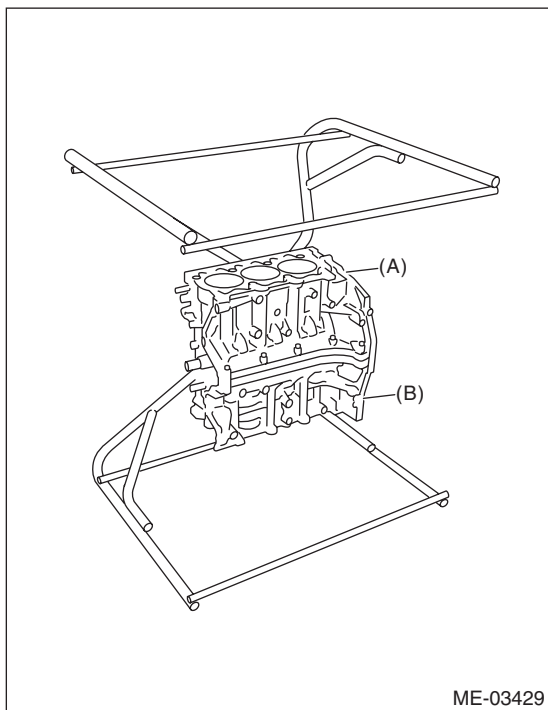


- (A) #4 connecting rod
- (B) Crank pin

23) Remove the #2 and #5 connecting rods and pistons from the cylinder block in the same manner.  
ST 18252AA000 CRANKSHAFT SOCKET

24) Remove the #3 and #6 connecting rods and pistons from the cylinder block in the same manner.  
ST 18252AA000 CRANKSHAFT SOCKET

25) Face the cylinder block (RH) up.

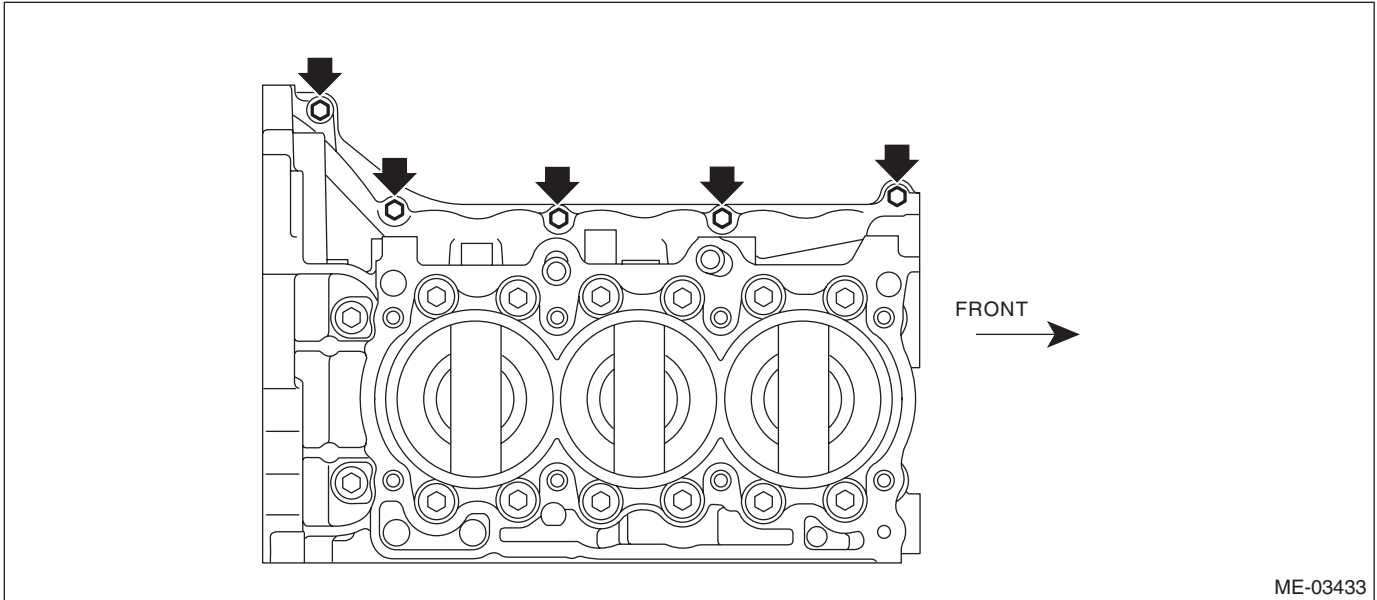


- (A) Cylinder block (RH)
- (B) Cylinder block (LH)

# Cylinder Block

## MECHANICAL

26) Remove the upper bolt.

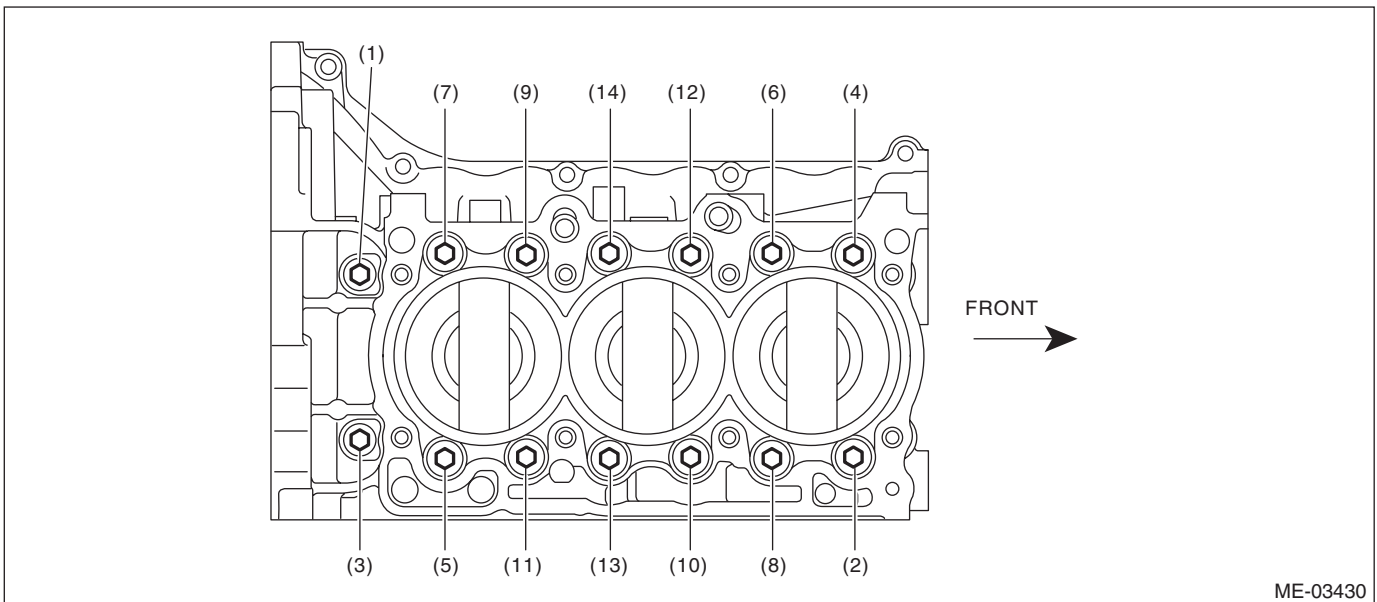


27) Loosen the cylinder block bolts in the order indicated in the figure, and separate cylinder block (RH) and (LH).

**NOTE:**

Confirm that the crankshaft is remaining in the cylinder block (LH).

If the cylinder block (RH) is lifted carelessly when separating, the crankshaft may stick to cylinder block (RH), then fall off.



28) Remove the rear oil seal.

29) Remove the crankshaft from cylinder block (LH).

30) Remove the crankshaft bearings from cylinder block using a hammer handle.

**NOTE:**

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

## B: INSTALLATION

1) After setting the cylinder block to ST, install the crankshaft bearing.  
ST 18232AA000 ENGINE STAND

**NOTE:**

Apply a coat of engine oil to the bearing and crankshaft journal.

2) Mount the crankshaft in cylinder block (LH).

3) Apply liquid gasket to the mating surfaces of cylinder block (RH).

**CAUTION:**

**Do not allow liquid gasket to run over into oil passages, bearing grooves, etc.**

**NOTE:**

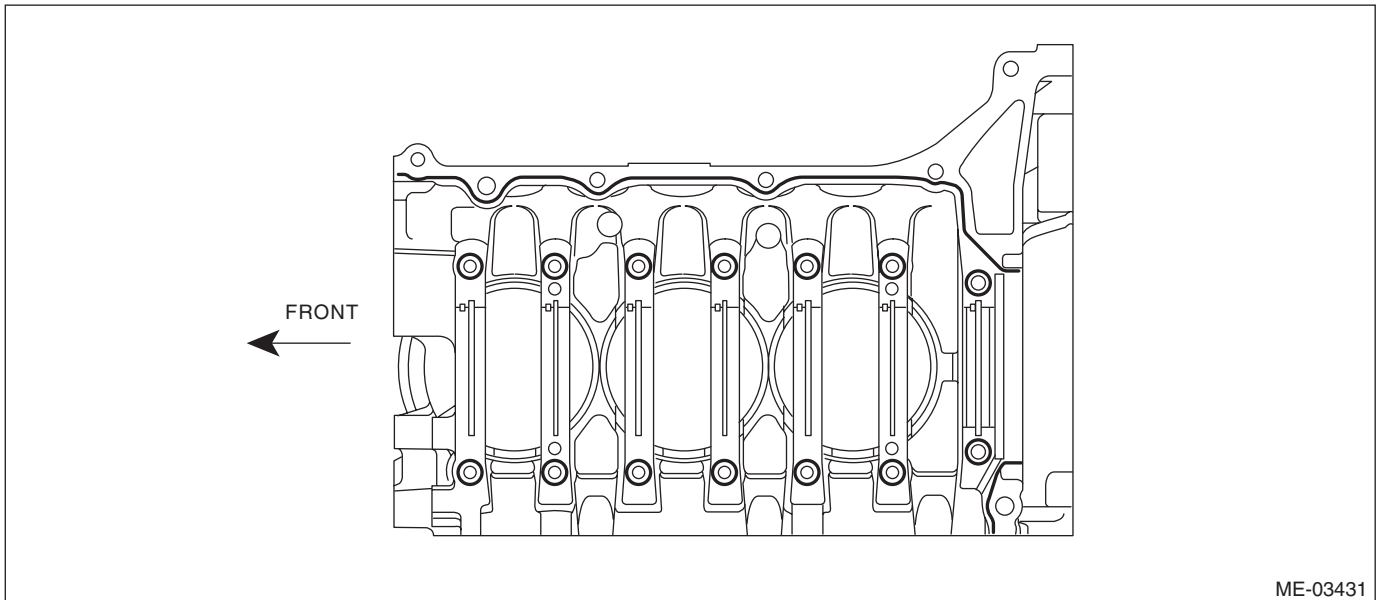
Install within 5 min. after applying liquid gasket.

**Liquid gasket:**

**THREE BOND 1217G (Part No. K0877Y0100) or equivalent**

**Liquid gasket applying diameter:**

**$1.0 \pm 0.2$  mm ( $0.039 \pm 0.008$  in)**



4) Attach cylinder block (RH) to cylinder block (LH).

5) Apply a coat of engine oil to the washer and bolt thread.

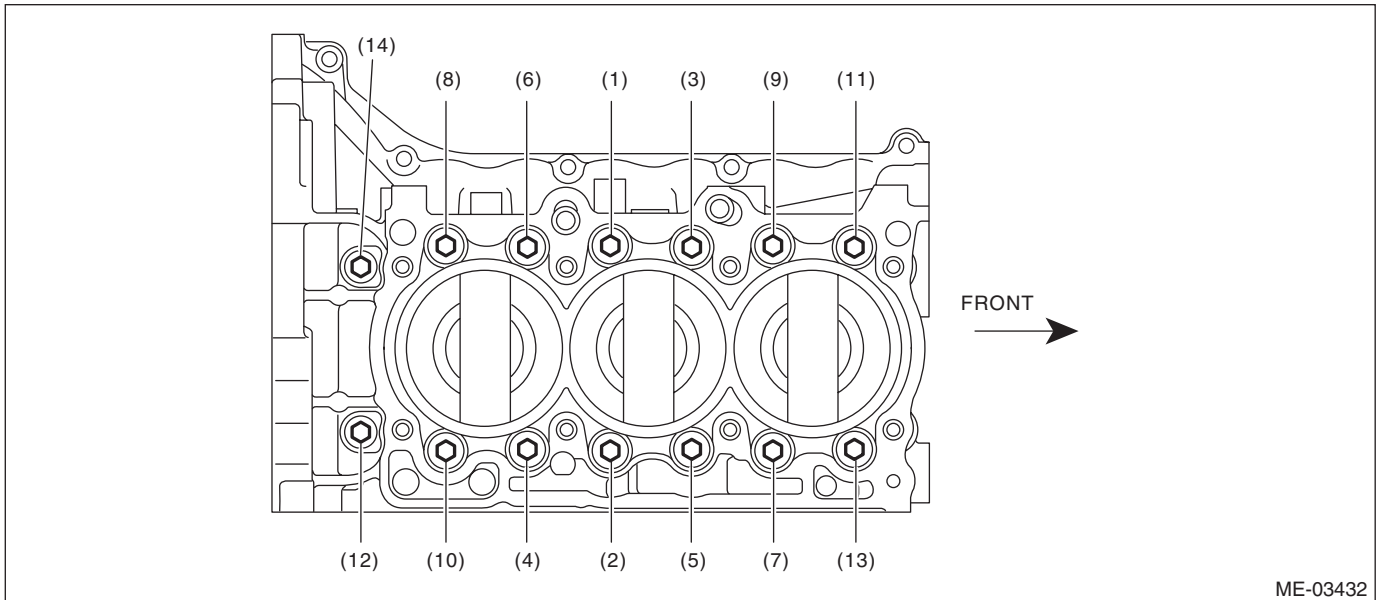
# Cylinder Block

## MECHANICAL

6) Tighten all bolts in the numerical order as shown in the figure.

**Tightening torque:**

**12 N-m (1.2 kgf-m, 8.9 ft-lb)**

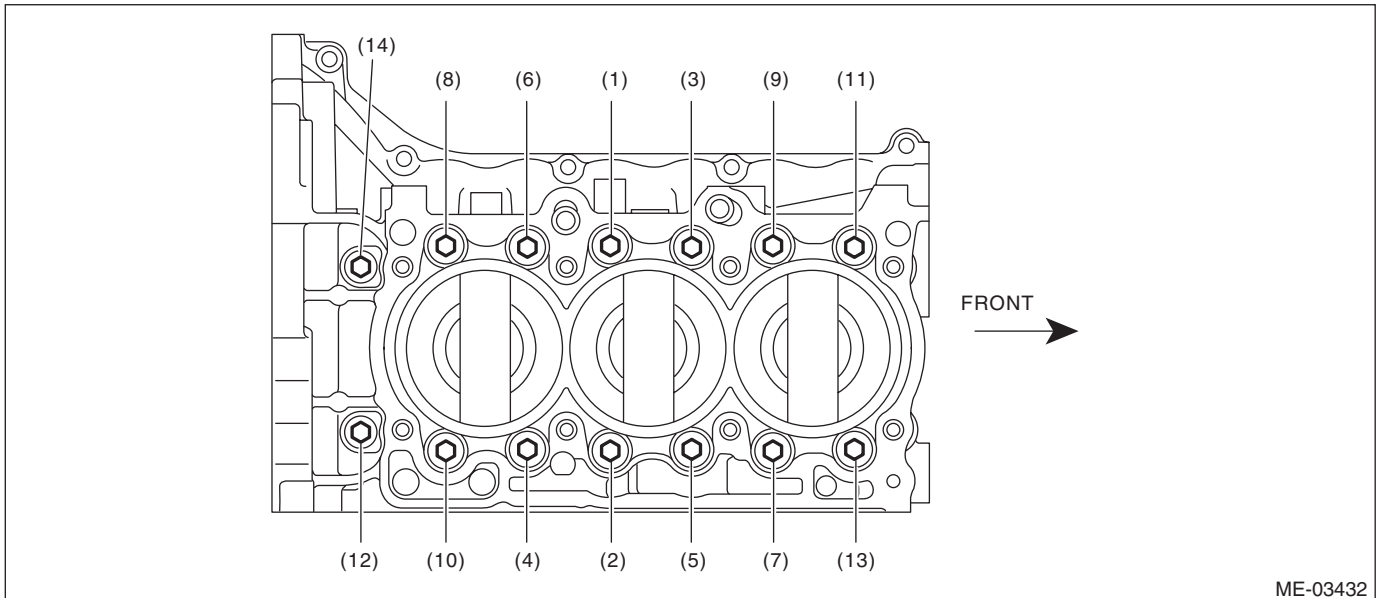


ME-03432

7) Retighten all bolts in the numerical order as shown in the figure.

**Tightening torque:**

**18 N-m (1.8 kgf-m, 13.3 ft-lb)**

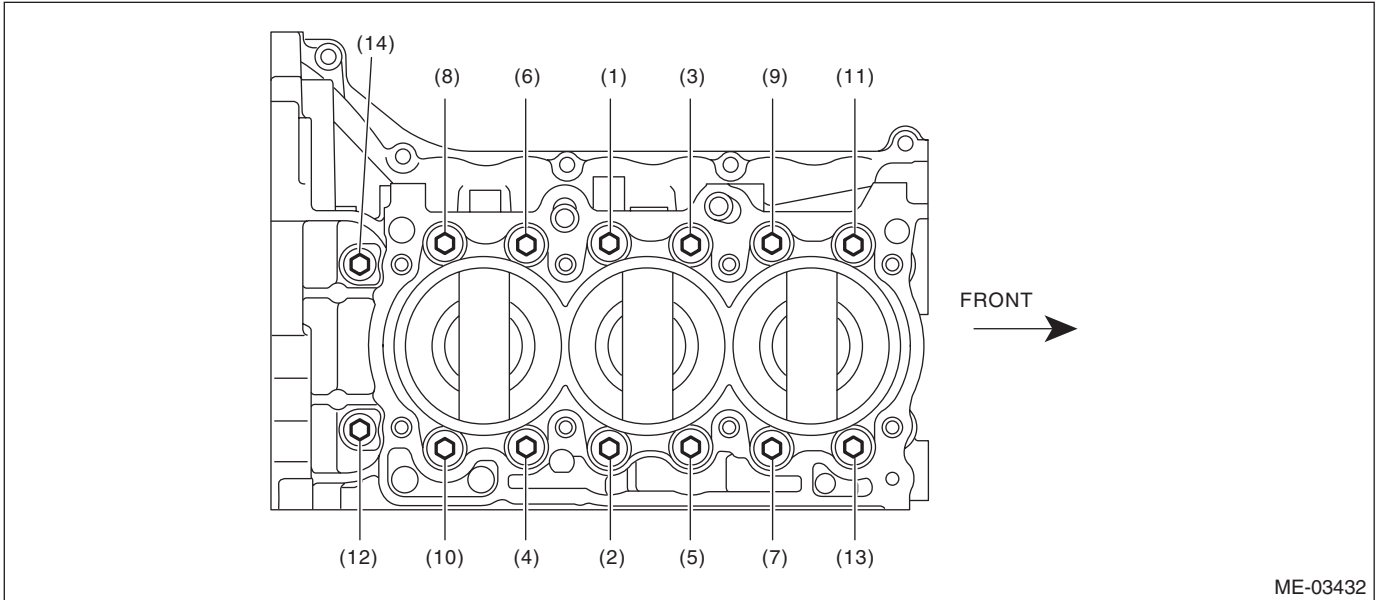


ME-03432

# Cylinder Block

MECHANICAL

8) Tighten all bolts by 90° in numerical order as shown in the figure.



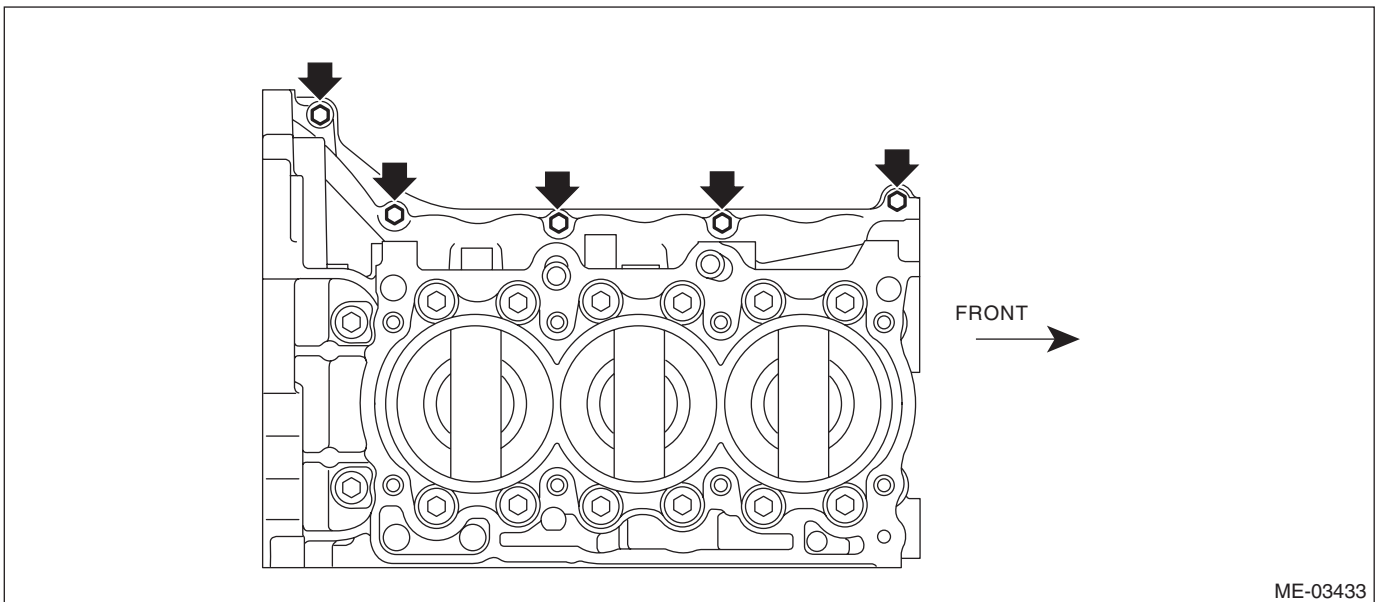
9) Install the upper bolt to cylinder block.

**Tightening torque:**

**25 N·m (2.5 kgf·m, 18.4 ft·lb)**

NOTE:

Remove any liquid gasket squeezed out onto the seal surface between the chain cover and oil pan upper, after tightening the cylinder block connecting bolts.



# Cylinder Block

## MECHANICAL

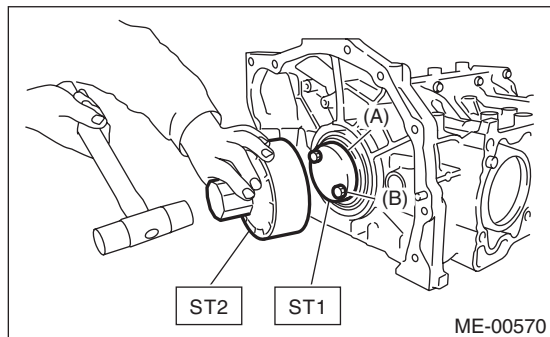
10) Apply a coat of engine oil to the oil seal inner periphery and outer periphery, and install the rear oil seal using ST1 and ST2.

### NOTE:

Use a new rear oil seal.

ST1 499597100 CRANKSHAFT OIL SEAL GUIDE

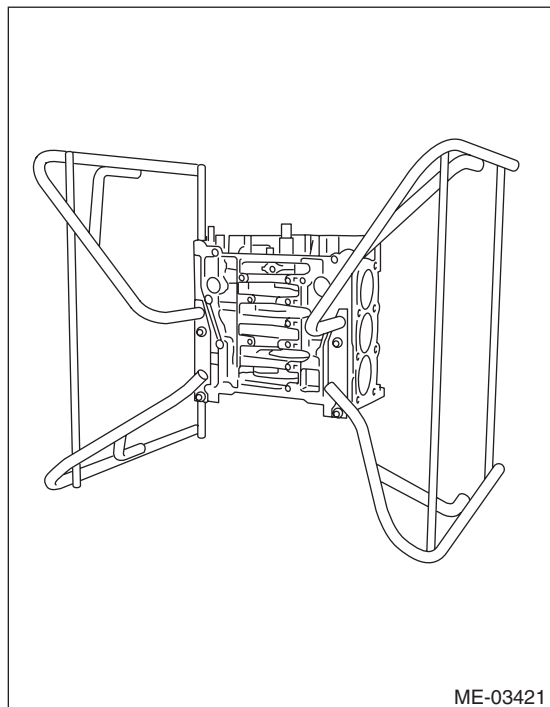
ST2 499587200 CRANKSHAFT OIL SEAL INSTALLER



(A) Rear oil seal

(B) Drive plate installation bolt

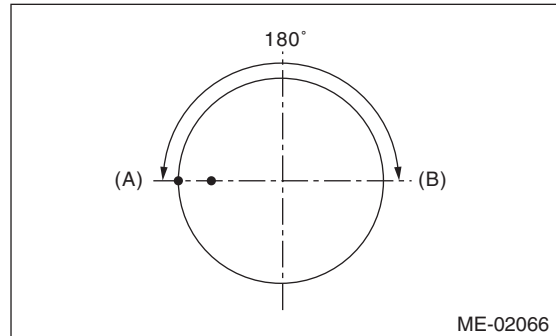
11) Face the front of the engine up, standing the engine on one end.



12) Attach the piston ring and oil ring to the piston.

(1) Position the top ring gap at (A) in the figure.

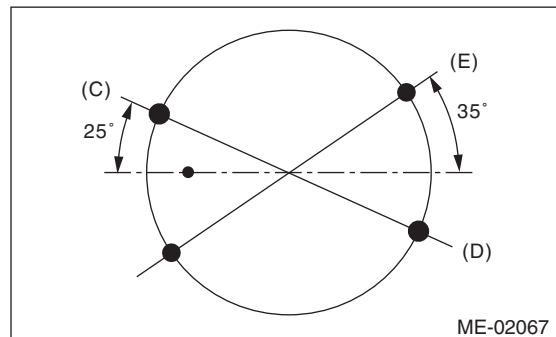
(2) Position the second ring gap at (B).



(3) Position the upper rail gap at (C) in the figure.

(4) Position the expander gap at (D) in the figure.

(5) Position the lower rail gap at (E) in the figure.



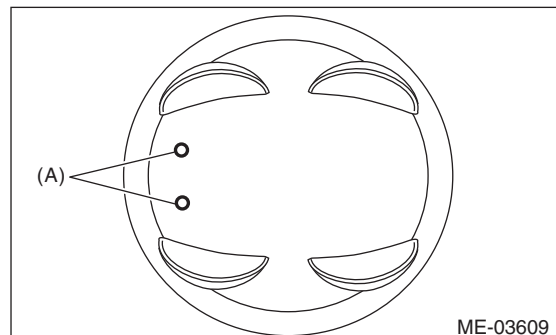
### CAUTION:

- Make sure ring gaps do not face the same direction.
- Make sure ring gaps are not within the piston skirt area.
- Assemble so that the stamp mark N faces towards the top of the piston.

13) Install the #1 piston and connecting rod to the cylinder block.

(1) Apply engine oil to the outer circumference of the piston and in the cylinder block.

(2) Face the front mark of piston (A) towards the front of the engine, and set the piston to the ST.





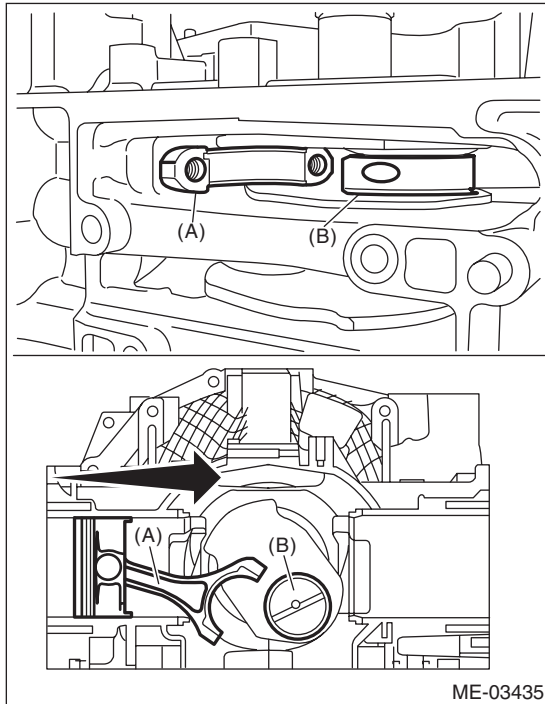
(3) Using ST, press-fit the piston into cylinder block.

**NOTE:**

When inserting the piston into the cylinder block, perform according to the items listed below.

- Insert while lightly tapping the top of the piston with the handle of a plastic hammer.
- Insert while making sure that the large end of the connecting rod does not scratch the cylinder liner.
- Insert while continually making sure that the large end of the connecting rod does not touch the crankshaft.

ST 398744300 PISTON GUIDE



- (A) #1 connecting rod
- (B) Crank pin

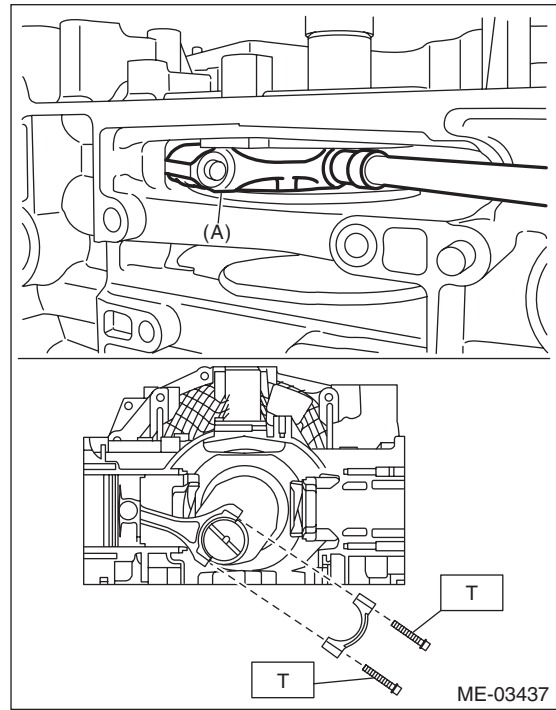
(4) Using the ST, turn the crankshaft and match the positions of the crank pin and the large end of the connecting rod.

ST 18252AA000 CRANKSHAFT SOCKET

(5) Install the connecting rod cap.

**Tightening torque:**

**60 N·m (6.1 kgf-m, 44.3 ft-lb)**



(A) #1 connecting rod

14) In the same procedures as for the #1 piston, install the piston and connecting rods to the cylinder block, in the order of #2, #3, #4, #5 and #6.

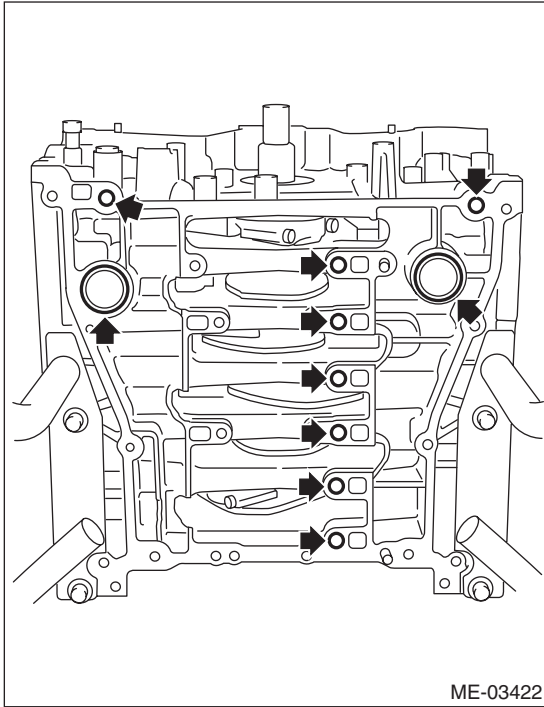
# Cylinder Block

## MECHANICAL

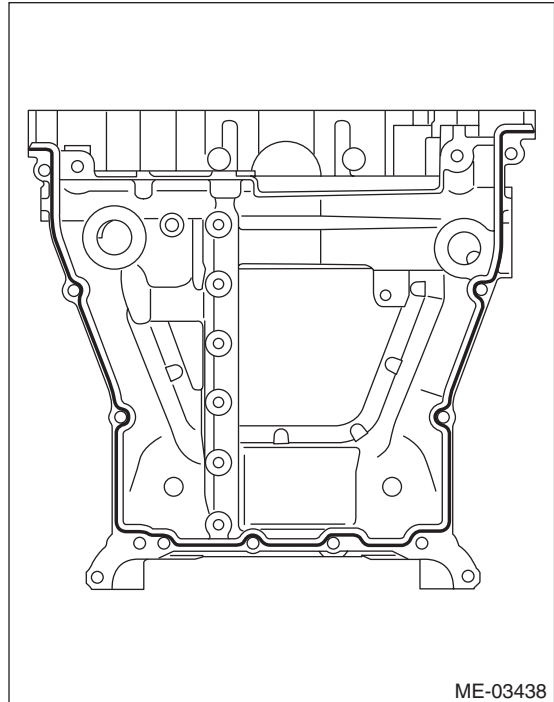
15) Install the O-ring to the underside of the cylinder block.

**NOTE:**

Use new O-rings.



**Liquid gasket applying diameter:**  
**5.0±1.0 mm (0.20±0.04 in)**



17) Temporarily tighten the oil pan upper.

16) Apply liquid gasket to the mating surface of oil pan upper.

**NOTE:**

Install within 5 min. after applying liquid gasket.

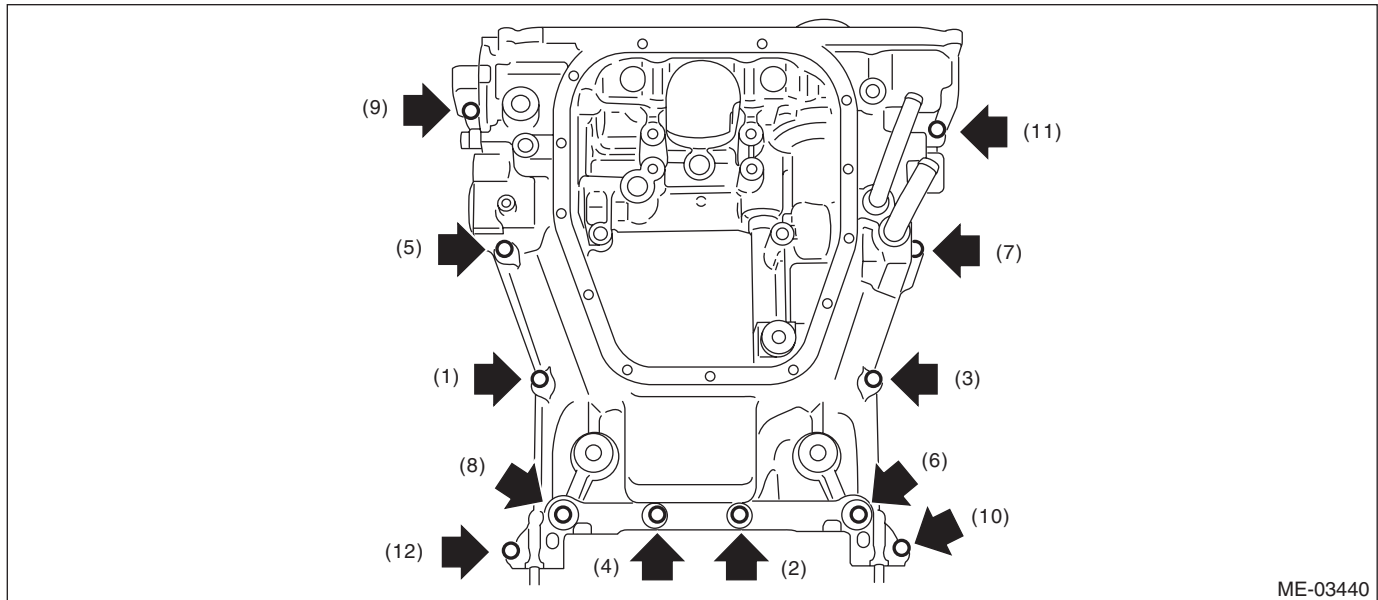
**Liquid gasket:**

**THREE BOND 1217G (Part No. K0877Y0100)**  
**or equivalent**

18) Tighten the oil pan upper installing bolts in the numerical order as shown in the figure.

**Tightening torque:**

**18 N·m (1.8 kgf·m, 13.3 ft·lb)**

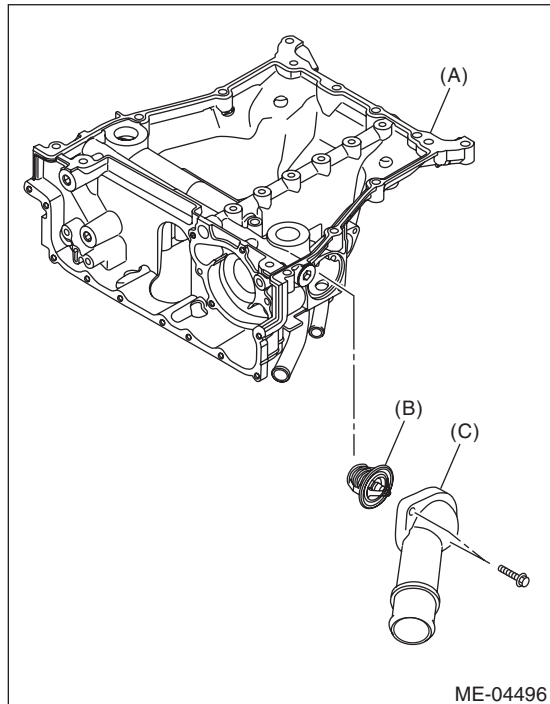


ME-03440

19) Install the thermostat and thermostat cover.

**Tightening torque:**

**6.4 N·m (0.7 kgf·m, 4.7 ft·lb)**



ME-04496

- (A) Oil pan upper
- (B) Thermostat
- (C) Thermostat cover

20) Install the oil pump. <Ref. to LU(H6DO)-12, INSTALLATION, Oil Pump.>

# Cylinder Block

## MECHANICAL

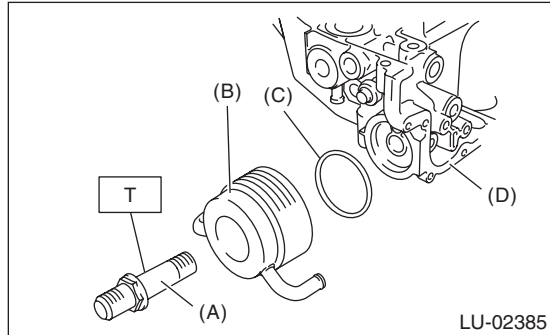
21) Tighten the oil cooler connector to install the oil cooler to the oil pan upper.

**Tightening torque:**

**54 N·m (5.5 kgf·m, 39.8 ft·lb)**

**NOTE:**

Use new O-rings.



- (A) Oil cooler connector
- (B) Oil cooler
- (C) O-ring
- (D) Oil pan upper

22) Apply liquid gasket to the matching surface of oil pan lower.

**NOTE:**

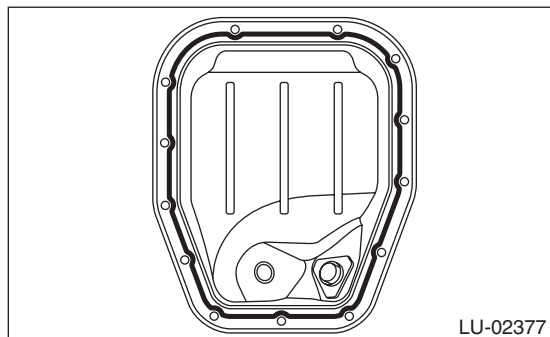
Install within 5 min. after applying liquid gasket.

**Liquid gasket:**

**THREE BOND 1217G (Part No. K0877Y0100)  
or equivalent**

**Liquid gasket applying diameter:**

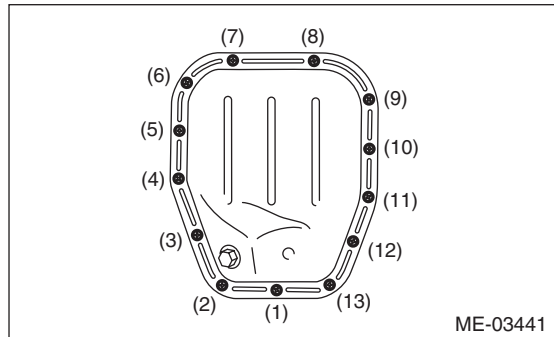
**5.0±1.0 mm (0.20±0.04 in)**



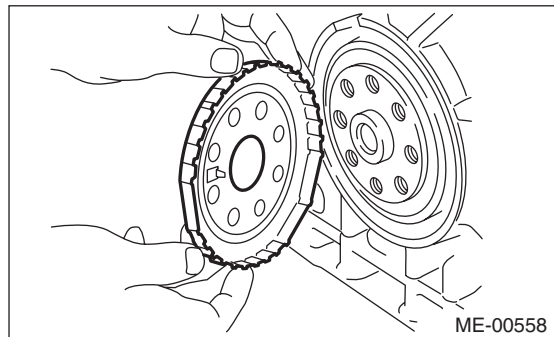
23) Tighten the oil pan lower installing bolts in the numerical order as shown in the figure.

**Tightening torque:**

**6.4 N·m (0.7 kgf·m, 4.7 ft·lb)**



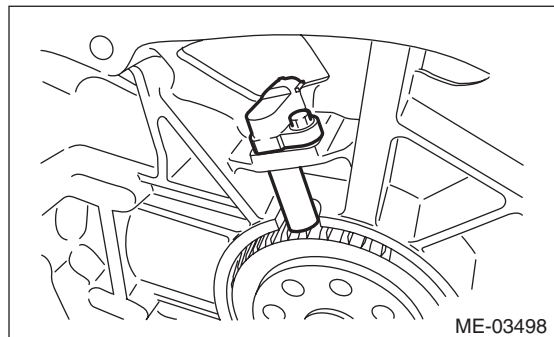
24) Install the crankshaft position sensor plate.



25) Install the crankshaft position sensor.

**Tightening torque:**

**6.4 N·m (0.7 kgf·m, 4.7 ft·lb)**



26) Install the drive plate. <Ref. to 5AT-61, INSTALLATION, Drive Plate.>

27) Install the cylinder head. <Ref. to ME(H6DO)-84, INSTALLATION, Cylinder Head.>

28) Install the camshaft. <Ref. to ME(H6DO)-76, INSTALLATION, Camshaft.>

29) Install the crank sprocket. <Ref. to ME(H6DO)-73, INSTALLATION, Crank Sprocket.>

30) Install the cam sprocket. <Ref. to ME(H6DO)-72, INSTALLATION, Cam Sprocket.>

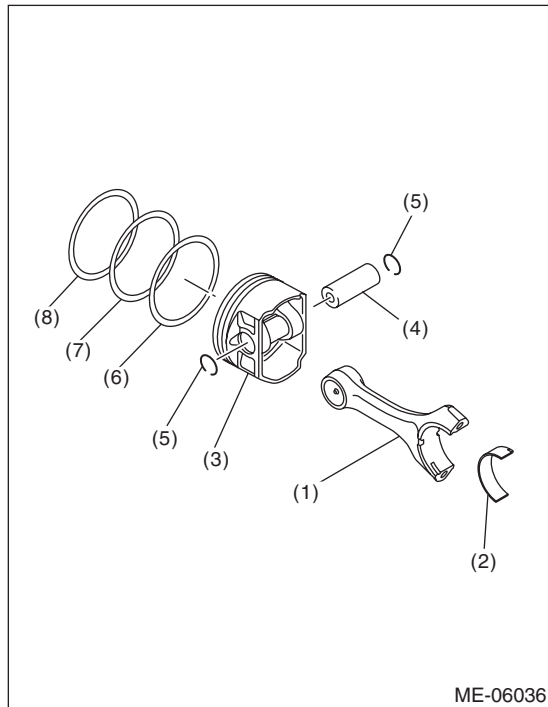
31) Install the timing chain assembly. <Ref. to ME(H6DO)-60, INSTALLATION, Timing Chain Assembly.>

32) Install the chain cover. <Ref. to ME(H6DO)-49, INSTALLATION, Chain Cover.>

33) Install the crank pulley. <Ref. to ME(H6DO)-46, INSTALLATION, Crank Pulley.>

34) Install the engine to the vehicle. <Ref. to ME(H6DO)-39, INSTALLATION, Engine Assembly.>

## C: DISASSEMBLY



- (1) Connecting rod
- (2) Connecting rod bearing
- (3) Piston
- (4) Piston pin
- (5) Circlip
- (6) Oil ring
- (7) Second ring
- (8) Top ring

### NOTE:

To prevent confusion of various parts, mark each part.

- 1) Remove the connecting rod bearing.
- 2) Remove the piston rings using piston ring expander.
- 3) Remove the oil ring by hand.

### NOTE:

Arrange the removed piston rings in proper order, to prevent confusion.

- 4) Remove the circlip on one end from the piston using a flat tip screwdriver.

### NOTE:

Be careful not damage the piston, by wrapping the tip of flat tip screwdriver with tape.

- 5) Remove the piston pin from the piston.

- 6) Separate the piston and connecting rod.

### NOTE:

Mark the direction of front side to each connecting rod.

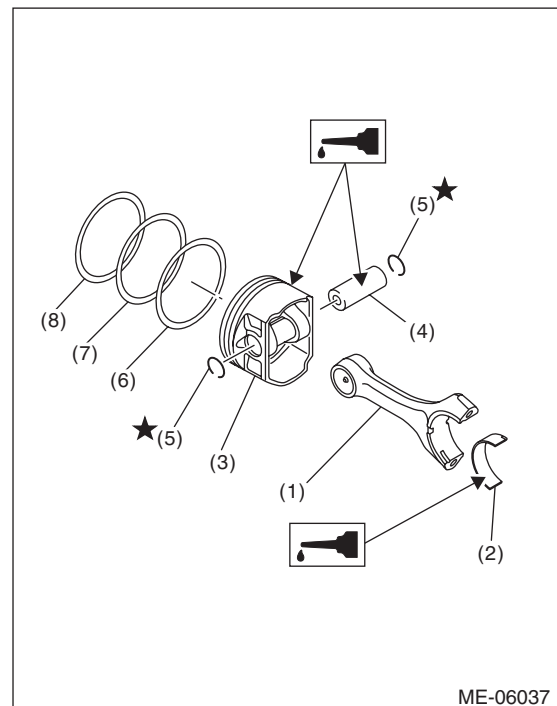
- 7) Remove the circlip on other end from the piston using a flat tip screwdriver.

### NOTE:

Be careful not damage the piston, by wrapping the tip of flat tip screwdriver with tape.

- 8) Remove the plug and orifice from the cylinder block as necessary. <Ref. to ME(H6DO)-12, CYLINDER BLOCK, COMPONENT, General Description.>

## D: ASSEMBLY



- (1) Connecting rod
- (2) Connecting rod bearing
- (3) Piston
- (4) Piston pin
- (5) Circlip
- (6) Oil ring
- (7) Second ring
- (8) Top ring

- 1) Apply engine oil to the surface of the connecting rod bearing. Attach the connecting rod bearing to the connecting rod.

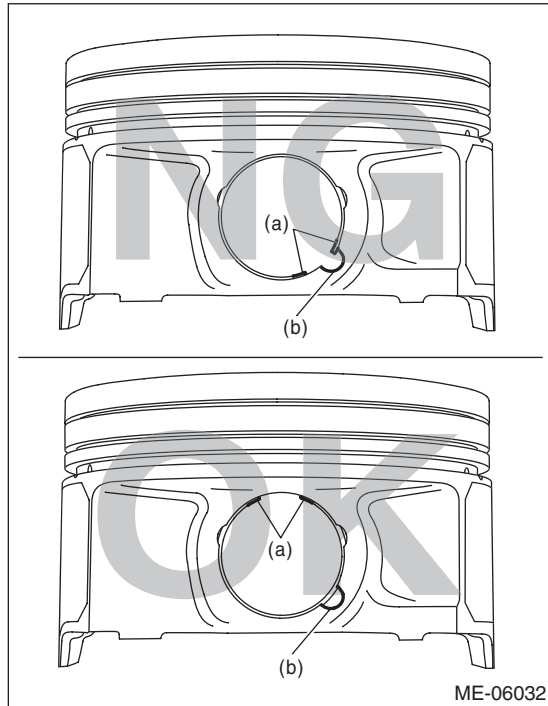
# Cylinder Block

## MECHANICAL

2) Install the circlip on one end of the piston using a flat tip screwdriver.

### NOTE:

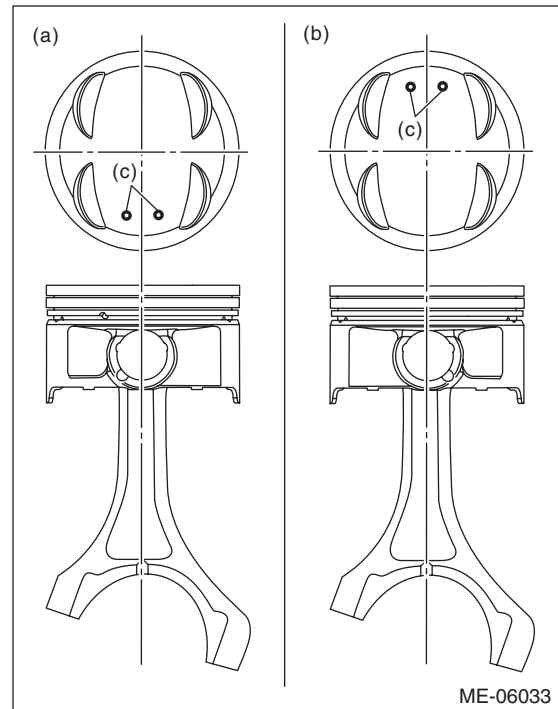
- Be careful not damage the piston, by wrapping the tip of flat tip screwdriver with tape.
- Make sure the circlip is firmly inserted into the circlip groove.
- After installing the circlip, rotate the circlip so that its end part (a) and the cutout portion of circlip groove (b) do not match.



3) Set the piston to the connecting rod.

### NOTE:

Align the front mark of piston and the connecting rod direction correctly as shown in the figure.



(a) RH side (#1, #3 and #5)

(b) LH side (#2, #4 and #6)

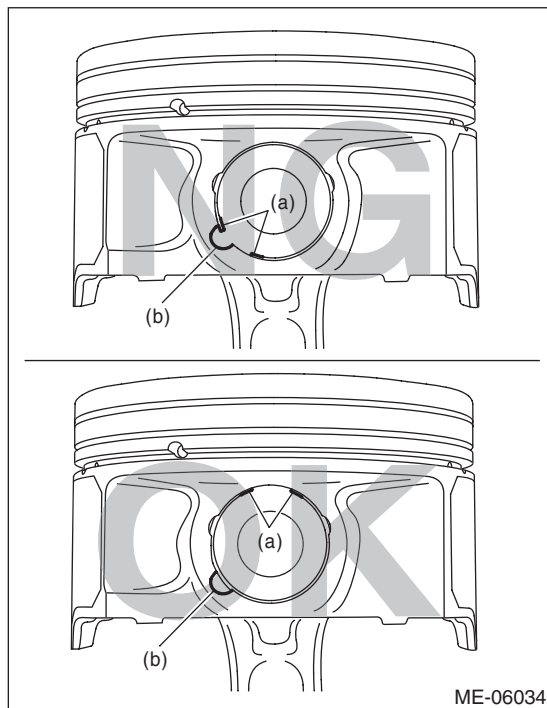
(c) Front mark

4) Apply engine oil to the piston pin, and attach the piston pin.

5) Install the circlip on the piston using a flat tip screwdriver.

**NOTE:**

- Be careful not damage the piston and piston pin, by wrapping the tip of flat tip screwdriver with tape.
- Make sure the circlip is firmly inserted into the circlip groove.
- After installing the circlip, rotate the circlip so that its end part (a) and the cutout portion of circlip groove (b) do not match.



6) Install the oil ring upper rail, expander and lower rail by hand.

7) Install the second ring and top ring using piston ring expander.

8) Install the plug and orifice to the cylinder block as necessary. <Ref. to ME(H6DO)-12, CYLINDER BLOCK, COMPONENT, General Description.>

## E: INSPECTION

### 1. CYLINDER BLOCK

1) Visually check for cracks or damage. Use liquid penetrant tester on the important sections for checking. Check that there are no marks of gas leaking or water leaking on gasket installing surface.

2) Check the oil passages for clogging.

3) Inspect the cylinder block surface that mates with cylinder head for warping by using a straight edge. If the warpage exceeds limit, replace the cylinder block.

**Warping limit:**

**0.020 mm (0.0008 in)**

**Standard height of cylinder block:**

**202 mm (7.95 in)**

### 2. CYLINDER AND PISTON

1) The cylinder bore size is stamped on the front upper face of the cylinder block.

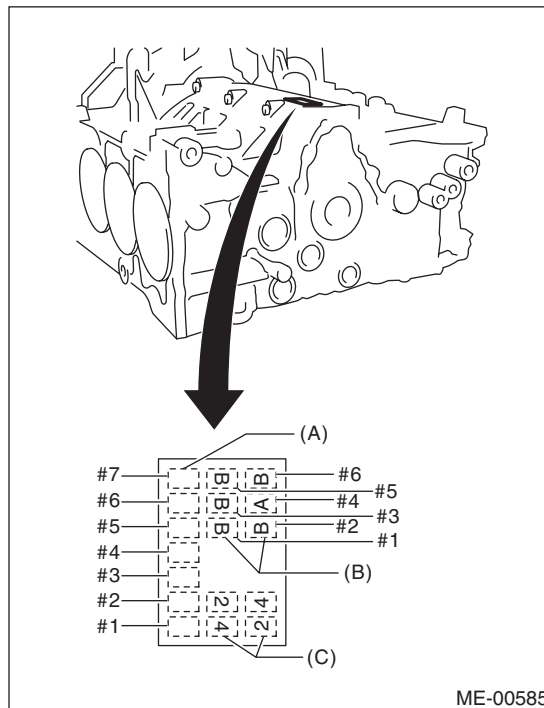
**NOTE:**

- Measurement should be performed at a temperature of 20°C (68°F).
- Standard sized pistons are classified into two grades, "A" and "B". These grades should be used as guide lines 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 journal size mark
- (B) Cylinder bore size mark
- (C) Cylinder block (RH) – (LH) combination mark

# Cylinder Block

## MECHANICAL

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

### NOTE:

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

### Cylindricity:

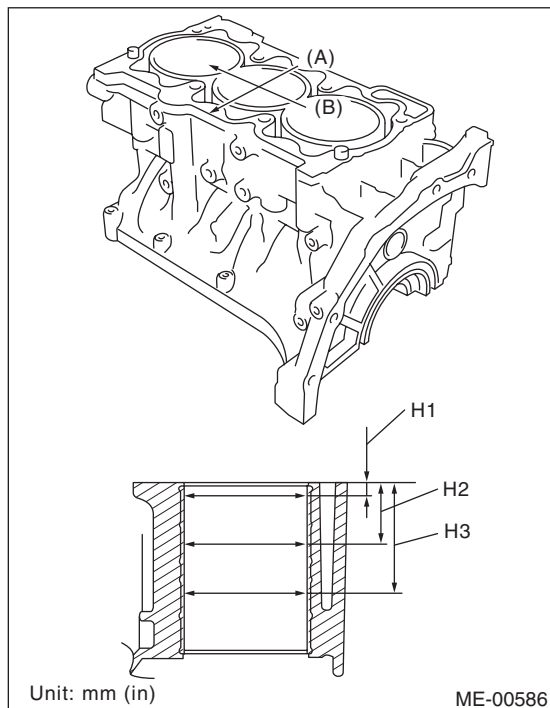
#### Limit

**0.030 mm (0.0012 in)**

### Out-of-roundness:

#### Limit

**0.010 mm (0.0004 in)**



(A) Thrust direction

(B) Piston pin direction

H1: 10 mm (0.39 in)

H2: 45 mm (1.77 in)

H3: 80 mm (3.15 in)

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

4) Measure outer diameter of each piston.

Measure the outer diameter of each piston at the height as shown in the figure. (Thrust direction)

### NOTE:

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

### Piston grade point H:

**37.3 mm (1.4685 in)**

### Piston outer diameter:

#### Standard

**A: 92.005 — 92.015 mm (3.6222 — 3.6226 in)**

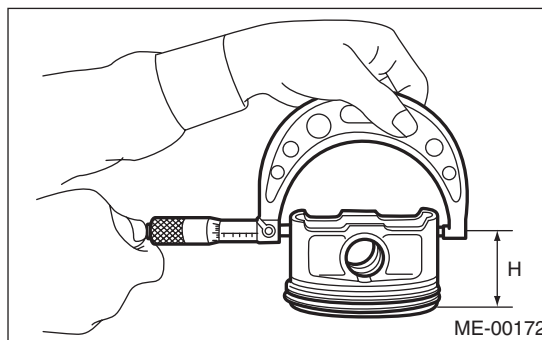
**B: 91.995 — 92.005 mm (3.6218 — 3.6222 in)**

#### 0.25 mm (0.0098 in) oversize

**92.245 — 92.265 mm (3.6317 — 3.6325 in)**

#### 0.50 mm (0.0197 in) oversize

**92.495 — 92.515 mm (3.6415 — 3.6423 in)**



5) Calculate the clearance between cylinder and piston.

### NOTE:

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

### Clearance between cylinder and piston at 20°C (68°F):

#### Standard

**-0.010 — 0.010 mm (-0.0004 — 0.0004 in)**

6) Boring and honing

(1) If any of the measured value of cylindricity, out-of-roundness or cylinder-to-piston clearance is out of standard or if there is any damage on the cylinder wall, rebore it to replace with an oversize piston.

### CAUTION:

**When any of the cylinders needs reboring, all other cylinders must be bored at the same time, and replaced with oversize pistons.**

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

### NOTE:

Immediately after reboring, the cylinder diameter may differ from its real diameter due to temperature rise. Thus, when measuring the cylinder diameter, wait until it has cooled to room temperature.

### Cylinder inner diameter boring limit (diameter):

**To 92.515 mm (3.6717 in)**



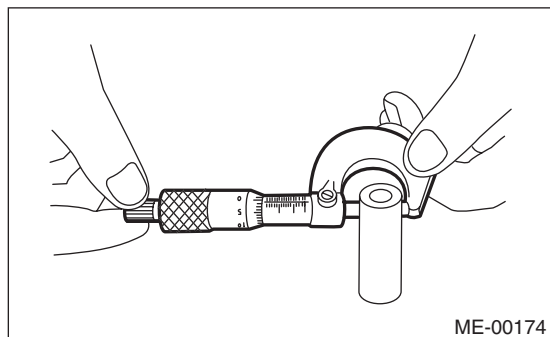
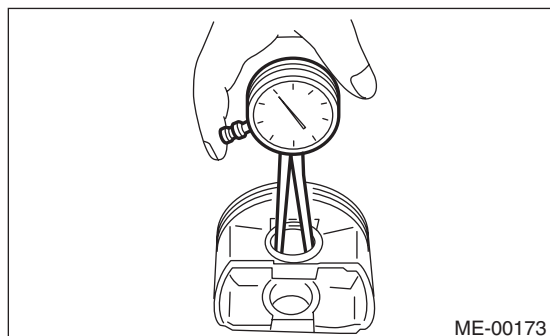
### 3. PISTON AND PISTON PIN

- 1) Check the piston and piston pin for damage, cracks or wear. Replace if faulty.
- 2) Check the piston ring groove for wear or damage. Replace if faulty.
- 3) Make sure that the piston pin can be inserted into the piston pin hole with a thumb at 20°C (68°F). Replace if faulty.

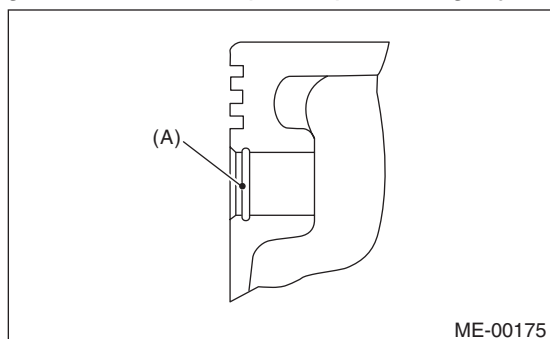
#### Clearance between piston pin hole and piston pin:

##### Standard

**0.004 — 0.008 mm (0.0002 — 0.0003 in)**



- 4) Check the snap ring installation groove (A) on the piston for burr. If necessary, remove burr from the groove so that the piston pin can lightly move.



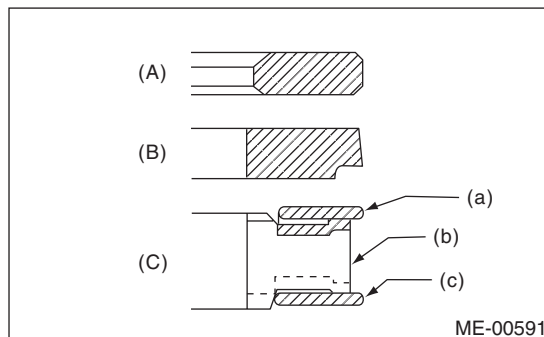
- 5) Check the piston pin snap ring for distortion, cracks and wear.

### 4. PISTON RING

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

#### NOTE:

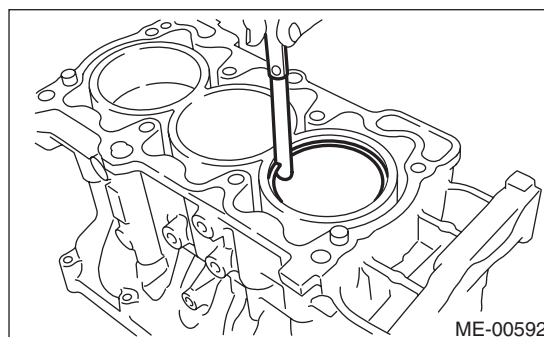
- The top ring and second ring have the mark to determine the direction for installing. When installing the ring to piston, face marks to the top side.
- Oil ring consists of the upper rail, expander and lower rail. When installing to the piston, be careful of the direction of each rail.



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

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

		Standard mm (in)
Piston ring gap	Top ring	0.20 — 0.35 (0.0079 — 0.0138)
	Second ring	0.40 — 0.50 (0.0157 — 0.0197)
	Oil ring	0.20 — 0.50 (0.0079 — 0.0197)



# Cylinder Block

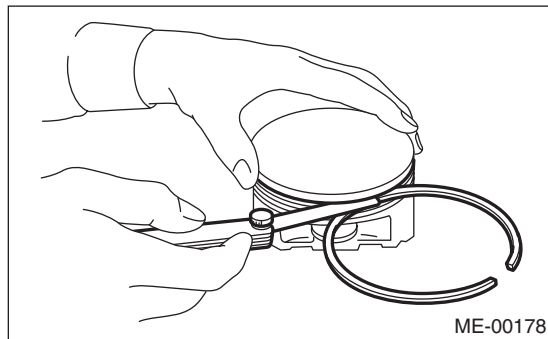
## MECHANICAL

3) Fit the piston ring straight into the piston ring groove, then measure the clearance between piston ring and piston ring groove with a thickness gauge.

### NOTE:

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

		Standard mm (in)
Clearance between piston ring and piston ring groove	Top ring	0.040 — 0.080 (0.0016 — 0.0031)
	Second ring	0.030 — 0.070 (0.0012 — 0.0028)
Clearance between oil ring and oil ring groove		0.065 — 0.165 (0.0026 — 0.0065)



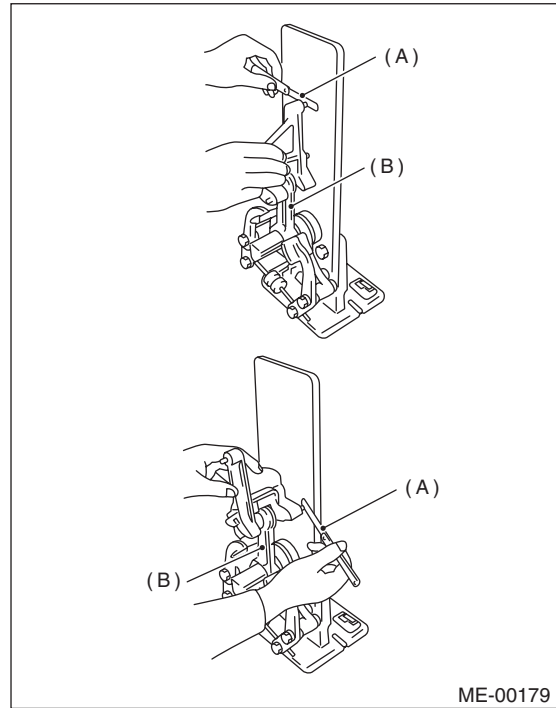
## 5. CONNECTING ROD

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

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

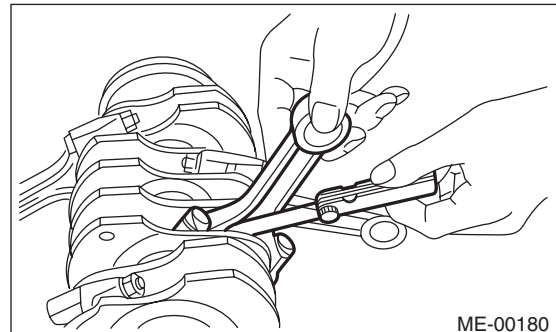
(B) Connecting rod

3) Install the connecting rod with bearings attached to the crankshaft, and using a thickness gauge, measure the thrust clearance. If the thrust clearance exceeds the standard or uneven wear is found, replace the connecting rod.

**Connecting rod thrust clearance:**

**Standard**

**0.070 — 0.330 mm (0.0028 — 0.0130 in)**



4) Inspect the connecting rod bearing for scar, peeling, seizure, melting, wear, etc.

5) Measure the oil clearance on each connecting rod bearing using plastigauge. If any oil clearance is not within the standard, replace the defective bearing with a new part of standard size or under-size as necessary.

**Connecting rod oil clearance:**  
**Standard**

**0.016 — 0.043 mm (0.0006 — 0.0017 in)**

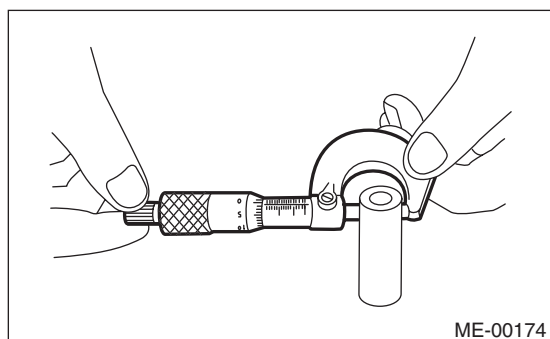
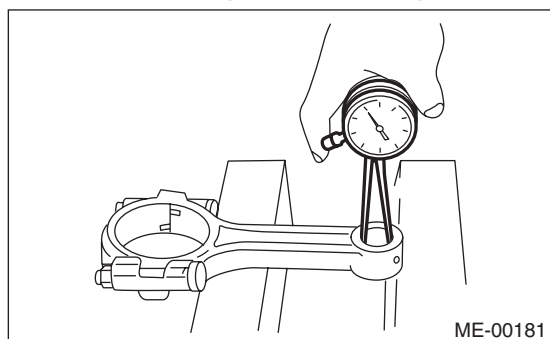
Unit: mm (in)		
Bearing	Bearing size (Thickness at center)	Outer diameter of crank pin
Standard	1.489 — 1.505 (0.0586 — 0.0593)	51.976 — 52.000 (2.0463 — 2.0472)
0.03 (0.0012) Undersize	1.507 — 1.515 (0.0593 — 0.0596)	51.954 — 51.970 (2.0454 — 2.0461)
0.05 (0.0020) Undersize	1.517 — 1.525 (0.0597 — 0.0600)	51.934 — 51.950 (2.0446 — 2.0453)
0.25 (0.0098) Undersize	1.617 — 1.625 (0.0637 — 0.0640)	51.734 — 51.750 (2.0368 — 2.0374)

6) Inspect the bushing at connecting rod small end, and replace with a new part if worn or damaged.

7) Measure the piston pin clearance at connecting rod small end. If the measured value is not within the standard, replace it with a new part.

**Clearance between piston pin and bushing:**  
**Standard**

**0 — 0.022 mm (0 — 0.0009 in)**

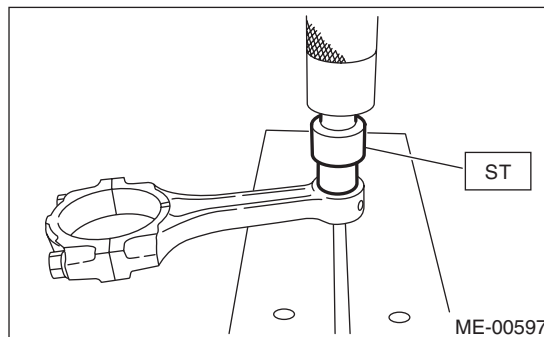


8) The replacement procedure for the connecting rod small end bushing is as follows.

(1) Remove the bushing from connecting rod with ST and press.

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

ST 18350AA000 CONNECTING ROD BUSHING REMOVER AND INSTALLER



(3) Make two 3 mm (0.12 in) holes in the pressed bushing to match the pre-manufactured holes on the connecting rod, then ream the inside of the bushing.

(4) After completion of reaming, clean the bushing to remove chips.

**6. CRANKSHAFT AND CRANKSHAFT BEARING**

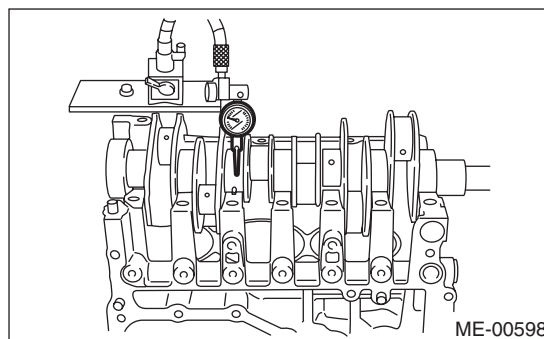
1) Clean the crankshaft completely, and check it for cracks using liquid penetrant tester. If defective, replace the crankshaft.

2) Check the crankshaft for bend, and repair or replace if needed. If it exceeds the limit, correct or replace it.

**NOTE:**

If a suitable V-block is not available, using the #1 and #7 crankshaft bearings on cylinder block, position the crankshaft on cylinder block. Then, measure the crankshaft bend using a dial gauge.

**Crankshaft bend limit:**  
**0.035 mm (0.0014 in)**



# Cylinder Block

## MECHANICAL

3) Inspect the crank journal and crank pin for wear. If they are not within the standard, replace the bearing with a suitable (undersize) one, and replace or grind to correct the crankshaft as necessary. When grinding the crank journal or crank pin, finish them to the specified dimensions according to the undersize bearing to be used.

### Crank pin:

#### Out-of-roundness

##### Limit

0.005 mm (0.0002 in)

#### Cylindricity

##### Limit

0.006 mm (0.0002 in)

#### Grinding limit (dia.)

To 51.734 mm (2.0368 in)

### Crank journal:

#### Out-of-roundness

##### Limit

0.005 mm (0.0002 in)

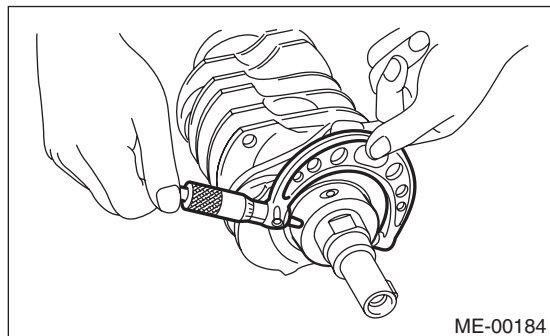
#### Cylindricity

##### Limit

0.006 mm (0.0002 in)

#### Grinding limit (dia.)

To 63.742 mm (2.5095 in)



		Crank journal diameter			Crank pin outer diameter
		#1, #3, #5	#7	#2, #4, #6	
Standard	Journal O.D.	63.992 — 64.016 (2.5194 — 2.5203)			51.976 — 52.000 (2.0463 — 2.0472)
	Bearing size (Thickness at center)	1.996 — 2.013 (0.0786 — 0.0793)	1.992 — 2.009 (0.0784 — 0.0791)	1.996 — 2.013 (0.0786 — 0.0793)	1.489 — 1.505 (0.0586 — 0.0593)
0.03 (0.0012) Undersize	Journal O.D.	63.962 — 63.978 (2.5182 — 2.5188)			51.954 — 51.970 (2.0454 — 2.0461)
	Bearing size (Thickness at center)	2.011 — 2.014 (0.0792 — 0.0793)	2.011 — 2.014 (0.0792 — 0.0793)	2.015 — 2.018 (0.0793 — 0.0794)	1.507 — 1.515 (0.0593 — 0.0596)
0.05 (0.0020) Undersize	Journal O.D.	63.942 — 63.958 (2.5174 — 2.5180)			51.934 — 51.950 (2.0446 — 2.0453)
	Bearing size (Thickness at center)	2.021 — 2.024 (0.0796 — 0.0797)	2.021 — 2.024 (0.0796 — 0.0797)	2.025 — 2.028 (0.0797 — 0.0798)	1.517 — 1.525 (0.0597 — 0.0600)
0.25 (0.0098) Undersize	Journal O.D.	63.742 — 63.758 (2.5095 — 2.5102)			51.734 — 51.750 (2.0368 — 2.0374)
	Bearing size (Thickness at center)	2.121 — 2.124 (0.0835 — 0.0836)	2.121 — 2.124 (0.0835 — 0.0836)	2.125 — 2.128 (0.0837 — 0.0838)	1.617 — 1.625 (0.0637 — 0.0640)

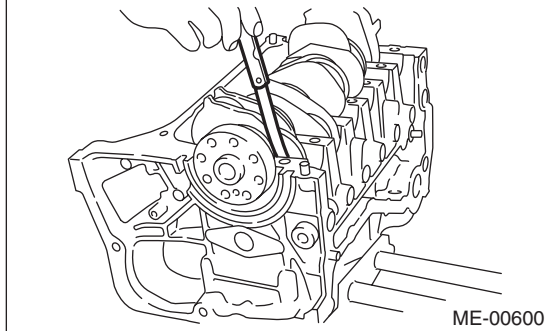
Unit: mm (in)

4) Use a thickness gauge to measure the thrust clearance of crankshaft at center bearing. If clearance exceeds the standard, replace the bearing.

**Crankshaft thrust clearance:**

**Standard**

**0.030 — 0.115 mm (0.0012 — 0.0045 in)**



5) Inspect individual crankshaft bearings for signs of flaking, seizure, melting and wear.

6) Measure the oil clearance on each crankshaft bearing using plastigauge. If the measured value is out of standard, replace the defective bearing with an undersize one, and replace or grind to correct the crankshaft as necessary.

**Crankshaft oil clearance:**

**Standard**

**0.010 — 0.030 mm (0.0004 — 0.0012 in)**

## 21.Oil Flow Control Solenoid Valve

### **A: REMOVAL**

The oil flow control solenoid valve is listed in the FU section. <Ref. to FU(H6DO)-45, REMOVAL, Oil Flow Control Solenoid Valve.>

### **B: INSTALLATION**

The oil flow control solenoid valve is listed in the FU section. <Ref. to FU(H6DO)-45, INSTALLATION, Oil Flow Control Solenoid Valve.>

## 22. Intake and Exhaust Valve

### A: SPECIFICATION

Refer to "Cylinder Head" for removal and installation procedures of intake and exhaust valves. <Ref. to ME(H6DO)-83, REMOVAL, Cylinder Head.>  
<Ref. to ME(H6DO)-84, INSTALLATION, Cylinder Head.>

## 23.Piston

### A: SPECIFICATION

Refer to "Cylinder Block" for removal and installation procedures of pistons. <Ref. to ME(H6DO)-95, REMOVAL, Cylinder Block.> <Ref. to ME(H6DO)-101, INSTALLATION, Cylinder Block.>



## 24. Connecting Rod

### A: SPECIFICATION

Refer to "Cylinder Block" for removal and installation procedures of connecting rod. <Ref. to ME(H6DO)-95, REMOVAL, Cylinder Block.> <Ref. to ME(H6DO)-101, INSTALLATION, Cylinder Block.>

## 25.Crankshaft

### A: SPECIFICATION

Refer to "Cylinder Block" for removal and installation procedures of crankshaft. <Ref. to ME(H6DO)-95, REMOVAL, Cylinder Block.> <Ref. to ME(H6DO)-101, INSTALLATION, Cylinder Block.>

## 26.Engine Trouble in General

### A: INSPECTION

NOTE:

The "RANK" shown in the chart shows the possibilities of the cause of trouble in order from "Very often" to "Rarely".

A — Very often

B — Sometimes

C — Rarely

Symptoms	Problem parts etc.	Possible cause	RANK
1. Engine does not start.			
1) Starter does not turn.	Starter	Defective battery-to-starter harness	B
		Defective starter switch	C
		Defective inhibitor switch	C
		Defective starter	B
	Battery	Improper connection of terminal	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(H6DO)(diag)-2, Basic Diagnostic Procedure.>		A
	Fuel line	Defective fuel pump and relay	A
		Clogged fuel line	C
		Lack of fuel or insufficient fuel	B
	Timing chain	Trouble	B
		Defective timing	B
	Compression	Incorrect valve clearance	C
		Loosened spark plug or defective gasket	C
		Loosened cylinder head bolt or defective gasket	C
		Improper valve sealing	C
		Defective valve stem	C
		Worn or broken valve spring	B
		Worn or stuck piston rings, cylinder and piston	C
Incorrect valve timing		B	
Improper engine oil (low viscosity)	B		

# Engine Trouble in General

## MECHANICAL

Symptoms	Problem parts etc.	Possible cause	RANK
3) Initial combustion occurs.	Engine control system <Ref. to EN(H6DO)(diag)-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 fuel or insufficient fuel	B
	Timing chain	Trouble	B
		Defective timing	B
	Compression	Incorrect valve clearance	C
		Loosened spark plug or defective gasket	C
		Loosened cylinder head bolt or defective gasket	C
		Improper valve sealing	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(H6DO)(diag)-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 fuel or insufficient fuel	B
	Timing chain	Trouble	B
		Defective timing	B
	Compression	Incorrect valve clearance	C
		Loosened spark plug or defective gasket	C
		Loosened cylinder head bolt or defective gasket	C
Improper valve sealing		C	
Defective valve stem		C	
Worn or broken valve spring		B	
Worn or stuck piston rings, cylinder and piston		C	
Incorrect valve timing		B	
Improper engine oil (low viscosity)	B		

# Engine Trouble in General

MECHANICAL

Symptoms	Problem parts etc.	Possible cause	RANK
2. Rough idle and engine stall	Engine control system <Ref. to EN(H6DO)(diag)-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 fuel or insufficient fuel	B
	Timing chain	Defective timing	C
	Compression	Incorrect valve clearance	B
		Loosened spark plug or defective gasket	B
		Loosened cylinder head bolt or defective gasket	B
		Improper valve sealing	B
		Defective valve stem	C
		Worn or broken valve spring	B
		Worn or stuck piston rings, cylinder and piston	B
		Incorrect valve timing	A
	Lubrication system	Improper engine oil (low viscosity)	B
		Incorrect oil pressure	B
Cooling system	Defective rocker cover gasket	C	
	Over-heating	C	
Others	Evaporative emission control system malfunction	A	
	Stuck or damaged throttle valve	B	

# Engine Trouble in General

## MECHANICAL

Symptoms	Problem parts etc.	Possible cause	RANK
3. Low output, hesitation and poor acceleration	Engine control system <Ref. to EN(H6DO)(diag)-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 fuel or insufficient fuel	C
	Timing chain	Defective timing	B
	Compression	Incorrect valve clearance	B
		Loosened spark plug or defective gasket	B
		Loosened cylinder head bolt or defective gasket	B
		Improper valve sealing	B
		Defective valve stem	C
		Worn or broken valve spring	B
		Worn or stuck piston rings, cylinder and piston	C
		Incorrect valve timing	A
	Lubrication system	Improper engine oil (low viscosity)	B
		Incorrect oil pressure	B
Cooling system	Defective rocker cover gasket	C	
	Over-heating	C	
Others	Over-cooling	C	
	Evaporative emission control system malfunction	A	

# Engine Trouble in General

MECHANICAL

Symptoms	Problem parts etc.	Possible cause	RANK
4. Surging	Engine control system <Ref. to EN(H6DO)(diag)-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 fuel or insufficient fuel	C
	Timing chain	Defective timing	B
	Compression	Incorrect valve clearance	B
		Loosened spark plug or defective gasket	C
		Loosened cylinder head bolt or defective gasket	C
		Improper valve sealing	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	Over-heating	B	
Others	Evaporative emission control system malfunction	C	
5. Engine does not return to idle.	Engine control system <Ref. to EN(H6DO)(diag)-2, Basic Diagnostic Procedure.>		A
	Intake system	Loosened or cracked vacuum hose	A
	Others	Stuck or damaged throttle valve	A
6. Dieseling (Run-on)	Engine control system <Ref. to EN(H6DO)(diag)-2, Basic Diagnostic Procedure.>		A
	Cooling system	Over-heating	B
	Others	Evaporative emission control system malfunction	B
7. After burning in exhaust system	Engine control system <Ref. to EN(H6DO)(diag)-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
	Timing chain	Defective timing	B
	Compression	Incorrect valve clearance	B
		Loosened spark plug or defective gasket	C
		Loosened cylinder head bolt or defective gasket	C
		Improper valve sealing	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	Evaporative emission control system malfunction	C	

# Engine Trouble in General

## MECHANICAL

Symptoms	Problem parts etc.	Possible cause	RANK
8. Knocking	Engine control system <Ref. to EN(H6DO)(diag)-2, Basic Diagnostic Procedure.>		A
	Intake system	Loosened oil filler cap	B
	Timing chain	Defective timing	B
	Compression	Incorrect valve clearance	C
		Incorrect valve timing	B
Cooling system	Over-heating	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 O-ring	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		
10. Excessive fuel consumption	Engine control system <Ref. to EN(H6DO)(diag)-2, Basic Diagnostic Procedure.>		A
	Intake system	Dirty air cleaner element	A
	Timing chain	Defective timing	B
	Compression	Incorrect valve clearance	B
		Loosened spark plug or defective gasket	C
		Loosened cylinder head bolt or defective gasket	C
		Improper valve sealing	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



## 27.Engine Noise

### A: INSPECTION

Type of sound	Condition	Possible cause
Regular clicking sound	Sound increases as engine speed increases.	<ul style="list-style-type: none"> <li>• Valve mechanism is defective.</li> <li>• Incorrect valve clearance</li> <li>• Worn camshaft</li> <li>• Broken valve spring</li> <li>• Trouble of valve lifter</li> </ul>
Heavy and dull clank	Oil pressure is low.	<ul style="list-style-type: none"> <li>• Worn camshaft main bearing</li> <li>• Worn connecting rod bearing (large end)</li> </ul>
	Oil pressure is normal.	Damaged engine mounting
High-pitched clank	Sound is noticeable when accelerating with an overload condition.	<ul style="list-style-type: none"> <li>• Ignition timing advanced</li> <li>• Accumulation of carbon inside combustion chamber</li> <li>• Wrong heat range of spark plug</li> <li>• Gasoline of improper octane number</li> </ul>
Clank when engine speed is between 1,000 and 2,000 rpms.	Noise is reduced when fuel injector connector of noisy cylinder is disconnected.*	<ul style="list-style-type: none"> <li>• Worn crankshaft main bearing</li> <li>• Worn connecting rod bearing (large end)</li> </ul>
Knocking sound when engine is operating under idling speed and engine is warm	Noise is reduced when fuel injector connector of noisy cylinder is disconnected.*	<ul style="list-style-type: none"> <li>• Worn cylinder liner and piston ring</li> <li>• Broken or stuck piston ring</li> <li>• Worn piston pin and hole at piston end of connecting rod</li> </ul>
	Sound is not reduced if each fuel injector connector is disconnected in turn.*	<ul style="list-style-type: none"> <li>• Unusually worn valve lifter</li> <li>• Worn cam gear</li> <li>• Worn camshaft journal bore in cylinder head</li> </ul>
Squeaky sound	—	Insufficient generator lubrication
Rubbing sound	—	Poor contact of generator brush and rotor
Gear scream when starting engine	—	<ul style="list-style-type: none"> <li>• Defective ignition starter switch</li> <li>• Worn gear and starter pinion</li> </ul>
Sound like polishing glass with a dry cloth	—	<ul style="list-style-type: none"> <li>• V-belt</li> <li>• Defective water pump shaft</li> </ul>
Hissing sound	—	<ul style="list-style-type: none"> <li>• Insufficient compression</li> <li>• Air leakage in air intake system, hose, connection or manifold</li> </ul>
Timing chain noise	—	<ul style="list-style-type: none"> <li>• Loose timing chain</li> <li>• Timing chain contacting with adjacent part</li> </ul>
Valve lifter noise	—	Incorrect valve clearance

\* When disconnecting the fuel injector connector, the malfunction indicator light illuminates and DTC is stored in ECM memory. Therefore, perform the Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.> after connecting the fuel injector connector.

# Engine Noise

MECHANICAL

---

# EXHAUST

# *EX(H6DO)*

---

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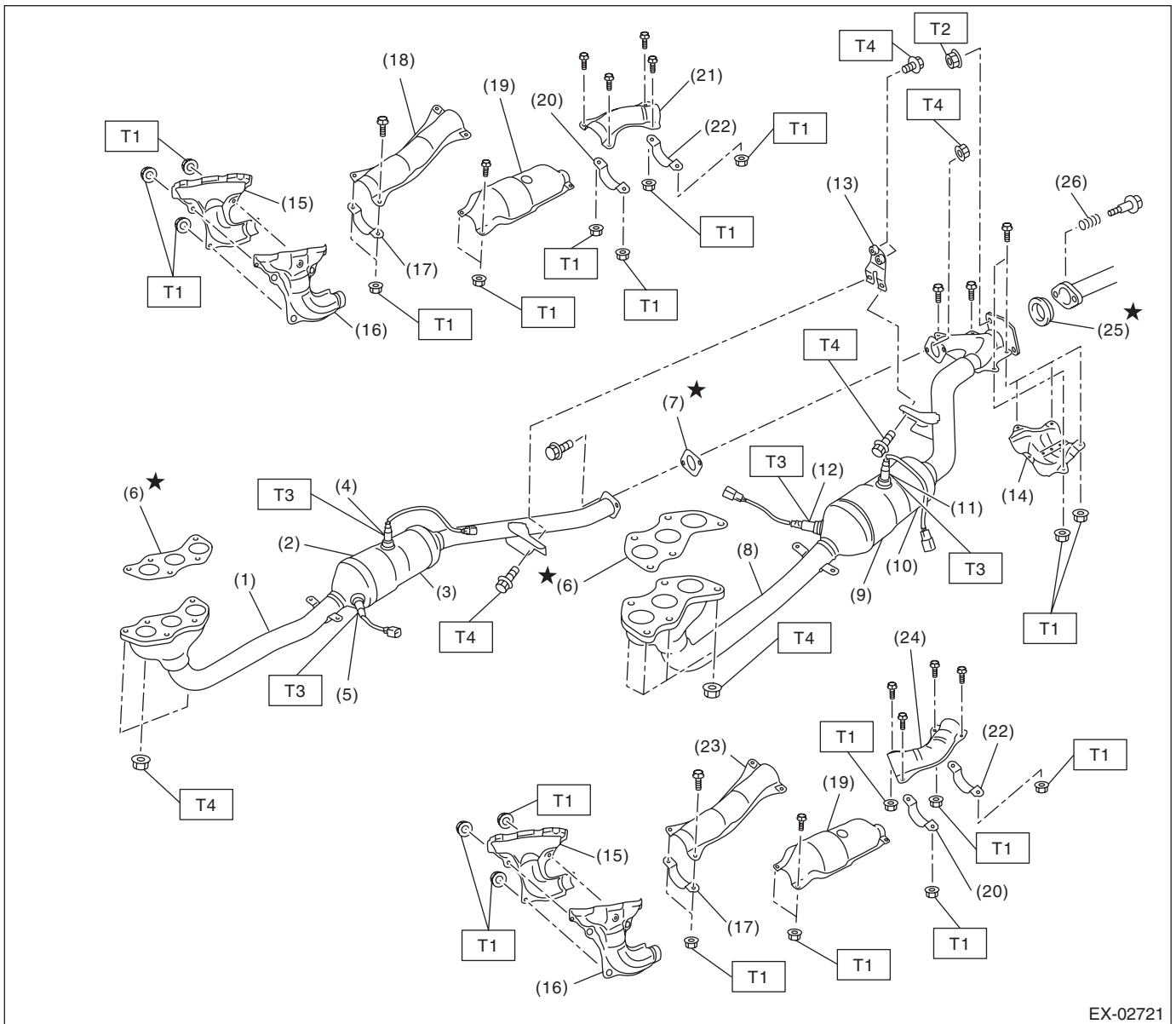
# General Description

EXHAUST

## 1. General Description

### A: COMPONENT

#### 1. FRONT EXHAUST PIPE



EX-02721

# General Description

EXHAUST

(1) Front exhaust pipe (RH)	(12) Front oxygen sensor (LH)	(23) Front exhaust pipe upper cover (LH) (front)
(2) Front catalytic converter (RH)	(13) Bracket	(24) Front exhaust pipe upper cover (LH) (rear)
(3) Rear catalytic converter (RH)	(14) Protector	(25) Gasket
(4) Rear oxygen sensor (RH)	(15) Front exhaust pipe cover (RH)	(26) Spring
(5) Front oxygen sensor (RH)	(16) Front exhaust pipe cover (LH)	
(6) Gasket	(17) Clamp	
(7) Gasket	(18) Front exhaust pipe upper cover (RH) (front)	
(8) Front exhaust pipe (LH)	(19) Catalytic converter upper cover	
(9) Front catalytic converter (LH)	(20) Clamp	
(10) Rear catalytic converter (LH)	(21) Front exhaust pipe upper cover (RH) (rear)	
(11) Rear oxygen sensor (LH)	(22) Clamp	

**Tightening torque: N·m (kgf-m, ft-lb)**

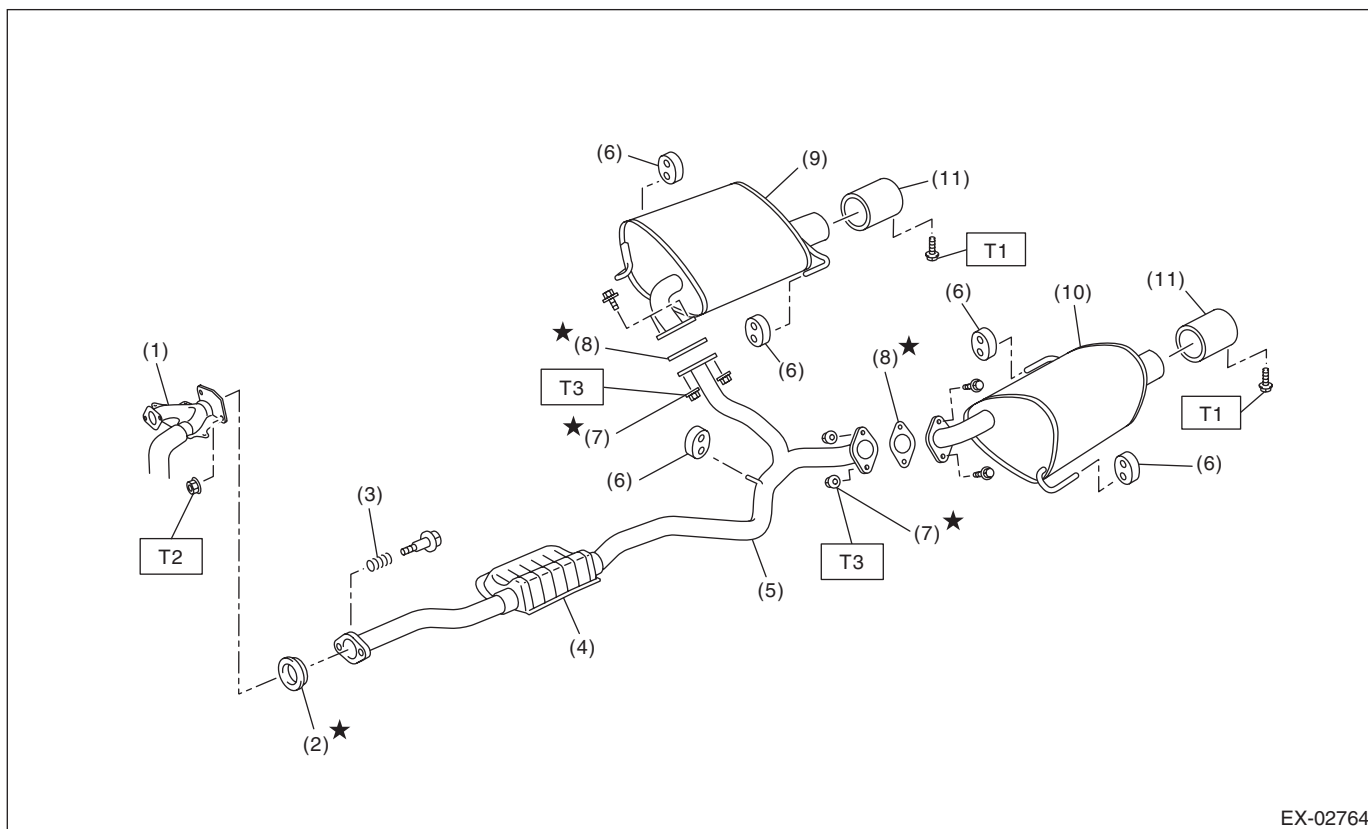
**T1: 13 (1.3, 9.6)**

**T2: 18 (1.8, 13.3)**

**T3: 21 (2.1, 15.5)**

**T4: 30 (3.1, 22.1)**

## 2. REAR EXHAUST PIPE AND MUFFLER



EX-02764

## General Description

### EXHAUST

---

- |                             |                      |
|-----------------------------|----------------------|
| (1) Front exhaust pipe (LH) | (7) Self-locking nut |
| (2) Gasket                  | (8) Gasket           |
| (3) Spring                  | (9) Muffler (RH)     |
| (4) Chamber                 | (10) Muffler (LH)    |
| (5) Rear exhaust pipe       | (11) Muffler cutter  |
| (6) Cushion rubber          |                      |

---

**Tightening torque: N·m (kgf-m, ft-lb)**

**T1: 7.5 (0.8, 5.5)**

**T2: 18 (1.8, 13.3)**

**T3: 48 (4.9, 35.4)**

---

### B: CAUTION

- Wear appropriate work clothing, including a cap, protective goggles and protective shoes when performing any work.
- 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.
- Vehicle components are extremely hot after driving. Be wary of receiving burns from heated parts.
- Be sure to tighten fasteners including bolts and nuts to the specified torque.
- Place shop jacks or rigid racks at the specified points.
- Before disconnecting connectors of sensors or units, be sure to disconnect the ground cable from the battery.
- If any fat adheres to the exhaust pipe, wipe it off. Otherwise a fire may happen.

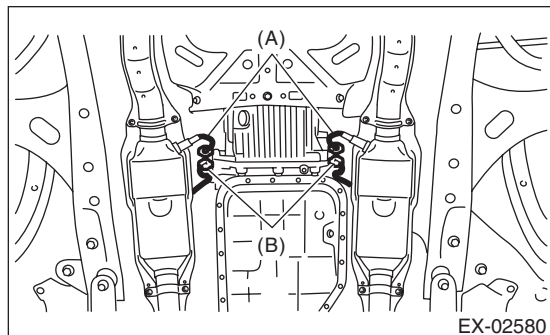
## 2. Front Exhaust Pipe

### A: REMOVAL

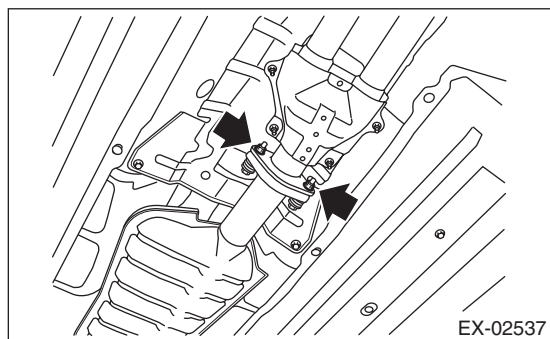
**CAUTION:**

Vehicle components are extremely hot after driving. Be wary of receiving burns from heated parts.

- 1) Disconnect the ground cable from battery.
- 2) Lift up the vehicle.
- 3) Remove the under cover. <Ref. to EI-18, REMOVAL, Front Under Cover.>
- 4) Disconnect the front oxygen (A/F) sensor connector (A) and rear oxygen sensor connector (B).



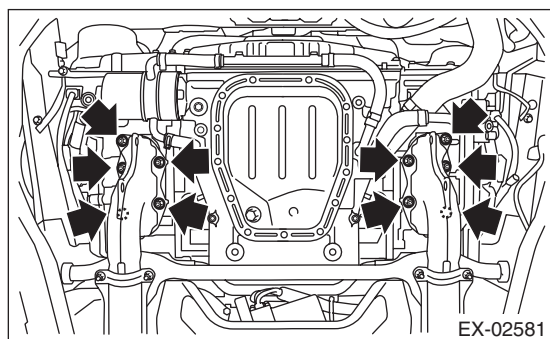
- 5) Remove the rear exhaust pipe from the front exhaust pipe assembly.



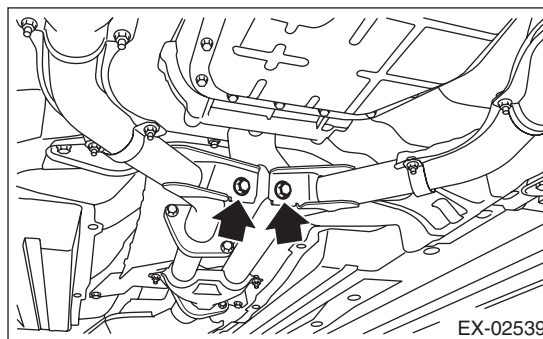
- 6) Remove the nuts which hold front exhaust pipe assembly onto cylinder heads.

**CAUTION:**

Be careful not to drop the front exhaust pipe assembly.



- 7) Remove the bolt which holds front exhaust pipe assembly to hanger bracket.

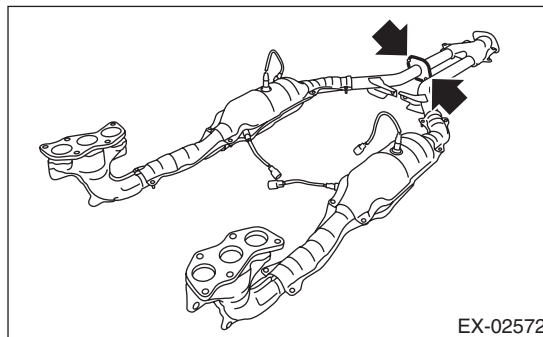


- 8) Remove the front exhaust pipe assembly.

**CAUTION:**

- Be careful not to let the front exhaust pipe assembly fall off when removing, since it is very heavy.
- After removing the front exhaust pipe assembly, do not apply excessive pulling force on the rear exhaust pipe.

- 9) Separate the front exhaust pipe (RH) from the front exhaust pipe (LH).



- 10) Remove the front oxygen (A/F) sensor and rear oxygen sensor. <Ref. to FU(H6DO)-48, REMOVAL, Front Oxygen (A/F) Sensor.> <Ref. to FU(H6DO)-50, REMOVAL, Rear Oxygen Sensor.>

### B: INSTALLATION

- 1) Install the front oxygen (A/F) sensor and rear oxygen sensor. <Ref. to FU(H6DO)-49, INSTALLATION, Front Oxygen (A/F) Sensor.> <Ref. to FU(H6DO)-50, INSTALLATION, Rear Oxygen Sensor.>

# Front Exhaust Pipe

## EXHAUST

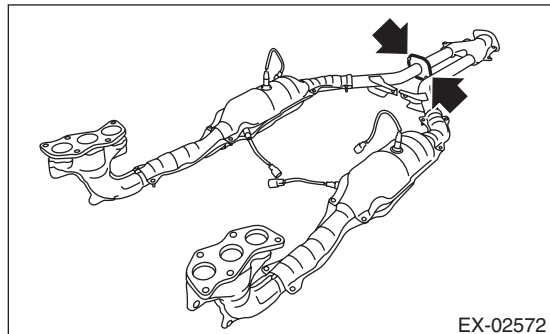
2) Install the front exhaust pipe (RH) to the front exhaust pipe (LH).

**NOTE:**

Use a new gasket.

**Tightening torque:**

**30 N·m (3.1 kgf·m, 22.1 ft·lb)**

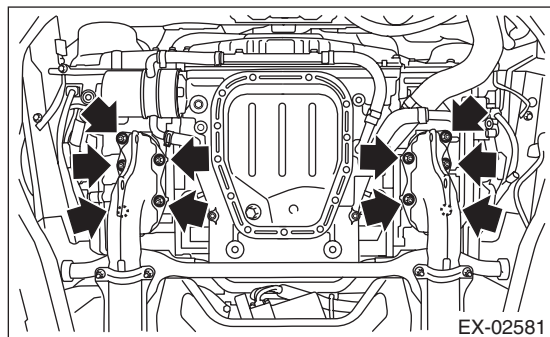


3) Install the front exhaust pipe assembly.

**NOTE:**

Use a new gasket.

4) Temporarily tighten the nuts which hold front exhaust pipe assembly to cylinder heads.



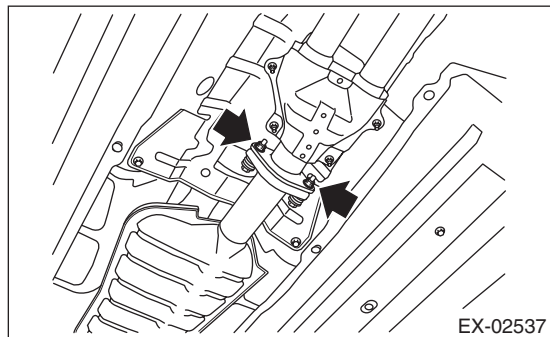
5) Install the front exhaust pipe assembly to the rear exhaust pipe.

**NOTE:**

Use a new gasket.

**Tightening torque:**

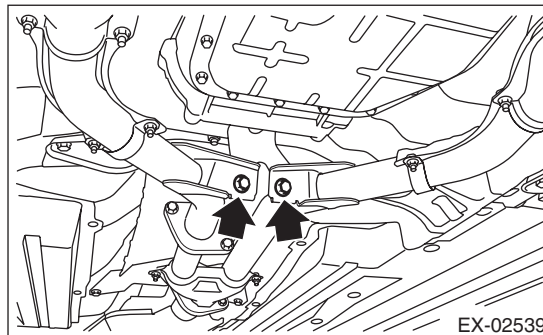
**18 N·m (1.8 kgf·m, 13.3 ft·lb)**



6) Tighten the bolts which hold front exhaust pipe assembly to hanger bracket.

**Tightening torque:**

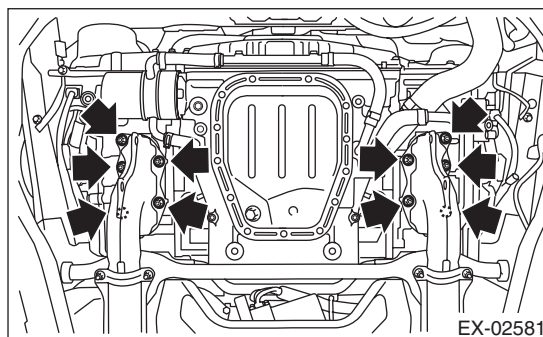
**30 N·m (3.1 kgf·m, 22.1 ft·lb)**



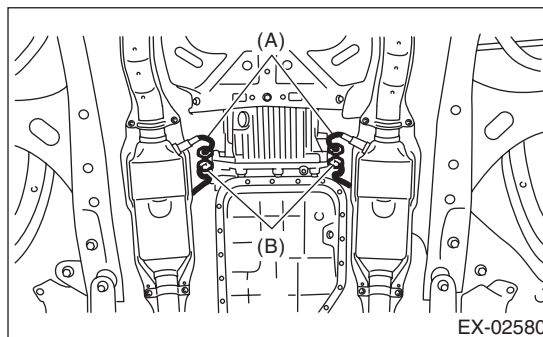
7) Tighten the nuts which hold front exhaust pipe assembly to cylinder heads.

**Tightening torque:**

**30 N·m (3.1 kgf·m, 22.1 ft·lb)**



8) Connect the front oxygen (A/F) sensor connector (A) and rear oxygen sensor connector (B).



9) Install the under cover. <Ref. to EI-18, INSTALLATION, Front Under Cover.>

10) Lower the vehicle.

11) Connect the battery ground terminal.

## C: INSPECTION

1) Check the connections and welds for exhaust leaks.

2) Make sure there are no holes or rusting.



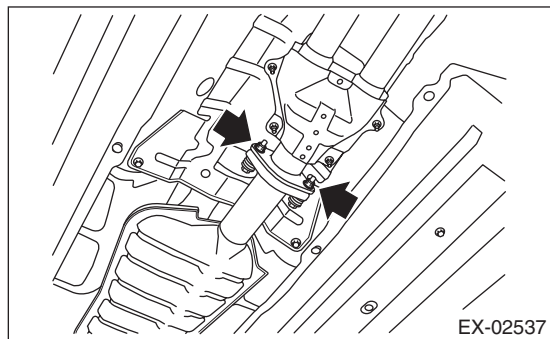
## 3. Rear Exhaust Pipe

### A: REMOVAL

**CAUTION:**

Vehicle components are extremely hot after driving. Be wary of receiving burns from heated parts.

- 1) Lift up the vehicle.
- 2) Remove the rear exhaust pipe from the front exhaust pipe assembly.

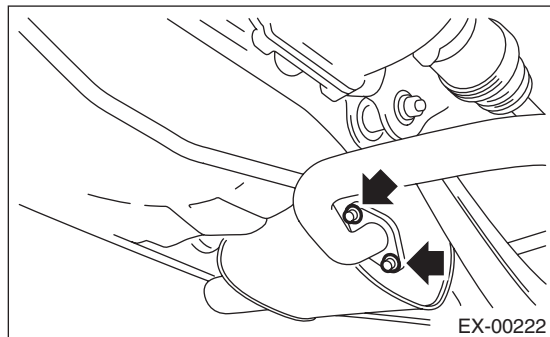


- 3) Remove the rear exhaust pipe from the muffler.

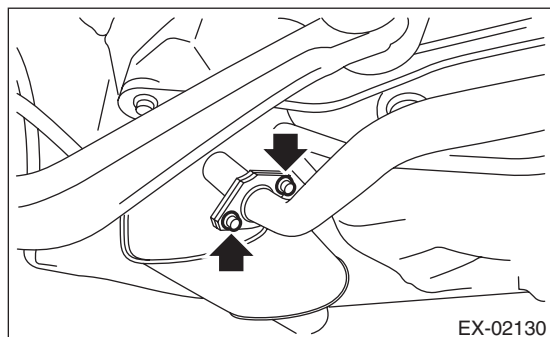
**CAUTION:**

Be careful not to drop the rear exhaust pipe.

- LH side



- RH side

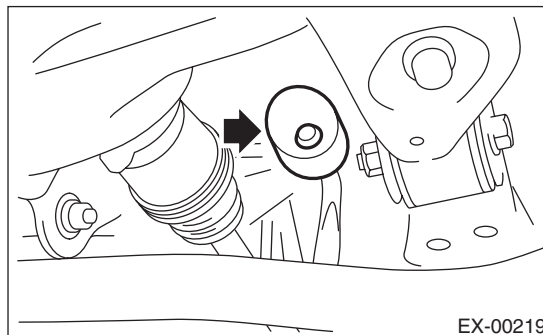


- 4) Apply a coat of spray type lubricant to the mating area of cushion rubber.

- 5) Remove the rear exhaust pipe from the cushion rubber.

**CAUTION:**

Be careful not to let the muffler contact the rear bumper.



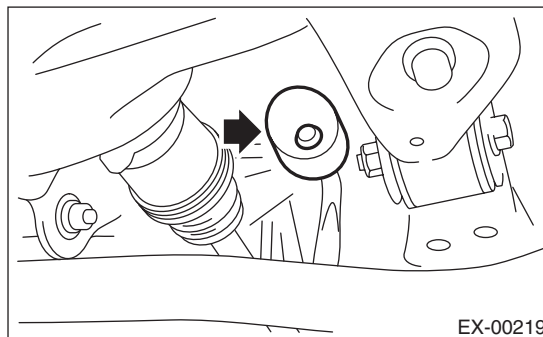
- 6) Remove the rear exhaust pipe.

### B: INSTALLATION

- 1) Apply a coat of spray type lubricant to the mating area of cushion rubber.
- 2) Install the rear exhaust pipe to cushion rubber.

**NOTE:**

After assembling, degrease the lubricant which was applied to the cushion rubber while removing/installing.



# Rear Exhaust Pipe

## EXHAUST

---

3) Install the rear exhaust pipe to the muffler.

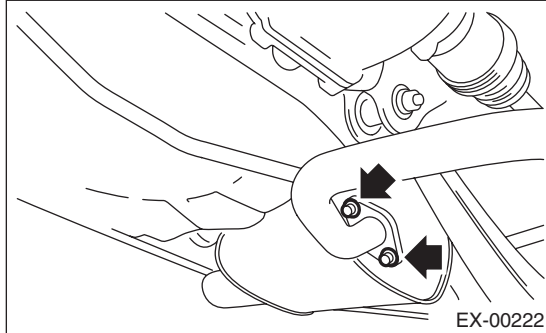
### NOTE:

Use a new gasket and self-locking nut.

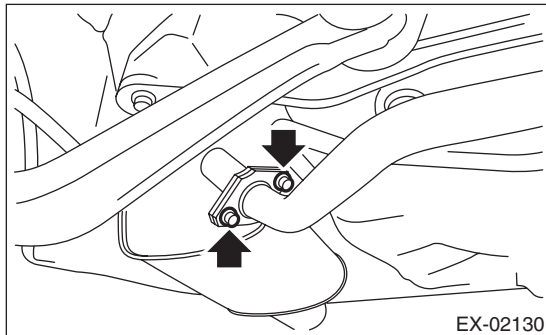
### Tightening torque:

**48 N·m (4.9 kgf·m, 35.4 ft·lb)**

- LH side



- RH side



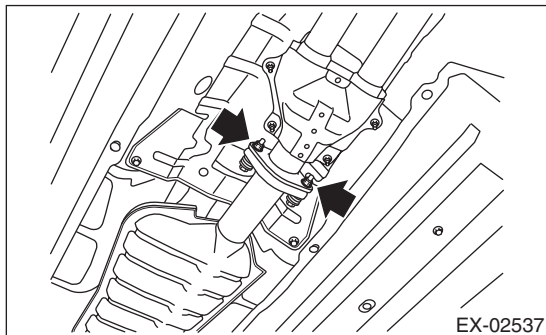
4) Install the rear exhaust pipe to the front exhaust pipe assembly.

### NOTE:

Use a new gasket.

### Tightening torque:

**18 N·m (1.8 kgf·m, 13.3 ft·lb)**



5) Lower the vehicle.

## C: INSPECTION

- 1) Check the connections and welds for exhaust leaks.
- 2) Make sure there are no holes or rusting.
- 3) Check the cushion rubber for wear or crack.

## 4. Muffler

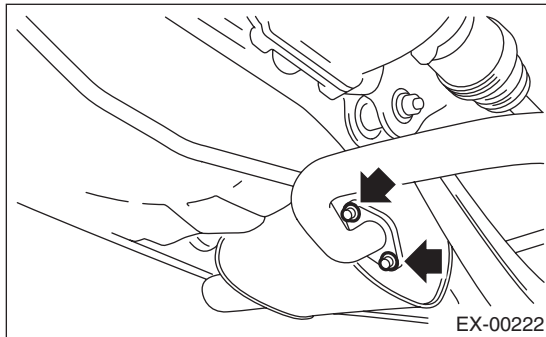
### A: REMOVAL

#### CAUTION:

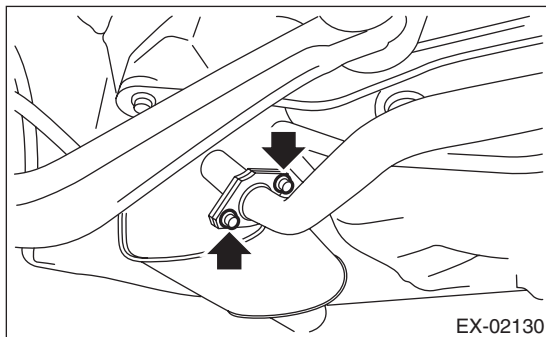
Vehicle components are extremely hot after driving. Be wary of receiving burns from heated parts.

- 1) Lift up the vehicle.
- 2) Remove the muffler from rear exhaust pipe.

- LH side



- RH side



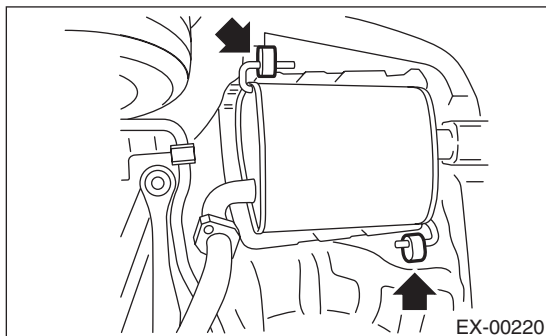
- 3) Apply a coat of spray type lubricant to the mating area of cushion rubber.

- 4) Remove the muffler from the cushion rubber.

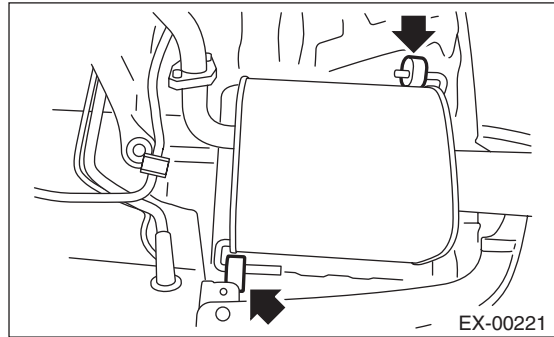
#### CAUTION:

Be careful not to drop the muffler during removal.

- LH side



- RH side



### B: INSTALLATION

Install in the reverse order of removal.

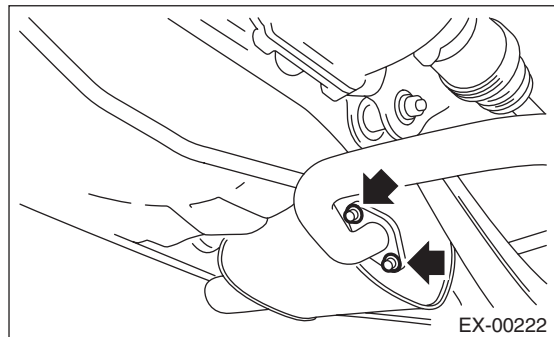
#### NOTE:

- Use a new gasket and self-locking nut.
- After assembling, degrease the lubricant which was applied to the cushion rubber while removing/installing.

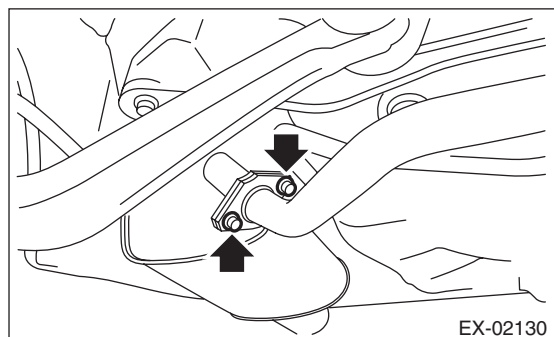
#### Tightening torque:

**48 N·m (4.9 kgf-m, 35.4 ft-lb)**

- LH side



- RH side



### C: INSPECTION

- 1) Check the connections and welds for exhaust leaks.
- 2) Make sure there are no holes or rusting.
- 3) Check the cushion rubber for wear or crack.

# Muffler

EXHAUST

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# COOLING

# *CO(H6DO)*

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# General Description

COOLING

## 1. General Description

### A: SPECIFICATION

Cooling system			Electric fan + Forced engine coolant circulation system	
Total engine coolant capacity			ℓ (US qt, Imp qt) 7.6 (8.0, 6.7)	
Water pump	Type		Centrifugal impeller type	
	Discharge performance	Discharge rate	ℓ (US gal, Imp gal) /min. 240 (63.4, 52.8)	
		Pump speed — Discharge pressure		4,956 rpm — 140 kPa (14.0 mAq)
		Engine coolant temperature		80°C (176°F)
	Impeller diameter		mm (in) 66 (2.60)	
	Number of impeller blades		8	
Pump sprocket outer diameter		mm (in) 60.60 (2.39)		
Thermostat	Type		Wax pellet type	
	Starting temperature to open		80 — 84°C (176 — 183°F)	
	Fully opens		95°C (203°F)	
	Valve lift	mm (in)	9.0 (0.354) or more	
	Valve bore	mm (in)	35 (1.38)	
Radiator fan	Motor input	Main fan	W 200	
		Sub fan	W 200	
	Fan diameter / Blade	Main fan	320 mm (12.6 in)/5	
		Sub fan	320 mm (12.6 in)/7	
Radiator	Type		Cross flow, pressure type	
	Core dimensions	Width × Height × Thickness	mm (in) 674.2 × 478.6 × 27 (26.543 × 18.842 × 1.06)	
	Pressure range in which cap valve is open	kPa (kg/cm <sup>2</sup> , psi)	Positive pressure side	Standard 73.6 — 103.0 (0.75 — 1.05, 11 — 15)
			Limit	63.6 (0.65, 9)
	Fins		Negative pressure side	Standard -1.0 — -4.9 (-0.01 — -0.05, -0.1 — -0.7)
			Corrugated fin type	
Reservoir tank	Capacity		ℓ (US qt, Imp qt) 0.45 (0.48, 0.40)	

	Recommended materials	Item number	Alternative
Coolant	SUBARU SUPER COOLANT (Concentrated type)	—	—
	SUBARU SUPER COOLANT (Diluted type)	K0670Y0001	
Water for dilution	Distilled water	—	Soft water or tap water
Cooling system protective agent	Cooling system conditioner	SOA345001	—

• **OUTSIDE TEMPERATURE: LESS THAN 35°C (95°F)**

A/C compressor load		Engine coolant temperature		
		Increase: less than 95°C (203°F) Decrease: less than 92°C (198°F)	Increase: 98 — 101°C (203 — 214°F) Decrease: 92 — 99°C (198 — 210°F)	Increase: 102°C (216°F) or more Decrease: 100°C (212°F) or more
OFF		0%	Refer to fig. (1)	100%
ON	Middle pressure switch OFF	Refer to fig. (2)		100%
	Middle pressure switch ON	Refer to fig. (3)		100%

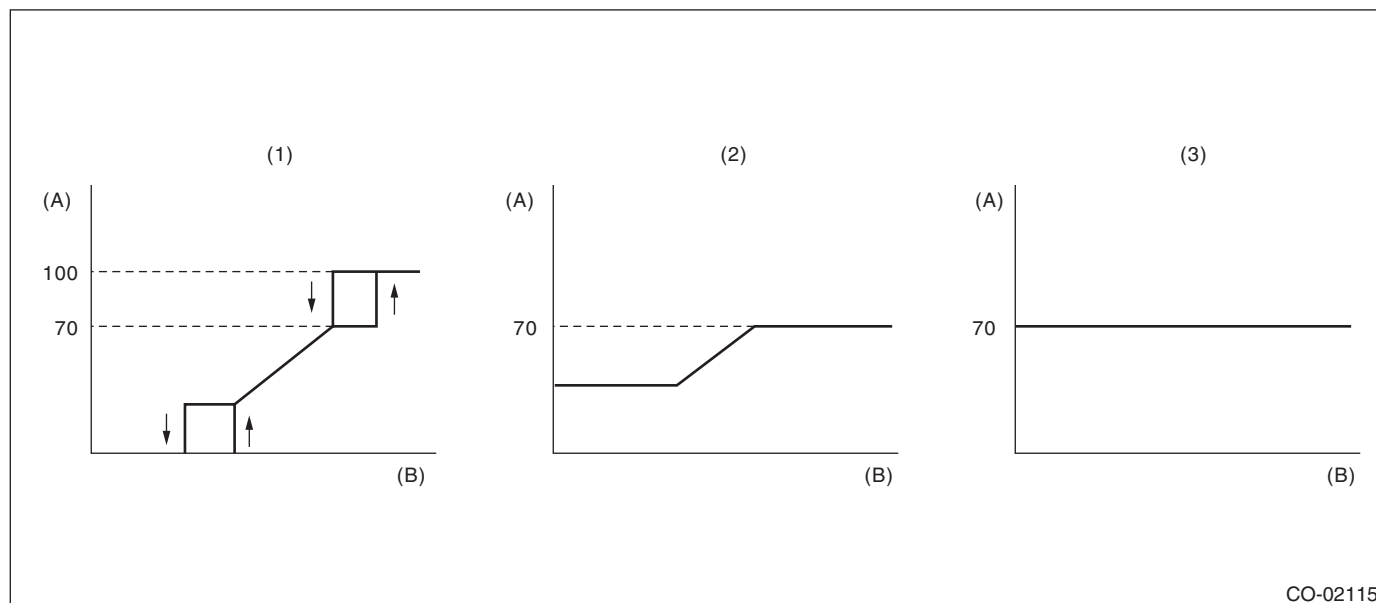
**CO(H6DO)-2**

# General Description

COOLING

## • OUTSIDE TEMPERATURE: 35°C (95°F) OR MORE

Vehicle speed	A/C compressor load		Engine coolant temperature		
			Increase: less than 95°C (203°F) Decrease: less than 92°C (198°F)	Increase: 95 — 101°C (203 — 214°F) Decrease: 92 — 99°C (198 — 210°F)	Increase: 102°C (216°F) or more Decrease: 100°C (212°F) or more
During acceleration: 19 km/h (12 MPH) or less During deceleration: 10 km/h (6 MPH) or less	OFF		Refer to fig. (1)		100%
	ON	Middle pressure switch OFF	Refer to fig. (2)		100%
		Middle pressure switch ON	100%		
During acceleration: 20 — 69 km/h (12 — 43 MPH) During deceleration: 11 — 64 km/h (7 — 40 MPH)	OFF		Refer to fig. (1)		100%
	ON	Middle pressure switch OFF	100%		
		Middle pressure switch ON	100%		
During acceleration: 70 — 105 km/h (43 — 65 MPH) During deceleration: 65 — 103 km/h (40 — 64 MPH)	OFF		Refer to fig. (1)		100%
	ON	Middle pressure switch OFF	Refer to fig. (2)		100%
		Middle pressure switch ON	Refer to fig. (3)		100%
During acceleration: 106 km/h (66 MPH) or more During deceleration: 104 km/h (65 MPH) or more	OFF		Refer to fig. (1)		100%
	ON	Middle pressure switch OFF	Refer to fig. (2)		100%
		Middle pressure switch ON	Refer to fig. (3)		100%



CO-02115

(A) Fan speed (%)

(B) Water temperature

(1) A/C OFF control

(2) A/C ON control (A/C middle pressure switch OFF)

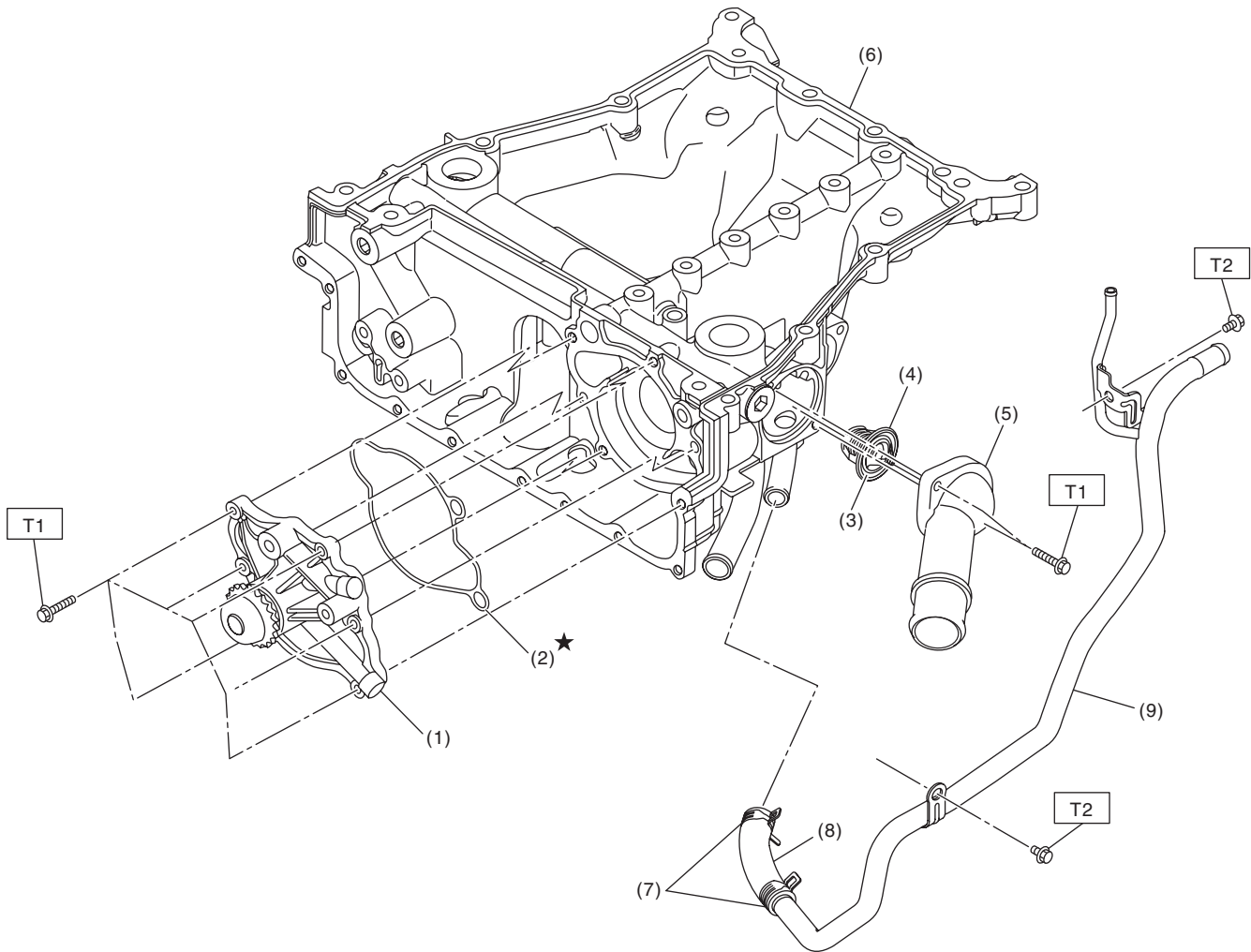
(3) A/C ON control (A/C middle pressure switch ON)

# General Description

## COOLING

### B: COMPONENT

#### 1. WATER PUMP & WATER PIPE



CO-02757

- |                      |                       |
|----------------------|-----------------------|
| (1) Water pump ASSY  | (6) Oil pan upper     |
| (2) O-ring           | (7) Clip              |
| (3) Thermostat       | (8) Hose              |
| (4) Gasket           | (9) Water return pipe |
| (5) Thermostat cover |                       |

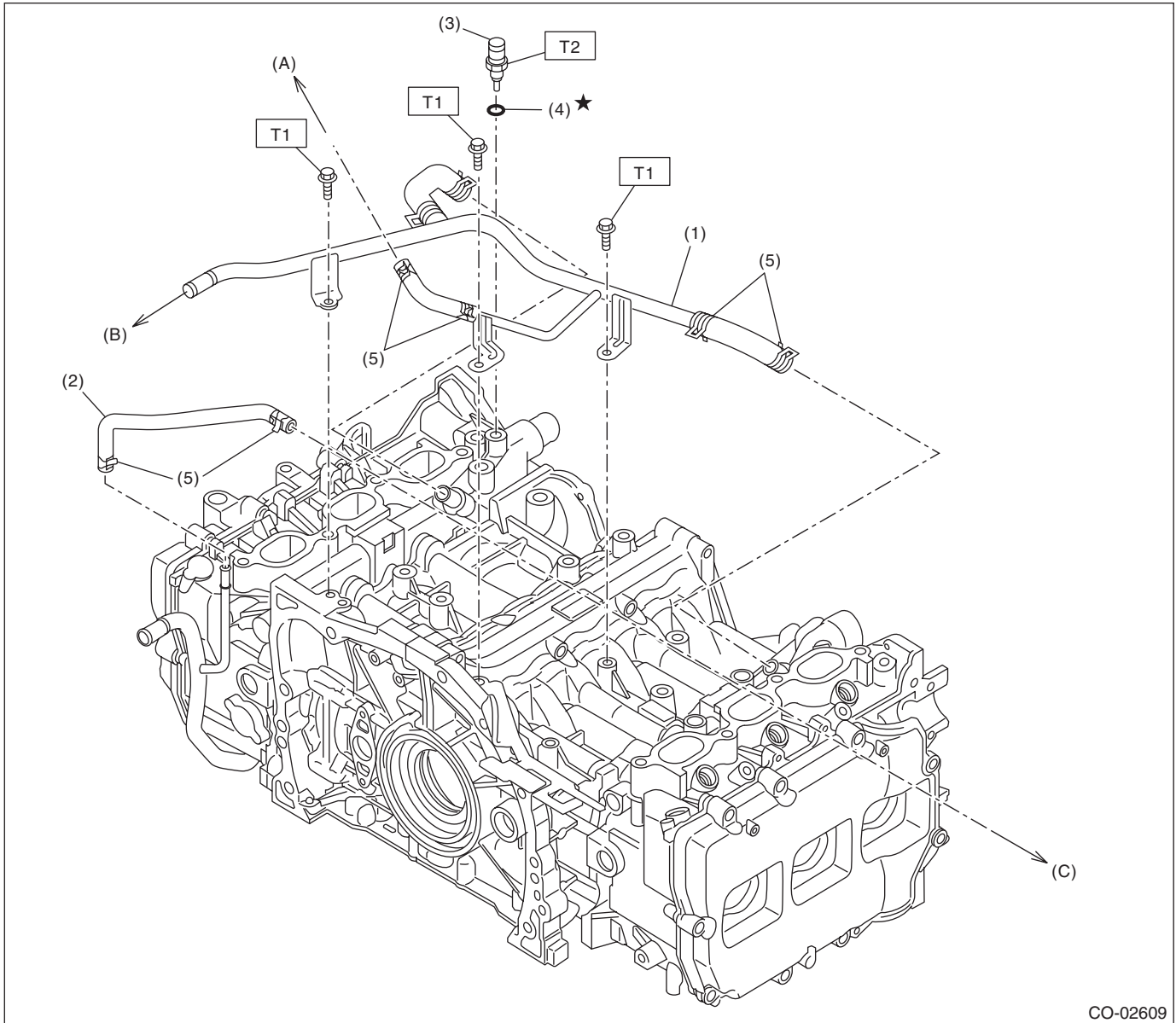
**Tightening torque:N·m (kgf·m, ft·lb)**

**T1: 6.4 (0.7, 4.7)**

**T2: 16 (1.6, 11.8)**



## 2. ENGINE COOLANT TEMPERATURE SENSOR & HEATER HOSE



CO-02609

(A) To the throttle body

(B) To the heater hose on body side

(C) To the throttle body

(1) Heater pipe

(4) Gasket

(2) Preheater hose

(5) Clip

(3) Engine coolant temperature sensor

**Tightening torque: N·m (kgf·m, ft·lb)**

**T1: 19 (1.9, 14.0)**

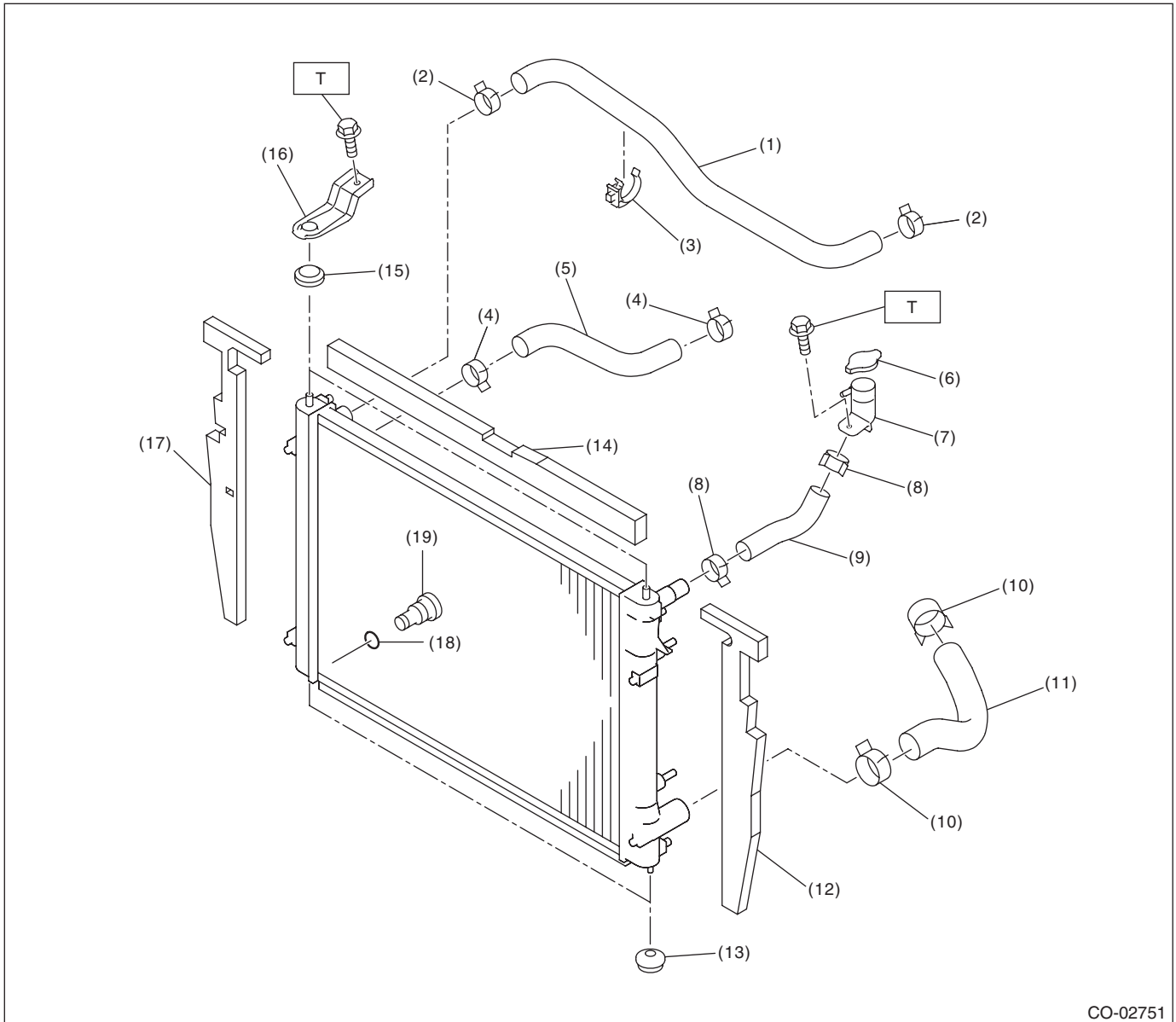
**T2: 22 (2.2, 16.2)**

# General Description

## COOLING

### 3. RADIATOR AND RADIATOR FAN

#### • Radiator



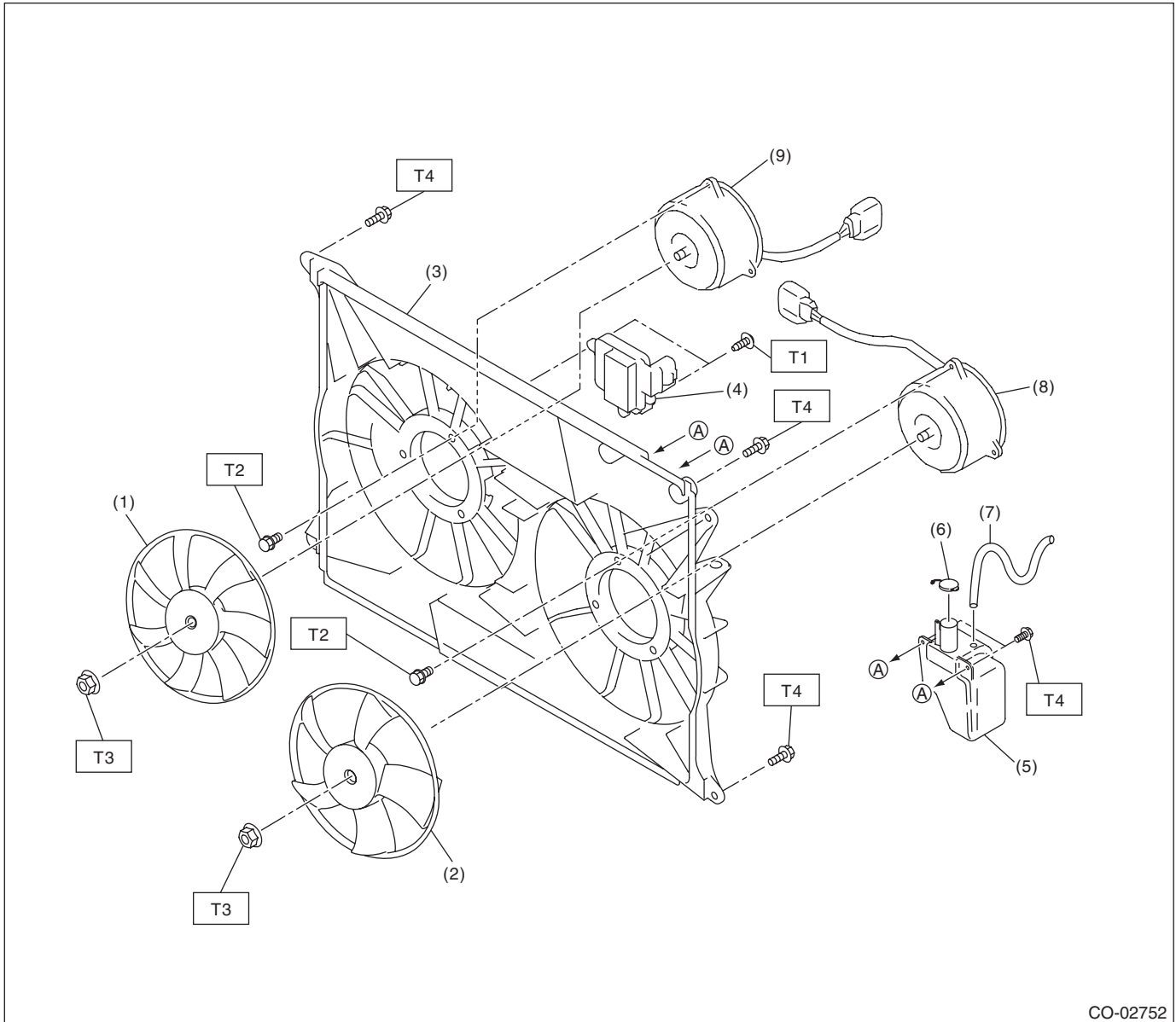
CO-02751

- |                            |                             |
|----------------------------|-----------------------------|
| (1) Radiator inlet hose LH | (11) Radiator outlet hose   |
| (2) Clip                   | (12) Gasket                 |
| (3) Clip                   | (13) Radiator lower cushion |
| (4) Clip                   | (14) Gasket                 |
| (5) Radiator inlet hose RH | (15) Radiator upper cushion |
| (6) Radiator cap           | (16) Radiator upper bracket |
| (7) Filler neck            | (17) Gasket                 |
| (8) Clip                   | (18) O-ring                 |
| (9) Radiator cap hose      | (19) Drain plug             |
| (10) Clip                  |                             |

**Tightening torque: N·m (kgf·m, ft·lb)**

**T: 12 (1.2, 8.9)**

• Radiator fan



CO-02752

- |                               |                             |
|-------------------------------|-----------------------------|
| (1) Radiator sub fan          | (7) Over flow hose          |
| (2) Radiator main fan         | (8) Radiator main fan motor |
| (3) Radiator fan shroud       | (9) Radiator sub fan motor  |
| (4) Radiator fan control unit |                             |
| (5) Reservoir tank            |                             |
| (6) Reservoir tank cap        |                             |

**Tightening torque: N·m (kgf·m, ft·lb)**

**T1: 2.6 (0.3, 1.9)**

**T2: 3.8 (0.4, 2.8)**

**T3: 6.3 (0.6, 4.6)**

**T4: 7.5 (0.8, 5.5)**

# General Description

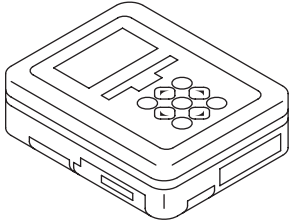
## COOLING

### C: CAUTION

- Wear appropriate work clothing, including a cap, protective goggles and protective shoes when performing any work.
- 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.
- Vehicle components are extremely hot after driving. Be wary of receiving burns from heated parts.
- Be sure to tighten fasteners including bolts and nuts to the specified torque.
- Place shop jacks or rigid racks at the specified points.
- Before disconnecting connectors of sensors or units, be sure to disconnect the ground cable from battery.
- Prepare a container and cloth to prevent scattering of engine coolant when performing work where engine coolant can be spilled. If the fuel spills, wipe it off immediately to prevent from penetrating into floor or flowing out for environmental protection.
- Follow all government and local regulations concerning disposal of refuse when disposing engine coolant.

### D: PREPARATION TOOL

#### 1. SPECIAL TOOL

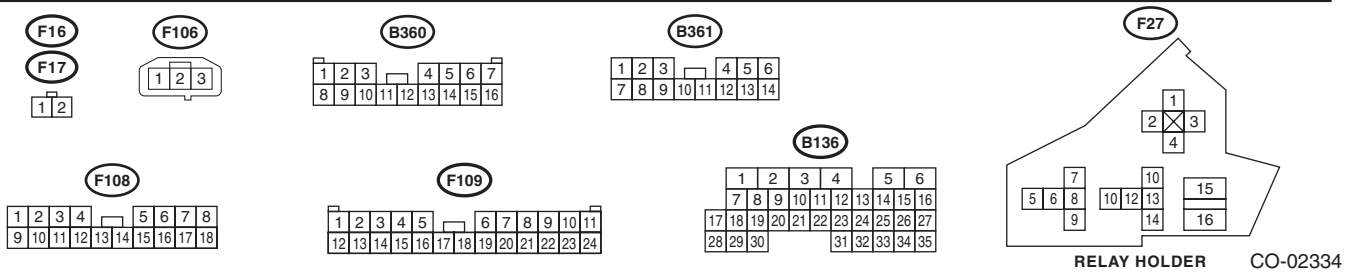
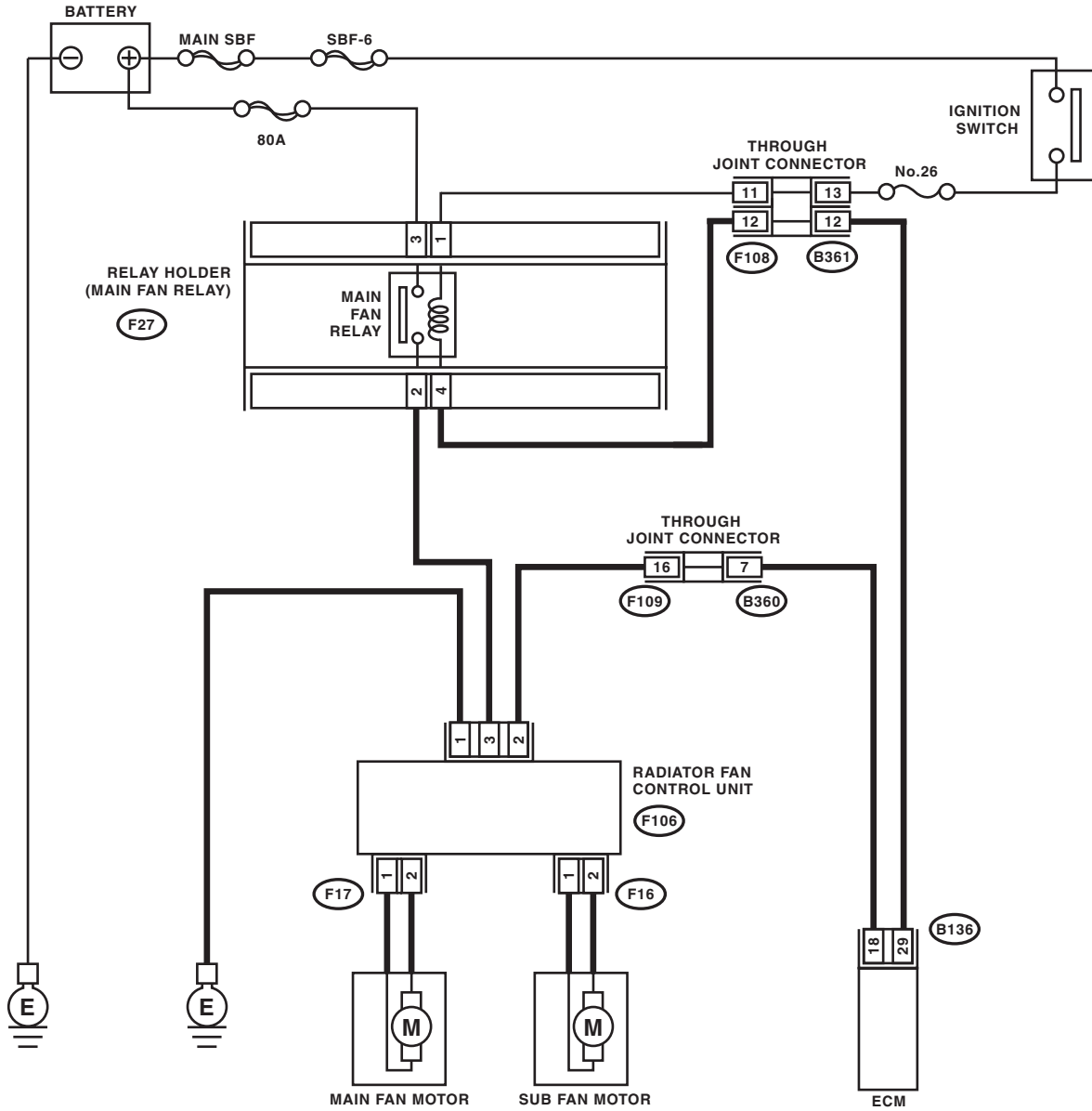
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST1B022XU0	1B022XU0	SUBARU SELECT MONITOR III KIT	Used for troubleshooting for electrical system.

#### 2. GENERAL TOOL

TOOL NAME	REMARKS
Circuit tester	Used for measuring resistance and voltage.
Radiator cap tester	Used for checking radiator and radiator cap.

## 2. Radiator Fan System

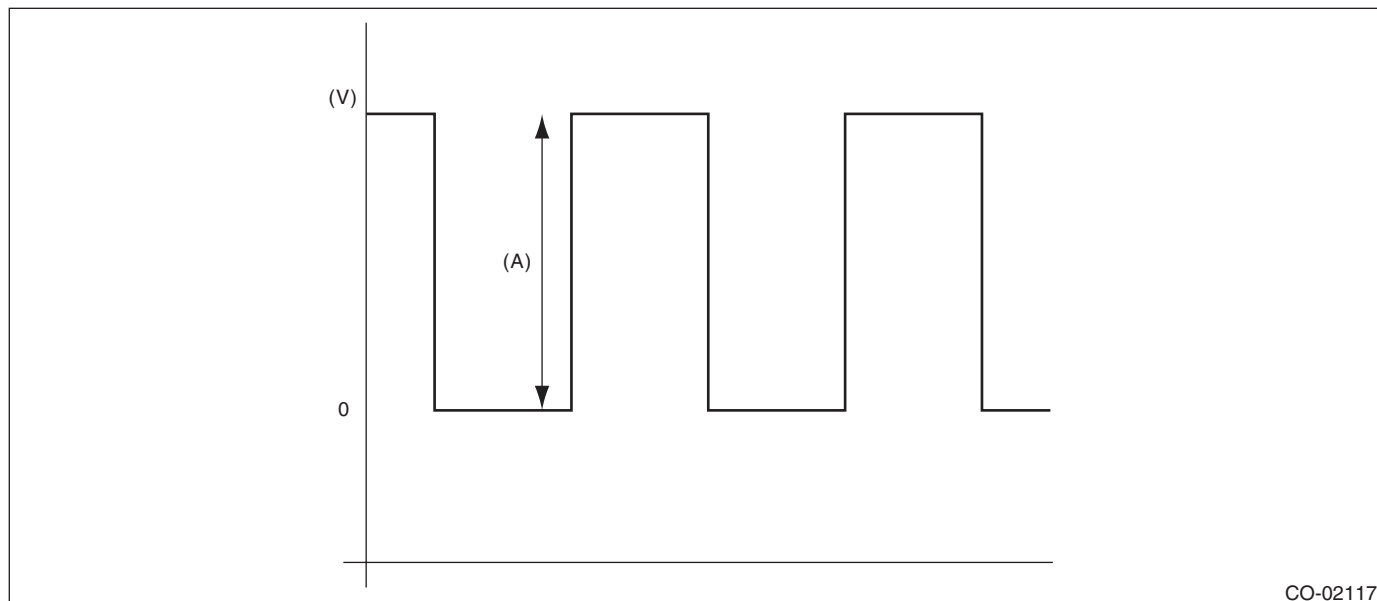
### A: WIRING DIAGRAM



# Radiator Fan System

COOLING

## B: RADIATOR FAN CONTROL OUTPUT WAVEFORM



CO-02117

(A) 5 V

## C: INSPECTION

### DETECTING CONDITION:

- Engine coolant temperature is 95°C (203°F) or more.
- A/C switch is turned OFF.
- Vehicle speed is 19 km/h (12 MPH) or less.

### TROUBLE SYMPTOMS:

Radiator main fan and radiator sub fan do not rotate under the above conditions.

Step	Check	Yes	No
<b>1 CHECK MAIN FAN RELAY.</b> 1) Turn the ignition switch to OFF. 2) Remove the main fan relay from the relay holder. 3) Measure the resistance of the main fan relay switch terminal.	Is the resistance 1 MΩ or more?	Go to step 2.	Replace the main fan relay.
<b>2 CHECK MAIN FAN RELAY.</b> 1) Connect the battery to the terminal on main fan relay coil side. 2) Measure the resistance between main fan relay switch terminals.	Is the resistance less than 1 Ω?	Go to step 3.	Replace the main fan relay.
<b>3 CHECK POWER SUPPLY FOR ECM.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Turn the ignition switch to ON. 4) Measure the voltage between ECM terminal and chassis ground. <b>Connector &amp; terminal</b> <b>(B136) No. 29 (+) — Chassis ground (-):</b>	Is the voltage 10 V or more?	Go to step 4.	Repair the power supply line.

# Radiator Fan System

COOLING

Step	Check	Yes	No
<b>4 CHECK POWER SUPPLY FOR RADIATOR FAN CONTROL UNIT.</b> 1) Turn the ignition switch to OFF. 2) Connect the connector to ECM. 3) Disconnect the connector from radiator fan control unit. 4) Turn the ignition switch to ON. 5) Measure the voltage between radiator fan control unit terminal and chassis ground. <b>Connector &amp; terminal</b> <b>(F106) No. 3 (+) — Chassis ground (-):</b>	Is the voltage 10 V or more?	Go to step 5.	Repair the power supply line.
<b>5 CHECK HARNESS BETWEEN ECM AND RADIATOR FAN CONTROL UNIT.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance between radiator fan control unit and ECM connector. <b>Connector &amp; terminal</b> <b>(B136) No. 18 — (F106) No. 2:</b>	Is the resistance less than 1 $\Omega$ ?	Go to step 6.	Repair the open circuit of harness between ECM and radiator fan control unit.
<b>6 CHECK GROUND CIRCUIT FOR RADIATOR FAN CONTROL UNIT.</b> 1) Connect the connector to ECM and radiator fan control unit. 2) Measure the resistance between radiator fan control unit connector and chassis ground. <b>Connector &amp; terminal</b> <b>(F106) No. 1 — Chassis ground:</b>	Is the resistance less than 5 $\Omega$ ?	Go to step 7.	Repair the open circuit of harness between radiator fan control unit connector and chassis ground.
<b>7 CHECK MAIN FAN MOTOR.</b> 1) Disconnect the connector from radiator fan control unit. 2) Connect the battery positive (+) terminal to terminal No. 1 of the main fan motor, and the ground (-) terminal to terminal No. 2.	Does the main fan motor rotate?	Go to step 8.	Replace the main fan motor.
<b>8 CHECK SUB FAN MOTOR.</b> 1) Disconnect the connector from radiator fan control unit. 2) Connect the battery positive (+) terminal to terminal No. 1 of the sub fan motor, and the ground (-) terminal to terminal No. 2.	Does the sub fan motor rotate?	Go to step 9.	Replace the sub fan motor.
<b>9 CHECK OUTPUT SIGNAL FROM ECM.</b> 1) Turn the ignition switch to OFF. 2) Connect the delivery (test) mode connector. 3) Turn the ignition switch to ON. 4) Check the output waveform using oscilloscope. <Ref. to CO(H6DO)-10, RADIATOR FAN CONTROL OUTPUT WAVEFORM, Radiator Fan System.> <b>Connector &amp; terminal</b> <b>(B134) No. 18 (+) — Chassis ground (-):</b>	Is waveform being output?	Replace the radiator fan control unit. <Ref. to CO(H6DO)-31, Radiator Fan Control Unit.>	Replace the ECM. <Ref. to FU(H6DO)-52, Engine Control Module (ECM).>

# Engine Coolant

## COOLING

### 3. Engine Coolant

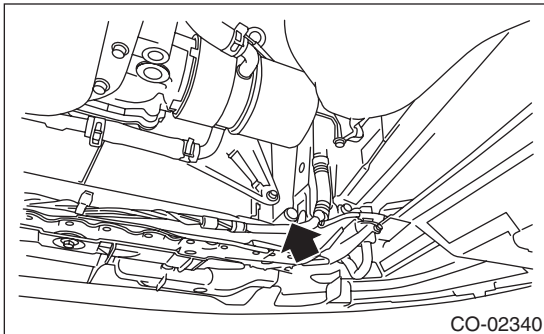
#### A: REPLACEMENT

##### 1. DRAINING OF ENGINE COOLANT

- 1) Lift up the vehicle.
- 2) Remove the under cover. <Ref. to EI-18, REMOVAL, Front Under Cover.>
- 3) Remove the drain plug to drain engine coolant into container.

##### NOTE:

Remove the radiator cap so that engine coolant will drain faster.



- 4) Install the drain plug.
- 5) Install the under cover. <Ref. to EI-18, INSTALLATION, Front Under Cover.>

##### 2. FILLING OF ENGINE COOLANT

- 1) Pour cooling system conditioner through the filler neck.

##### Cooling system protective agent:

For cooling system protective agent, refer to "SPECIFICATION". <Ref. to CO(H6DO)-2, SPECIFICATION, General Description.>

- 2) Pour engine coolant into the radiator up to the filler neck position.

##### Recommended engine coolant:

Refer to "SPECIFICATION" for recommended engine coolant. <Ref. to CO(H6DO)-2, SPECIFICATION, General Description.>

##### Engine coolant level:

Refer to "SPECIFICATION" for engine coolant level. <Ref. to CO(H6DO)-2, SPECIFICATION, General Description.>

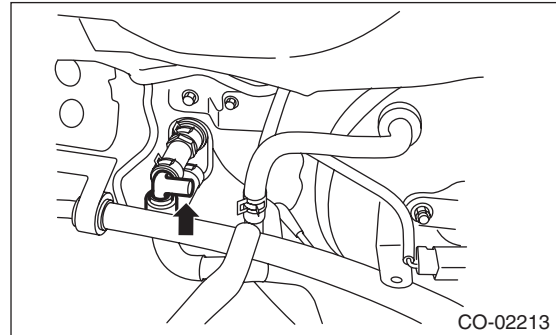
##### Engine coolant concentration:

Refer to "ADJUSTMENT" for the recommended engine coolant concentration. <Ref. to CO(H6DO)-13, ADJUSTMENT, Engine Coolant.>

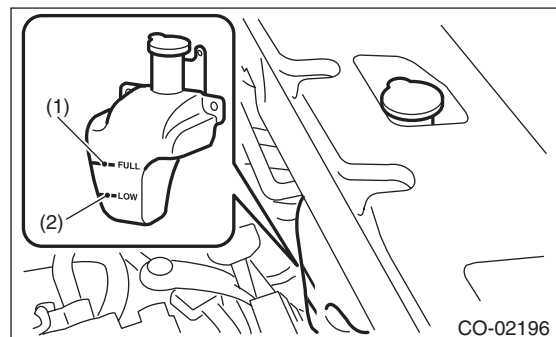
##### NOTE:

The SUBARU Super Coolant contains anti-freeze and anti-rust agents, and is especially made for Subaru engines with an aluminum cylinder block. Be sure to use SUBARU Super Coolant, since other coolant may cause corrosion.

- 3) Open the air bleeding valve on the heater hose side.



- 4) If the engine coolant level drops, add engine coolant into radiator up to the filler neck position.
- 5) Close the air bleeder valve when engine coolant comes out of the air bleeder valve on the heater hose side.
- 6) If the engine coolant level drops, add engine coolant into radiator up to the filler neck position.
- 7) When engine coolant has come out from the air bleeding valve on the radiator side, close the valve.
- 8) Fill engine coolant into the reservoir tank up to "FULL" level.



- (1) FULL
- (2) LOW

- 9) Close the radiator cap and start the engine. Race 5 to 6 times at 3,000 rpm or less, then stop the engine. (Complete this operation within 40 seconds.)
- 10) Wait for one minute after the engine stops, and open the radiator cap. If the engine coolant level drops, add engine coolant into radiator up to the filler neck position.
- 11) Perform the procedures 9) and 10) again.



- 12) Attach the radiator cap and reservoir tank cap properly.
- 13) Start the engine and operate the heater at maximum hot position and the blower speed setting to "LO".
- 14) Run the engine at 2,000 rpm or less until radiator fan starts and stops.

**NOTE:**

Be careful with the engine coolant temperature to prevent overheating.

- 15) Stop the engine and wait until the engine coolant temperature lowers to 30°C (86°F) or less.
- 16) Open the radiator cap. If the engine coolant level drops, add engine coolant into the radiator up to the filler neck position and the reservoir tank to "FULL" level.
- 17) Attach the radiator cap and reservoir tank cap properly.
- 18) Set the heater setting to maximum hot position and the blower speed setting to "LO" and start the engine. Perform racing at 3,000 rpm or less. If the flowing sound is heard from the heater core, repeat the procedures from step 14).

## B: ADJUSTMENT

### 1. PROCEDURE TO ADJUST THE CONCENTRATION OF THE SUBARU SUPER COOLANT

**CAUTION:**

**Use the SUBARU Super Coolant with a 50 — 60% concentration in order to obtain maximum anti-freeze and anti-rust performance.**

To adjust the concentration of SUBARU Super Coolant according to temperature, find the proper SUBARU Super Coolant concentration in the table, and add diluting water to the SUBARU Super Coolant (undiluted type) until it reaches the proper dilution.

Relationship of SUBARU Super Coolant concentration and freezing temperature			
SUBARU Super Coolant concentration	50%	55%	60%
Freezing temp.	-36°C (-33°F)	-41°C (-42°F)	-50°C (-58°F)

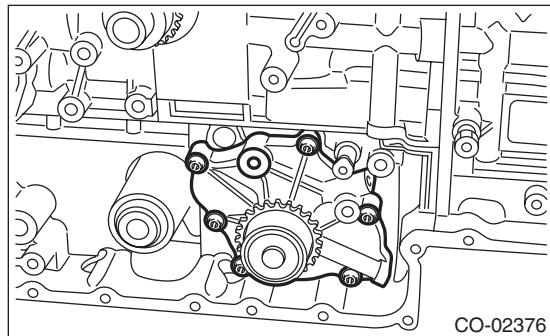
**Engine coolant and diluting water:**

**Refer to "SPECIFICATION" for the recommended engine coolant and diluting water. <Ref. to CO(H6DO)-2, SPECIFICATION, General Description.>**

## 4. Water Pump

### A: REMOVAL

- 1) Remove the radiator. <Ref. to CO(H6DO)-17, REMOVAL, Radiator.>
- 2) Remove the V-belts. <Ref. to ME(H6DO)-45, REMOVAL, V-belt.>
- 3) Remove the crank pulley. <Ref. to ME(H6DO)-46, REMOVAL, Crank Pulley.>
- 4) Remove the chain cover. <Ref. to ME(H6DO)-47, REMOVAL, Chain Cover.>
- 5) Remove the timing chain assembly. <Ref. to ME(H6DO)-54, REMOVAL, Timing Chain Assembly.>
- 6) Remove the water pump from the oil pan upper.



### B: INSTALLATION

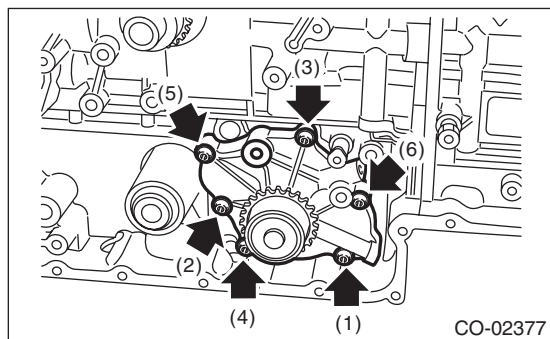
- 1) Tighten the bolts in the numerical order as shown in the figure, and install water pump to the oil pan upper.

**NOTE:**

Use new O-rings.

**Tightening torque:**

**6.4 N·m (0.7 kgf·m, 4.7 ft·lb)**



- 2) Install the timing chain assembly. <Ref. to ME(H6DO)-60, INSTALLATION, Timing Chain Assembly.>
- 3) Install the chain cover. <Ref. to ME(H6DO)-49, INSTALLATION, Chain Cover.>
- 4) Install the crank pulley. <Ref. to ME(H6DO)-46, INSTALLATION, Crank Pulley.>
- 5) Install the V-belts. <Ref. to ME(H6DO)-45, INSTALLATION, V-belt.>

- 6) Install the radiator. <Ref. to CO(H6DO)-19, INSTALLATION, Radiator.>
- 7) Fill engine coolant. <Ref. to CO(H6DO)-12, FILLING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>

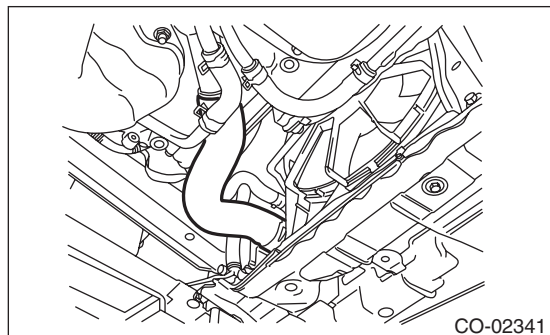
### C: INSPECTION

- 1) Check the water pump bearing for smooth rotation.
- 2) Check the water pump sprocket for abnormalities.
- 3) Make sure the impeller is not abnormally deformed or damaged.
- 4) After water pump installation, check pulley shaft for engine coolant leaks or noise. If leaks or noise are noted, replace the water pump assembly.

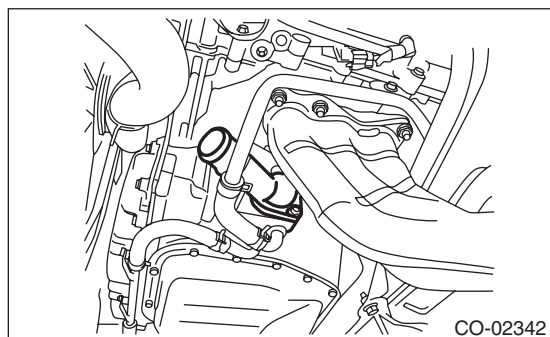
## 5. Thermostat

### A: REMOVAL

- 1) Lift up the vehicle.
- 2) Remove the under cover. <Ref. to EI-18, REMOVAL, Front Under Cover.>
- 3) Drain engine coolant completely. <Ref. to CO(H6DO)-12, DRAINING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>
- 4) Remove the radiator outlet hose from the radiator lower and the thermostat cover.



- 5) Remove the thermostat cover, and then remove the thermostat.



### B: INSTALLATION

- 1) Install a gasket to thermostat.

NOTE:

Use a new gasket.

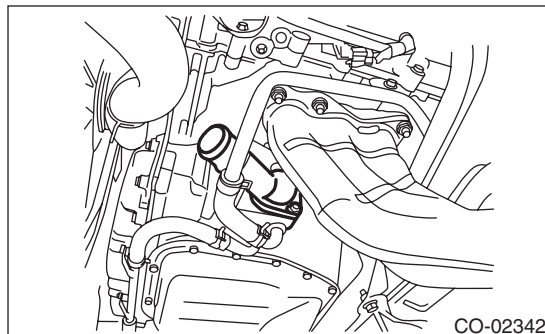
- 2) Install the thermostat and thermostat cover.

NOTE:

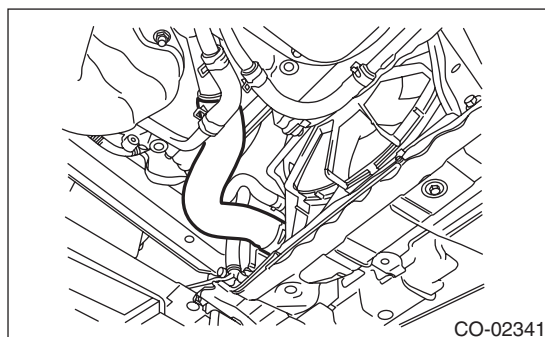
Install the parts with the jiggle pin facing the upside.

**Tightening torque:**

**6.4 N·m (0.65 kgf·m, 4.7 ft·lb)**



- 3) Install the radiator outlet hose to the radiator lower and the thermostat cover.



- 4) Install the under cover. <Ref. to EI-18, INSTALLATION, Front Under Cover.>

- 5) Lower the vehicle.

- 6) Fill engine coolant. <Ref. to CO(H6DO)-12, FILLING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>

# Thermostat

## COOLING

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### C: INSPECTION

- 1) Check that the thermostat does not have deformation, cracks or damage.
- 2) Check that the thermostat valve closes completely at an ambient temperature.
- 3) Immerse the thermostat and a thermometer in water. Raise water temperature gradually, and check the temperature and valve lift when the valve begins to open and when the valve is fully opened. Replace the thermostat if faulty.

#### NOTE:

- During the test, agitate the water for even temperature distribution.
- Leave the thermostat in the boiling water for five minutes or more before measuring the valve lift.
- Hold the thermostat with a wire or the like to avoid contacting the container.

#### **Starting temperature to open:**

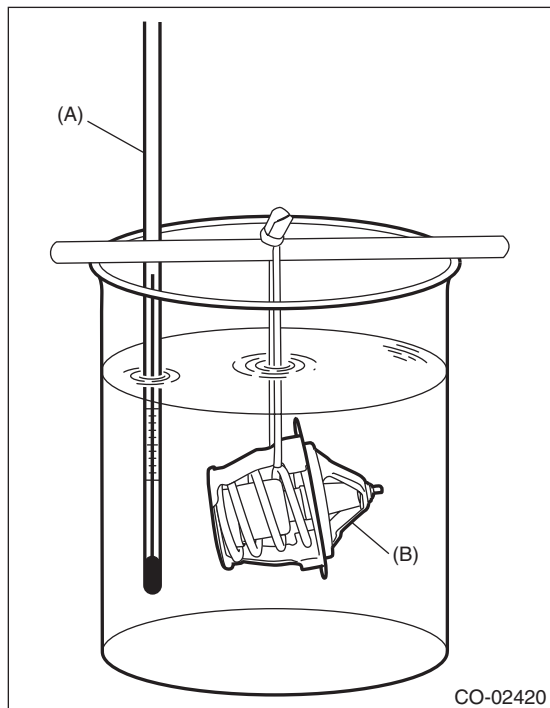
**80 — 84°C (176 — 183°F)**

#### **Full open temperature:**

**95°C (203°F)**

#### **Total valve lift:**

**9.0 mm (0.354 in) or more**



(A) Thermometer

(B) Thermostat

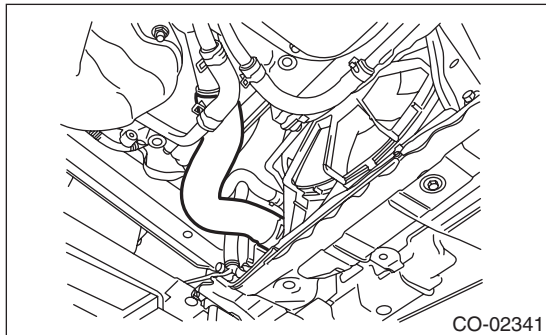
## 6. Radiator

### A: REMOVAL

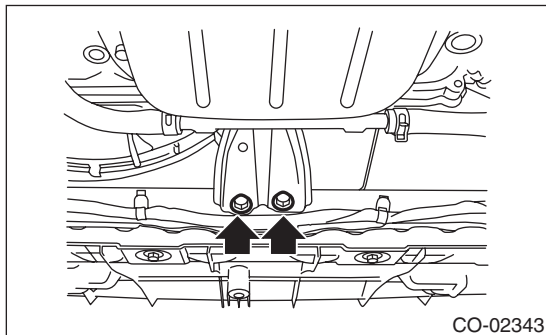
#### CAUTION:

The radiator is pressurized when the engine and radiator are hot. Wait until engine and radiator cool down before working on the radiator.

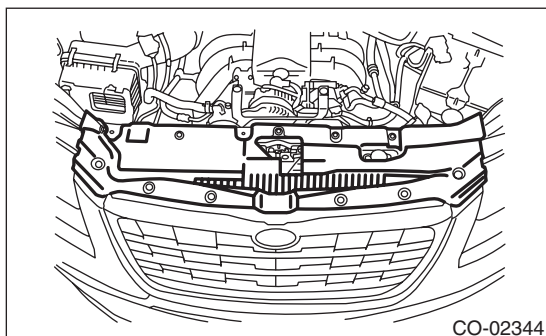
- 1) Remove the collector cover.
- 2) Disconnect the ground cable from battery.
- 3) Lift up the vehicle.
- 4) Remove the under cover. <Ref. to EI-18, REMOVAL, Front Under Cover.>
- 5) Drain engine coolant completely. <Ref. to CO(H6DO)-12, DRAINING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>
- 6) Disconnect the radiator outlet hose from radiator lower.



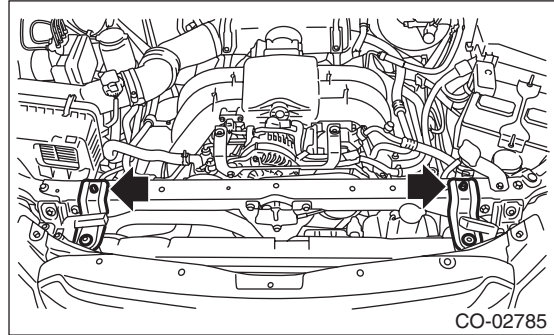
- 7) Remove the bolts on the underside of the radiator stay.



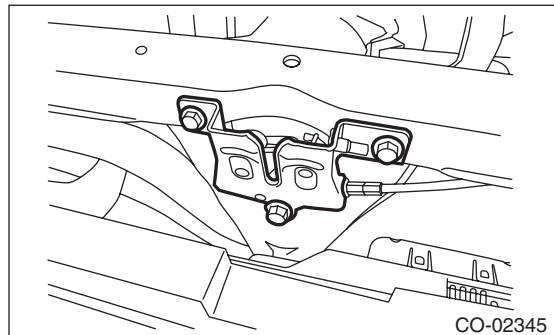
- 8) Lower the vehicle.
- 9) Remove the air intake duct. <Ref. to IN(H6DO)-9, REMOVAL, Air Intake Duct.>
- 10) Remove the front upper cover.



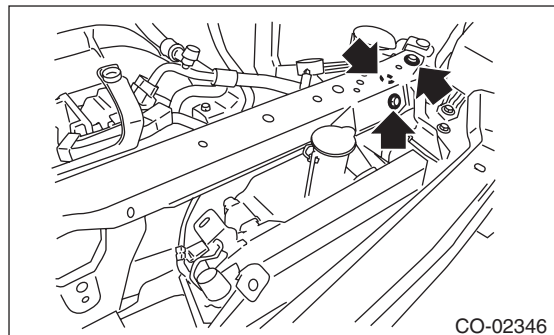
- 11) Remove the radiator upper brackets.



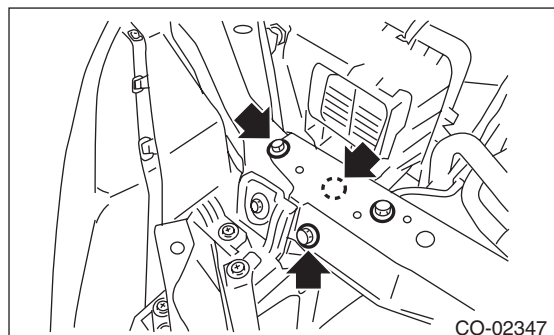
- 12) Remove the radiator stay.
  - (1) Remove the latch.



- (2) Remove the radiator inlet hose LH from the clip.
- (3) Remove the front hood cable fixing clip from the radiator stay.
- (4) Remove the bolts on the left side of the radiator stay.



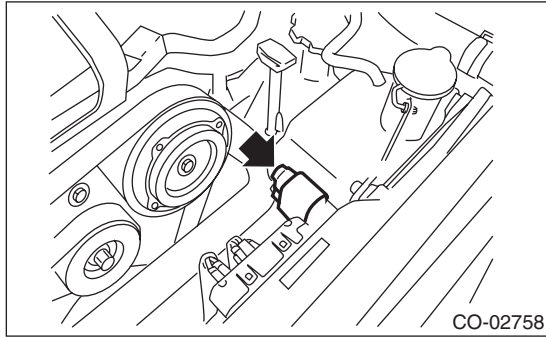
- (5) Remove the bolts on the right side of the radiator stay.



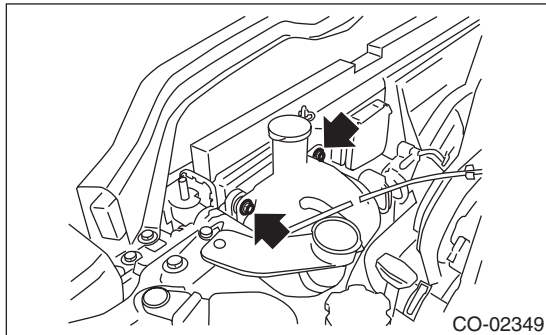
# Radiator

## COOLING

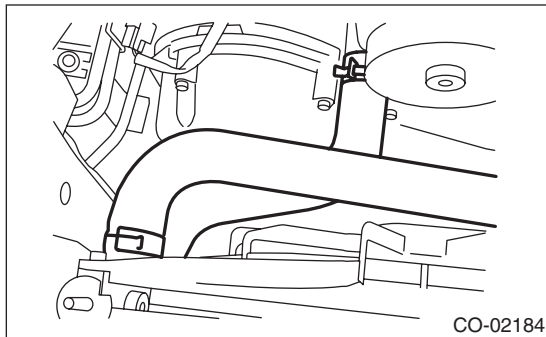
13) Disconnect the connector from radiator fan control unit.



14) Remove the reservoir tank.



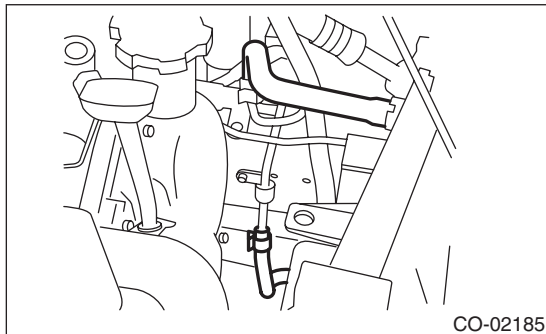
15) Disconnect the radiator inlet hoses LH and RH from the radiator.



16) Disconnect the ATF radiator hose from radiator.

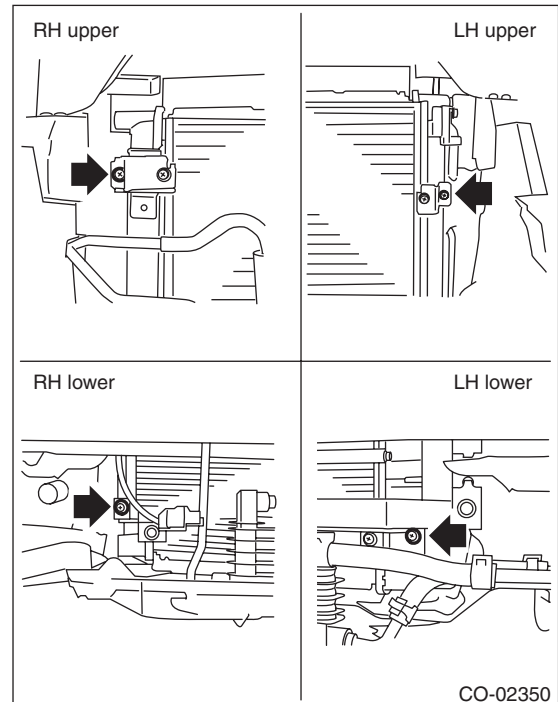
### NOTE:

Plug the ATF pipe to prevent ATF leaks.

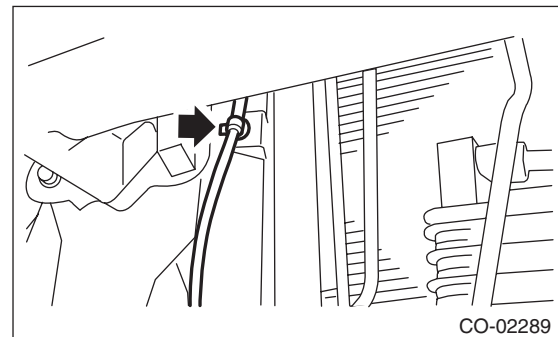


17) Remove the front bumper. <Ref. to EI-22, REMOVAL, Front Bumper.>

18) Remove the bolts which hold the radiator and condenser.



19) Remove the clip holding the ambient sensor harness.



20) Lift the radiator up and away from vehicle.

21) Remove the radiator lower cushion.

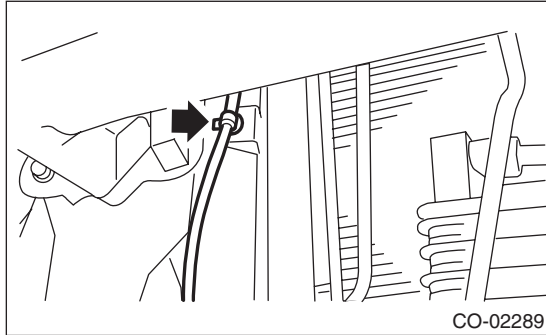
## B: INSTALLATION

- 1) Install the radiator lower cushion.
- 2) Install the radiator to vehicle.

**NOTE:**

Insert pins on the lower side of radiator into the radiator lower cushions on vehicle side.

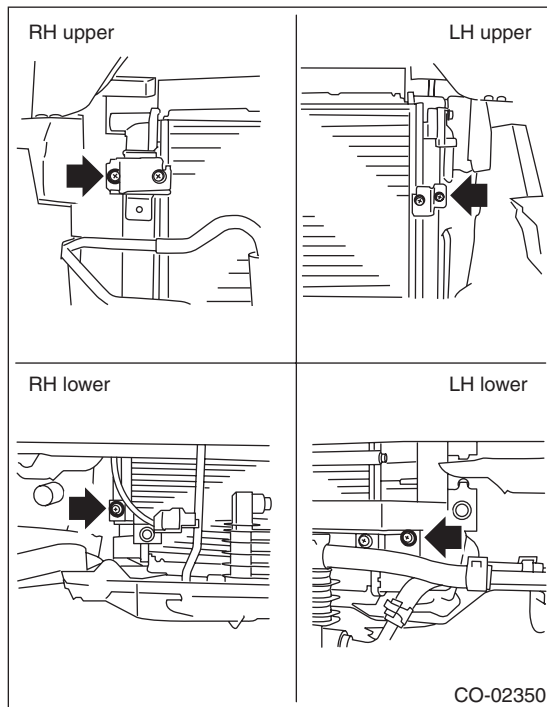
- 3) Hold the ambient sensor harness with clip.



- 4) Hold the radiator and condenser with bolts.

**Tightening torque:**

**7.5 N·m (0.8 kgf-m, 5.5 ft-lb)**

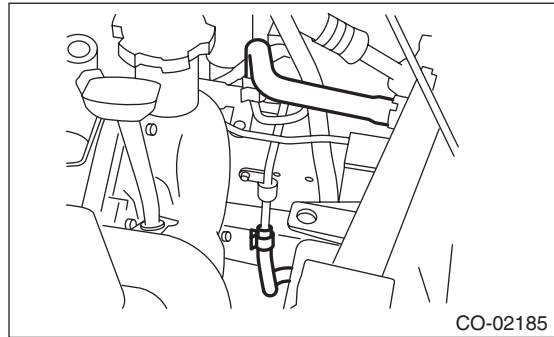


- 5) Install the front bumper. <Ref. to EI-23, INSTALLATION, Front Bumper.>

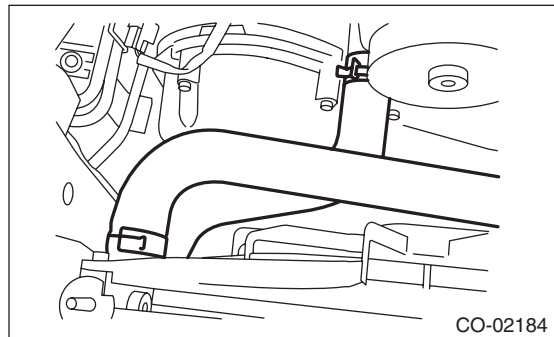
- 6) Connect the ATF radiator hose.

**NOTE:**

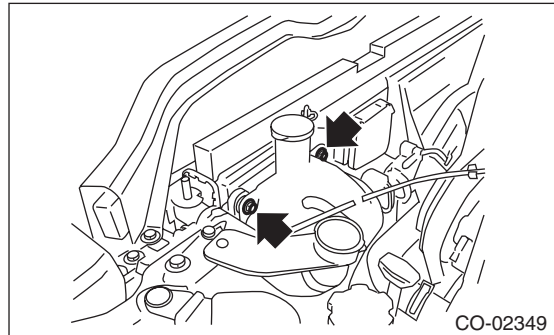
Use a new ATF radiator hose.



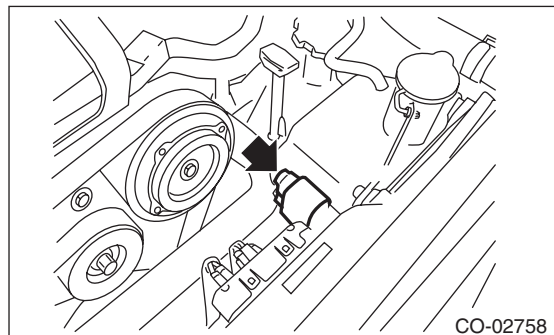
- 7) Connect the radiator inlet hoses LH and RH.



- 8) Install the reservoir tank.



- 9) Connect the connector to radiator fan control unit.

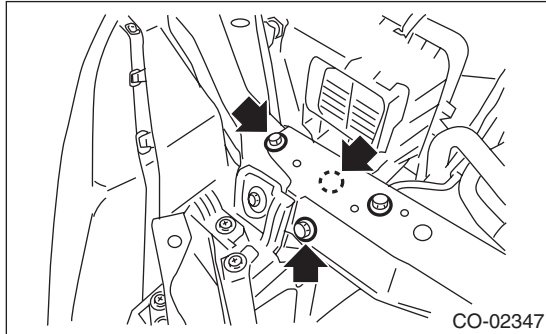


# Radiator

## COOLING

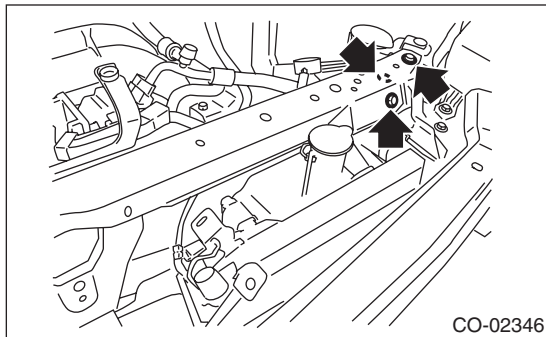
- 10) Install the radiator stay.
  - (1) Tighten the bolts on the right side of the radiator stay.

**Tightening torque:**  
**18 N·m (1.8 kgf·m, 13.3 ft·lb)**



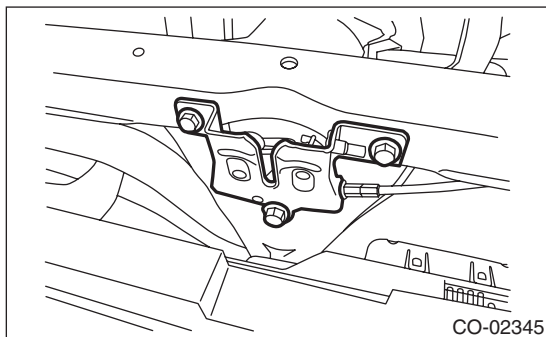
- (2) Tighten the bolts on the left side of the radiator stay.

**Tightening torque:**  
**18 N·m (1.8 kgf·m, 13.3 ft·lb)**



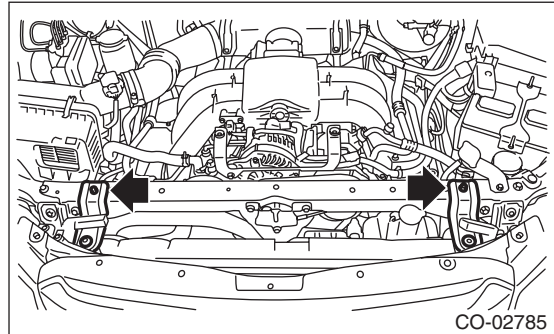
- (3) Install the front hood cable fixing clip to the radiator stay.
  - (4) Install the radiator inlet hose LH to the clip.
  - (5) Install the latch.

**Tightening torque:**  
**33 N·m (3.4 kgf·m, 24.3 ft·lb)**

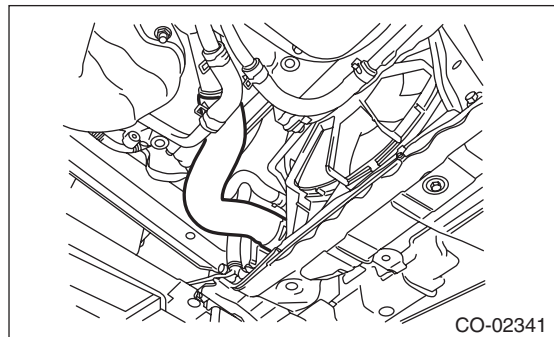


- 11) Install the radiator upper brackets.

**Tightening torque:**  
**12 N·m (1.2 kgf·m, 8.9 ft·lb)**

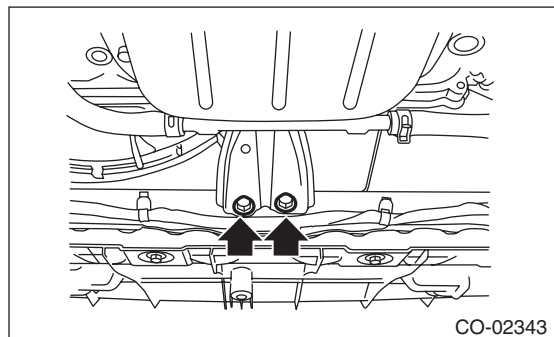


- 12) Lift up the vehicle.
- 13) Connect the radiator outlet hose to the radiator lower.



- 14) Tighten the bolts at the bottom of the radiator stay.

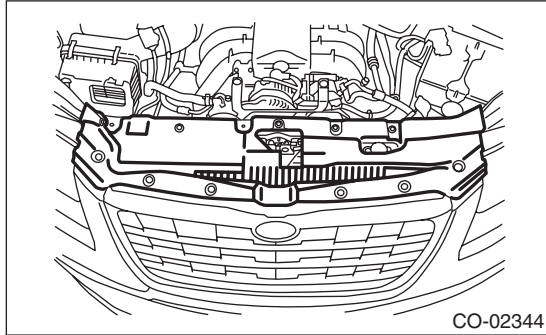
**Tightening torque:**  
**18 N·m (1.8 kgf·m, 13.3 ft·lb)**



- 15) Install the under cover. <Ref. to EI-18, INSTALLATION, Front Under Cover.>
- 16) Lower the vehicle.
- 17) Connect the battery ground terminal.
- 18) Fill engine coolant. <Ref. to CO(H6DO)-12, FILLING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>
- 19) Check the ATF level and replenish it if necessary. <Ref. to 5AT-28, INSPECTION, Automatic Transmission Fluid.>



20) Install the front upper cover.



21) Install the air intake duct. <Ref. to IN(H6DO)-9, INSTALLATION, Air Intake Duct.>

22) Install the collector cover.

## C: INSPECTION

- 1) Check that the radiator does not have deformation, cracks or damage.
- 2) Check that the hose has no cracks, damage or loose part.
- 3) Remove the radiator cap, fill the radiator with engine coolant, and then install the radiator cap tester to the filler neck of radiator.
- 4) Apply a pressure of 157 kPa (1.6 kgf/cm<sup>2</sup>, 23 psi) to the radiator, and check the following items.
  - Leakage from the radiator or its vicinity
  - Leakage from the hose or its connections

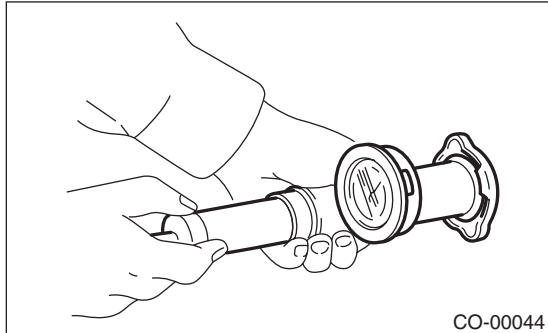
### CAUTION:

- **Engine should be turned off.**
- **Wipe engine coolant from check points in advance.**
- **Be careful of engine coolant from spurting out when removing the radiator cap tester.**
- **Be careful not to deform the filler neck of radiator when installing and removing the radiator cap tester.**

## 7. Radiator Cap

### A: INSPECTION

- 1) Check that the radiator cap does not have deformation, cracks or damage.
- 2) Attach the radiator cap tester to radiator cap.



- 3) Increase pressure until the radiator cap tester gauge needle stops. Radiator cap is functioning properly if it holds the service limit pressure for 5 — 6 seconds. Replace the radiator cap if its valve opens at less than the service limit.

**Standard:**

**73.6 — 103.0 kPa (0.75 — 1.05 kgf/cm<sup>2</sup>, 11 — 15 psi)**

**Service limit:**

**63.6 kPa (0.65 kgf/cm<sup>2</sup>, 9 psi)**

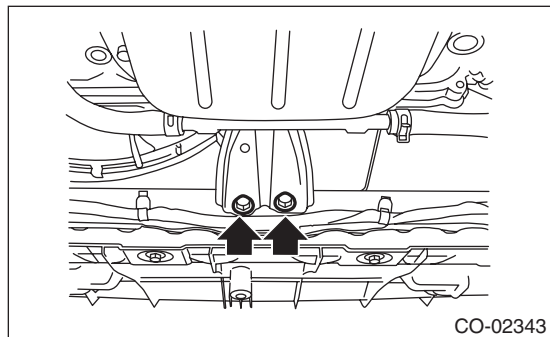
**CAUTION:**

**Be sure to remove foreign matter and rust from the cap in advance. Otherwise, results of pressure test will be incorrect.**

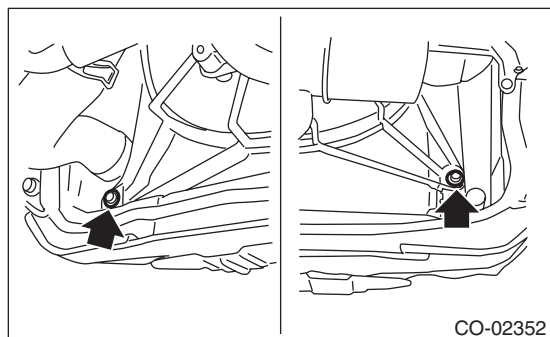
## 8. Radiator Main Fan and Fan Motor

### A: REMOVAL

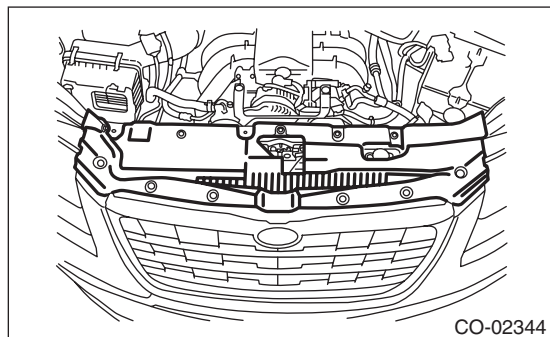
- 1) Remove the collector cover.
- 2) Disconnect the ground cable from battery.
- 3) Lift up the vehicle.
- 4) Remove the under cover. <Ref. to EI-18, REMOVAL, Front Under Cover.>
- 5) Remove the bolts at the bottom of the radiator stay.



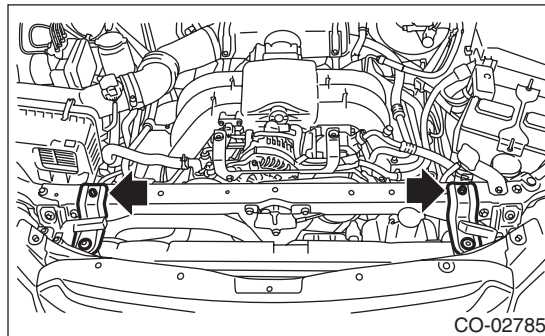
- 6) Remove the bolts at the bottom of the radiator fan shroud.



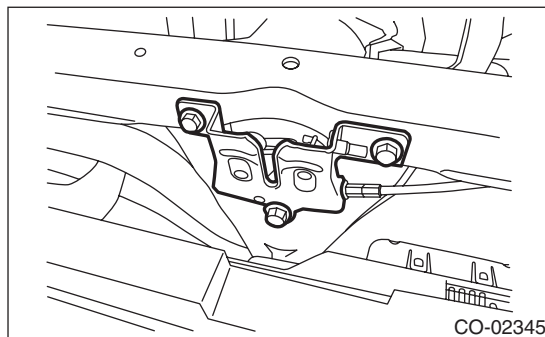
- 7) Lower the vehicle.
- 8) Remove the air intake duct. <Ref. to IN(H6DO)-9, REMOVAL, Air Intake Duct.>
- 9) Remove the front upper cover.



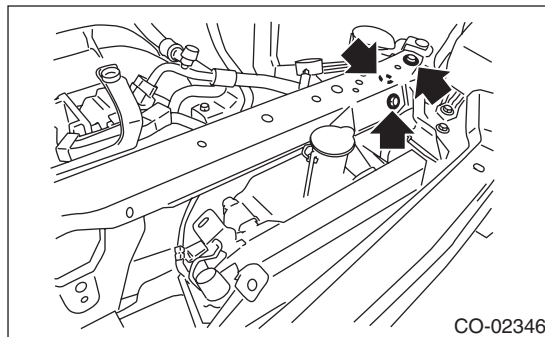
- 10) Remove the radiator upper brackets.



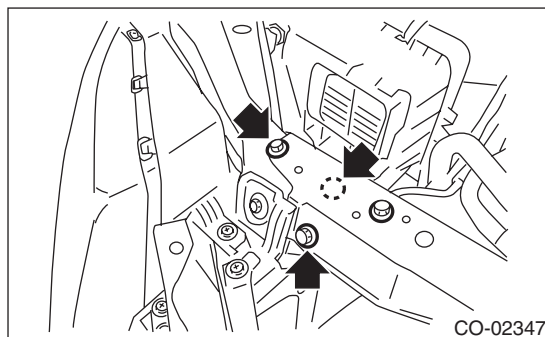
- 11) Remove the radiator stay.
  - (1) Remove the latch.



- (2) Remove the radiator inlet hose LH from the clip.
- (3) Remove the front hood cable fixing clip from the radiator stay.
- (4) Remove the bolts on the left side of the radiator stay.



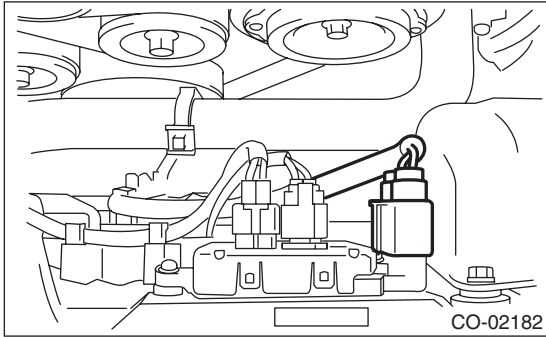
- (5) Remove the bolts on the right side of the radiator stay.



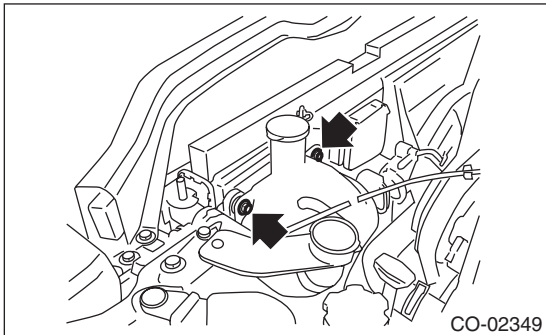
# Radiator Main Fan and Fan Motor

## COOLING

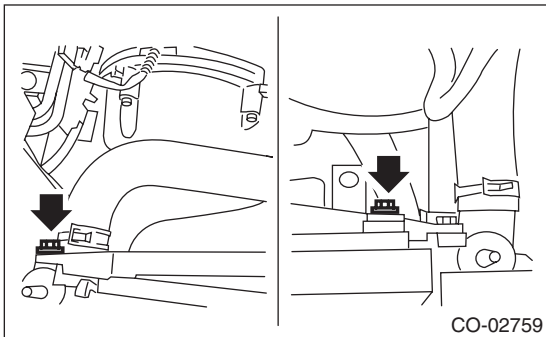
12) Disconnect the connector from radiator fan control unit.



13) Remove the reservoir tank.



14) Remove the bolts on the upper side of the radiator fan shroud.



15) Remove the radiator fan shroud.

### NOTE:

When pulling up the radiator fan shroud, be careful not to damage the radiator hose or ATF radiator hose.

## B: INSTALLATION

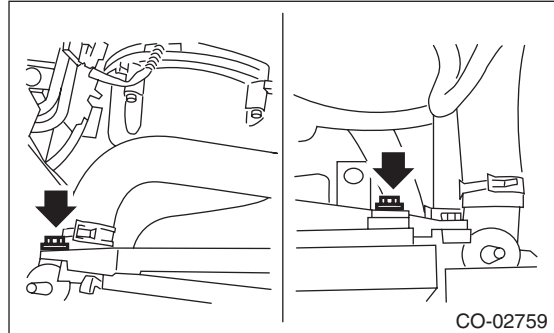
### CAUTION:

Check if the radiator hose, over flow hose or ATF radiator hose are properly connected.

1) Tighten the bolts on the upper side of radiator fan shroud.

### Tightening torque:

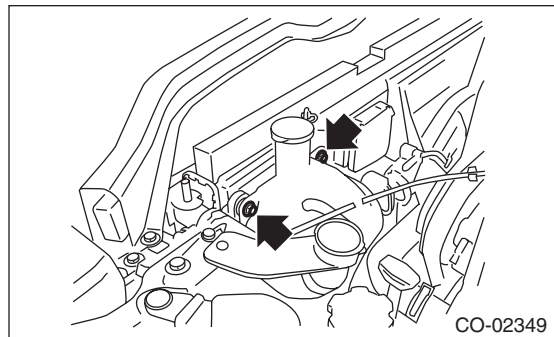
**7.5 N-m (0.8 kgf-m, 5.5 ft-lb)**



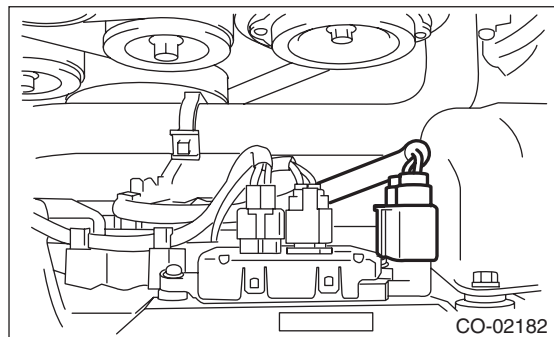
2) Install the reservoir tank.

### Tightening torque:

**7.5 N-m (0.8 kgf-m, 5.5 ft-lb)**

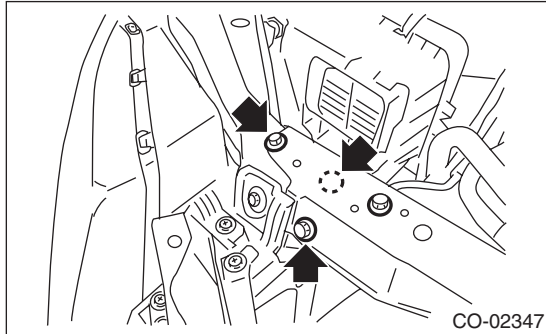


3) Connect the connector to radiator fan control unit.



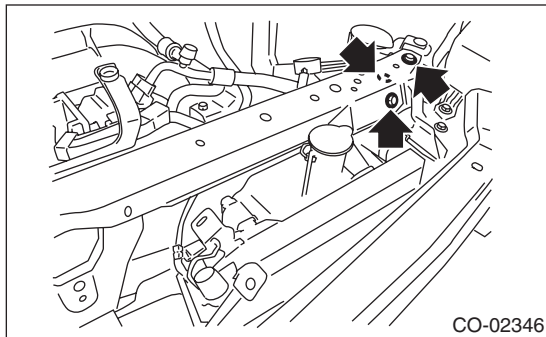
- 4) Install the radiator stay.  
 (1) Tighten the bolts on the right side of the radiator stay.

**Tightening torque:**  
**18 N·m (1.8 kgf·m, 13.3 ft·lb)**



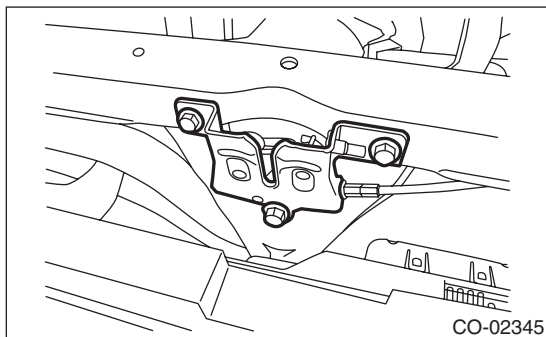
- (2) Tighten the bolts on the left side of the radiator stay.

**Tightening torque:**  
**18 N·m (1.8 kgf·m, 13.3 ft·lb)**



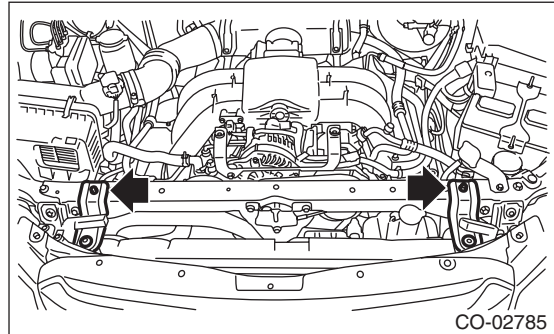
- (3) Install the front hood cable fixing clip to the radiator stay.  
 (4) Install the radiator inlet hose LH to the clip.  
 (5) Install the latch.

**Tightening torque:**  
**33 N·m (3.4 kgf·m, 24.3 ft·lb)**

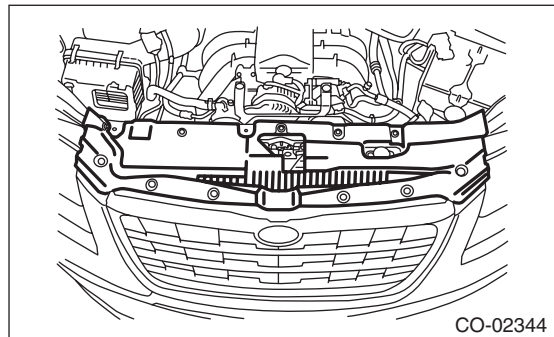


- 5) Install the radiator upper brackets.

**Tightening torque:**  
**12 N·m (1.2 kgf·m, 8.9 ft·lb)**

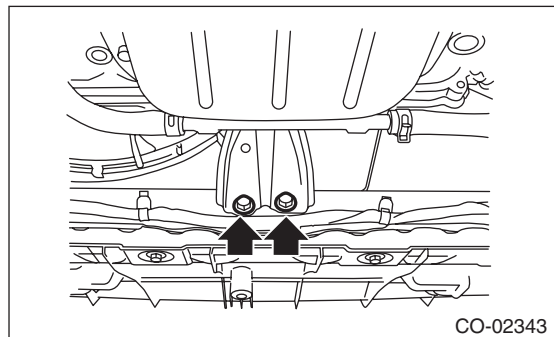


- 6) Install the front upper cover.



- 7) Install the air intake duct. <Ref. to IN(H6DO)-9, INSTALLATION, Air Intake Duct.>  
 8) Lift up the vehicle.  
 9) Tighten the bolts at the bottom of the radiator stay.

**Tightening torque:**  
**18 N·m (1.8 kgf·m, 13.3 ft·lb)**



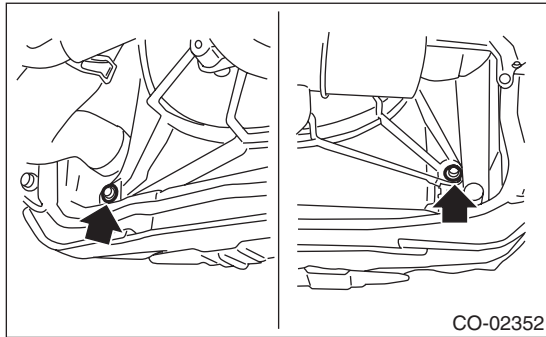
# Radiator Main Fan and Fan Motor

## COOLING

10) Tighten the bolts at the bottom of the radiator fan shroud.

**Tightening torque:**

**7.5 N·m (0.8 kgf·m, 5.5 ft·lb)**



11) Install the under cover. <Ref. to EI-18, INSTALLATION, Front Under Cover.>

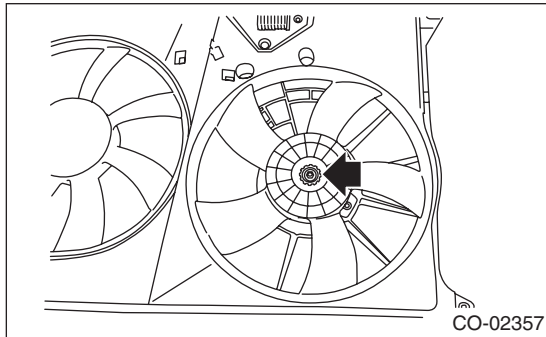
12) Lower the vehicle.

13) Connect the battery ground terminal.

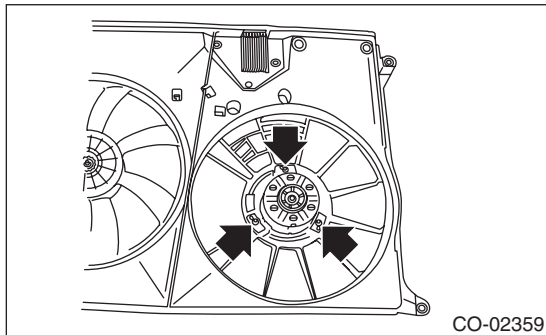
14) Install the collector cover.

## C: DISASSEMBLY

1) Remove the radiator main fan.



2) Remove the radiator main fan motor.

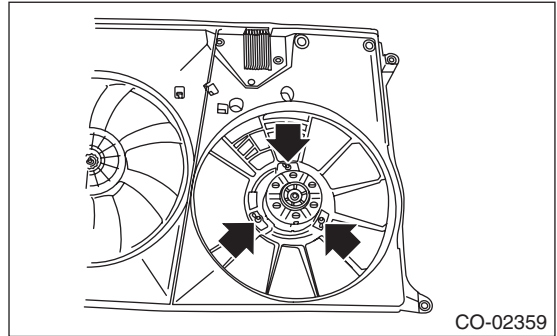


## D: ASSEMBLY

Assemble in the reverse order of disassembly.

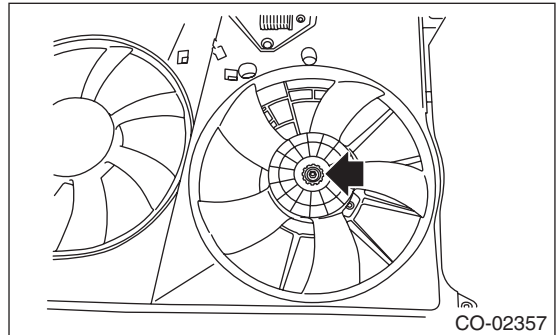
**Tightening torque:**

**3.8 N·m (0.4 kgf·m, 2.8 ft·lb)**



**Tightening torque:**

**6.3 N·m (0.6 kgf·m, 4.6 ft·lb)**



## E: INSPECTION

Check that the radiator main fan, radiator main fan shroud and main fan motor do not have deformation, cracks or damage.

## 9. Radiator Sub Fan and Fan Motor

### A: REMOVAL

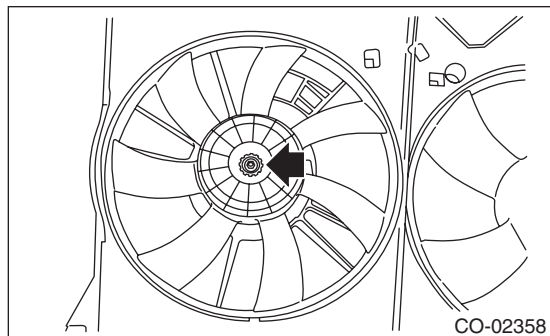
Refer to the radiator main fan and fan motor. <Ref. to CO(H6DO)-23, REMOVAL, Radiator Main Fan and Fan Motor.>

### B: INSTALLATION

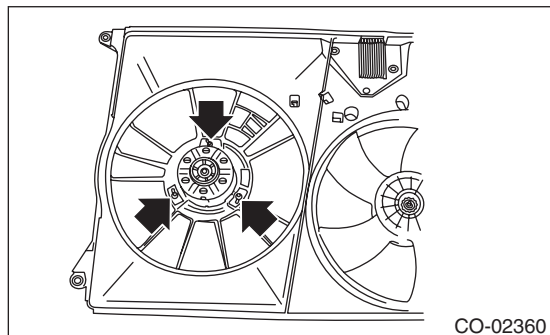
Refer to the radiator main fan and fan motor. <Ref. to CO(H6DO)-24, INSTALLATION, Radiator Main Fan and Fan Motor.>

### C: DISASSEMBLY

- 1) Remove the radiator sub fan.



- 2) Remove the radiator sub fan motor.

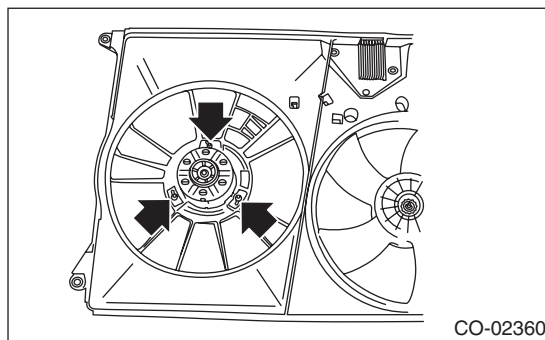


### D: ASSEMBLY

Assemble in the reverse order of disassembly.

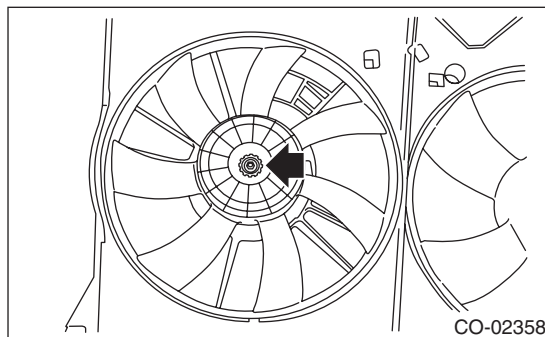
**Tightening torque:**

**3.8 N·m (0.4 kgf-m, 2.8 ft-lb)**



**Tightening torque:**

**6.3 N·m (0.6 kgf-m, 4.6 ft-lb)**



### E: INSPECTION

Check that the radiator sub fan, radiator sub fan shroud and sub fan motor do not have deformation, cracks or damage.

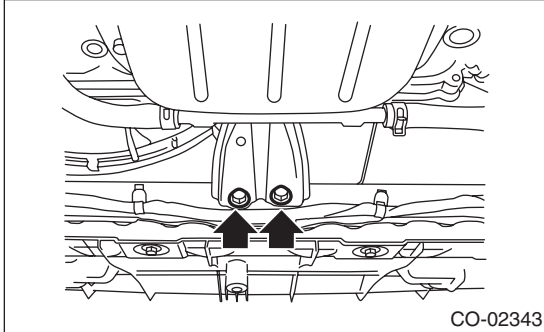
# Reservoir Tank

## COOLING

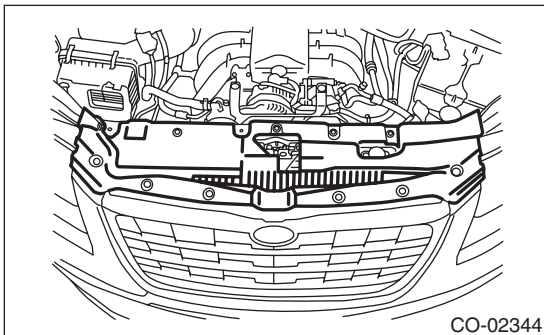
### 10. Reservoir Tank

#### A: REMOVAL

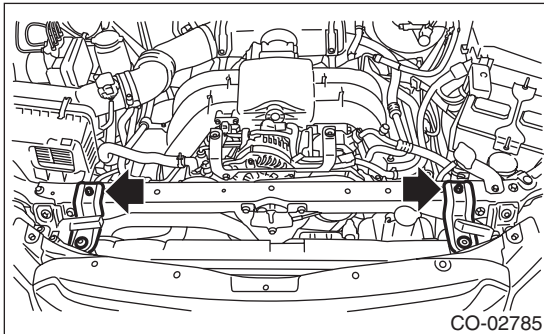
- 1) Remove the collector cover.
- 2) Lift up the vehicle.
- 3) Remove the under cover. <Ref. to EI-18, REMOVAL, Front Under Cover.>
- 4) Remove the bolts at the bottom of the radiator stay.



- 5) Lower the vehicle.
- 6) Remove the air intake duct. <Ref. to IN(H6DO)-9, REMOVAL, Air Intake Duct.>
- 7) Remove the front upper cover.

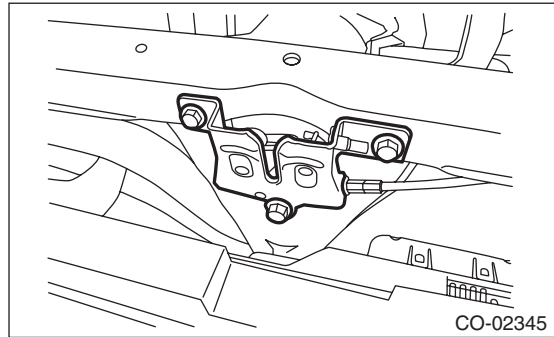


- 8) Remove the radiator upper brackets.



- 9) Remove the radiator stay.

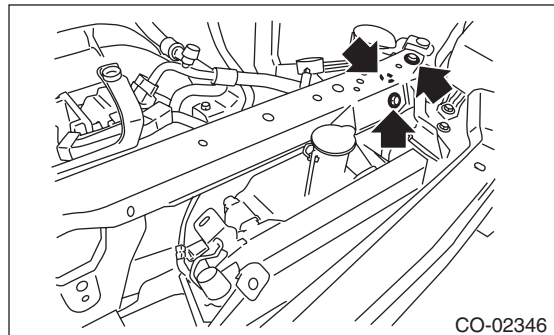
- (1) Remove the latch.



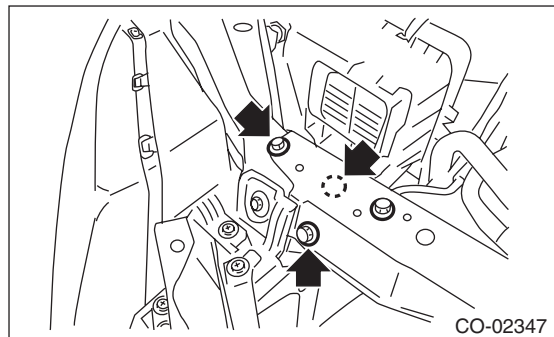
- (2) Remove the radiator inlet hose LH from the clip.

- (3) Remove the front hood cable fixing clip from the radiator stay.

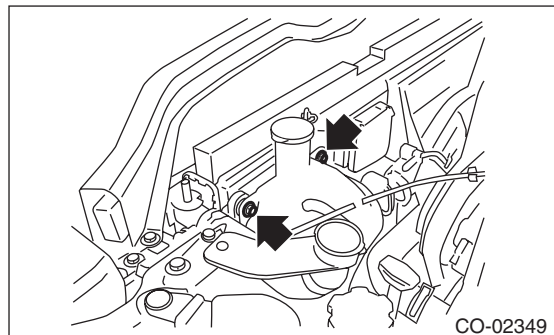
- (4) Remove the bolts on the left side of the radiator stay.



- (5) Remove the bolts on the right side of the radiator stay.



- 10) Remove the reservoir tank.



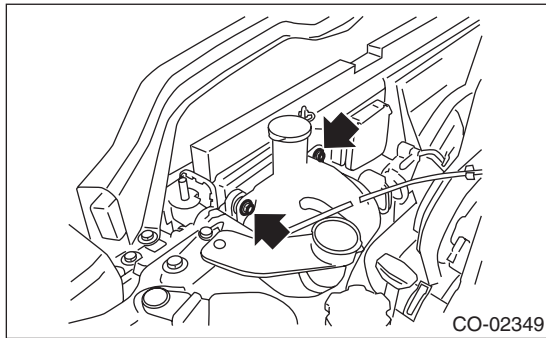


## B: INSTALLATION

1) Install the reservoir tank.

**Tightening torque:**

**7.5 N·m (0.8 kgf·m, 5.5 ft·lb)**

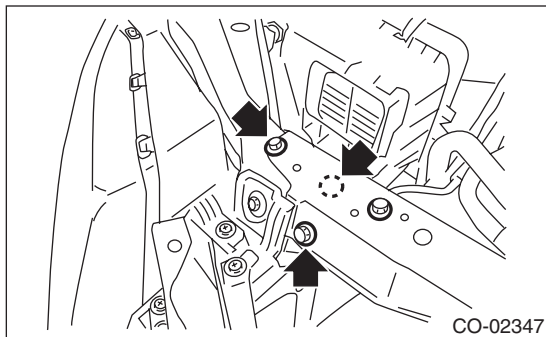


2) Install the radiator stay.

(1) Tighten the bolts on the right side of the radiator stay.

**Tightening torque:**

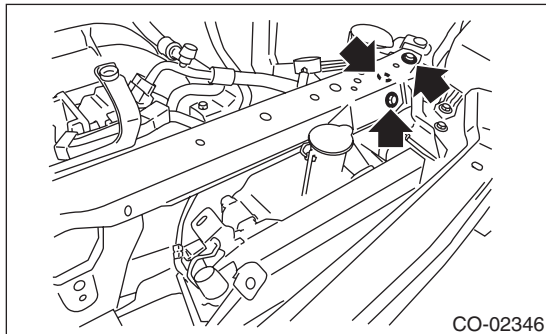
**18 N·m (1.8 kgf·m, 13.3 ft·lb)**



(2) Tighten the bolts on the left side of the radiator stay.

**Tightening torque:**

**18 N·m (1.8 kgf·m, 13.3 ft·lb)**



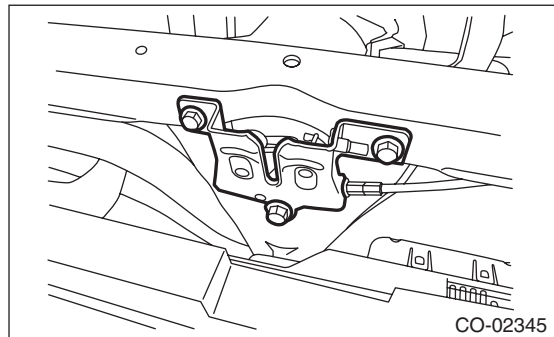
(3) Install the front hood cable fixing clip to the radiator stay.

(4) Install the radiator inlet hose LH to the clip.

(5) Install the latch.

**Tightening torque:**

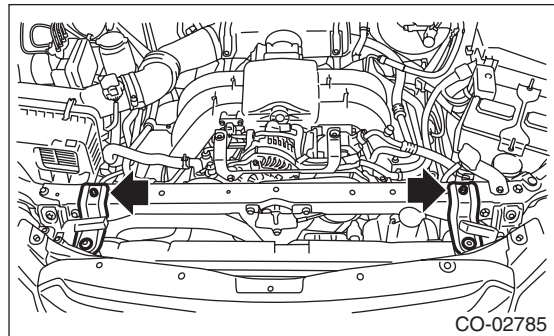
**33 N·m (3.4 kgf·m, 24.3 ft·lb)**



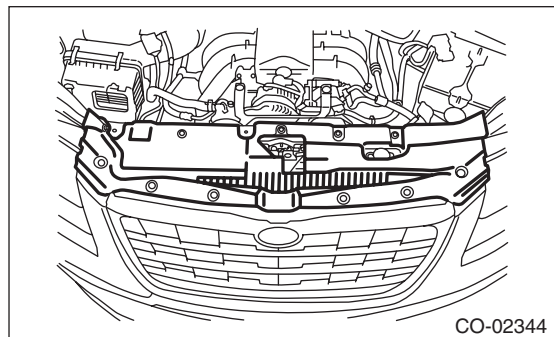
3) Install the radiator upper brackets.

**Tightening torque:**

**12 N·m (1.2 kgf·m, 8.9 ft·lb)**



4) Install the front upper cover.



5) Install the air intake duct. <Ref. to IN(H6DO)-9, INSTALLATION, Air Intake Duct.>

6) Lift up the vehicle.

# Reservoir Tank

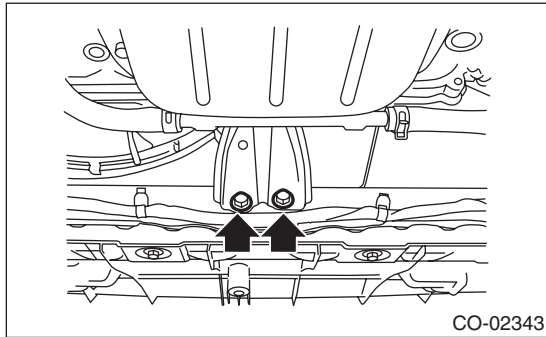
## COOLING

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7) Tighten the bolts at the bottom of the radiator stay.

**Tightening torque:**

**18 N·m (1.8 kgf-m, 13.3 ft-lb)**



8) Install the under cover. <Ref. to EI-18, INSTALLATION, Front Under Cover.>

9) Lower the vehicle.

10) Install the collector cover.

## C: INSPECTION

1) Check that the reservoir tank does not have deformation, cracks or damage.

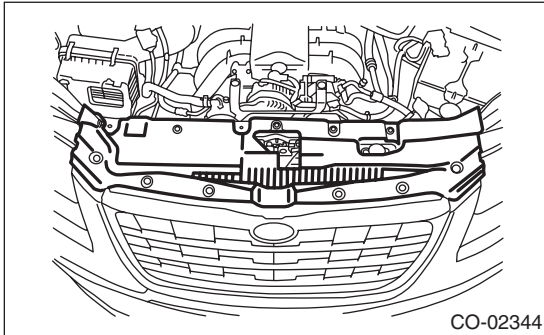
2) Check the over flow hose for cracks or damage.

3) Make sure the engine coolant level is between "FULL" and "LOW".

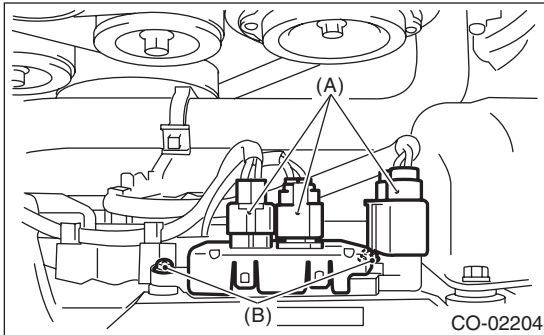
## 11. Radiator Fan Control Unit

### A: REMOVAL

- 1) Disconnect the ground cable from battery.
- 2) Remove the air intake duct. <Ref. to IN(H6DO)-9, REMOVAL, Air Intake Duct.>
- 3) Remove the front upper cover.



- 4) Remove the radiator fan control unit.
  - (1) Disconnect the connector (A) from the radiator fan control unit.
  - (2) Remove the screws (B) holding the radiator fan control unit.



### B: INSTALLATION

Install in the reverse order of removal.

#### **Tightening torque:**

**2.6 N·m (0.3 kgf-m, 1.9 ft-lb)**

# Engine Cooling System Trouble in General

COOLING

## 12.Engine Cooling System Trouble in General

### A: INSPECTION

Trouble	Possible cause	Corrective action
Over-heating	a. Insufficient engine coolant	Replenish engine coolant, inspect for leakage, and repair it if necessary.
	b. Defective thermostat	Replace.
	c. Malfunction of water pump	Replace.
	d. Clogged engine coolant passage	Clean.
	e. Improper ignition timing	Inspect and repair ignition control system. <Ref. to EN(H6DO)(diag)-2, PROCEDURE, Basic Diagnostic Procedure.>
	f. Clogged or leaking radiator	Clean, repair or replace.
	g. Improper engine oil in engine coolant	Replace the engine coolant.
	h. Air/fuel mixture ratio too lean	Inspect and repair the fuel injection system. <Ref. to EN(H6DO)(diag)-2, PROCEDURE, Basic Diagnostic Procedure.>
	i. Excessive back pressure in exhaust system	Clean or replace.
	j. Insufficient clearance between piston and cylinder	Adjust or replace.
	k. Dragging brake	Adjust.
l. Defective radiator fan	Inspect the radiator fan relay, engine coolant temperature sensor or fan motor and replace them.	
Over-cooling	a. Ambient 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. Cylinder head and crankcase damaged or cracked	Repair or replace.
	f. Damaged or cracked thermostat cover	Repair or replace.
	g. Leakage from radiator	Repair or replace.
Noise	a. Defective radiator fan	Replace.
	b. Defective water pump bearing	Replace water pump.
	c. Defective water pump mechanical seal	Replace water pump.

# LUBRICATION

# *LU(H6DO)*

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3. Engine Oil .....	9
4. Oil Pan .....	11
5. Oil Pump .....	12
6. Oil Pressure Switch .....	14
7. Engine Oil Filter .....	15
8. Oil Cooler .....	16
9. General Diagnostic Table .....	17

# General Description

## LUBRICATION

### 1. General Description

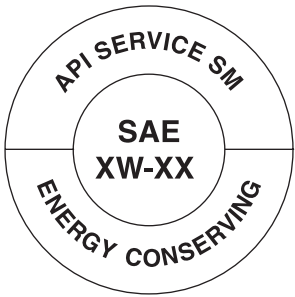

#### A: SPECIFICATION

Lubrication method				Forced lubrication	
Oil pump	Pump type			Trochoid type	
	Number of teeth	Inner rotor		7	
		Outer rotor		8	
	Outer rotor diameter x thickness			mm (in)	
	Performance (Oil temperature 80°C (176°F))	600 rpm	Discharge pressure	kPa (kgf/cm <sup>2</sup> , psi)	98 (1.0, 14)
			Discharge rate	ℓ (US qt, Imp qt)/min.	5.0 (5.3, 4.4) or more
6,000 rpm		Discharge pressure	kPa (kgf/cm <sup>2</sup> , psi)	392 (4.0, 57)	
		Discharge rate	ℓ (US qt, Imp qt)/min.	82.8 (87.5, 72.9) or more	
Oil filter	Filter type			Full-flow filter type	
	Filtration area			cm <sup>2</sup> (sq in)	
	By-pass valve opening pressure			kPa (kgf/cm <sup>2</sup> , psi)	
	Outer diameter x width			mm (in)	
	Installation screw specifications			M 20 x 1.5	
Oil pressure switch	Type			Immersed contact point type	
	Operating voltage — power consumption			12 V — 3.4 W or less	
	Warning light operating pressure			kPa (kgf/cm <sup>2</sup> , psi)	
	Proof pressure			kPa (kgf/cm <sup>2</sup> , psi)	
Engine oil	Total capacity (at overhaul)			ℓ (US qt, Imp qt)	
	When replacing engine oil and oil filter			ℓ (US qt, Imp qt)	
	When replacing engine oil only			ℓ (US qt, Imp qt)	

#### Recommended oil:

#### CAUTION:

It is acceptable to fill an engine with oil of another brand when replacing the oil, but make sure to use following oil specified by Subaru.

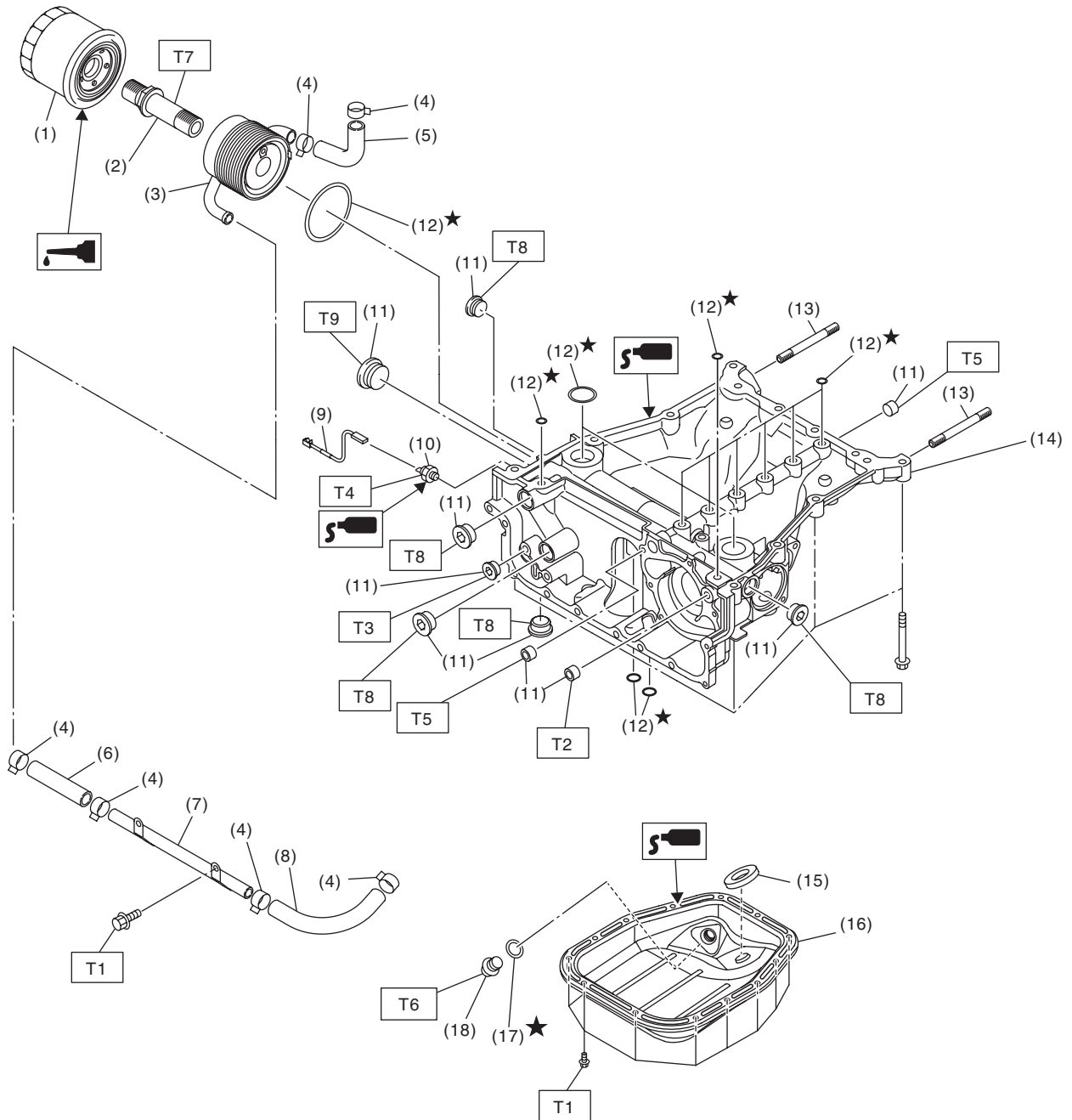
Engine oil standard	SAE viscosity No. 5W-30 (synthetic oil)
 <small>RM-00076</small> For API standard, oil with SM "Energy Conserving" or SN "Resource Conserving" logo.	 <small>RM-00002</small> Those with the ILSAC standard GF-4 or GF-5 "starburst mark" displayed on top of the container.

#### NOTE:

The proper viscosity oil helps the engine maintain its ideal temperature, and cranking speed increased by reducing viscosity friction in hot condition.

## B: COMPONENT

### 1. OIL PAN UPPER, OIL COOLER, OIL FILTER



LU-02689

# General Description

## LUBRICATION

---

- (1) Oil filter
- (2) Oil cooler connector
- (3) Oil cooler
- (4) Clip
- (5) Water hose
- (6) Water hose
- (7) Engine oil cooler water pipe
- (8) Water hose
- (9) Oil pressure switch harness

- (10) Oil pressure switch
- (11) Plug
- (12) O-ring
- (13) Stud bolt
- (14) Oil pan upper
- (15) Oil pan magnet
- (16) Oil pan lower
- (17) Gasket
- (18) Drain plug

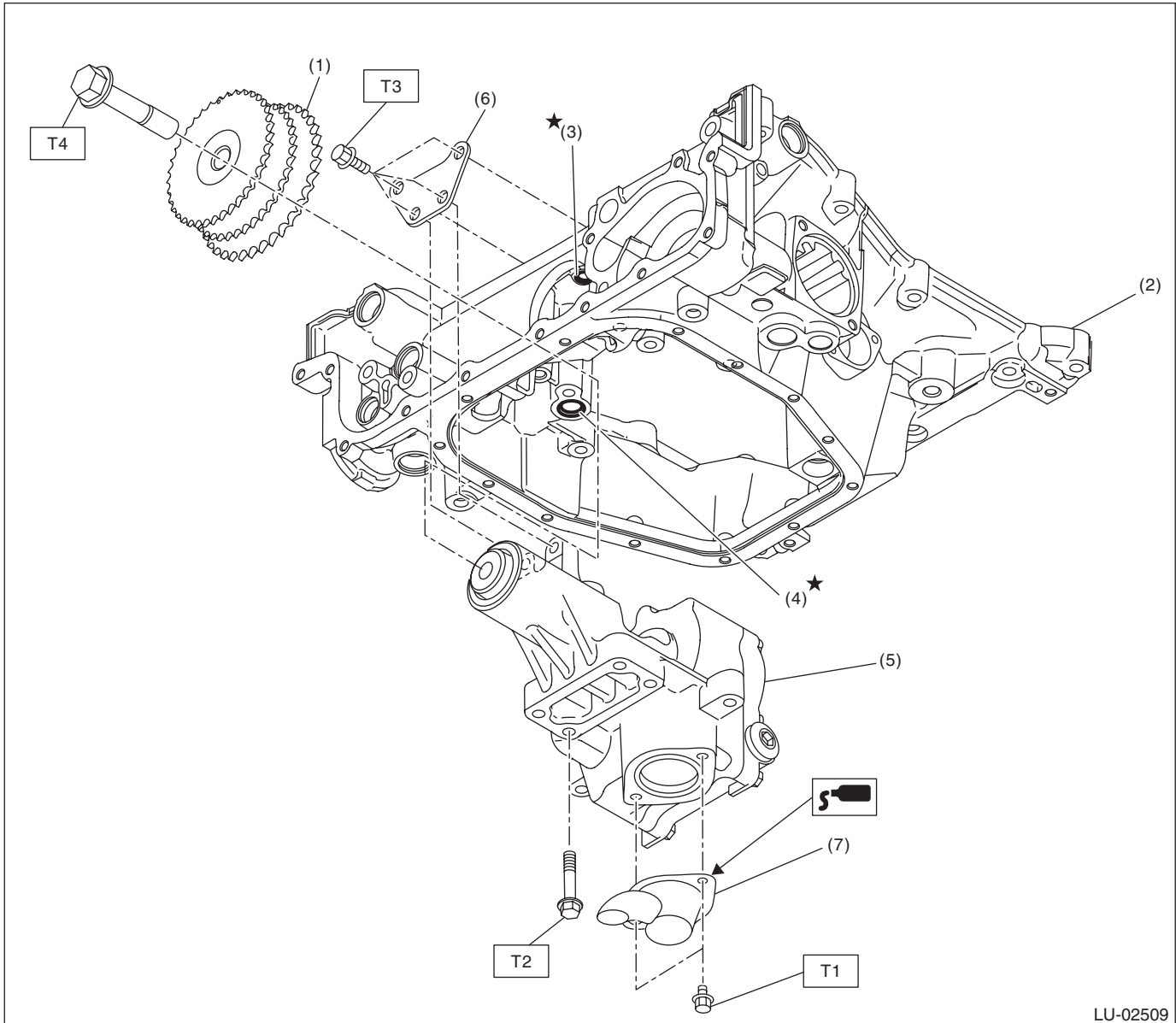
---

**Tightening torque:N·m (kgf-m, ft-lb)****T1: 6.4 (0.7, 4.7)****T2: 17 (1.7, 12.5)****T3: 23 (2.3, 17.0)****T4: 25 (2.5, 18.4)****T5: 34 (3.5, 25.1)****T6: 44 (4.5, 32.5)****T7: 54 (5.5, 39.8)****T8: 60 (6.1, 44.3)****T9: 90 (9.2, 66.4)**

---



## 2. OIL PUMP



LU-02509

- |                    |               |
|--------------------|---------------|
| (1) Idler sprocket | (5) Oil pump  |
| (2) Oil pan upper  | (6) Stiffener |
| (3) O-ring         | (7) Strainer  |
| (4) O-ring         |               |

**Tightening torque: N·m (kgf-m, ft-lb)**

**T1: 6.4 (0.7, 4.7)**

**T2: 13 (1.3, 9.6)**

**T3: 24 (2.4, 17.7)**

**T4: 120 (12.2, 88.5)**

# General Description

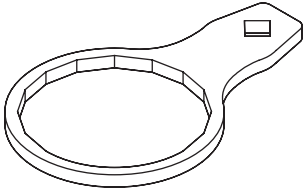
## LUBRICATION

### C: CAUTION

- Wear appropriate work clothing, including a cap, protective goggles and protective shoes when performing any work.
- 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.
- Before applying liquid gasket, completely remove the old liquid gasket and degrease it.
- Vehicle components are extremely hot after driving. Be wary of receiving burns from heated parts.
- Be sure to tighten fasteners including bolts and nuts to the specified torque.
- Place shop jacks or rigid racks at the specified points.
- Before disconnecting connectors of sensors or units, be sure to disconnect the ground cable from battery.
- If the engine oil is spilt over exhaust pipe or the under cover, wipe it off with cloth to avoid emitting smoke or causing a fire.
- Prepare a container and cloth to prevent scattering of oil when performing work where engine coolant can be spilled. If the fuel spills, wipe it off immediately to prevent from penetrating into floor or flowing out for environmental protection.
- Follow all government and local regulations concerning disposal of refuse when disposing oil.

### D: PREPARATION TOOL

#### 1. SPECIAL TOOL

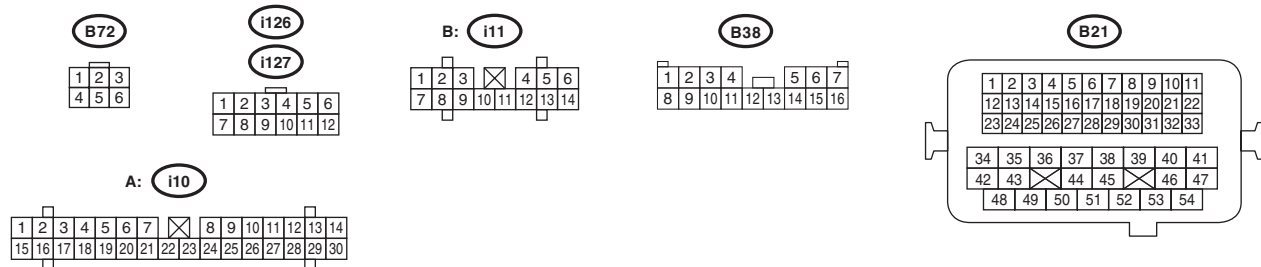
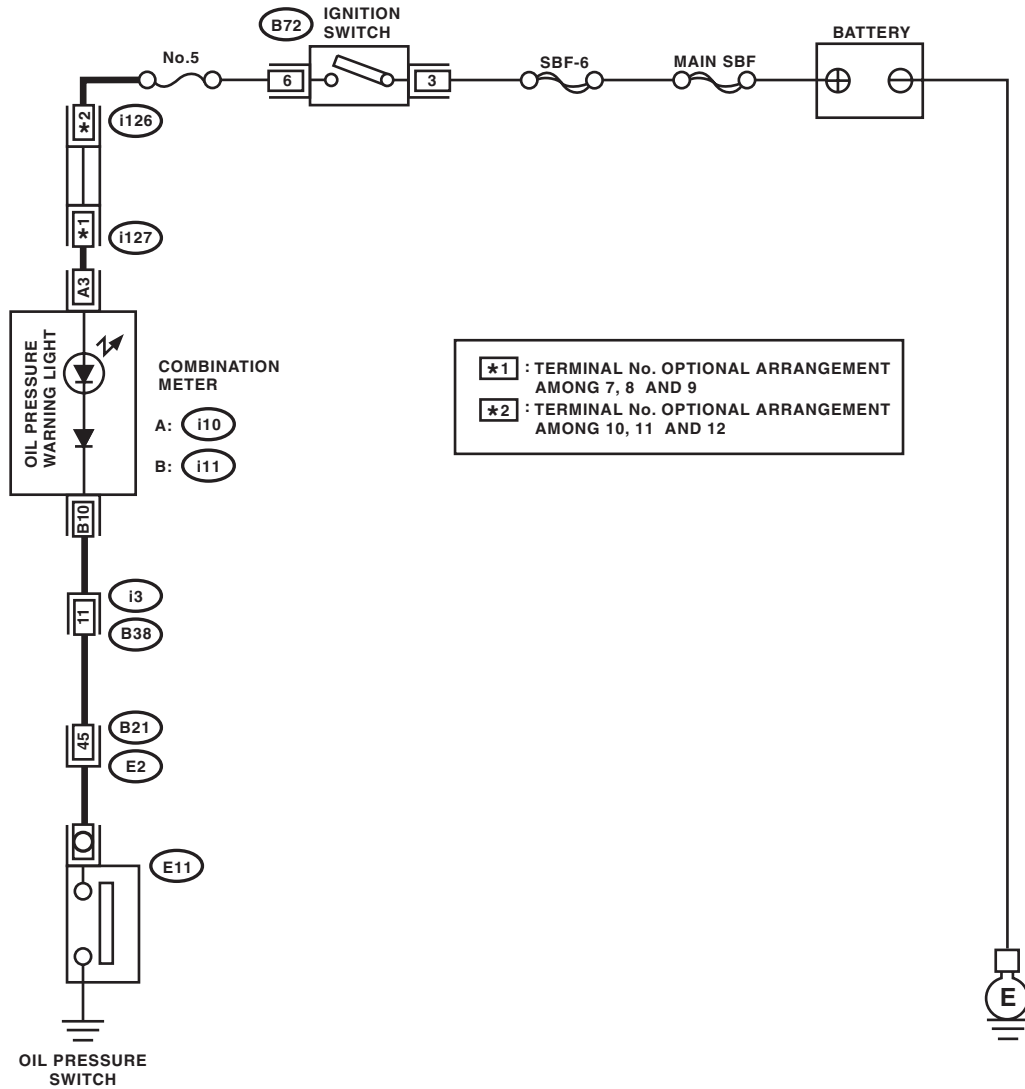
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18332AA020	18332AA020	OIL FILTER WRENCH	Used for removing and installing oil filter.

#### 2. GENERAL TOOL

TOOL NAME	REMARKS
Circuit tester	Used for measuring resistance and voltage.

## 2. Oil Pressure System

### A: WIRING DIAGRAM



LU-02369

# Oil Pressure System

LUBRICATION

## B: INSPECTION

Step	Check	Yes	No
<b>1</b> <b>CHECK COMBINATION METER.</b> 1) Turn the ignition switch to ON. (engine OFF) 2) Check the warning light of combination meter.	Does the warning light illuminate?	Go to step 2.	Repair or replace the combination meter. <Ref. to IDI-4, INSPECTION, Combination Meter System.>
<b>2</b> <b>CHECK HARNESS CONNECTOR BETWEEN COMBINATION METER AND OIL PRESSURE SWITCH.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connector from oil pressure switch. 3) Turn the ignition switch to ON. 4) Measure the voltage of harness between oil pressure switch connector and chassis ground. <b>Connector &amp; terminal</b> <b>(E11) No. 1 (+) — Chassis ground (-):</b>	Is the voltage 10 V or more?	Replace the oil pressure switch. <Ref. to LU(H6DO)-14, Oil Pressure Switch.>	Go to step 3.
<b>3</b> <b>CHECK COMBINATION METER.</b> 1) Turn the ignition switch to OFF. 2) Remove the combination meter. 3) Measure the resistance of combination meter. <b>Terminals</b> <b>(i10) No. 3 — (i11) No. 10:</b>	Is the resistance less than 10 $\Omega$ ?	Repair the harness and connector. NOTE: In this case, repair the following item: <ul style="list-style-type: none"> <li>• Open circuit of harness between combination meter and oil pressure switch</li> <li>• Poor contact of combination meter connector</li> <li>• Poor contact of oil pressure switch connector</li> <li>• Poor contact of coupling connector</li> </ul>	Repair or replace the combination meter. <Ref. to IDI-4, INSPECTION, Combination Meter System.>

## 3. Engine Oil

### A: INSPECTION

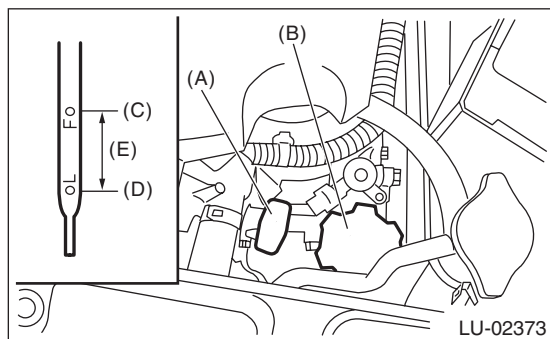
#### CAUTION:

If the engine oil is spilt over exhaust pipe or the under cover, wipe it off with cloth to avoid emitting smoke or causing a fire.

- 1) Park the vehicle on a level surface.
- 2) Remove the oil level gauge and wipe away the oil.
- 3) Reinsert the oil level gauge all the way. Be sure that the oil level gauge is correctly inserted and properly orientated.
- 4) Pull out the oil level gauge again, and check the oil level. If the engine oil level is below "L" line, make sure that there is no oil leakage from the engine, then add oil to raise the level up to the "F" line.
- 5) Start the engine to circulate the oil in engine room.
- 6) After turning off the engine, wait a few minutes for the oil to return to the oil pan before checking the level.

#### NOTE:

- Just after driving or while the engine is warm, engine oil level may be exceeding the "F" line. This is caused by thermal expansion of engine oil.
- To prevent overfilling of engine oil, do not add oil above "F" line when the engine is cold.
- As the oil level gauge is used for daily inspection, standard of "F" line and "L" line of the oil level gauge is set for the condition that engine is cold.



- (A) Oil level gauge
- (B) Engine oil filler cap
- (C) "F" line
- (D) "L" line
- (E) Approx. 1.0 ℓ (1.1 US qt, 0.9 Imp qt)

### B: REPLACEMENT

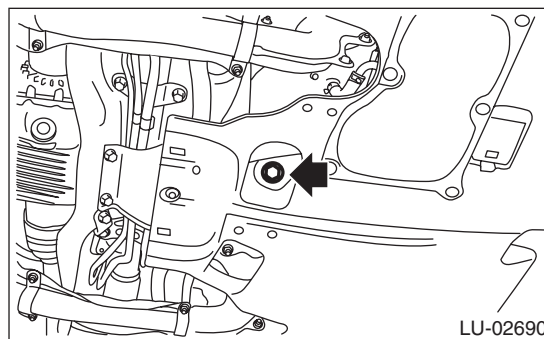
#### CAUTION:

If the engine oil is spilt over exhaust pipe or the under cover, wipe it off with cloth to avoid emitting smoke or causing a fire.

- 1) Open the engine oil filler cap for quick draining of engine oil.
- 2) Lift up the vehicle.
- 3) Drain engine oil by loosening the engine oil drain plug.

#### NOTE:

Prepare the container for draining of engine oil.



- 4) Tighten the engine oil drain plug after draining engine oil.

#### NOTE:

Use a new drain plug gasket.

#### Tightening torque:

**44 N·m (4.5 kgf-m, 32.5 ft-lb)**

- 5) Lower the vehicle.
- 6) Using engine oil of proper quality and viscosity, fill engine oil through the oil filler duct to the "F" line on level gauge. Make sure that the vehicle is parked on a level surface when checking oil level.

#### Recommended oil:

<Ref. to LU(H6DO)-2, SPECIFICATION, General Description.>

#### Engine oil capacity:

<Ref. to LU(H6DO)-2, SPECIFICATION, General Description.>

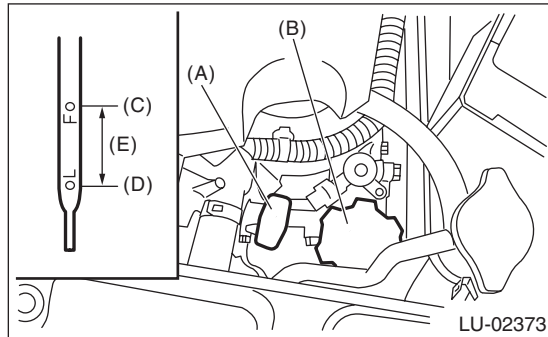
- 7) Close the engine oil filler cap.
- 8) Start the engine to circulate the oil in engine room.

# Engine Oil

## LUBRICATION

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9) After the engine stops, recheck the oil level. If necessary, add engine oil up to the “F” line on level gauge.



- (A) Oil level gauge
- (B) Engine oil filler cap
- (C) “F” line
- (D) “L” line
- (E) Approx. 1.0 ℓ (1.1 US qt, 0.9 Imp qt)

## 4. Oil Pan

### A: REMOVAL

#### NOTE:

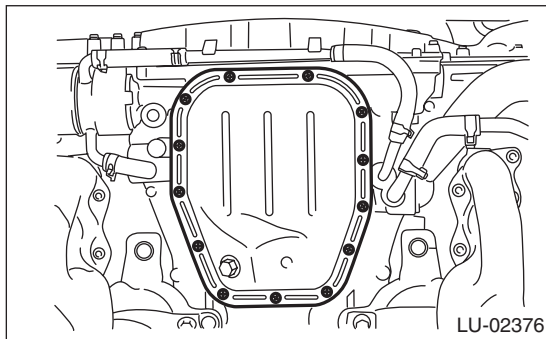
Before removing the oil pan upper, remove the engine from vehicle. <Ref. to ME(H6DO)-35, REMOVAL, Engine Assembly.> <Ref. to ME(H6DO)-95, REMOVAL, Cylinder Block.>

- 1) Lift up the vehicle.
- 2) Remove the under cover. <Ref. to EI-18, REMOVAL, Front Under Cover.>
- 3) Drain the engine oil. <Ref. to LU(H6DO)-9, REPLACEMENT, Engine Oil.>
- 4) Insert an oil pan cutter blade into the gap between oil pan upper and oil pan lower, and remove the oil pan.

#### CAUTION:

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

- 5) Remove the oil pan lower.



### B: INSTALLATION

- 1) Apply liquid gasket to the mating surfaces of oil pan, and install the oil pan lower.

#### NOTE:

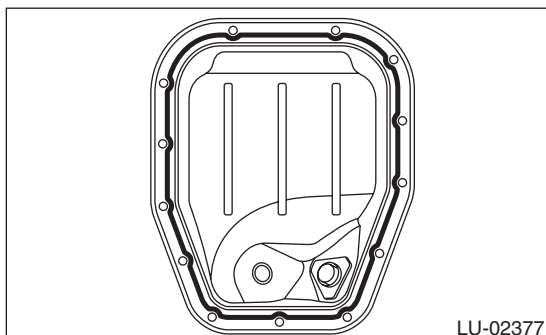
Install within 5 min. after applying liquid gasket.

#### Liquid gasket:

**THREE BOND 1217G (Part No. K0877Y0100)  
or equivalent**

#### Liquid gasket applying diameter:

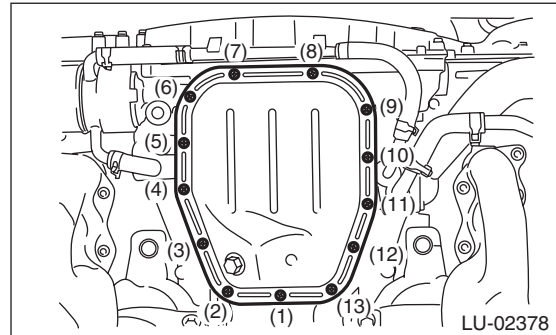
**$5.0 \pm 1.0$  mm ( $0.197 \pm 0.039$  in)**



- 2) Tighten the oil pan lower installing bolts in the numerical order as shown in the figure.

#### Tightening torque:

**$6.4$  N·m ( $0.7$  kgf·m,  $4.7$  ft·lb)**



- 3) Install the under cover. <Ref. to EI-18, INSTALLATION, Front Under Cover.>
- 4) Lower the vehicle.
- 5) Refill the engine oil. <Ref. to LU(H6DO)-9, INSPECTION, Engine Oil.>
- 6) Check the engine oil level. <Ref. to LU(H6DO)-9, INSPECTION, Engine Oil.>

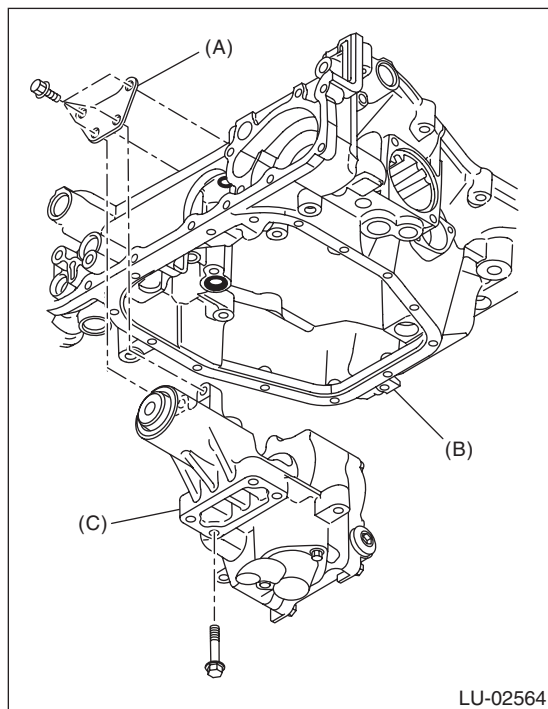
### C: INSPECTION

Check that the oil pan upper and oil pan lower have no deformation, cracks or other damages.

## 5. Oil Pump

### A: REMOVAL

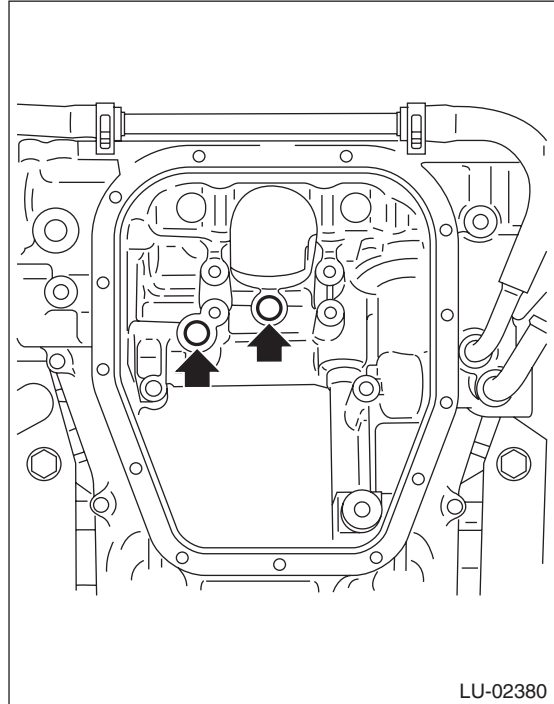
- 1) Remove the collector cover.
- 2) Disconnect the ground cable from battery.
- 3) Lift up the vehicle.
- 4) Remove the under cover. <Ref. to EI-18, REMOVAL, Front Under Cover.>
- 5) Drain the engine oil. <Ref. to LU(H6DO)-9, REPLACEMENT, Engine Oil.>
- 6) Drain engine coolant. <Ref. to CO(H6DO)-12, DRAINING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>
- 7) Lower the vehicle.
- 8) Remove the radiator. <Ref. to CO(H6DO)-17, REMOVAL, Radiator.>
- 9) Remove the V-belts. <Ref. to ME(H6DO)-45, REMOVAL, V-belt.>
- 10) Remove the crank pulley. <Ref. to ME(H6DO)-46, REMOVAL, Crank Pulley.>
- 11) Remove the chain cover. <Ref. to ME(H6DO)-47, REMOVAL, Chain Cover.>
- 12) Remove the timing chain. <Ref. to ME(H6DO)-54, REMOVAL, Timing Chain Assembly.>
- 13) Remove the oil pan lower. <Ref. to LU(H6DO)-11, REMOVAL, Oil Pan.>
- 14) Remove the stiffener and the oil pump.



- (A) Stiffener
- (B) Oil pan upper
- (C) Oil pump

- 15) Remove the strainer from the oil pump.

- 16) Remove the O-ring from oil pan upper.

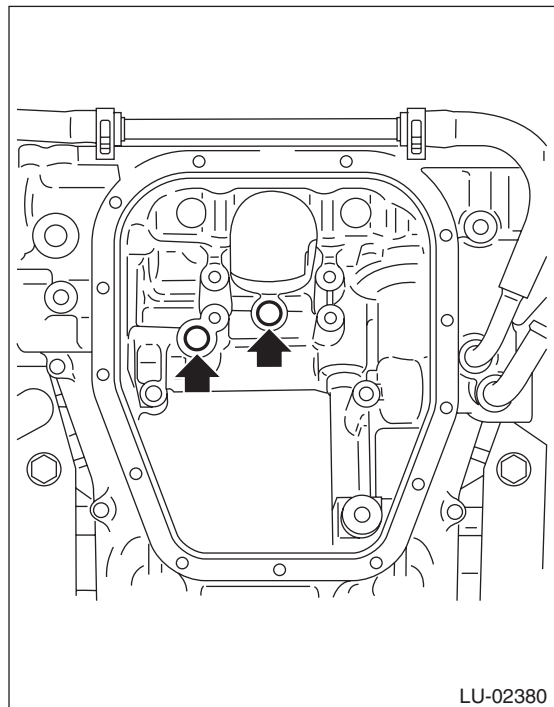


LU-02380

### B: INSTALLATION

- 1) Apply engine oil to the O-ring and attach it to the oil pan upper.

**NOTE:**  
Use new O-rings.



LU-02380



2) Apply liquid gasket to the mating surfaces of strainer.

**Liquid gasket:**

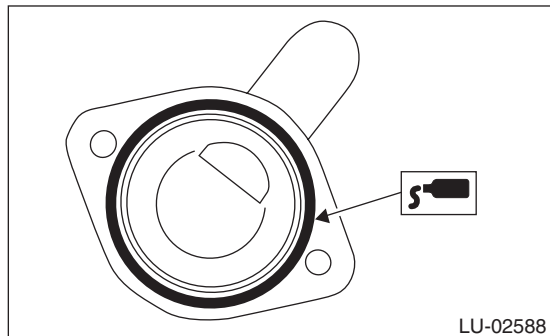
**THREE BOND 1217G (Part No. K0877Y0100) or equivalent**

**Liquid gasket applying diameter:**

**2.0±1.0 mm (0.079±0.039 in)**

**NOTE:**

- Install within 5 min. after applying liquid gasket.
- After installing the strainer, remove any liquid gasket that is squeezed out.



3) Install the strainer to the oil pump.

**Tightening torque:**

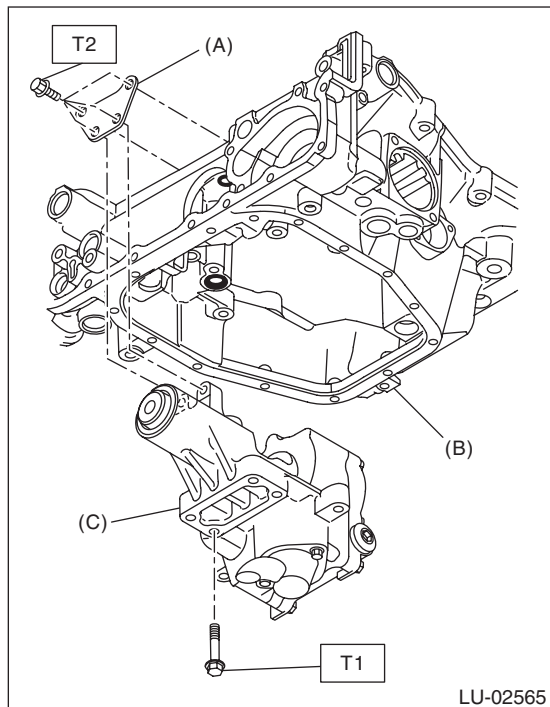
**6.4 N·m (0.7 kgf-m, 4.7 ft-lb)**

4) Install the stiffener and the oil pump.

**Tightening torque:**

**T1: 13 N·m (1.3 kgf-m, 9.6 ft-lb)**

**T2: 24 N·m (2.4 kgf-m, 17.7 ft-lb)**



- (A) Stiffener
- (B) Oil pan upper
- (C) Oil pump

5) Install the oil pan lower. <Ref. to LU(H6DO)-11, INSTALLATION, Oil Pan.>

6) Install the timing chain. <Ref. to ME(H6DO)-60, INSTALLATION, Timing Chain Assembly.>

7) Install the chain cover. <Ref. to ME(H6DO)-49, INSTALLATION, Chain Cover.>

8) Install the crank pulley. <Ref. to ME(H6DO)-46, INSTALLATION, Crank Pulley.>

9) Install the V-belts. <Ref. to ME(H6DO)-45, INSTALLATION, V-belt.>

10) Install the radiator. <Ref. to CO(H6DO)-19, INSTALLATION, Radiator.>

11) Lift up the vehicle.

12) Install the under cover. <Ref. to EI-18, INSTALLATION, Front Under Cover.>

13) Lower the vehicle.

14) Fill the ATF. <Ref. to CO(H6DO)-12, FILLING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>

15) Refill the engine oil. <Ref. to LU(H6DO)-9, REPLACEMENT, Engine Oil.>

16) Check the engine oil level. <Ref. to LU(H6DO)-9, INSPECTION, Engine Oil.>

**C: INSPECTION**

1) Visually check the oil pump for breakage.

2) Visually check the strainer portion for clogging.

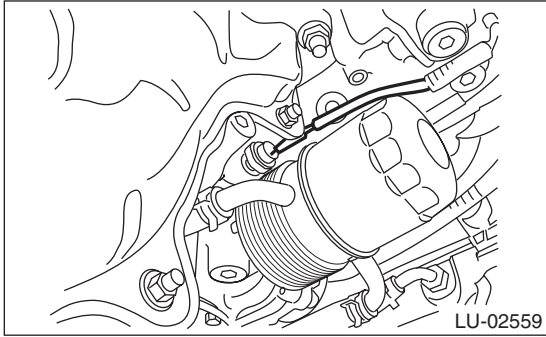
# Oil Pressure Switch

## LUBRICATION

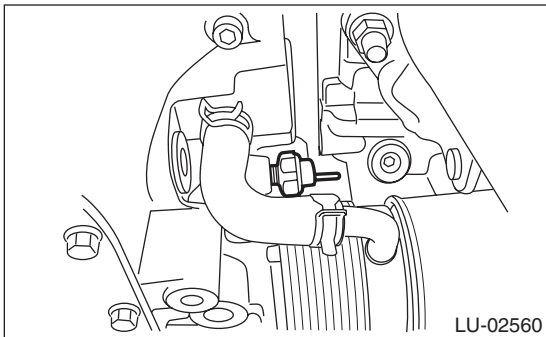
### 6. Oil Pressure Switch

#### A: REMOVAL

- 1) Disconnect the ground cable from battery.
- 2) Lift up the vehicle.
- 3) Remove the under cover. <Ref. to EI-18, REMOVAL, Front Under Cover.>
- 4) Drain the engine oil. <Ref. to LU(H6DO)-9, REPLACEMENT, Engine Oil.>
- 5) Disconnect the terminal from oil pressure switch.



- 6) Remove the oil pressure switch.

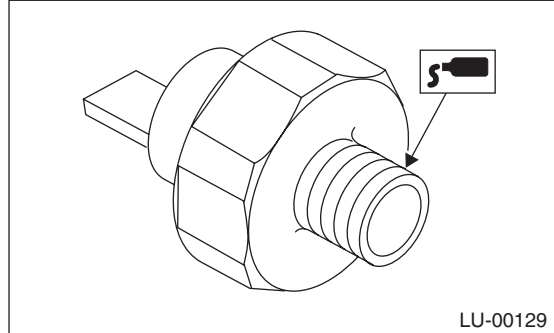


#### B: INSTALLATION

- 1) Apply liquid gasket to the oil pressure switch threads.

##### Liquid gasket:

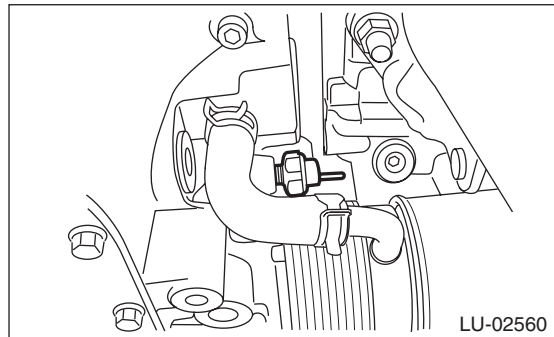
**THREE BOND 1324 (Part No. 004403042) or equivalent**



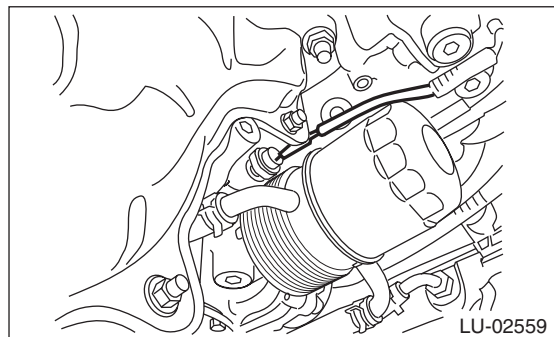
- 2) Install the oil pressure switch.

##### Tightening torque:

**25 N·m (2.5 kgf-m, 18.4 ft-lb)**



- 3) Connect the terminal of the oil pressure switch.



- 4) Install the under cover. <Ref. to EI-18, INSTALLATION, Front Under Cover.>
- 5) Refill the engine oil. <Ref. to LU(H6DO)-9, REPLACEMENT, Engine Oil.>
- 6) Check the engine oil level. <Ref. to LU(H6DO)-9, INSPECTION, Engine Oil.>

#### C: INSPECTION

- 1) Check that the oil pressure switch does not have deformation, cracks or damage.
- 2) Check the oil pressure switch installation portion for oil leakage and oil seepage.

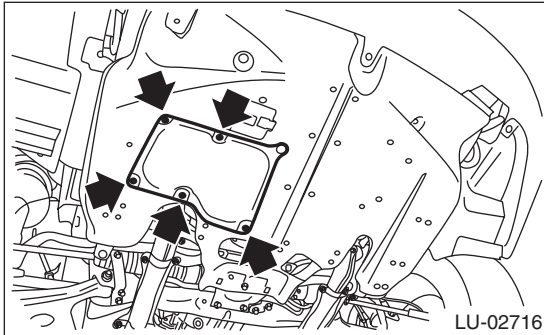
## 7. Engine Oil Filter

### A: REMOVAL

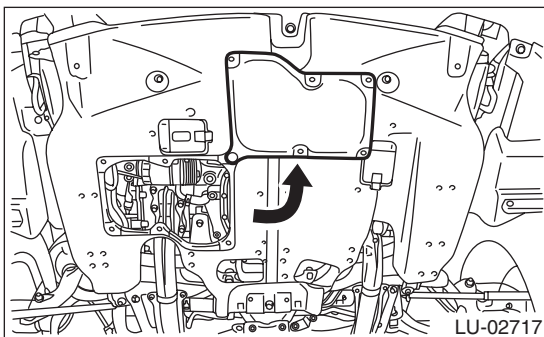
**CAUTION:**

If the engine oil is spilt over exhaust pipe or the under cover, wipe it off with cloth to avoid emitting smoke or causing a fire.

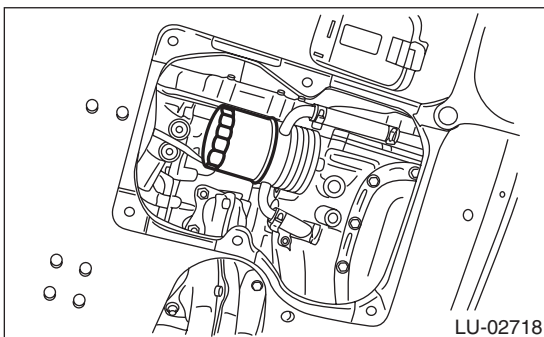
- 1) Lift up the vehicle.
- 2) Drain the engine oil. <Ref. to LU(H6DO)-9, REPLACEMENT, Engine Oil.>
- 3) Remove the service hole cover clip.



- 4) Rotate the service hole cover in the arrow direction.



- 5) Remove the oil filter using ST.  
ST 18332AA020 OIL FILTER WRENCH



### B: INSTALLATION

**CAUTION:**

Do not tighten excessively, or oil may leak.

- 1) Clean the oil filter installation surface of the oil cooler.
- 2) Obtain a new oil filter and apply a thin coat of engine oil to the seal rubber.
- 3) Install the oil filter turning it by hand, being careful not to damage the seal rubber.
- 4) Tighten more (approx. 3/4 turn) after the seal rubber contacts the oil cooler. When using a torque wrench, tighten to 14 N·m (1.4 kgf-m, 10.3 ft-lb).
- 5) Install the service hole cover.
- 6) Lower the vehicle.
- 7) Refill the engine oil. <Ref. to LU(H6DO)-9, INSPECTION, Engine Oil.>
- 8) Check the engine oil level. <Ref. to LU(H6DO)-9, INSPECTION, Engine Oil.>

### C: INSPECTION

- 1) After installing the oil filter, run the 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(H6DO)-9, INSPECTION, Engine Oil.>

# Oil Cooler

## LUBRICATION

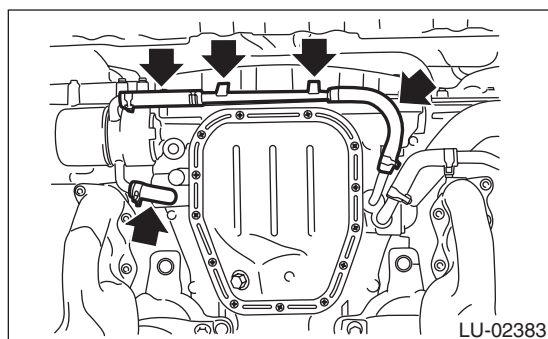
### 8. Oil Cooler

#### A: REMOVAL

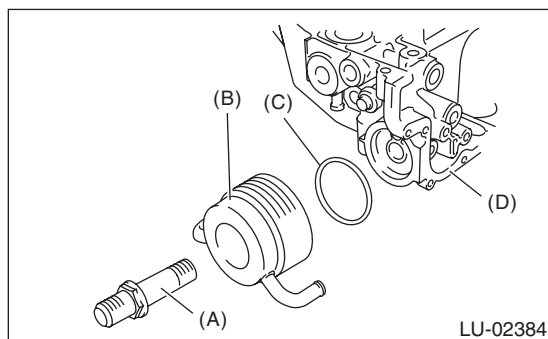
##### CAUTION:

If the engine oil is spilt over exhaust pipe or the under cover, wipe it off with cloth to avoid emitting smoke or causing a fire.

- 1) Lift up the vehicle.
- 2) Remove the under cover. <Ref. to EI-18, REMOVAL, Front Under Cover.>
- 3) Drain engine coolant. <Ref. to CO(H6DO)-12, DRAINING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>
- 4) Drain the engine oil. <Ref. to LU(H6DO)-9, REPLACEMENT, Engine Oil.>
- 5) Remove the bolts which hold the engine oil cooler water pipe to chain cover and disconnect the water hose from oil cooler.



- 6) Remove the oil filter using the ST. <Ref. to LU(H6DO)-15, REMOVAL, Engine Oil Filter.>
- 7) Remove the oil cooler connector and remove the oil cooler.



- (A) Oil cooler connector
- (B) Oil cooler
- (C) O-ring
- (D) Oil pan upper

#### B: INSTALLATION

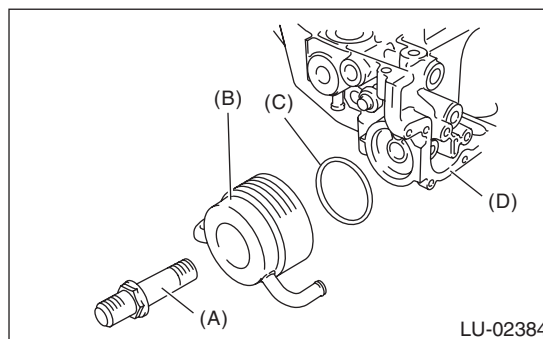
- 1) Tighten the oil cooler connector to install the oil cooler to the oil pan upper.

##### Tightening torque:

**54 N·m (5.5 kgf·m, 39.8 ft·lb)**

##### NOTE:

Use new O-rings.

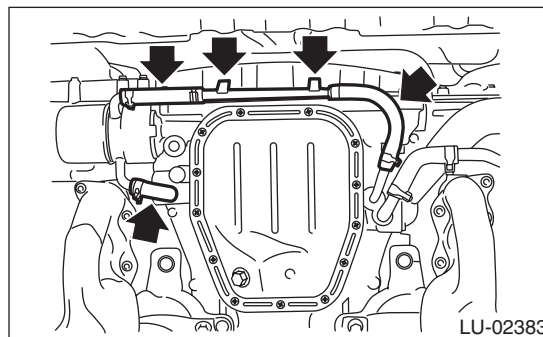


- (A) Oil cooler connector
- (B) Oil cooler
- (C) O-ring
- (D) Oil pan upper

- 2) Install the oil filter. <Ref. to LU(H6DO)-15, INSTALLATION, Engine Oil Filter.>
- 3) Attach the bolts which hold the engine oil cooler water pipe to chain cover and connect the water hose to oil cooler.

##### Tightening torque:

**6.4 N·m (0.7 kgf·m, 4.7 ft·lb)**



- 4) Lower the vehicle.
- 5) Refill the engine oil. <Ref. to LU(H6DO)-9, REPLACEMENT, Engine Oil.>
- 6) Fill the ATF. <Ref. to CO(H6DO)-12, FILLING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>
- 7) Check the engine oil level. <Ref. to LU(H6DO)-9, INSPECTION, Engine Oil.>

#### C: INSPECTION

- 1) Check that coolant passages are not clogged using a compressed air.
- 2) Check that the oil pan upper and O-ring installing surface of oil filter are not damaged.

## 9. General Diagnostic Table

### A: INSPECTION

Before performing diagnostics, make sure that the engine oil level is correct and no oil leakage exists.

Trouble	Possible cause	Corrective action
Warning light remains ON.	a. Oil pressure switch failure	
	○ Cracked diaphragm or oil leakage within switch	Replace.
	○ Broken spring or seized contacts	Replace.
	b. Low oil pressure	
	○ Clogging of oil filter	Replace.
	○ Malfunction of oil by-pass valve in oil filter	Replace.
	○ Malfunction of oil relief valve in oil pump	Replace.
	○ Clogged oil passage	Clean.
	○ Excessive tip clearance and side clearance of oil pump rotor	Replace.
	○ Clogged oil strainer or broken pipe	Clean or replace.
	c. No oil pressure	
	○ Insufficient engine oil (degradation, etc.)	Replace.
	○ Broken pipe of oil strainer	Replace.
○ Stuck oil pump rotor	Replace.	
Warning light does not illuminate.	a. Malfunction of combination meter	Replace.
	b. Poor contact of switch contact points	Replace.
	c. Disconnection of wiring	Repair.
Warning light flickers momentarily.	a. Defective terminal contact	Repair.
	b. Defective wiring harness	Repair.
	c. Oil pressure switch failure	
	○ Cracked diaphragm or oil leakage within switch	Replace.
	○ Broken spring or seized contacts	Replace.
	d. Low oil pressure	
	○ Clogging of oil filter	Replace.
	○ Malfunction of oil by-pass valve in oil filter	Replace.
	○ Malfunction of oil relief valve in oil pump	Replace.
	○ Clogged oil passage	Clean.
○ Excessive tip clearance and side clearance of oil pump rotor	Replace.	
○ Clogged oil strainer or broken pipe	Clean or replace.	

# General Diagnostic Table

LUBRICATION

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# SPEED CONTROL SYSTEMS

# *SP(H6DO)*

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2. Accelerator Pedal .....	4

# General Description

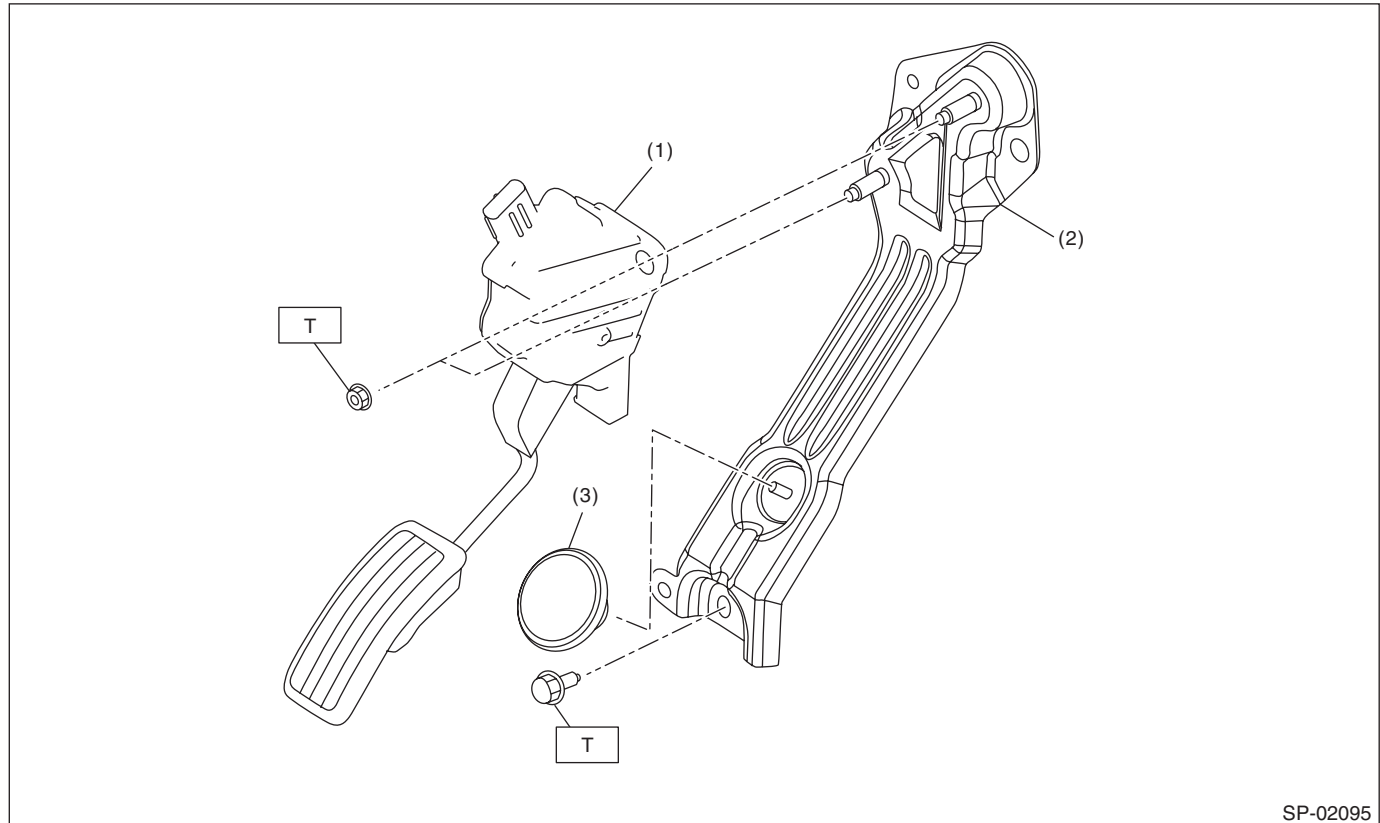
## SPEED CONTROL SYSTEMS

### 1. General Description

#### A: SPECIFICATION

Accelerator pedal	Stroke	At pedal pad	49 — 58 mm (1.93 — 2.28 in)
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#### B: COMPONENT



SP-02095

- (1) Accelerator pedal ASSY  
(2) Accelerator pedal bracket

- (3) Accelerator stopper

**Tightening torque: N·m (kgf·m, ft·lb)**  
**T: 18 (1.8, 13.3)**

#### C: CAUTION

- Wear appropriate work clothing, including a cap, protective goggles and protective shoes when performing any work.
- Remove contamination including dirt and corrosion before removal or installation.
- Keep the parts in order and protect them from dust and dirt.
- Before removal or installation, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
- Vehicle components are extremely hot after driving. Be wary of receiving burns from heated parts.
- Be sure to tighten fasteners including bolts and nuts to the specified torque.
- Place shop jacks or rigid racks at the specified points.
- Before disconnecting connectors of sensors or units, be sure to disconnect the ground cable from the battery.

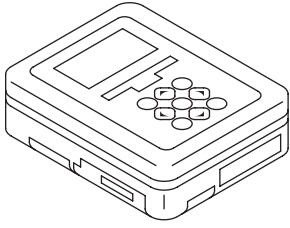


# General Description

SPEED CONTROL SYSTEMS

## D: PREPARATION TOOL

### 1. SPECIAL TOOL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST1B022XU0	1B022XU0	SUBARU SELECT MONITOR III KIT	Used for inspecting the accelerator pedal.

### 2. GENERAL TOOL

TOOL NAME	REMARKS
Circuit tester	Used for measuring voltage.

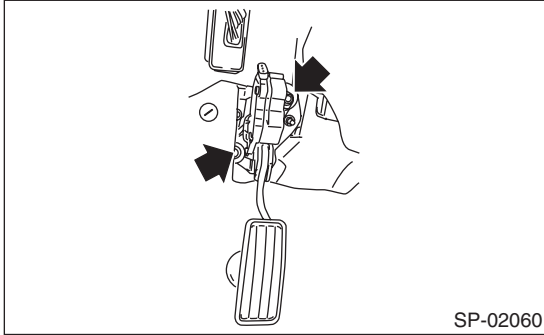
# Accelerator Pedal

## SPEED CONTROL SYSTEMS

### 2. Accelerator Pedal

#### A: REMOVAL

- 1) Disconnect the ground cable from battery.
- 2) Disconnect the connector.
- 3) Remove the nut securing accelerator pedal assembly, and remove the accelerator pedal assembly.



#### B: INSTALLATION

Install in the reverse order of removal.

#### Tightening torque:

**18 N·m (1.8 kgf·m, 13.3 ft·lb)**

#### C: DISASSEMBLY

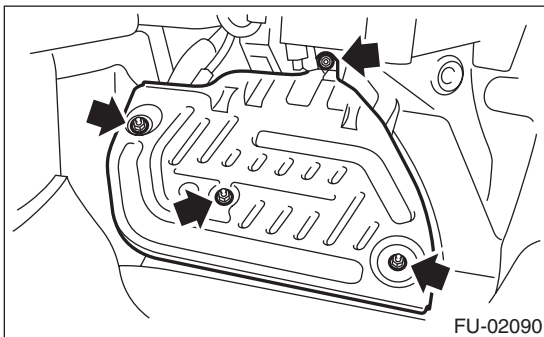
NOTE:

The accelerator pedal cannot be disassembled.

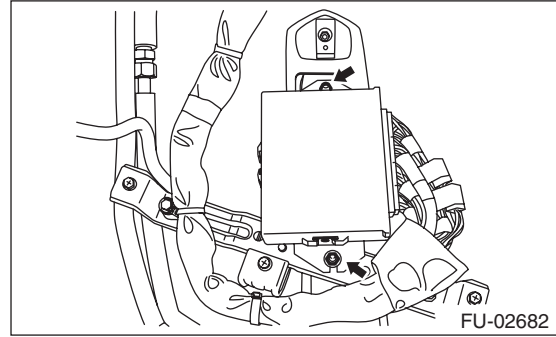
#### D: INSPECTION

##### 1. CHECK ACCELERATOR PEDAL SENSOR AREA (METHOD WITH CIRCUIT TESTER)

- 1) Remove the front pillar lower trim and console side panel lower RH of passenger's side.
- 2) Detach the floor mat of passenger's seat.
- 3) Remove the protect cover.

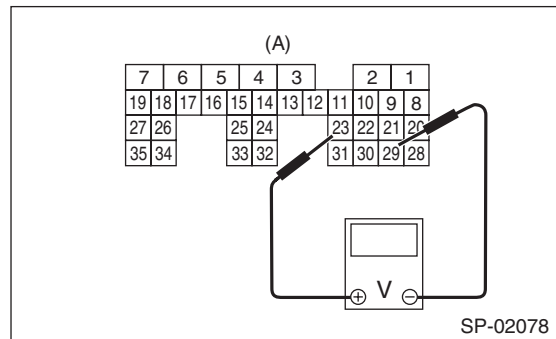


- 4) Remove the ECM from vehicle.

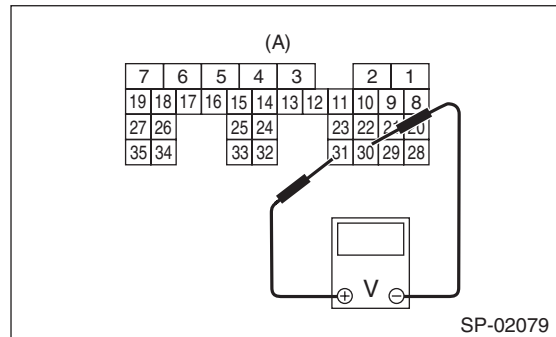


- 5) Turn the ignition switch to ON. (engine OFF)
- 6) Measure the voltage between ECM connector terminals.

Main sensor side



Sub sensor side



(A) To ECM connector

Accelerator pedal sensor	Accelerator pedal	Terminal No.	Standard
Main	Not depressed (Full closed)	23 (+) and 29 (-)	1 V
	Depressed (Full opened)		3.5 V
Sub	Not depressed (Full closed)	31 (+) and 30 (-)	1 V
	Depressed (Full opened)		3.5 V

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

**Tightening torque:**

**7.5 N·m (0.8 kgf-m, 5.5 ft-lb)**

**2. CHECK ACCELERATOR PEDAL SENSOR AREA (METHOD WITH SUBARU SELECT MONITOR)**

- 1) Turn the ignition switch to ON. (engine OFF)
- 2) Read the accelerator pedal opening angle signal and voltage of accelerator pedal sensor using Subaru Select Monitor. <Ref. to EN(H6DO)(diag)-37, READ CURRENT DATA FOR ENGINE (NORMAL MODE), OPERATION, Subaru Select Monitor.>

Accelerator pedal sensor	Accelerator pedal opening angle signal	Standard
Main	0.0%	1 V
	100.0%	3.5 V
Sub	0.0%	1 V
	100.0%	3.5 V

**3. OTHER INSPECTIONS**

- 1) Check that the accelerator pedal does not have deformation, cracks or damage.
- 2) Check for smooth operation when the accelerator pedal is depressed.
- 3) Check if the accelerator pedal returns to its original position smoothly when the pedal is released.

# Accelerator Pedal

SPEED CONTROL SYSTEMS

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# IGNITION

# *IG(H6DO)*

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	<b>Page</b>
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2. Spark Plug .....	4
3. Ignition Coil .....	7

# General Description

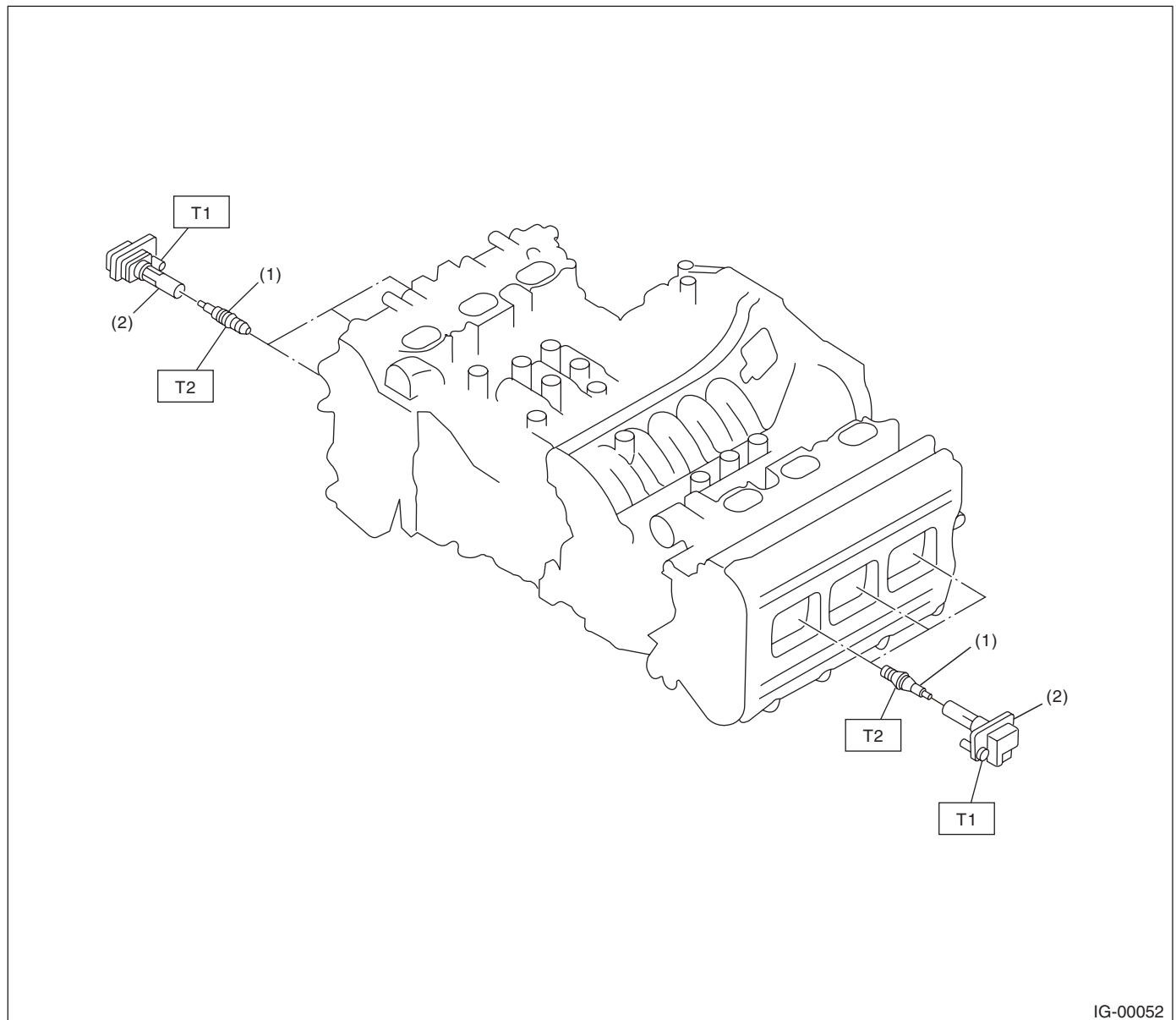
## IGNITION

### 1. General Description

#### A: SPECIFICATION

Item		Specifications
Ignition coil	Type	FK0368
	Ignition system	Independent ignition coil
	Manufacturer	Diamond Electric
Spark plug	Manufacturer and type	NGK: SILFR6C11
	Thread size (diameter, pitch, length)	mm 14, 1.25, 26.5
	Spark plug gap	mm (in) Standard 1.0 — 1.1 (0.039 — 0.043)
	Electrode	Iridium

#### B: COMPONENT



- (1) Spark plug
- (2) Ignition coil

**Tightening torque: N·m (kgf·m, ft·lb)**  
**T1: 16 (1.6, 11.8)**  
**T2: 21 (2.1, 15.5)**

### **C: CAUTION**

- Wear appropriate work clothing, including a cap, protective goggles and protective shoes when performing any work.
- 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.
- Vehicle components are extremely hot after driving. Be wary of receiving burns from heated parts.
- Be sure to tighten fasteners including bolts and nuts to the specified torque.
- Place shop jacks or rigid racks at the specified points.
- Before disconnecting connectors of sensors or units, be sure to disconnect the ground cable from the battery.

# Spark Plug

## IGNITION

### 2. Spark Plug

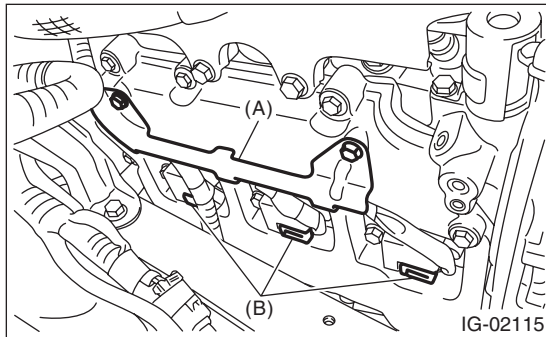
#### A: REMOVAL

##### Spark plug:

<Ref. to IG(H6DO)-2, SPECIFICATION, General Description.>

#### 1. RH SIDE

- 1) Remove the collector cover.
- 2) Disconnect the ground cable from battery.
- 3) Remove the air cleaner case. <Ref. to IN(H6DO)-6, REMOVAL, Air Cleaner Case.>
- 4) Remove the engine harness stay (A).
- 5) Disconnect the connector (B) from ignition coil.

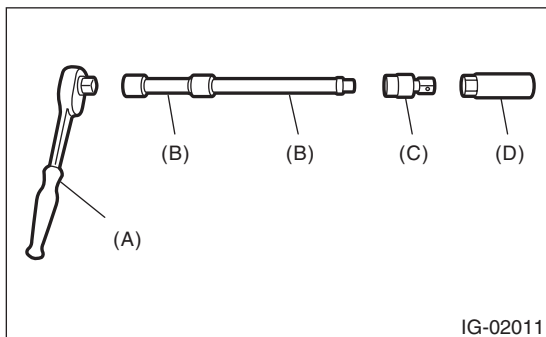
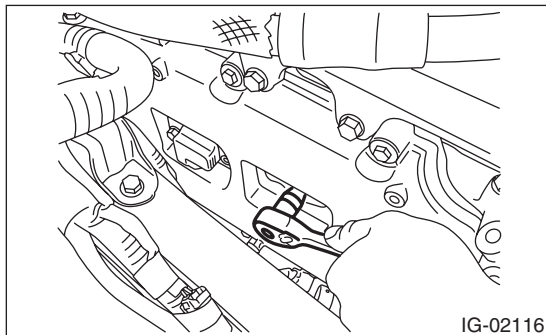


- 6) Remove the ignition coil.

##### NOTE:

Turn the #5 ignition coil to remove it.

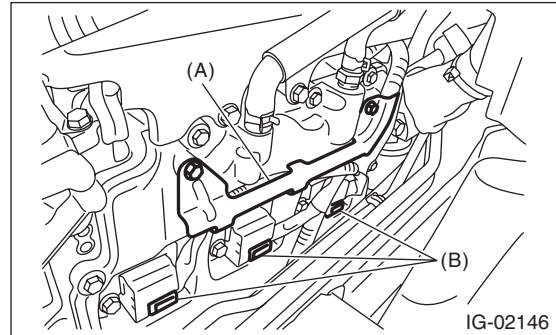
- 7) Remove the spark plug with a spark plug socket.



- (A) Ratchet handle
- (B) Extension bar
- (C) Universal joint
- (D) Spark plug socket

#### 2. LH SIDE

- 1) Remove the collector cover.
- 2) Remove the battery and battery carrier. <Ref. to SC(H6DO)-19, REMOVAL, Battery.>
- 3) Remove the engine harness stay (A).
- 4) Disconnect the connector (B) from ignition coil.

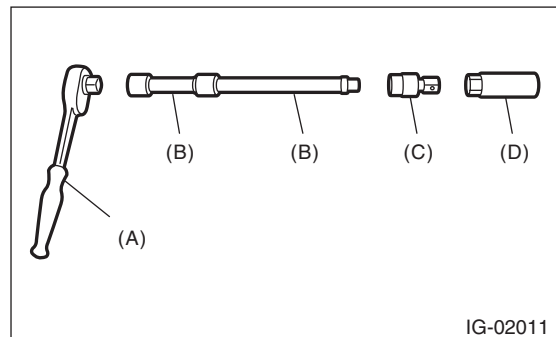
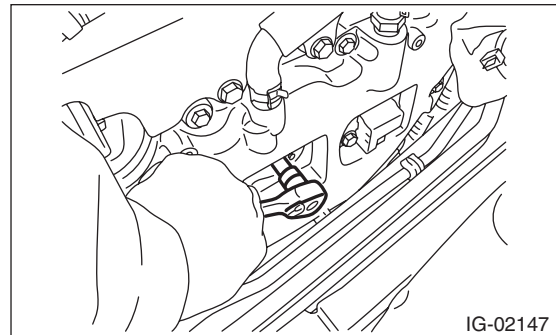


- 5) Remove the ignition coil.

##### NOTE:

Turn the #6 ignition coil to remove it.

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



- (A) Ratchet handle
- (B) Extension bar
- (C) Universal joint
- (D) Spark plug socket



## B: INSTALLATION

### 1. RH SIDE

Install in the reverse order of removal.

#### Tightening torque:

##### Spark plug

21 N·m (2.1 kgf-m, 15.5 ft-lb)

##### Ignition coil

16 N·m (1.6 kgf-m, 11.8 ft-lb)

##### Engine harness stay

6.4 N·m (0.7 kgf-m, 4.7 ft-lb)

### 2. LH SIDE

Install in the reverse order of removal.

#### Tightening torque:

##### Spark plug

21 N·m (2.1 kgf-m, 15.5 ft-lb)

##### Ignition coil

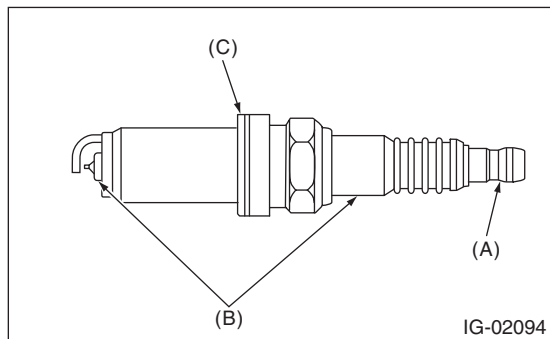
16 N·m (1.6 kgf-m, 11.8 ft-lb)

##### Engine harness stay

6.4 N·m (0.7 kgf-m, 4.7 ft-lb)

## C: INSPECTION

1) Check the spark plug for abnormalities. If defective, replace the spark plug.

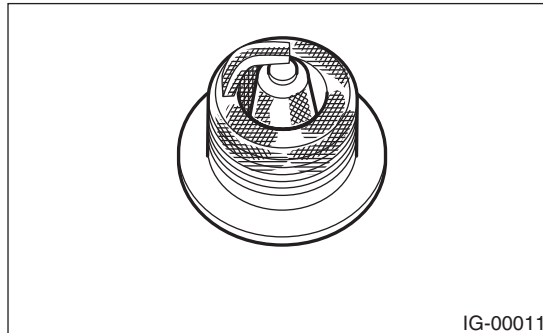


- (A) Terminal damage
- (B) Crack or damage in insulator
- (C) Damaged gasket

2) Check the spark plug electrode and condition of the insulator. If abnormal, check and repair the cause and replace the spark plug.

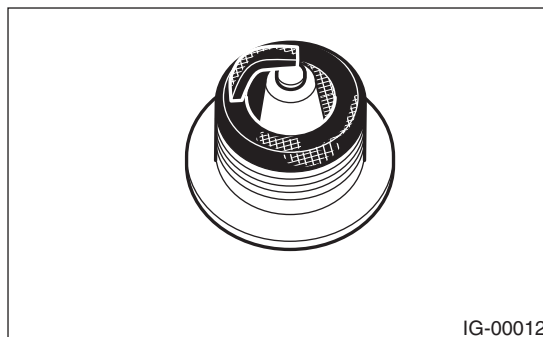
(1) Normal:

Brown to grayish-tan deposits and slight electrode wear indicate correct spark plug heat range.



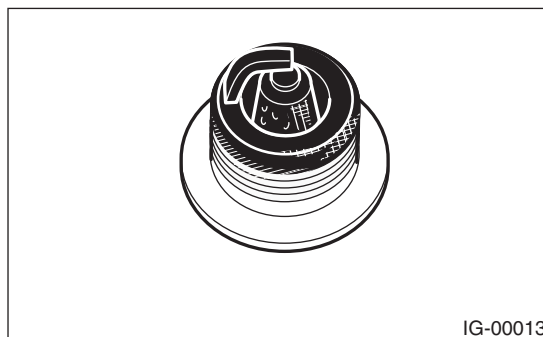
(2) Carbon fouled:

Dry fluffy carbon deposits on the insulator and electrode are mostly caused by slow-speed driving in town, weak ignition, too rich fuel mixture, etc.



(3) Oil fouled:

Wet black deposits show oil entrance into combustion chamber through worn piston rings or increased clearance between valve guides and valve stems.



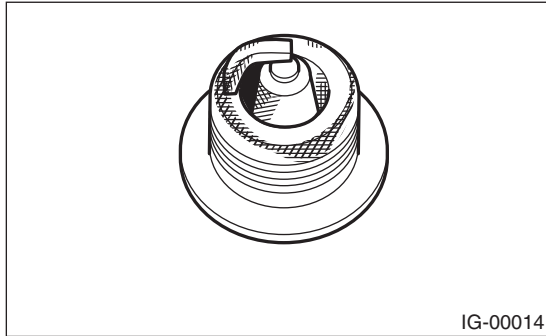
# Spark Plug

## IGNITION

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### (4) Overheating:

A white or light gray insulator with black or brown spots and bluish burnt electrodes indicate engine overheating, wrong selection of fuel, or loose spark plugs.



3) Using a nylon brush, etc., clean and remove the carbon or oxide deposits from the spark plug. If deposits are too stubborn, replace the spark plugs. After cleaning the spark plugs, check the spark plug gap "L" using a gap gauge. If it is not within the standard, replace the spark plug.

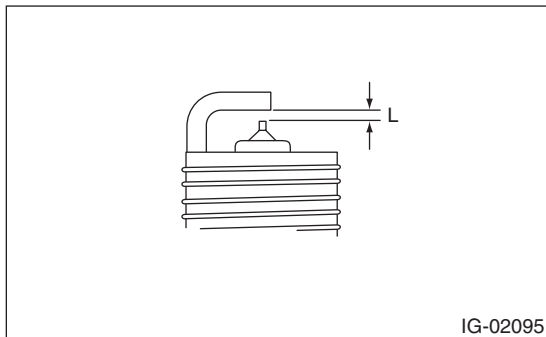
### NOTE:

- Never use a plug cleaner.
- Do not use a metal brush as it may damage the electrode area.

### **Spark plug gap L:**

#### **Standard**

**1.0 — 1.1 mm (0.039 — 0.043 in)**



### 3. Ignition Coil

#### A: REMOVAL

Direct ignition type has been adopted. Refer to “Spark Plug” for removal procedure. <Ref. to IG(H6DO)-4, REMOVAL, Spark Plug.>

#### B: INSTALLATION

Install in the reverse order of removal.

#### *Tightening torque:*

**16 N·m (1.6 kgf-m, 11.8 ft-lb)**

#### C: INSPECTION

For inspection procedure, refer to “Diagnostics for Engine Starting Failure”. <Ref. to EN(H6DO)(diag)-77, IGNITION CONTROL SYSTEM, Diagnostics for Engine Starting Failure.>

# Ignition Coil

IGNITION

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**IG(H6DO)-8**

# STARTING/CHARGING SYSTEMS

# *SC(H6DO)*

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# General Description

## STARTING/CHARGING SYSTEMS

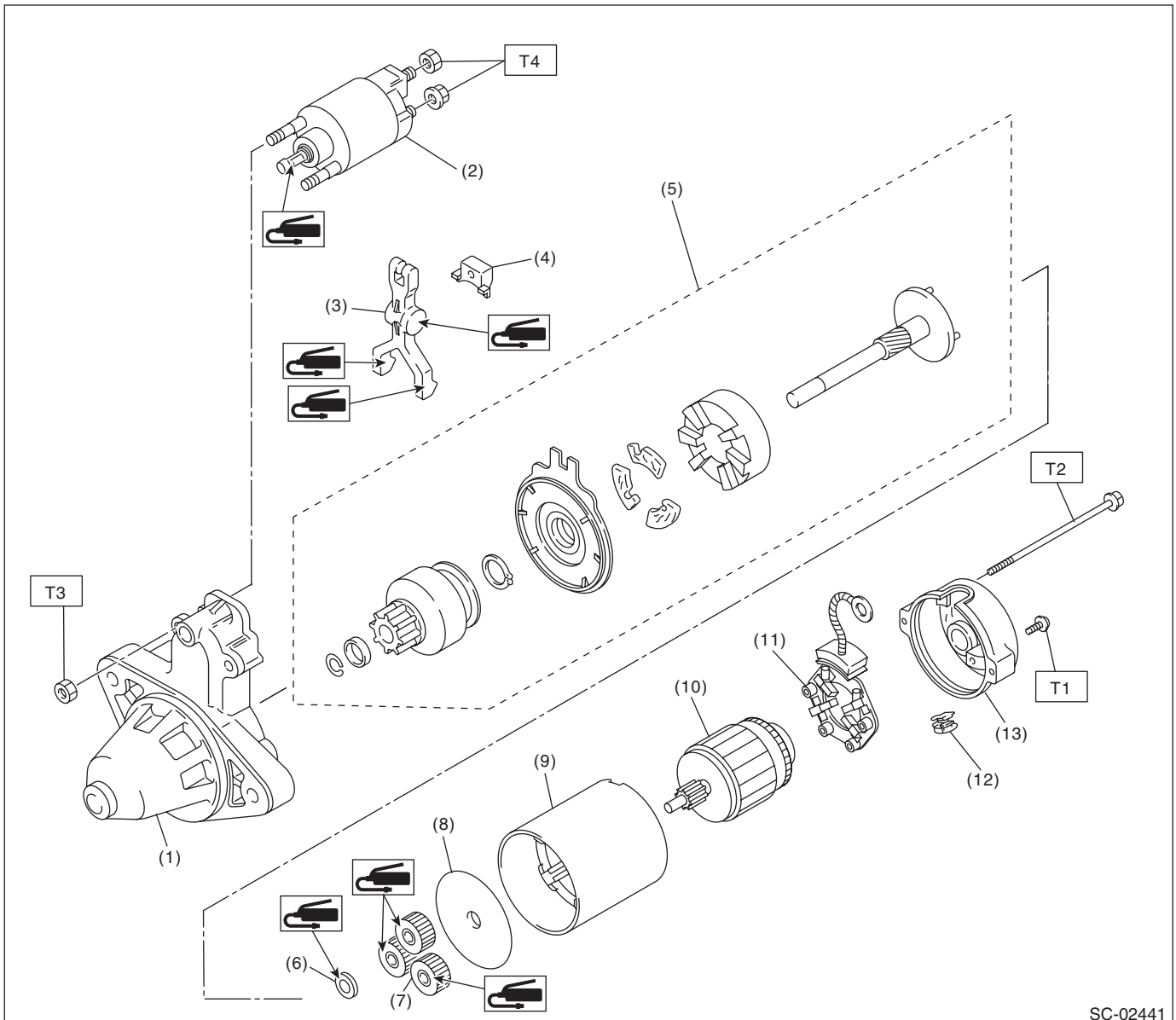
### 1. General Description

#### A: SPECIFICATION

Item		Specifications	
Vehicle model		AT	
Starter	Type	Reduction type	
	Model	428000-5250	
	Manufacturer	DENSO	
	Voltage and output	12 V — 1.6 kW	
	Direction of rotation	Counterclockwise (when observed from pinion)	
	Number of pinion teeth	9	
	No-load characteristics	Voltage	11 V
		Current	90 A or less
		Rotating speed	1,550 rpm or more
	Load characteristics	Voltage	8 V
		Current	370 A
		Torque	12.8 N·m (1.3 kgf-m, 9.4 ft-lb) or more
		Rotating speed	800 rpm or more
	Lock characteristics	Voltage	3 V
Current		750 A or less	
Torque		19.0 N·m (1.9 kgf-m, 14.0 ft-lb) or more	
Generator	Type	Rotating-field three-phase type, voltage regulator built-in type, with load response control system	
	Model	A3TJ3591	
	Manufacturer	Mitsubishi Electric	
	Voltage and output	12 V — 130 A	
	Polarity on ground side	Negative	
	Direction of rotation	Clockwise (when observed from pulley side)	
	Armature connection	3-phase $\Delta$ type	
	Output current	1,500 rpm — 55 A or more 2,500 rpm — 108 A or more 5,000 rpm — 127 A or more	
	Regulated voltage	14.1 — 14.8 V [20°C (68°F)]	
	Rotor slip ring outer diameter	Standard	22.7 mm (0.894 in)
		Limit	22.1 mm (0.870 in)
	Brush length	Standard	22.5 mm (0.886 in)
		Limit	5.0 mm (0.197 in)
Battery	Type and capacity	12 V — 52 AH (75D 23L)	

## B: COMPONENT

### 1. STARTER



SC-02441

- |                             |                        |
|-----------------------------|------------------------|
| (1) Starter housing         | (8) Starter plate      |
| (2) Magnet switch ASSY      | (9) Yoke               |
| (3) Shift lever             | (10) Armature          |
| (4) Starter seal            | (11) Brush holder ASSY |
| (5) Overrunning clutch ASSY | (12) Drain duct        |
| (6) Washer                  | (13) Starter cover     |
| (7) Planetary gear          |                        |

**Tightening torque: N·m (kgf·m, ft·lb)**

**T1: 1.4 (0.1, 1.0)**

**T2: 6 (0.6, 4.4)**

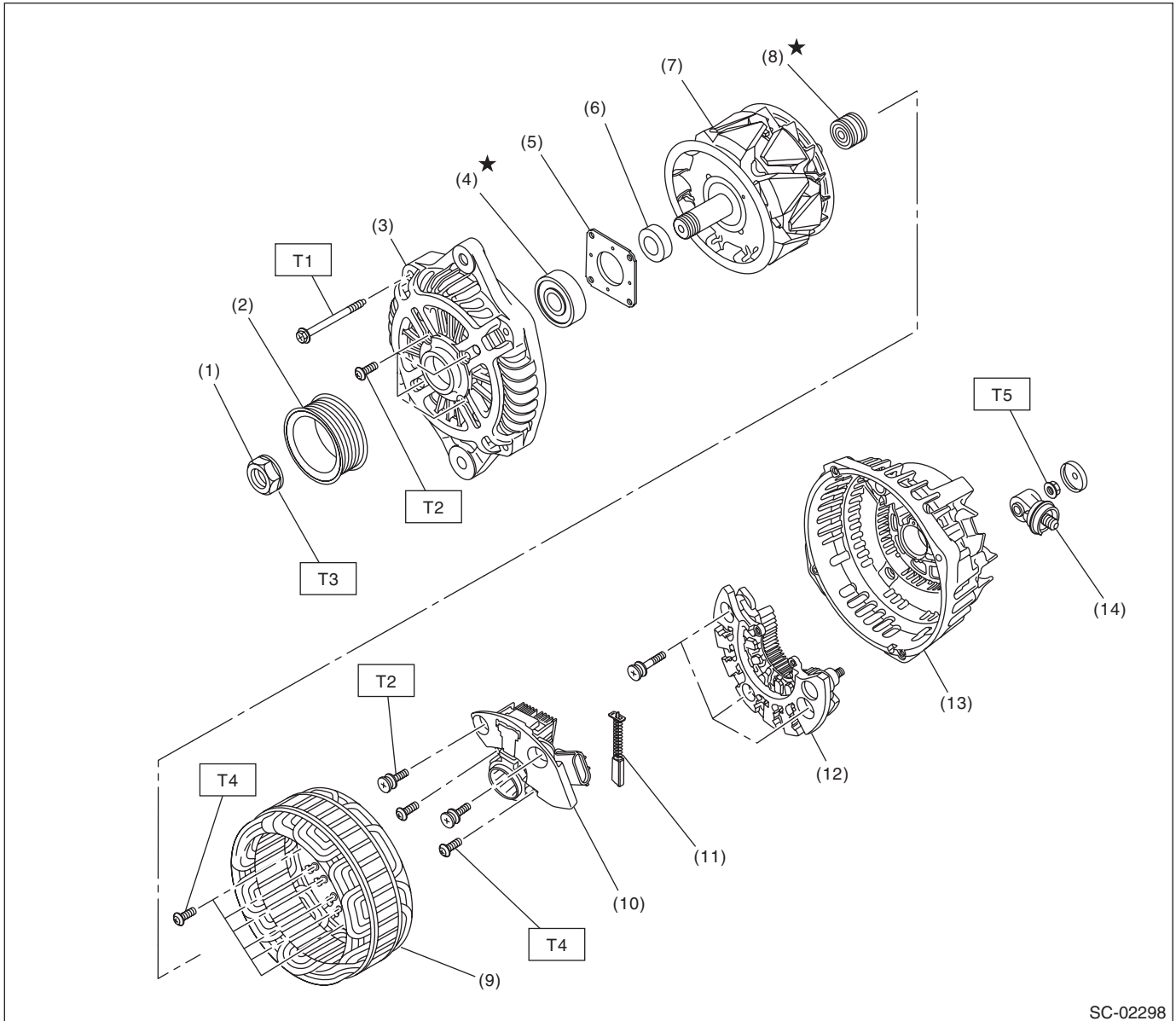
**T3: 7.5 (0.8, 5.5)**

**T4: 10 (1.0, 7.4)**

# General Description

## STARTING/CHARGING SYSTEMS

### 2. GENERATOR



SC-02298

- |                      |                   |
|----------------------|-------------------|
| (1) Pulley nut       | (8) Bearing       |
| (2) Pulley           | (9) Stator coil   |
| (3) Front cover      | (10) IC regulator |
| (4) Ball bearing     | (11) Brush        |
| (5) Bearing retainer | (12) Rectifier    |
| (6) Spacer           | (13) Rear cover   |
| (7) Rotor            | (14) Terminal B   |

**Tightening torque: N·m (kgf·m, ft·lb)**

**T1: 4.4 (0.4, 3.2)**

**T2: 3.9 (0.4, 2.9)**

**T3: 117.5 (12.0, 86.7)**

**T4: 2 (0.2, 1.5)**

**T5: 8.9 (0.9, 6.6)**



## C: CAUTION

- Wear appropriate work clothing, including a cap, protective goggles and protective shoes when performing any work.
- 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.
- Vehicle components are extremely hot after driving. Be wary of receiving burns from heated parts.
- Be sure to tighten fasteners including bolts and nuts to the specified torque.
- Place shop jacks or rigid racks at the specified points.
- Before disconnecting connectors of sensors or units, be sure to disconnect the ground cable from the battery.

## D: PREPARATION TOOL

### 1. GENERAL TOOL

TOOL NAME	REMARKS
Circuit tester	Used for measuring resistance, voltage and current.

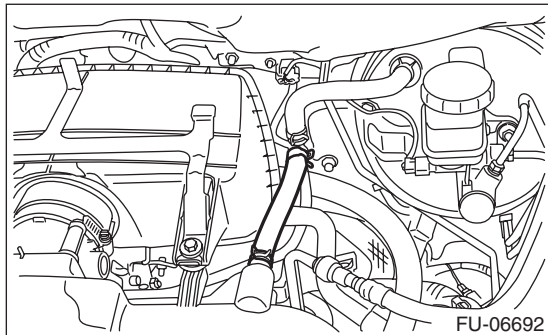
# Starter

## STARTING/CHARGING SYSTEMS

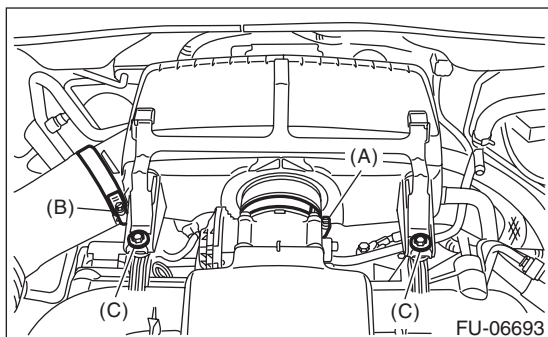
### 2. Starter

#### A: REMOVAL

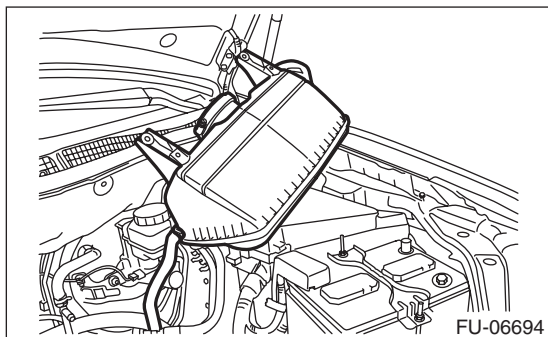
- 1) Remove the collector cover.
- 2) Disconnect the ground cable from battery.
- 3) Disconnect the brake booster vacuum hose from the intake manifold.



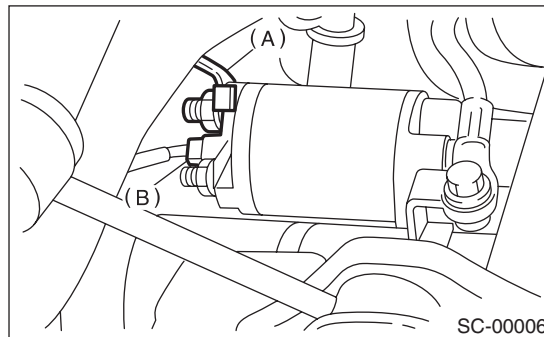
- 4) Loosen the clamp (A) which connects air intake chamber to throttle body.
- 5) Loosen the clamp (B) which connects intake boot to air intake chamber.
- 6) Loosen the bolt (C) which secures air intake chamber and collector cover bracket to the stay.



- 7) Remove the air intake chamber, and move it to the left side wheel apron.



- 8) Disconnect the connector (B) and terminal (A) from starter.



- 9) Remove the starter from transmission.

#### B: INSTALLATION

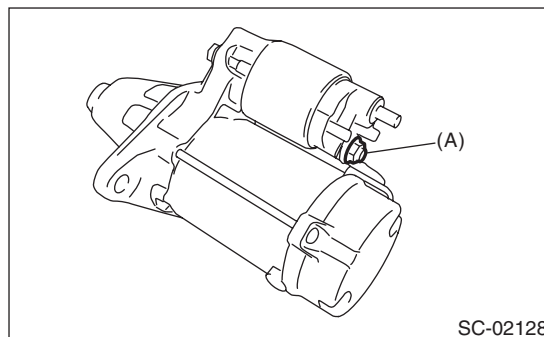
Install in the reverse order of removal.

#### Tightening torque:

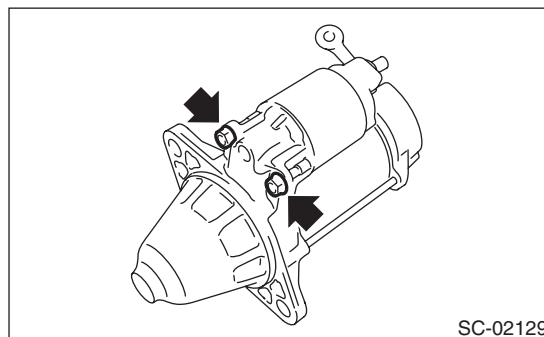
**50 N·m (5.1 kgf-m, 36.9 ft-lb)**

#### C: DISASSEMBLY

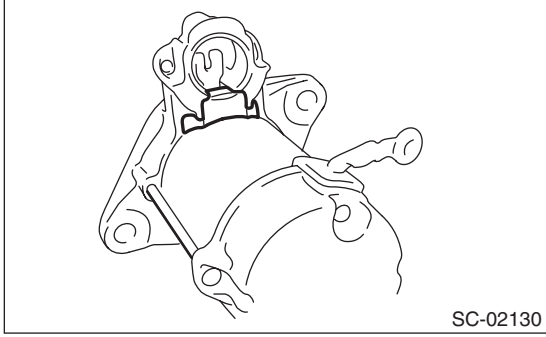
- 1) Remove the nut which holds terminal M (A) of the magnet switch assembly, then disconnect the harness from the terminal.



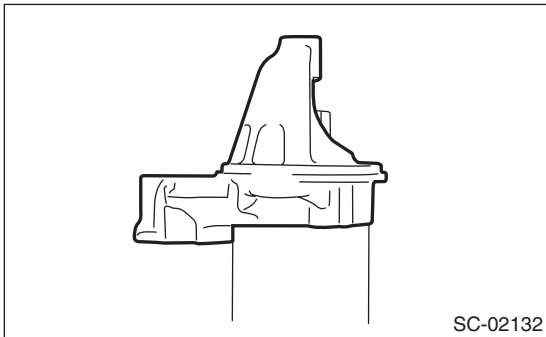
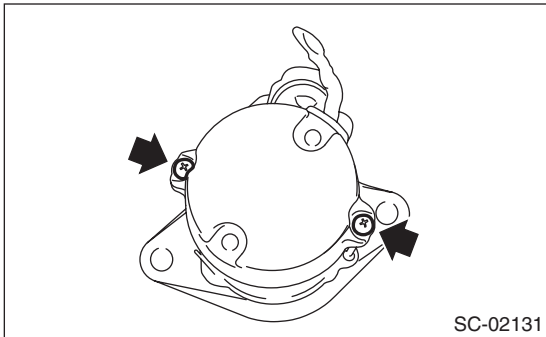
- 2) Remove the nuts fastening the magnet switch assembly to the starter housing, then remove the magnet switch assembly.



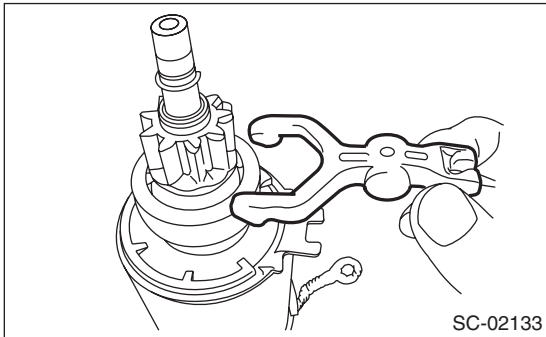
3) Remove the starter seal.



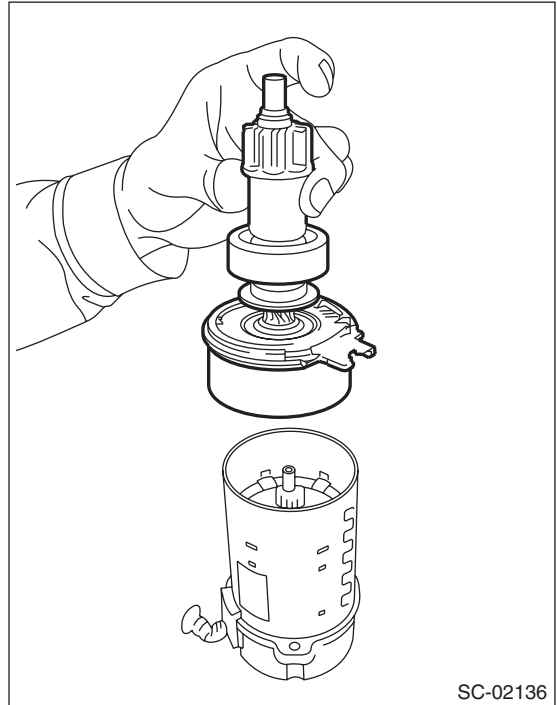
4) Remove the through bolts on both sides, and remove the starter housing.



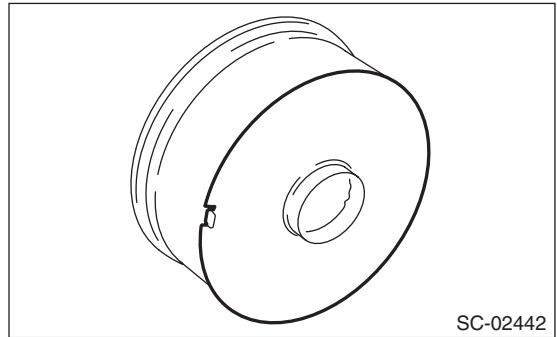
5) Remove the shift lever.



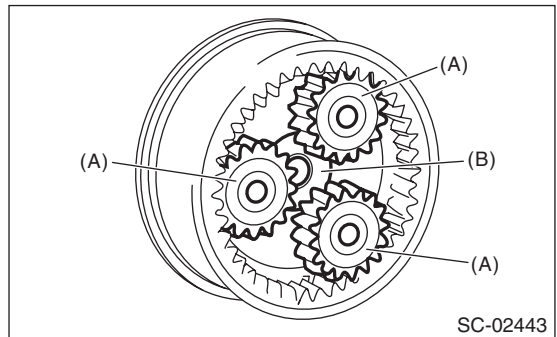
6) Remove the overrunning clutch assembly from the yoke.



7) Remove the starter plate.



8) Remove the planetary gear (A) and washer (B) from internal gear.



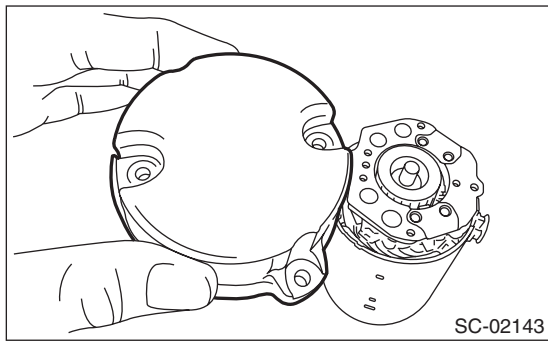
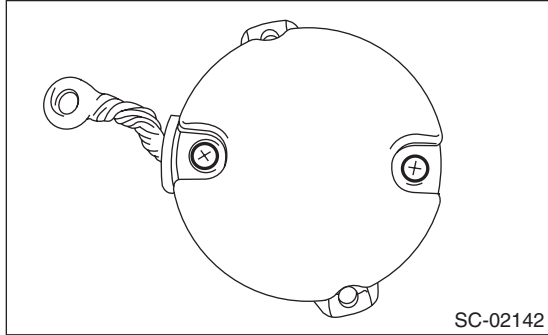
# Starter

## STARTING/CHARGING SYSTEMS

9) Remove the screws, and remove the starter cover from the brush holder assembly.

**NOTE:**

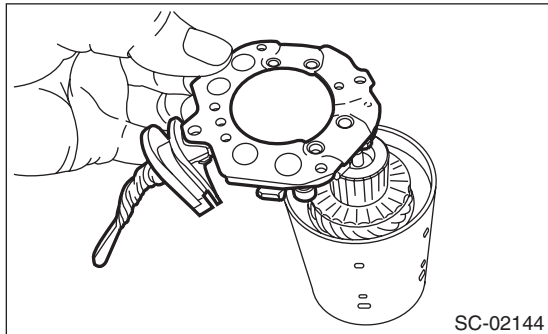
Separate the starter cover by pressing the brush holder assembly using the screws so that the assembly stays onto the armature side.



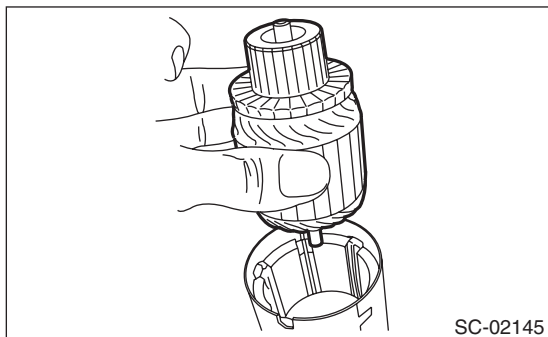
10) Remove the brush holder assembly from the armature by hand.

**NOTE:**

Spread the brush with your fingers, being careful not to damage the brush.

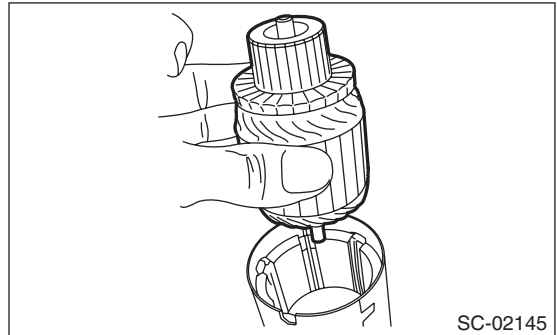


11) Remove the armature from the yoke.



## D: ASSEMBLY

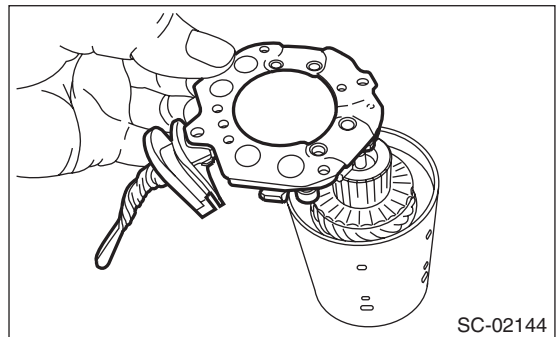
1) Install the armature to the yoke.



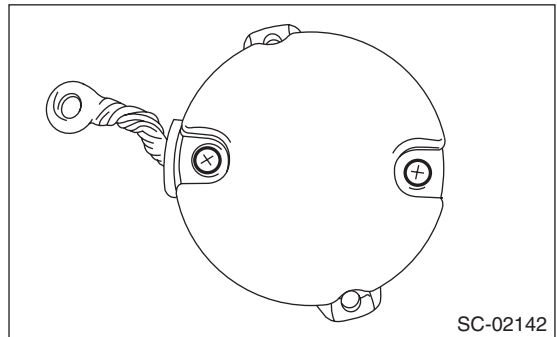
2) Install the brush holder assembly to the armature.

**NOTE:**

Spread the brush with your fingers, being careful not to damage the brush.



3) Install the starter cover, and secure it to the brush holder assembly with the screws.



4) Assemble the planetary gear (A) and washer (B) to the internal gear.

(1) Apply grease to the planetary gear installation position.

**Grease:**

**DENSO HL50**

(2) Install the planetary gear to the pin.

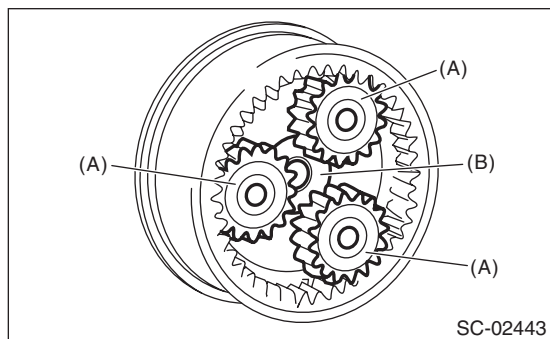
(3) Apply grease to the planetary gear, internal gear, washer, and upper part of the pin.

**NOTE:**

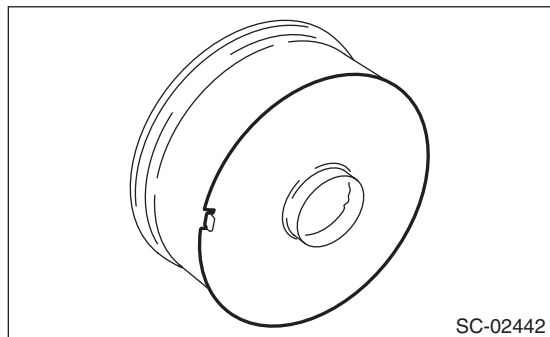
- Apply grease so that it contacts each gear.
- Be careful not to allow dirt to get in.

**Grease:**

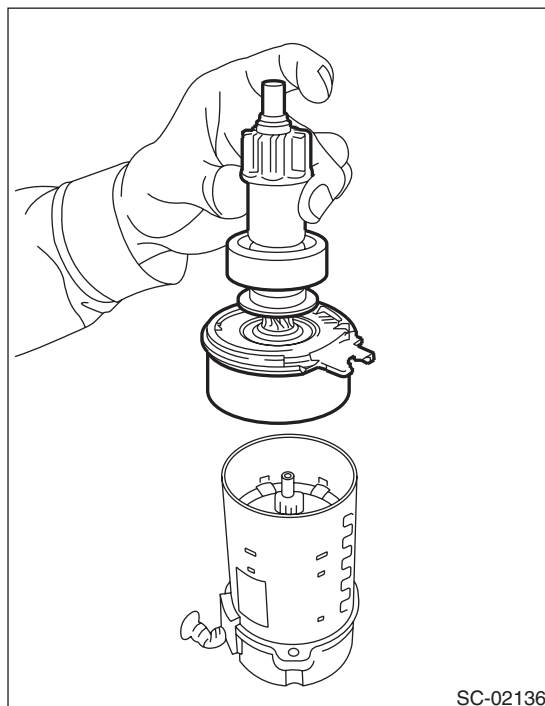
**DENSO HL50**



(4) Install the starter plate.



5) Assemble the overrunning clutch assembly to the yoke.



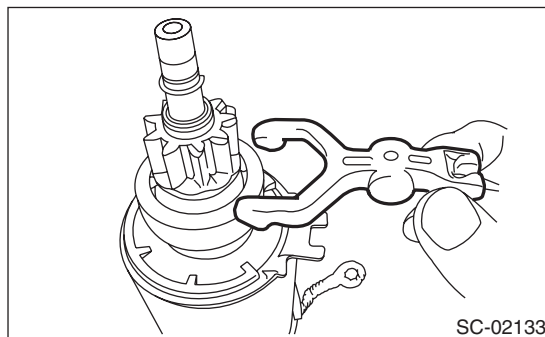
6) Install the shift lever.

**NOTE:**

Apply grease to the contact portion of the shift lever.

**Grease:**

**DENSO HL50**

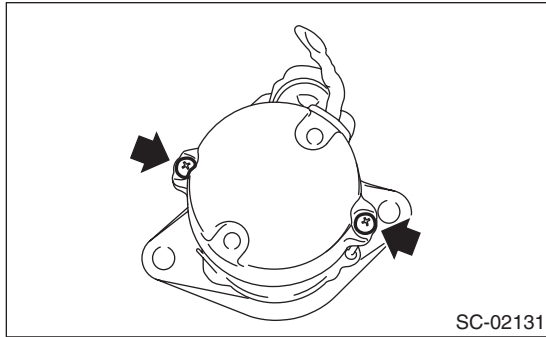
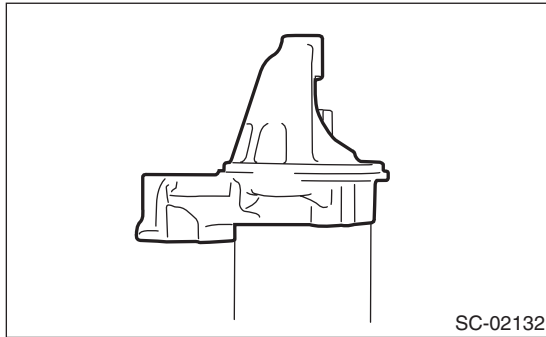


# Starter

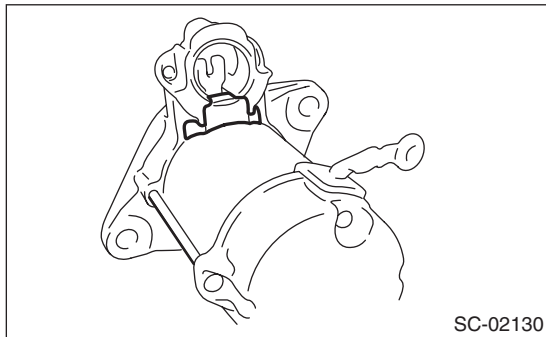
## STARTING/CHARGING SYSTEMS

7) Install the starter housing, and tighten through bolts on both sides.

**Tightening torque:**  
**6 N·m (0.6 kgf-m, 4.4 ft-lb)**



8) Install the starter seal.



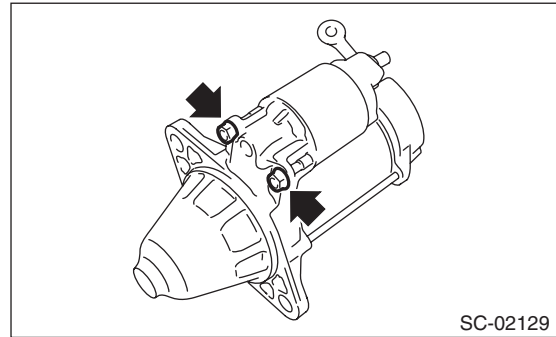
9) Install the magnet switch assembly to the starter housing, and tighten the nuts.

**NOTE:**

Apply grease to the shift lever installation position.

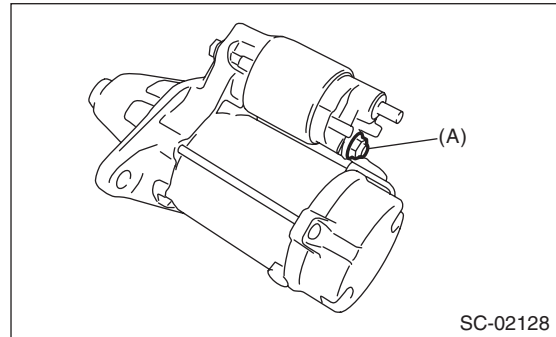
**Grease:**  
**DENSO HL50**

**Tightening torque:**  
**7.5 N·m (0.8 kgf-m, 5.5 ft-lb)**



10) Install the harness to the terminal M (A) of the magnet switch assembly, and tighten the nut.

**Tightening torque:**  
**10 N·m (1.0 kgf-m, 7.4 ft-lb)**



## E: INSPECTION

### 1. SWITCH ASSEMBLY

Using a circuit tester (set to "ohm"), check that there is continuity between terminals S and M, and between terminal S and ground.

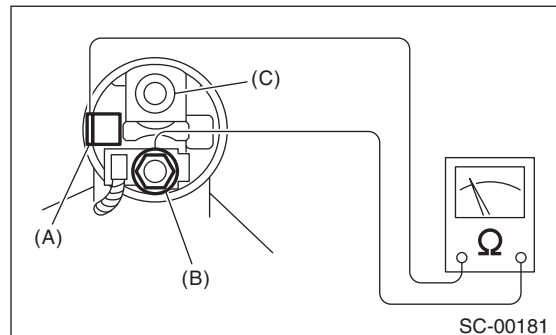
Also check to be sure there is no continuity between terminal M and B.

**Terminal/Resistance:**

**S — M/1  $\Omega$  or less**

**S — Ground/1  $\Omega$  or less**

**M — B/1 M $\Omega$  or more**



- (A) Terminal S
- (B) Terminal M
- (C) Terminal B

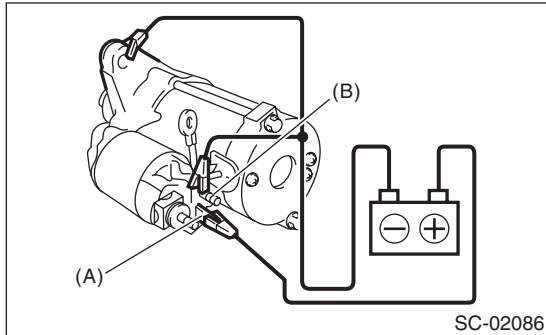
### 2. SWITCH ASSEMBLY OPERATION

**NOTE:**

Perform each test in a short period of time (3 — 5 sec).

**1) Suction test**

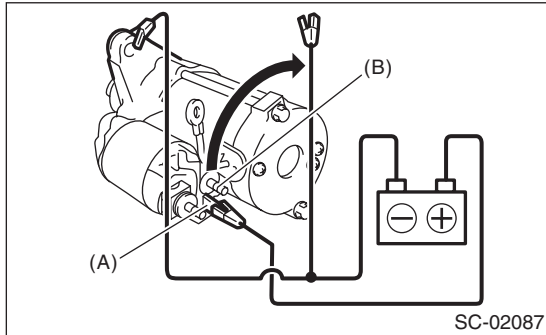
Check that the pinion gear comes flying out when the harness is disconnected from terminal M and connected as shown in the figure.



- (A) Terminal S
- (B) Terminal M

**2) Holding test**

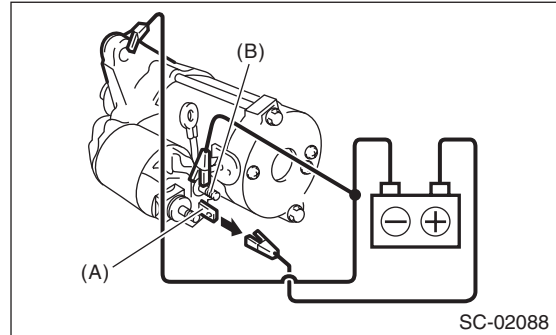
Check that the pinion gear remains flying out after the cable is disconnected from terminal M.



- (A) Terminal S
- (B) Terminal M

**3) Returning test**

With terminal S connected to the positive terminal, and terminal M and starter body connected to the battery ground terminal to suction the main contact point, check that the pinion gear returns to its original position when terminal S is disconnected.



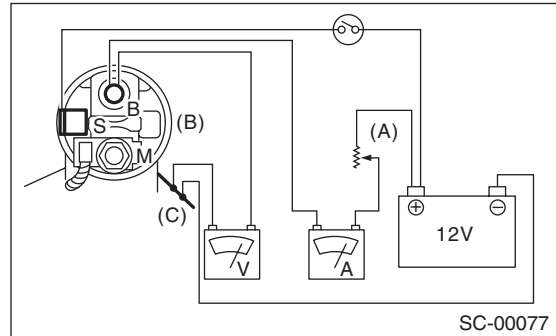
- (A) Terminal S
- (B) Terminal M

### 3. PERFORMANCE TEST

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

# Starter

## STARTING/CHARGING SYSTEMS

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### 1) No-load test

Adjust the variable resistance with the switch on until the voltage is 11 V, and read the value displayed on the ammeter to measure rotating speed. Compare these values with the standard.

#### ***No-load test (standard):***

##### ***Voltage/Current***

***Max. 11 V/90 A or less***

##### ***Rotating speed***

***1,550 rpm or more***

### 2) Load test

Apply the specified braking torque to starter. The condition is normal if the current draw and rotating speed are within standard.

#### ***Load test (standard):***

##### ***Voltage/Load***

***8 V/12.8 N·m (1.3 kgf-m, 9.4 ft-lb)***

##### ***Current/Rotating speed***

***370 A/800 rpm or more***

### 3) Lock test

With the starter stalled, or not rotating, measure the torque developed and current draw when the voltage is adjusted to standard voltage.

#### ***Lock test (standard):***

##### ***Voltage/Current***

***3 V/750 A or less***

##### ***Torque***

***19.0 N·m (1.9 kgf-m, 14.0 ft-lb)***

## 4. OTHER INSPECTIONS

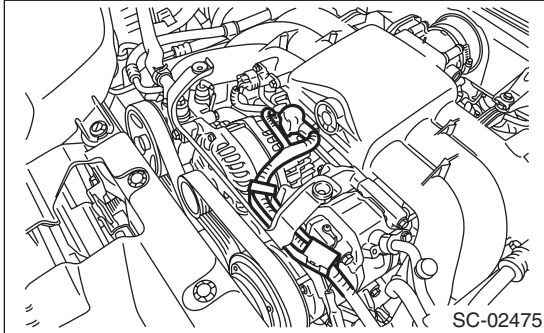
Check that the starter does not have deformation, cracks and any other damage.



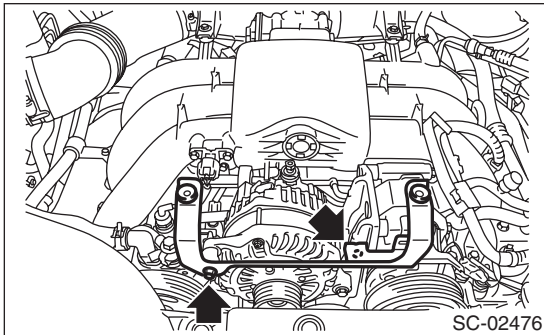
## 3. Generator

### A: REMOVAL

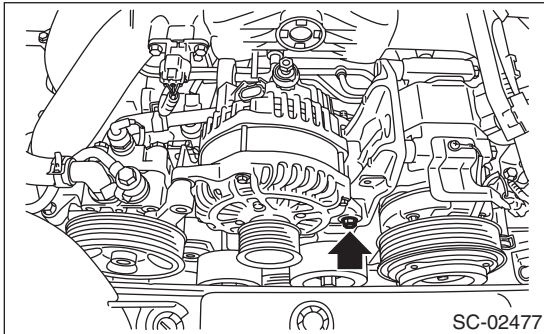
- 1) Remove the collector cover.
- 2) Disconnect the ground cable from battery.
- 3) Disconnect the connector and terminal B from the generator, and remove the harness cover from the collector cover bracket.



- 4) Remove the V-belts. <Ref. to ME(H6DO)-45, REMOVAL, V-belt.>
- 5) Remove the collector cover bracket.



- 6) Remove the generator.



### B: INSTALLATION

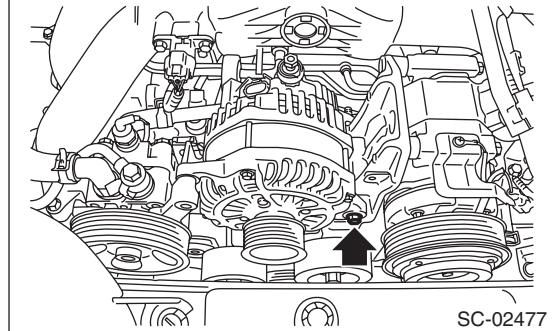
Install in the reverse order of removal.

#### CAUTION:

Check and adjust the V-belt tension. <Ref. to ME(H6DO)-45, INSPECTION, V-belt.>

#### Tightening torque:

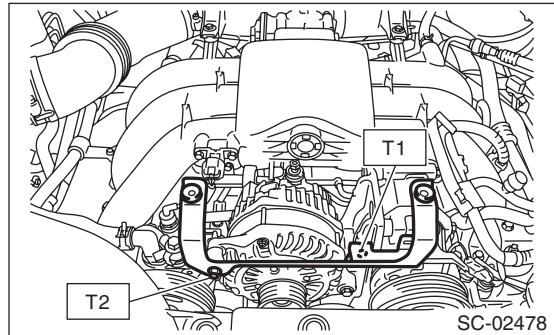
**25 N·m (2.5 kgf-m, 18.4 ft-lb)**



#### Tightening torque:

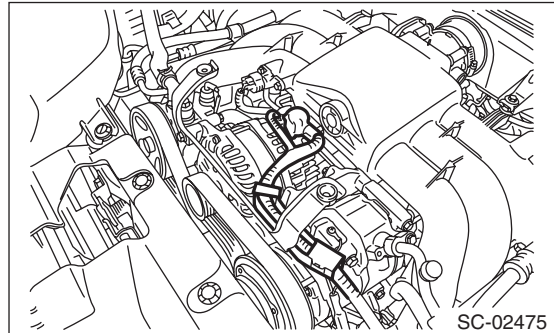
**T1: 6.4 N·m (0.7 kgf-m, 4.7 ft-lb)**

**T2: 25 N·m (2.5 kgf-m, 18.4 ft-lb)**



#### Tightening torque:

**16 N·m (1.6 kgf-m, 11.8 ft-lb)**

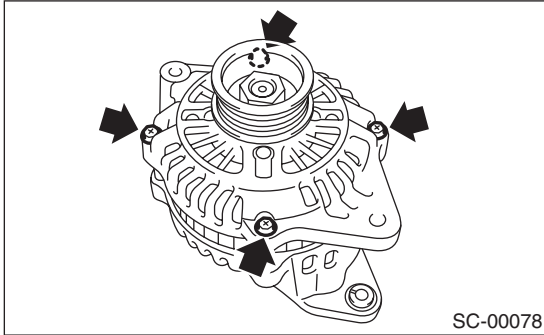


# Generator

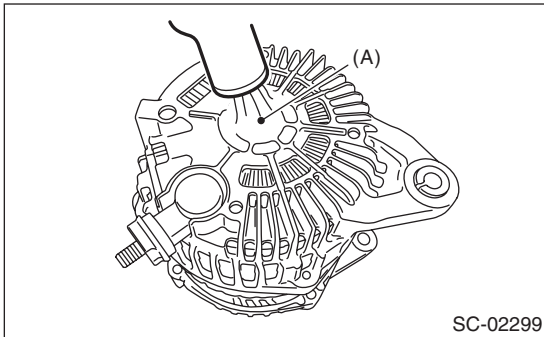
## STARTING/CHARGING SYSTEMS

### C: DISASSEMBLY

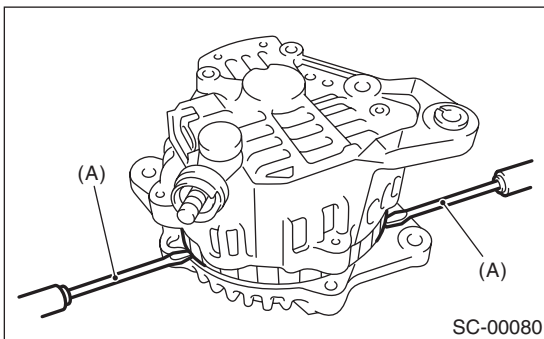
1) Remove the four through bolts.



2) Use a drier to heat the rear cover (A) portion to 50 — 60°C (122 — 140°F).



3) Insert the end of a flat tip screwdriver into the gap between stator core and front cover. Pry them apart to disassemble.

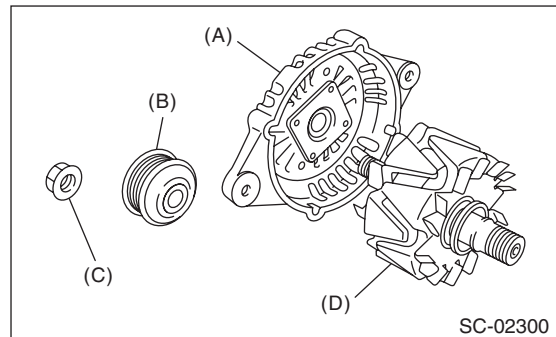
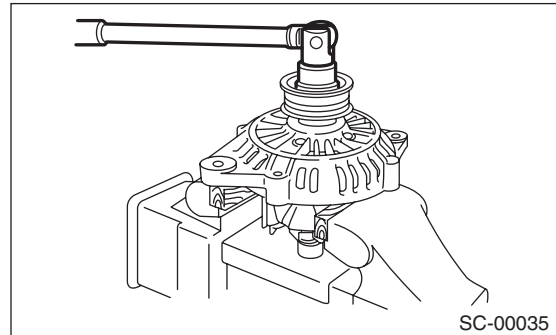


(A) Screwdriver

4) Using a vise, support the rotor and remove the pulley nut, then remove the rotor from the front cover.

#### CAUTION:

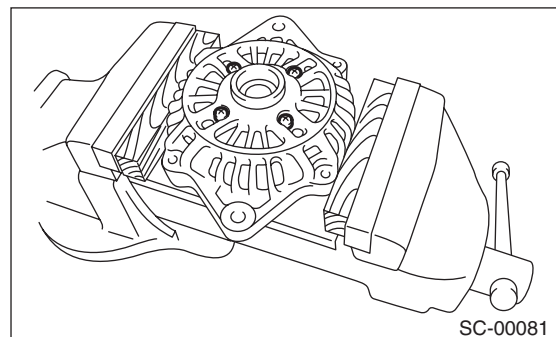
When holding the rotor with a vise, place aluminum plates or wooden pieces on the vise jaws to prevent rotor from damage.



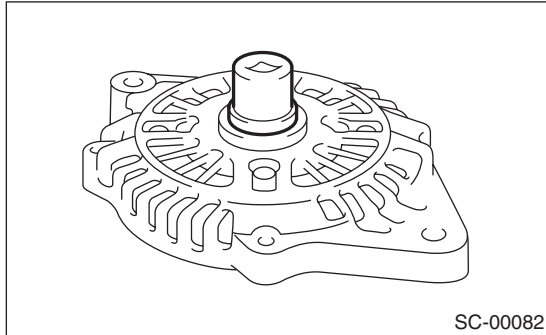
(A) Front cover  
(B) Pulley  
(C) Pulley nut  
(D) Rotor

5) Use the following procedures to remove the ball bearings.

(1) Remove the bolt, and then detach the bearing retainer.

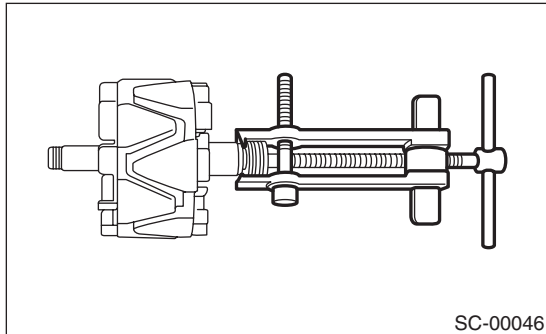


(2) Firmly attach an appropriate tool (such as a correct size socket wrench) to the bearing inner race.

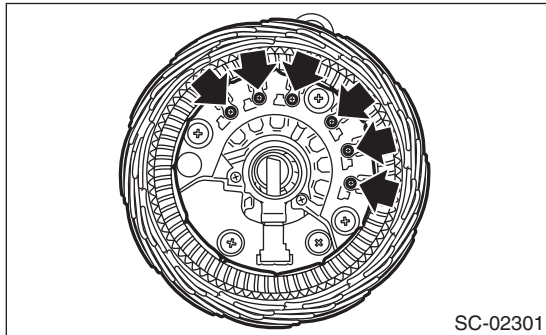


(3) Use the press to push the ball bearings out from the front cover.

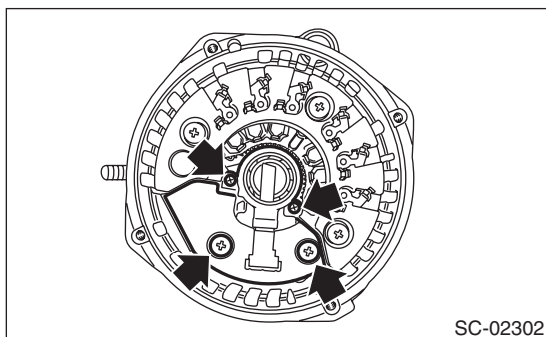
6) Using the bearing puller, remove the bearings from the rotor.



7) Remove six bolts between the rectifier and stator coil, then remove the stator coil.

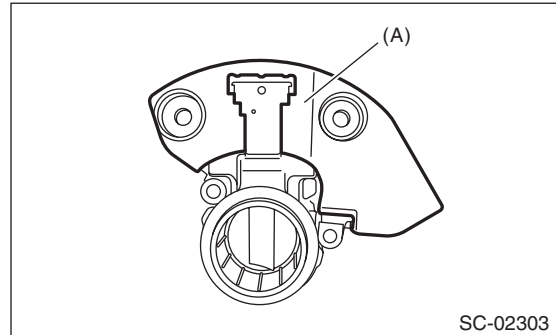


8) Remove four screws which secure the IC regulator to the rear cover, then remove the IC regulator.



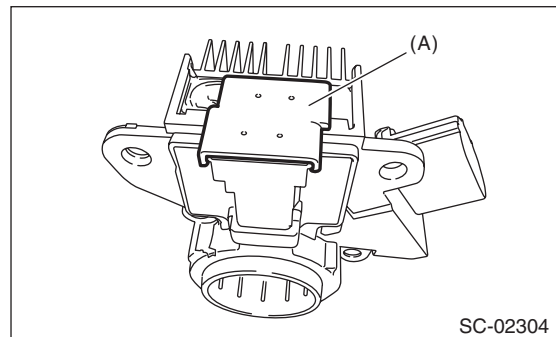
9) Use the following procedures to remove the brush.

(1) Remove the cover A.



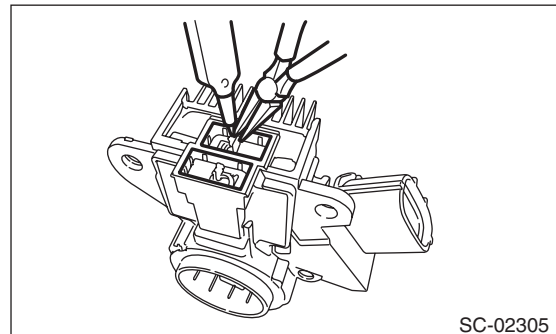
(A) Cover A

(2) Remove the cover B.



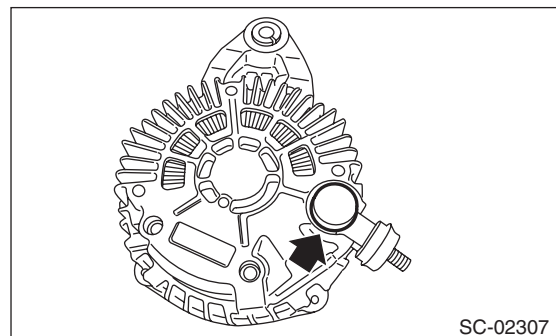
(A) Cover B

(3) Disconnect the connection and remove the brush.



10) Remove the rectifier as follows.

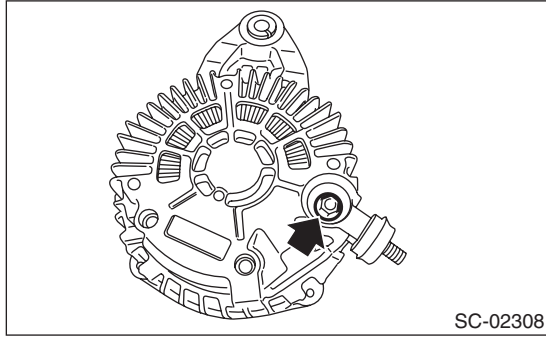
(1) Remove the cover on terminal B.



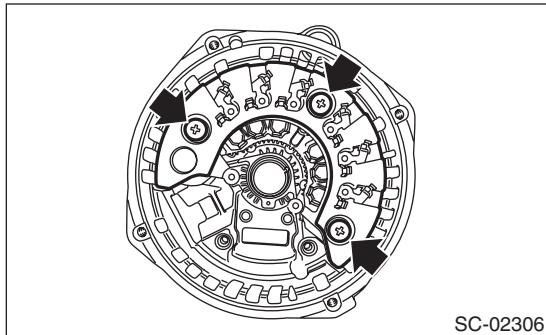
# Generator

## STARTING/CHARGING SYSTEMS

(2) Remove the nut on terminal B.



(3) Remove the bolts which secure the rectifier, and remove the rectifier.



### D: ASSEMBLY

Assemble in the reverse order of disassembly.

#### NOTE:

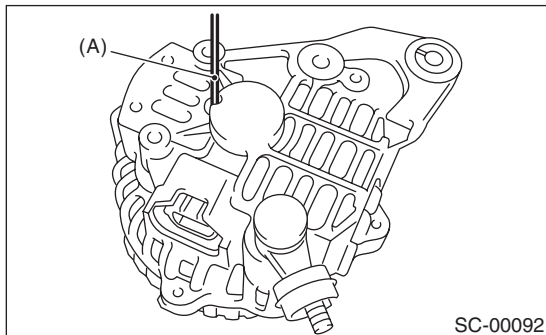
- Refer to component for tightening torque of each part. <Ref. to SC(H6DO)-4, GENERATOR, COMPONENT, General Description.>
- After assembling, manually turn the pulley to check that the rotor rotates smoothly.

1) Push of the brush

Before assembling the front and rear parts, press the brush down into the brush holder, then fix the brush in that position by inserting a [1 mm (0.08 in) dia., 40 — 50 mm (1.6 — 2.0 in) long] wire through the hole as shown in the figure.

#### CAUTION:

**After re-assembling, remove the wire.**



(A) Wire

2) Install the ball bearings.

(1) Set the ball bearings in the front cover, then securely install an appropriate tool (such as a socket wrench of proper size) to the bearing outer race.

(2) Using a press to press the ball bearings into the specified location.

(3) Install the bearing retainer.

3) Install the bearings.

#### CAUTION:

**Do not apply grease to the bearings. If there is any oil on the bearing box, remove it completely.**

(1) Use a press to install the bearings to the rotor shaft.

(2) Heat the bearing box in rear cover at 50 to 60°C (122 to 140°F), and then press the bearing into rear cover.

### E: INSPECTION

#### 1. DIODE

#### CAUTION:

**There is the possibility of damaging the diodes if a mega-tester (used to measure high voltages) or a similar measuring instrument is used. Never use a mega tester or equivalent for this test.**

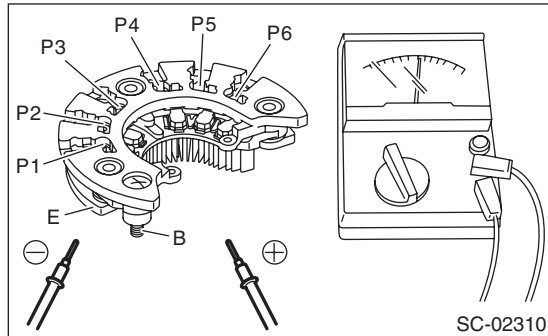
1) Check for continuity between the diode lead and terminal E or B. If continuity is not as shown in the table, replace the rectifier.

- At analog type tester

Tester lead		Continuity
-lead	+lead	
E	P1, P2, P3, P4, P5, P6	Yes
B		No
P1, P2, P3, P4, P5, P6	E	No
	B	Yes

- At digital type tester

Tester lead		Continuity
-lead	+lead	
E	P1, P2, P3, P4, P5, P6	No
B		Yes
P1, P2, P3, P4, P5, P6	E	Yes
	B	No



## 2. ROTOR

- 1) Inspect the slip rings for contamination or any roughness on the sliding surface. Repair the slip ring surface using a lathe or sand paper.
- 2) Measure the slip ring outer diameter. Replace the rotor if the slip ring is worn.

### **Slip ring outer diameter:**

#### **Standard**

**22.7 mm (0.894 in)**

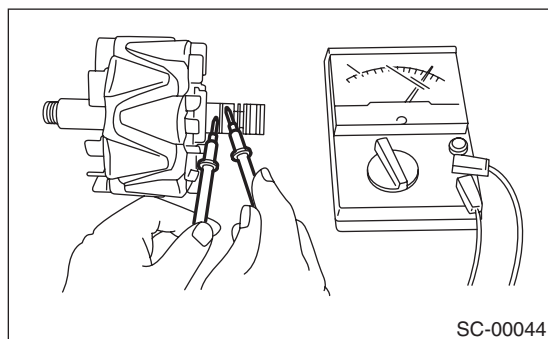
#### **Limit**

**22.1 mm (0.870 in)**

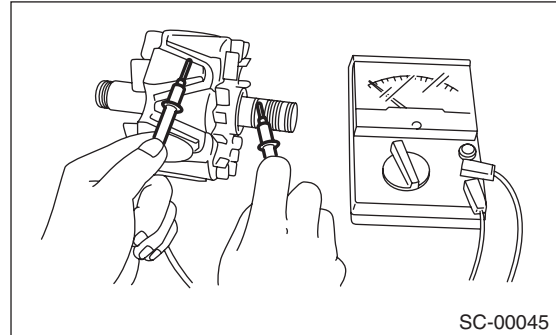
- 3) Using a circuit tester, check the resistance between slip rings. If resistance exceeds the standard, replace the rotor.

### **Standard:**

**Approx. 2.0 — 2.3  $\Omega$**



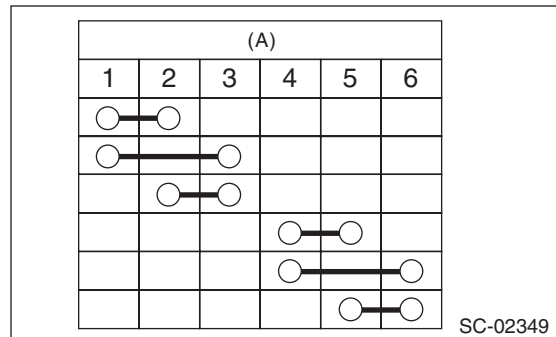
- 4) Check the continuity between slip ring and rotor core or shaft. If there is continuity, replace the rotor because the rotor coil is grounded.



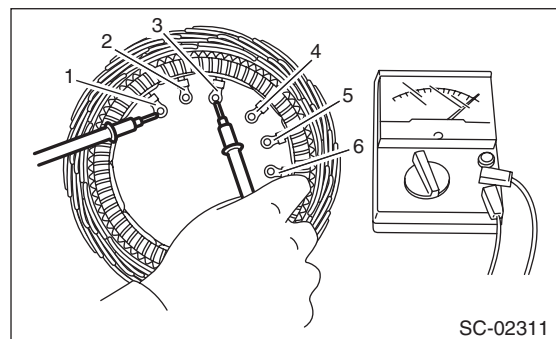
- 5) Check the bearings. If there is any noise, or the rotor does not rotate smoothly, replace the bearings.

## 3. STATOR COIL

- 1) Inspect the continuity between the stator coil terminals. If continuity is not as shown in the table, replace the stator coil.



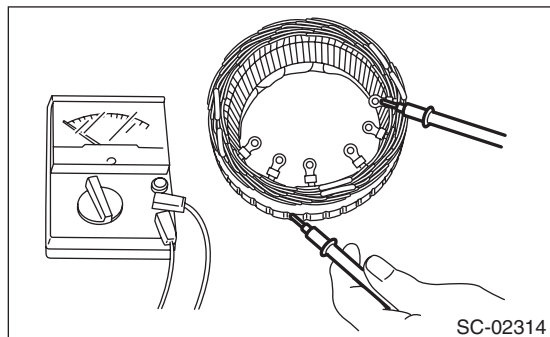
(A) Terminals



# Generator

## STARTING/CHARGING SYSTEMS

2) Inspect the continuity between the stator coil stator core and lead wire terminals. If there is continuity, replace the stator coil because the stator coil is grounded.



### 4. BRUSH

1) Measure the length of each brush. Replace the brush if wear exceeds service limits. There is a service limit mark (A) on each brush.

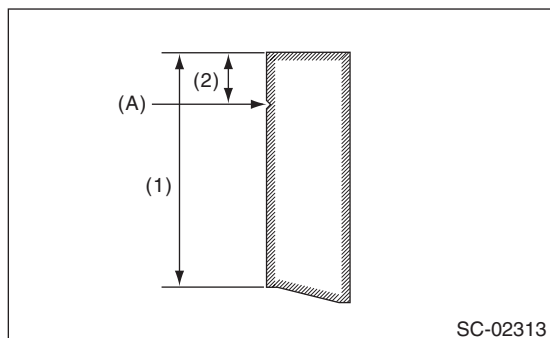
#### **Brush length:**

##### **Standard (1)**

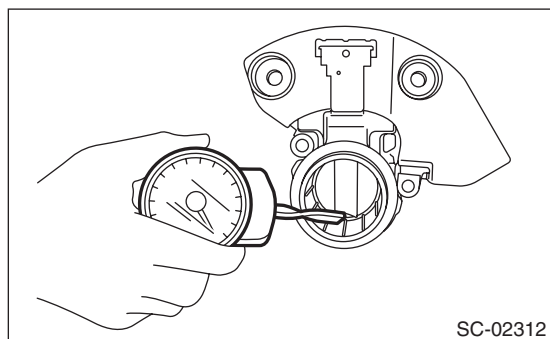
**22.5 mm (0.886 in)**

##### **Limit (2)**

**5.0 mm (0.197 in)**



2) 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 brush spring. If the pressure is 1.7 N (173 gf, 6.11 ozf) or less, replace the brush spring. 4.1 — 5.3 N (418 — 540 gf, 14.75 — 19.06 ozf) pressure is required on the new spring.



### 5. BALL BEARING

Check the ball bearings. Replace the ball bearings if there is resistance in the rotation, or if there is any abnormal noise.

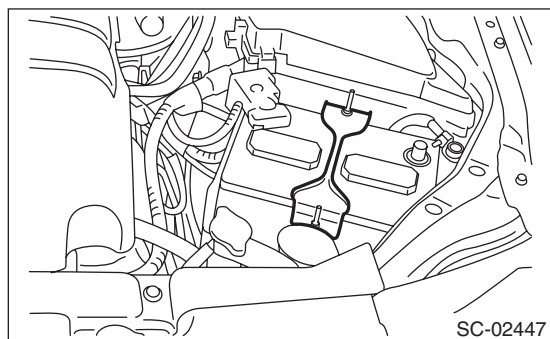
### 6. OTHER INSPECTIONS

Check that the generator does not have deformation, cracks and any other damage.

## 4. Battery

### A: REMOVAL

- 1) After disconnecting the battery ground terminal, remove the terminal cover, then disconnect the positive terminal.
- 2) Remove the flange nut from battery rod and remove battery holder.



- 3) Remove the battery.

### B: INSTALLATION

Install in the reverse order of removal.

#### **Tightening torque:**

**3.5 N·m (0.4 kgf-m, 2.6 ft-lb)**

#### **NOTE:**

- Clean the battery cable terminals and apply grease to retard the formation of corrosion.
- Connect the positive (+) terminal, and then connect the negative (-) terminal of the battery.
- After the battery is installed, initial diagnosis of the electronic throttle control is performed. Therefore, start the engine after 10 seconds or more have passed since turning the ignition switch to ON.

### C: INSPECTION

#### **WARNING:**

- **Electrolyte is corrosive acid and has toxicity; be careful of handling the fluid.**
- **Do not let electrolyte contact with skin, eyes or clothing. Especially at contact with eyes, flush with water for 15 minutes and get prompt medical attention.**
- **Do not let electrolyte contact with painted surfaces.**
- **Batteries produce explosive gases; be careful of handling.**
- **Keep open flames away from batteries.**
- **In case an explosion does occur, wear safety glasses when working near any battery. Never lean over a battery.**
- **Ventilate when using or charging batteries in enclosed space.**

- **Before starting work, remove rings, watches and other metallic belongings.**
- **When in contact with a metallic portion of the vehicle, never allow metallic tools held in the other hand to come into contact with the battery positive terminal or any hardware attached to the terminal.**

### 1. EXTERNAL PARTS

Check the battery case, top cover, vent plugs, and terminal posts for dirt or cracks. If necessary, clean with water and wipe with a dry cloth. Apply a thin coat of grease on the terminal posts to prevent corrosion.

### 2. ELECTROLYTE LEVEL

Check the electrolyte level in each cell. If the level is below MIN level, bring the level to MAX level by pouring distilled water into the battery cell. Do not fill beyond MAX level.

### 3. SPECIFIC GRAVITY OF ELECTROLYTE

1) Measure specific gravity of electrolyte using a hydrometer and a thermometer. Specific gravity varies with temperature of electrolyte, so it must be corrected for 20°C (68°F) using the following calculation:

$$S_{20} = St + 0.0007 \times (t - 20)$$

**$S_{20}$ : Specific gravity corrected at electrolyte temperature of 20°C (68°F)**

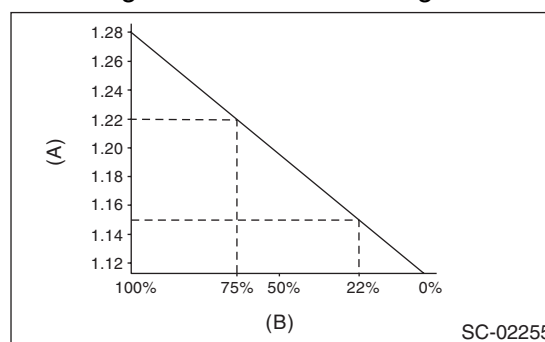
**$St$ : Measured specific gravity**

**$t$ : Measured temperature (°C)**

**Determine whether or not battery must be charged, according to the 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 specific gravity and state of charge is as shown in the figure.



(A) Specific gravity [20°C (68°F)]

(B) State of charge

# Battery

## STARTING/CHARGING SYSTEMS

### D: MEASUREMENT

#### WARNING:

Do not bring an open flame close to the battery while working.

#### CAUTION:

- Prior to charging, corroded terminals should be cleaned with a brush and common caustic soda solution.
- Be careful since battery electrolyte overflows while charging the battery.
- Observe instructions when handling the battery charger.
- Before charging the battery on the vehicle, disconnect the battery ground terminal to prevent damage of generator diodes or other electrical units.

### 1. JUDGMENT OF BATTERY IN CHARGED CONDITION

1) Specific gravity of electrolyte should be held within the specific range from 1.250 to 1.290 for more than one hour.

2) Voltage per battery cell should be held at a specific value in a range from 2.5 to 2.8 V for more than one hour.

### 2. CHECK CONDITION OF CHARGE WITH HYDROMETER

Hydrometer indicator	State of charge	Corrective action
Green	65% or more	Load test
Dark	65% or less	Charge battery
Clear	Low electrolyte	Replace the battery.* (If cranking is difficult)

\* Check electrical system before replacement.

### 3. NORMAL CHARGING

Charge the battery at the current value specified by manufacturer or at approximately 1/10 of battery's ampere-hour rating.

### 4. QUICK CHARGING

#### CAUTION:

- Observe the items in "3. NORMAL CHARGING".
- Never use 10 A or more when charging the battery because it will shorten the battery life.

Quick charging is a method that 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, quick charging must be carried out within a current range that will not raise the electrolyte temperature to 40°C (104°F) or more. Also the quick charging is a temporary mean to bring battery voltage up to some level, and battery should be charged slowly with low current as a rule.



# ENGINE (DIAGNOSTICS)

# *EN(H6DO)(diag)*

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# Basic Diagnostic Procedure

ENGINE (DIAGNOSTICS)

## 1. Basic Diagnostic Procedure

### A: PROCEDURE

#### 1. ENGINE

	Step	Check	Yes	No
1	<p><b>CHECK ENGINE START FAILURE.</b></p> <p>1) Ask the customer when and how the trouble occurred using the interview check list. &lt;Ref. to EN(H6DO)(diag)-4, CHECK, Check List for Interview.&gt;</p> <p>2) Start the engine.</p>	Does the engine start?	Go to step 2.	Inspection using "Diagnostics for Engine Start Failure". <Ref. to EN(H6DO)(diag)-70, Diagnostics for Engine Starting Failure.>
2	<p><b>CHECK ILLUMINATION OF MALFUNCTION INDICATOR LIGHT.</b></p>	Does the malfunction indicator light illuminate?	Go to step 3.	Inspection using "General Diagnostic Table". <Ref. to EN(H6DO)(diag)-381, INSPECTION, General Diagnostic Table.>
3	<p><b>CHECK COMMUNICATION STATUS.</b></p> <p>1) Turn the ignition switch to OFF.</p> <p>2) Connect the Subaru Select Monitor or general scan tool to the data link connector.</p> <p>3) Turn the ignition switch to ON, and run the Subaru Select Monitor or general scan tool.</p> <p>NOTE:</p> <ul style="list-style-type: none"> <li>Subaru Select Monitor</li> </ul> <p>For detailed procedures, refer to "Subaru Select Monitor". &lt;Ref. to EN(H6DO)(diag)-36, Subaru Select Monitor.&gt;</p> <ul style="list-style-type: none"> <li>General scan tool</li> </ul> <p>For detailed operation procedures, refer to the general scan tool operation manual.</p>	Does Subaru Select Monitor or general scan tool communicate with vehicle normally?	Go to step 4.	Inspection using "Diagnostics Procedure for Subaru Select Monitor Communication". <Ref. to EN(H6DO)(diag)-82, Diagnostic Procedure for Subaru Select Monitor Communication.>
4	<p><b>CHECK DTC.</b></p> <p>Read DTC using Subaru Select Monitor or general scan tool.</p> <p>NOTE:</p> <ul style="list-style-type: none"> <li>Subaru Select Monitor</li> </ul> <p>Refer to "Read Diagnostic Trouble Code" for detailed operation procedure. &lt;Ref. to EN(H6DO)(diag)-44, Read Diagnostic Trouble Code (DTC).&gt;</p> <ul style="list-style-type: none"> <li>General scan tool</li> </ul> <p>For detailed operation procedures, refer to the general scan tool operation manual.</p>	Is DTC displayed on Subaru Select Monitor or general scan tool?	Record the DTC. Repair the trouble cause. <Ref. to EN(H6DO)(diag)-84, List of Diagnostic Trouble Code (DTC).> Go to step 5.	Repair the related parts. NOTE: If DTC is not shown on display although the malfunction indicator light illuminates, perform the diagnosis of malfunction indicator light circuit or combination meter. <Ref. to EN(H6DO)(diag)-63, Malfunction Indicator Light.>

# Basic Diagnostic Procedure

ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<p><b>5</b></p> <p><b>CHECK FREEZE FRAME DATA.</b> Check the freeze frame data using the Subaru Select Monitor or general scan tool.</p> <p>NOTE: • Subaru Select Monitor For detailed procedures, refer to “Subaru Select Monitor”. &lt;Ref. to EN(H6DO)(diag)-36, Subaru Select Monitor.&gt; • General scan tool For detailed operation procedures, refer to the general scan tool operation manual.</p>	<p>Is freeze frame data displayed on Subaru Select Monitor or general scan tool?</p>	<p>Record the freeze frame data. Repair the cause of fault, and go to the next step. Go to step <b>6</b>.</p>	<p>Go to step <b>6</b>.</p>
<p><b>6</b></p> <p><b>PERFORM DIAGNOSIS.</b> 1) Perform the Clear Memory Mode. &lt;Ref. to EN(H6DO)(diag)-58, Clear Memory Mode.&gt; 2) Perform the Inspection Mode or Drive Cycle. &lt;Ref. to EN(H6DO)(diag)-45, Inspection Mode.&gt; &lt;Ref. to EN(H6DO)(diag)-51, Drive Cycle.&gt;</p>	<p>Is DTC displayed on Subaru Select Monitor or general scan tool?</p>	<p>Inspect using “Diagnostic Procedure with Diagnostic Trouble Code (DTC)”. &lt;Ref. to EN(H6DO)(diag)-94, Diagnostic Procedure with Diagnostic Trouble Code (DTC).&gt;</p>	<p>Finish the diagnosis.</p>

## Check List for Interview

ENGINE (DIAGNOSTICS)

### 2. Check List for Interview

#### A: CHECK

##### 1. CHECK LIST NO. 1

Check the following item when problem has occurred.

NOTE:

Use copies of this page for interviewing customers.

Customer's name		Engine No.	
Date of purchase		Fuel type	
Date of repair		Odometer reading	km
V.I.N.			miles
Weather	<input type="checkbox"/> Fine <input type="checkbox"/> Cloudy <input type="checkbox"/> Rainy <input type="checkbox"/> Snowy <input type="checkbox"/> Various/Others:		
Ambient air temperature	°C ( °F)		
	<input type="checkbox"/> Hot <input type="checkbox"/> Warm <input type="checkbox"/> Cool <input type="checkbox"/> Cold		
Place	<input type="checkbox"/> Highway <input type="checkbox"/> Suburbs <input type="checkbox"/> Inner city <input type="checkbox"/> Uphill <input type="checkbox"/> Downhill <input type="checkbox"/> Rough road <input type="checkbox"/> Others:		
Engine temperature	<input type="checkbox"/> Cold <input type="checkbox"/> Warming-up <input type="checkbox"/> After warming-up <input type="checkbox"/> Any temperature <input type="checkbox"/> Others:		
Engine speed	rpm		
Vehicle speed	km/h (MPH)		
Driving conditions	<input type="checkbox"/> Not affected <input type="checkbox"/> At starting <input type="checkbox"/> While idling <input type="checkbox"/> At racing <input type="checkbox"/> While accelerating <input type="checkbox"/> While cruising <input type="checkbox"/> While decelerating <input type="checkbox"/> While turning (RH/LH)		
Headlight	<input type="checkbox"/> ON/ <input type="checkbox"/> OFF	Rear defogger	<input type="checkbox"/> ON/ <input type="checkbox"/> OFF
Blower	<input type="checkbox"/> ON/ <input type="checkbox"/> OFF	Audio	<input type="checkbox"/> ON/ <input type="checkbox"/> OFF
A/C compressor	<input type="checkbox"/> ON/ <input type="checkbox"/> OFF	CD/Cassette	<input type="checkbox"/> ON/ <input type="checkbox"/> OFF
Radiator fan	<input type="checkbox"/> ON/ <input type="checkbox"/> OFF	Car phone	<input type="checkbox"/> ON/ <input type="checkbox"/> OFF
Front wiper	<input type="checkbox"/> ON/ <input type="checkbox"/> OFF	Wireless device	<input type="checkbox"/> ON/ <input type="checkbox"/> OFF
Rear wiper	<input type="checkbox"/> ON/ <input type="checkbox"/> OFF		

# Check List for Interview

ENGINE (DIAGNOSTICS)

## 2. CHECK LIST NO. 2

Check the following item about the vehicle's state when the malfunction indicator light turns on.

NOTE:

Use copies of this page for interviewing customers.

a) Other warning lights or indicators illuminate: <input type="checkbox"/> Yes / <input type="checkbox"/> No
<input type="checkbox"/> Fuel level warning light <input type="checkbox"/> Charge warning light <input type="checkbox"/> Engine coolant temperature warning light <input type="checkbox"/> Oil pressure warning light <input type="checkbox"/> ATF temperature warning light or SPORT indicator light <input type="checkbox"/> Driver's control center differential indicator light <input type="checkbox"/> ABS warning light <input type="checkbox"/> VDC warning light <input type="checkbox"/> Cruise indicator light <input type="checkbox"/> SI-CRUISE warning light <input type="checkbox"/> Immobilizer indicator light <input type="checkbox"/> STEERING warning light <input type="checkbox"/> Glow indicator light <input type="checkbox"/> Sedimentor warning light <input type="checkbox"/> Electronic parking brake warning light <input type="checkbox"/> Others:
b) Fuel level
<ul style="list-style-type: none"><li>• Lack of fuel: <input type="checkbox"/> Yes / <input type="checkbox"/> No</li><li>• Indicator position of fuel gauge:</li><li>• Experienced running out of fuel: <input type="checkbox"/> Yes / <input type="checkbox"/> No</li></ul>
c) Intentional connecting or disconnecting of harness connectors or spark plug cords: <input type="checkbox"/> Yes / <input type="checkbox"/> No
<ul style="list-style-type: none"><li>• What:</li></ul>
d) Intentional connecting or disconnecting of hoses: <input type="checkbox"/> Yes / <input type="checkbox"/> No
<ul style="list-style-type: none"><li>• What:</li></ul>
e) Installing of other parts except genuine parts: <input type="checkbox"/> Yes / <input type="checkbox"/> No
<ul style="list-style-type: none"><li>• What:</li><li>• Where:</li></ul>
f) Occurrence of noise: <input type="checkbox"/> Yes / <input type="checkbox"/> No
<ul style="list-style-type: none"><li>• From where:</li><li>• What kind:</li></ul>
g) Occurrence of smell: <input type="checkbox"/> Yes / <input type="checkbox"/> No
<ul style="list-style-type: none"><li>• From where:</li><li>• What kind:</li></ul>
h) Intrusion of water into engine compartment or passenger compartment: <input type="checkbox"/> Yes / <input type="checkbox"/> No
i) Troubles occurred
<input type="checkbox"/> Engine does not start. <input type="checkbox"/> Engine stalls during idling. <input type="checkbox"/> Engine stalls while driving. <input type="checkbox"/> Engine speed decreases. <input type="checkbox"/> Engine speed does not decrease. <input type="checkbox"/> Rough idling <input type="checkbox"/> Poor acceleration <input type="checkbox"/> Back fire <input type="checkbox"/> After fire <input type="checkbox"/> Does not shift. <input type="checkbox"/> Excessive shift shock

# General Description

## ENGINE (DIAGNOSTICS)

### 3. General Description

#### A: CAUTION

1) Airbag system wiring harness is routed near the ECM, main relay and fuel pump relay.

#### CAUTION:

- Do not use electrical test equipment on the airbag system circuits.
- Be careful not to damage the airbag system wiring harness when servicing the ECM, TCM, main relay and fuel pump relay.

2) Never connect the battery in reverse polarity. Doing so will damage the ECM instantly, and other parts will also be damaged.

3) Do not disconnect the battery terminals while the engine is running. A large counter electromotive force will be generated in the generator, and this voltage may damage electronic parts such as ECM etc.

4) Before disconnecting the connectors of each sensor and ECM, be sure to turn the ignition switch to OFF. Perform the Clear Memory Mode after connecting the connectors. <Ref. to EN(H6DO)(diag)-58, Clear Memory Mode.>

5) When measuring the voltage or resistance of individual sensor or all electrical control modules, use a tapered pin with a diameter of less than 0.6 mm (0.024 in). Do not insert the pin 4 mm (0.16 in) or more into the part.

#### CAUTION:

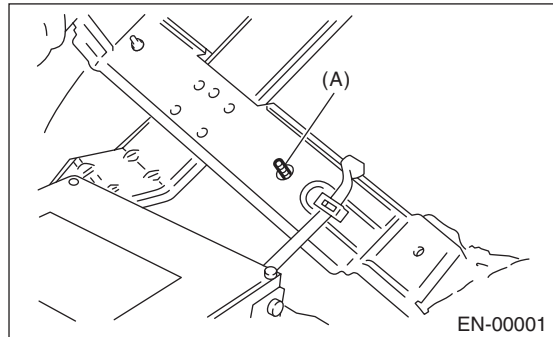
**When replacing the ECM, be careful not to use the wrong spec. ECM to avoid any damage on the fuel injection system.**

#### NOTE:

When replacing the ECM of the models with Immobilizer, immobilizer system must be registered. To do so, all ignition keys and ID cards need to be prepared. Refer to the "PC application help for Subaru Select Monitor".

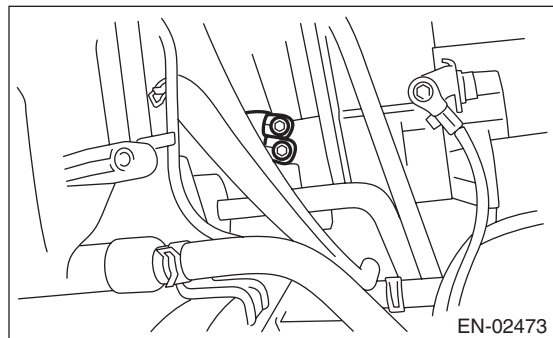
6) Take care not to allow water to get into the connectors when servicing or washing the vehicle in rainy weather. Avoid exposure to water even if the connectors are waterproof.

7) Use ECM mounting stud bolts at the body side grounding point when measuring voltage and resistance inside the passenger compartment.



(A) Stud bolt

8) Use the engine ground terminal or engine assembly as the grounding point to chassis when measuring the voltage and resistance in engine compartment.



9) All parts related to the engine control system are precision parts. Do not drop them.

10) Observe the following cautions when installing a radio in vehicle.

#### CAUTION:

- The antenna must be kept as far apart as possible from control module. (ECM is installed under the passenger's side floor mat.)
- The antenna feeder must be placed as far apart as possible from the ECM and engine control system harness.
- Carefully adjust the antenna for correct matching.
- When mounting a large power type radio, pay special attention to the three items mentioned above.
- Incorrect installation of the radio may affect the operation of ECM.

11) When disconnecting the fuel hose, release the fuel pressure. <Ref. to FU(H6DO)-59, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>

12) Warning lights may illuminate when performing driving test with jacked-up or lifted-up condition, but this is not a system malfunction. The reason for this is the speed difference between the front and rear wheels. When engine control system diagnosis is finished, perform the VDC memory clearance procedure of self-diagnosis function. <Ref. to VDC(diag)-26, Clear Memory Mode.>

## B: INSPECTION

Before performing diagnostics, check the following item which might affect engine problems.

### 1. BATTERY

1) Measure the battery voltage and specific gravity of the electrolyte.

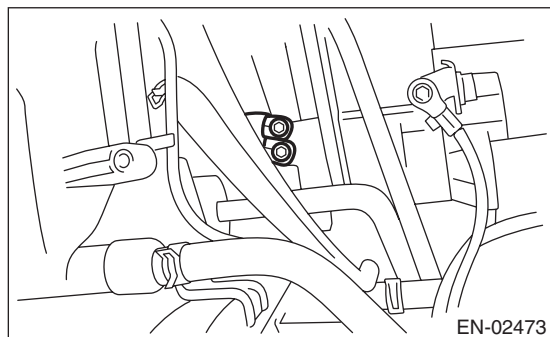
**Standard voltage: 12 V**

**Specific gravity: 1.260 or more**

2) Check the condition of the main and other fuses, and harnesses and connectors. Also check for proper grounding.

### 2. ENGINE GROUND

Make sure that the engine ground terminal is properly connected to the engine.



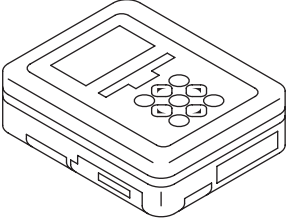
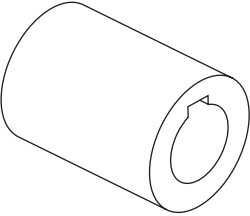
## C: NOTE

- The on-board diagnostic (OBD) system detects and indicates a fault in various inputs and outputs of the complex electronic control. Malfunction indicator light in the combination meter indicates occurrence of a fault or trouble.
  - Further, against such a failure of sensors as may disable the drive, the fail-safe function is provided to ensure the minimal drivability.
  - The OBD system incorporated with the vehicles within this type of engine complies with OBD-II regulations. 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, malfunction indicator light illuminates. At the same time of the malfunction indicator light illumination or blinking, a 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.
  - Freeze frame engine condition data are stored until the DTCs are cleared. However when such malfunctions as fuel trim fault and misfire are detected with the freeze frame engine condition data stored, they are rewritten into those related to the fuel trim fault and misfire.
  - When the malfunction does not occur again for three consecutive driving cycles\*, malfunction indicator light is turned off, but DTC remains at on-board computer.
- \*: One driving cycle means the period between the ignition switch ON and the ignition switch OFF after driving.
- When performing diagnosis, connect the Subaru Select Monitor or general scan tool to the vehicle.

# General Description

ENGINE (DIAGNOSTICS)

## D: PREPARATION TOOL

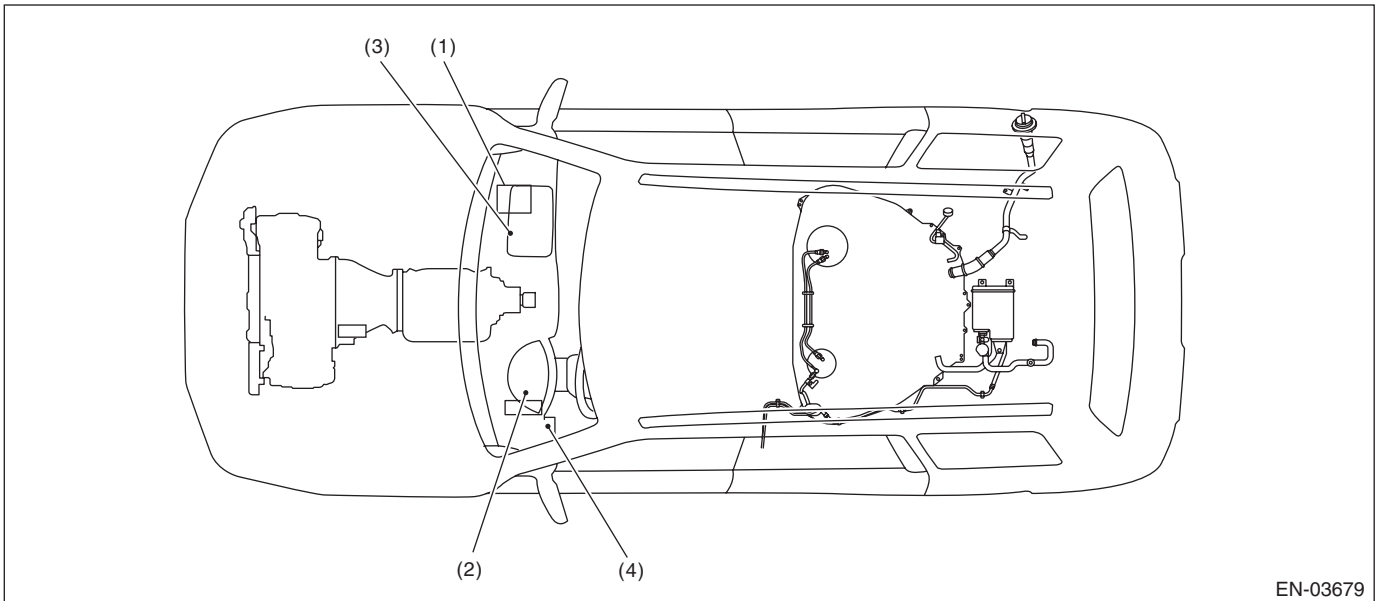
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST1B022XU0	1B022XU0	SUBARU SELECT MONITOR III KIT	Used for troubleshooting the electrical system.
 ST18252AA000	18252AA000	CRANKSHAFT SOCKET	Used for rotating crankshaft.



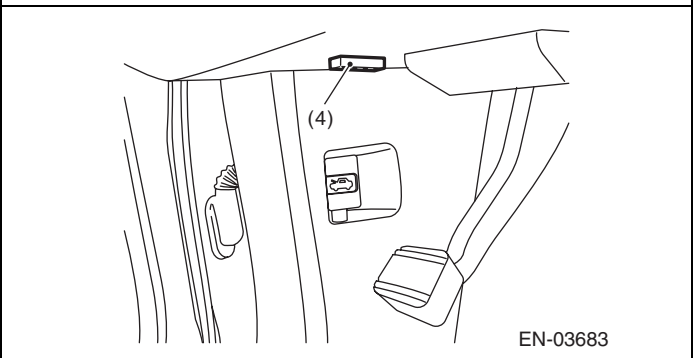
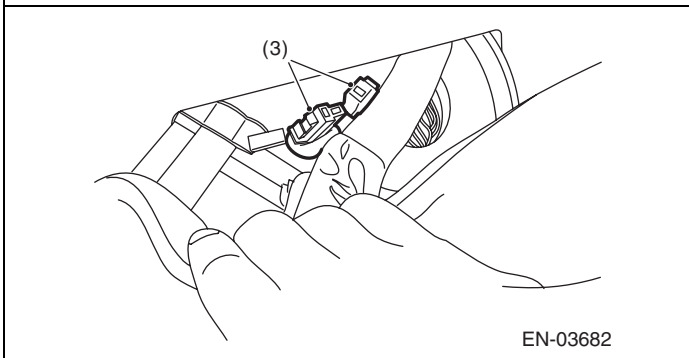
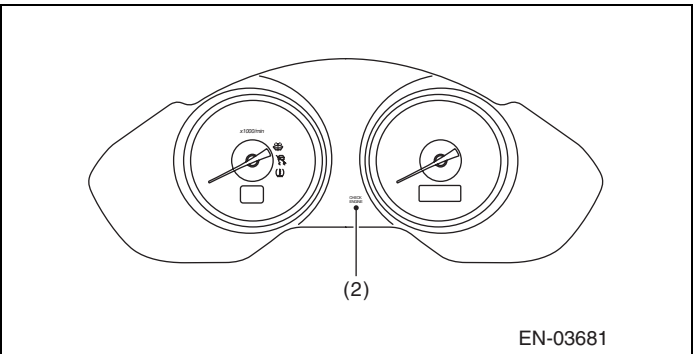
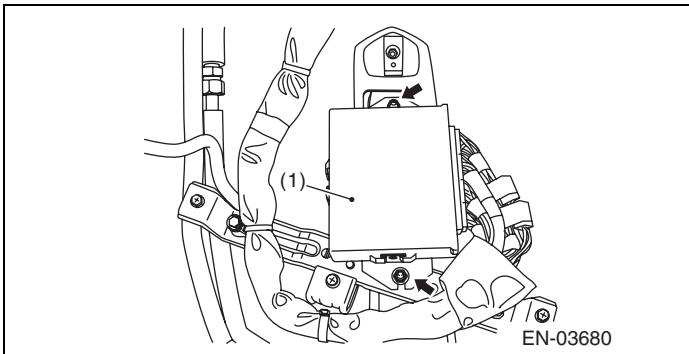
## 4. Electrical Component Location

### A: LOCATION

#### 1. CONTROL MODULE



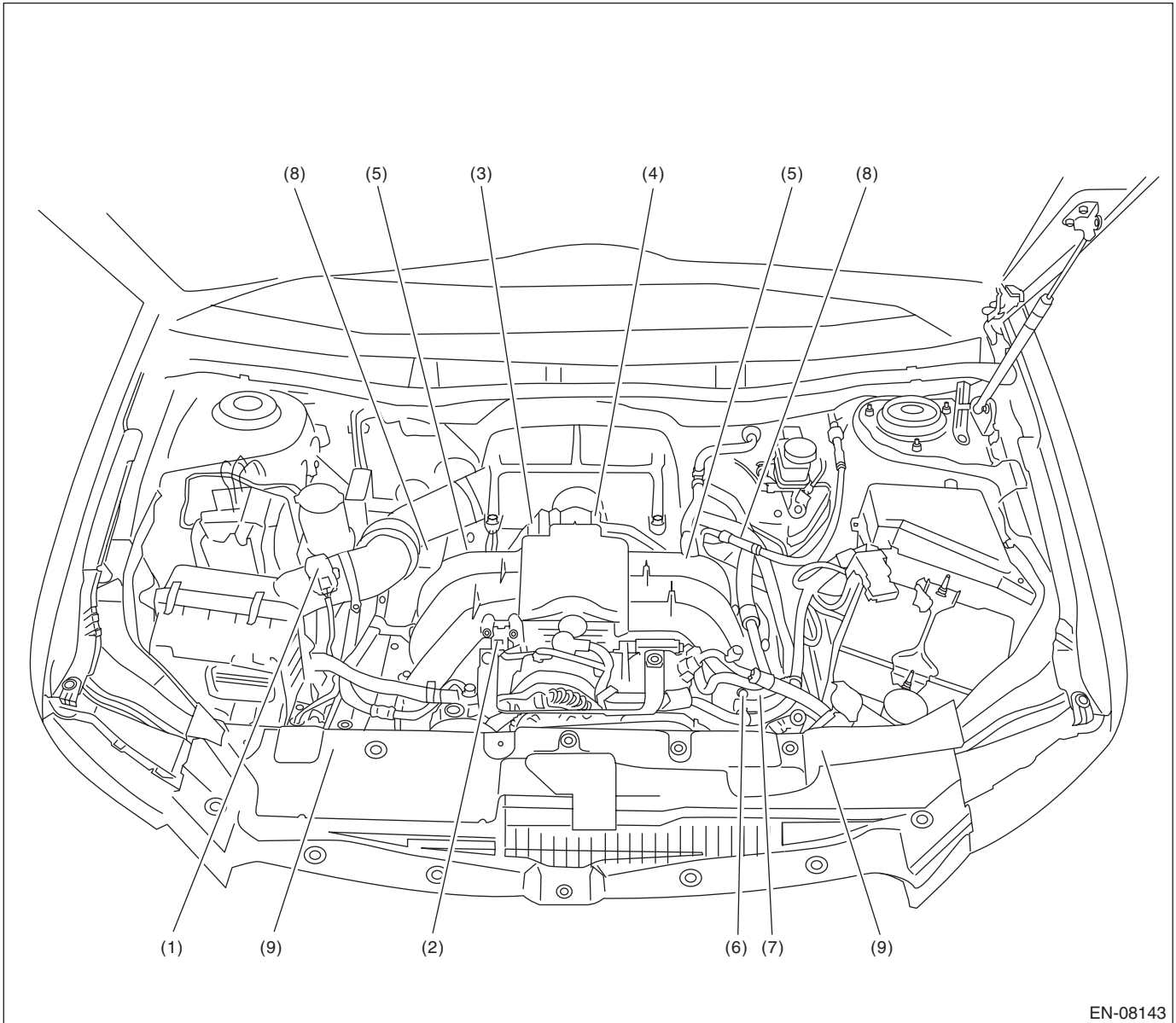
- (1) Engine control module (ECM)
- (2) Malfunction indicator light
- (3) Delivery (test) mode connector
- (4) Data link connector



# Electrical Component Location

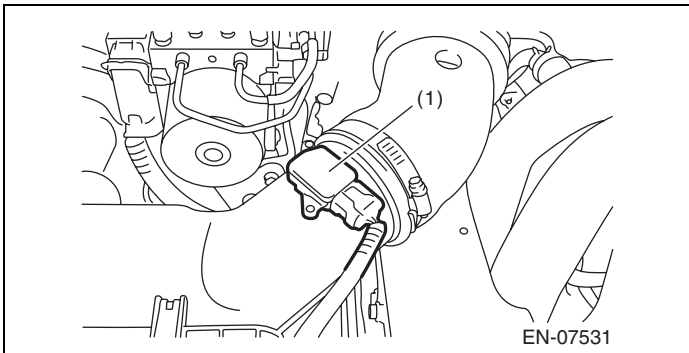
## ENGINE (DIAGNOSTICS)

### 2. SENSOR

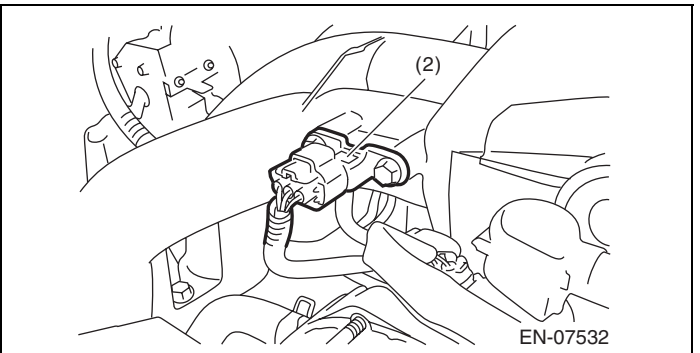


EN-08143

- |   |                                       |                                      |
|---|---------------------------------------|--------------------------------------|
| (1) Mass air flow and intake air temperature sensor | (4) Crankshaft position sensor        | (7) Engine oil temperature sensor    |
| (2) Manifold absolute pressure sensor               | (5) Knock sensor                      | (8) Intake camshaft position sensor  |
| (3) Electronic throttle control                     | (6) Engine coolant temperature sensor | (9) Exhaust camshaft position sensor |



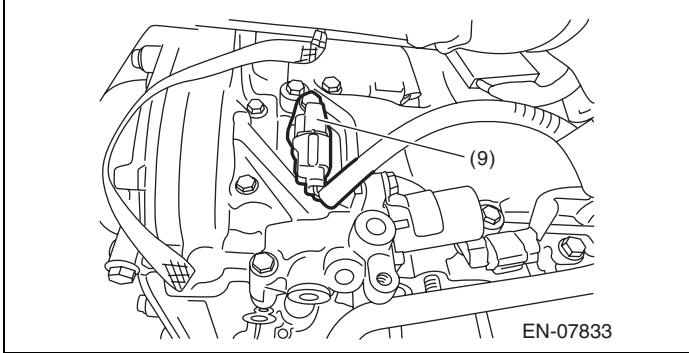
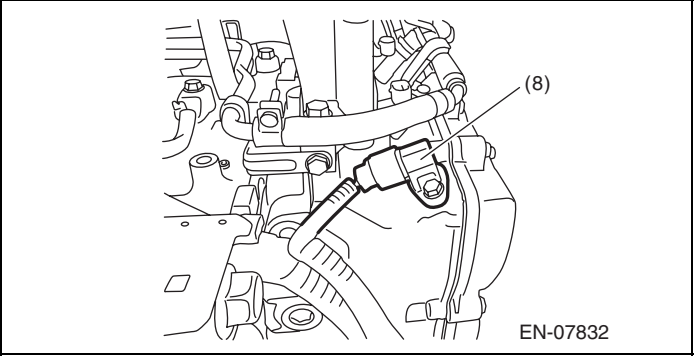
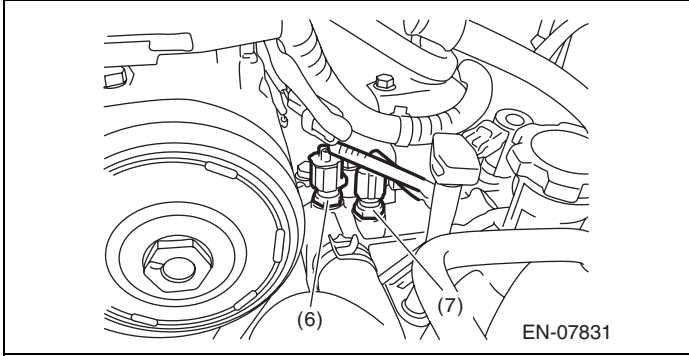
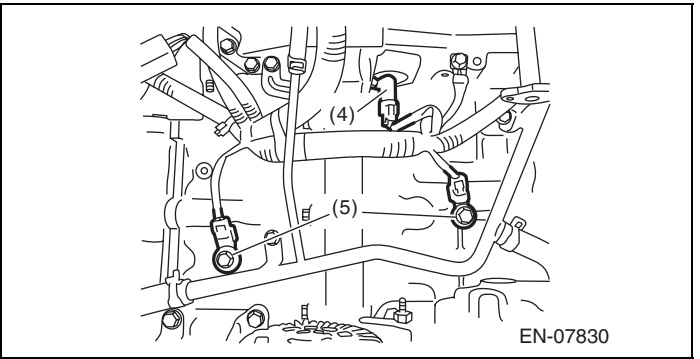
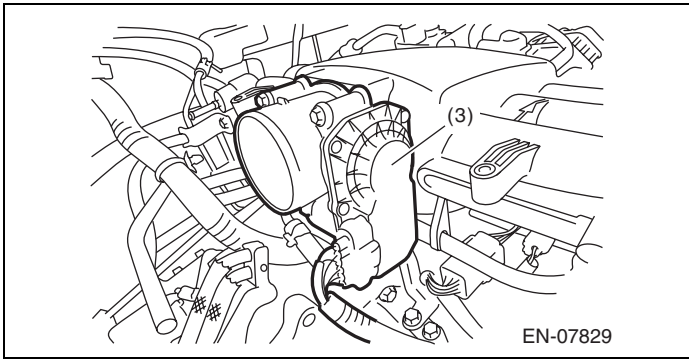
EN-07531



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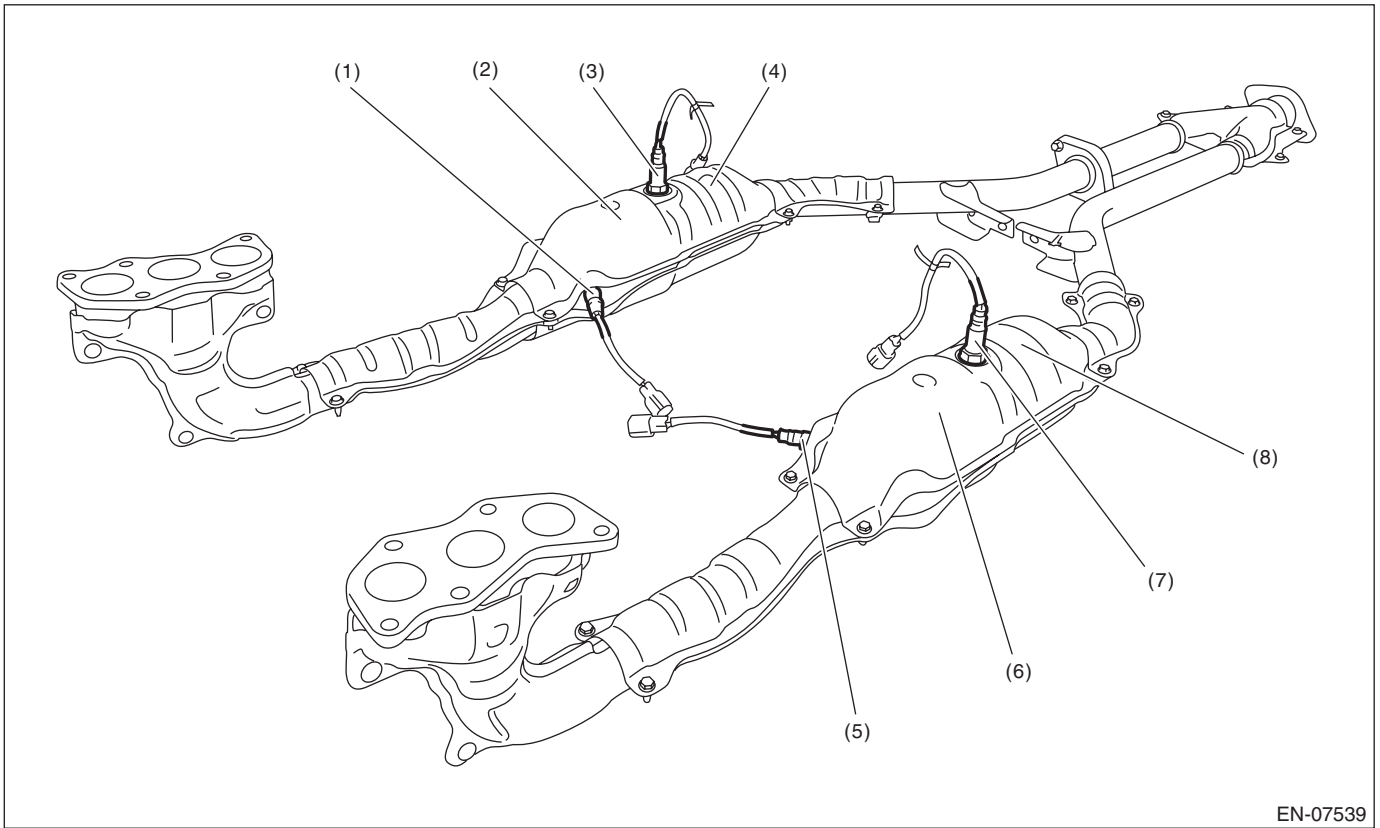
# Electrical Component Location

ENGINE (DIAGNOSTICS)



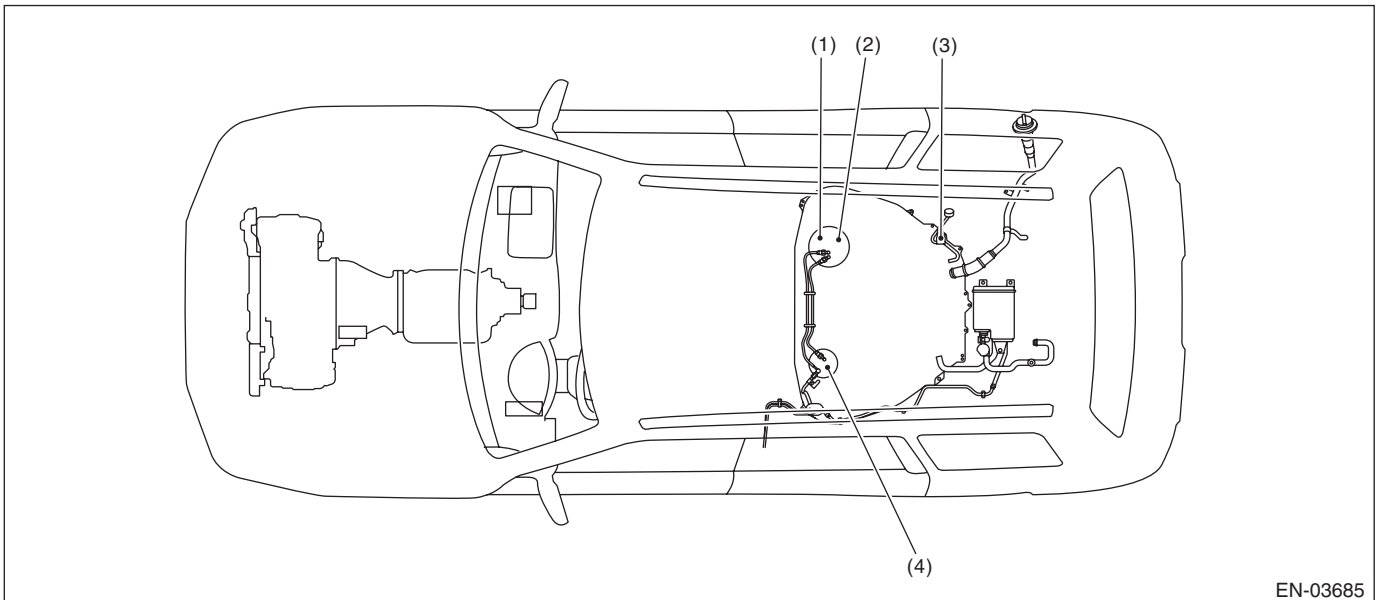
# Electrical Component Location

## ENGINE (DIAGNOSTICS)



EN-07539

- |                                  |                                  |                                 |
|----------------------------------|----------------------------------|---------------------------------|
| (1) Front oxygen (A/F) sensor RH | (4) Rear catalytic converter RH  | (7) Rear oxygen sensor LH       |
| (2) Front catalytic converter RH | (5) Front oxygen (A/F) sensor LH | (8) Rear catalytic converter LH |
| (3) Rear oxygen sensor RH        | (6) Front catalytic converter LH |                                 |

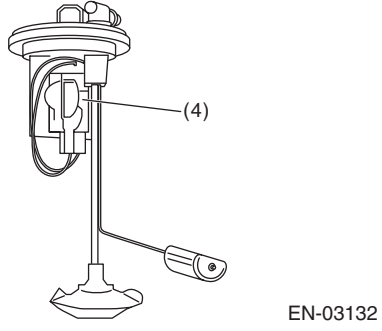
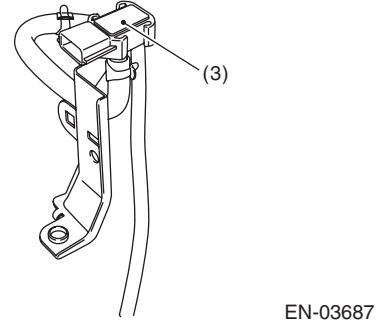
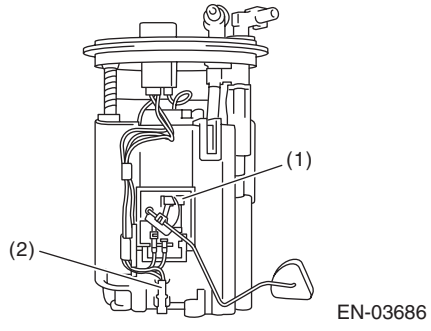


EN-03685

- |                             |                               |                           |
|-----------------------------|-------------------------------|---------------------------|
| (1) Fuel level sensor       | (3) Fuel tank pressure sensor | (4) Fuel sub level sensor |
| (2) Fuel temperature sensor |                               |                           |

# Electrical Component Location

ENGINE (DIAGNOSTICS)

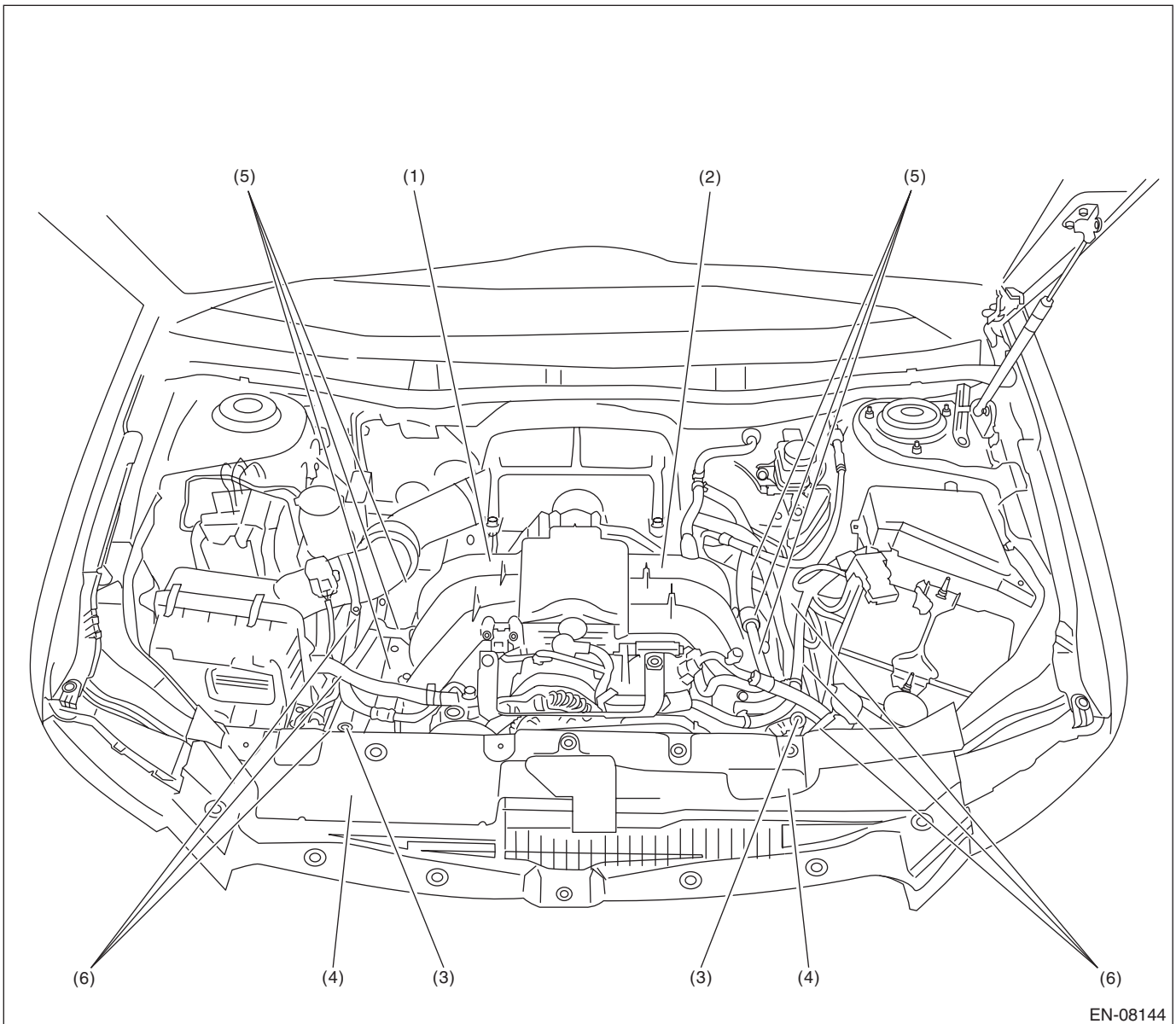


SUBARU.

# Electrical Component Location

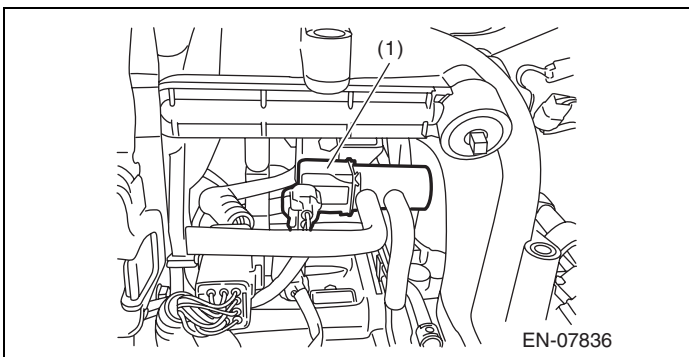
ENGINE (DIAGNOSTICS)

## 3. SOLENOID VALVE, ACTUATOR, EMISSION CONTROL SYSTEM PARTS AND IGNITION SYSTEM PARTS

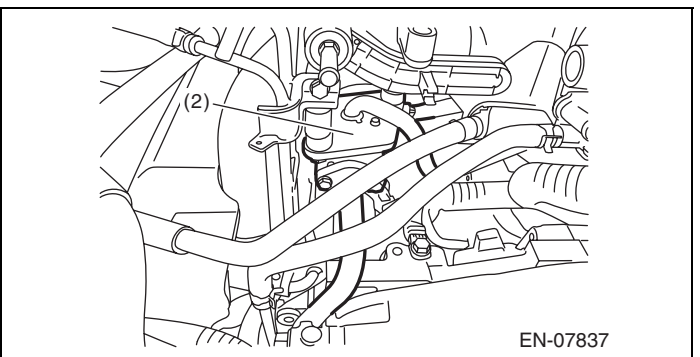


EN-08144

- |                                  |   |                         |
|----------------------------------|---|-------------------------|
| (1) Purge control solenoid valve | (3) Intake oil flow control solenoid valve  | (5) Fuel injector valve |
| (2) EGR control valve            | (4) Exhaust oil flow control solenoid valve | (6) Ignition coil       |



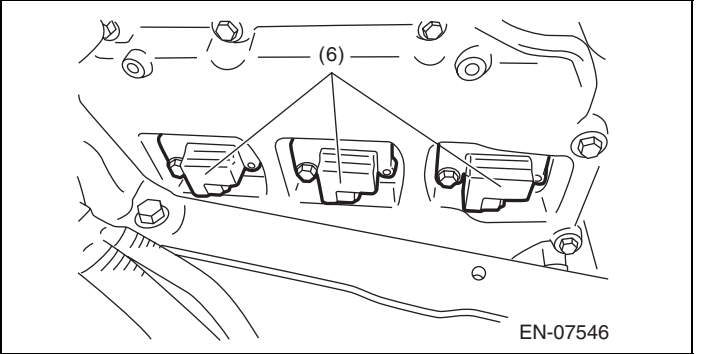
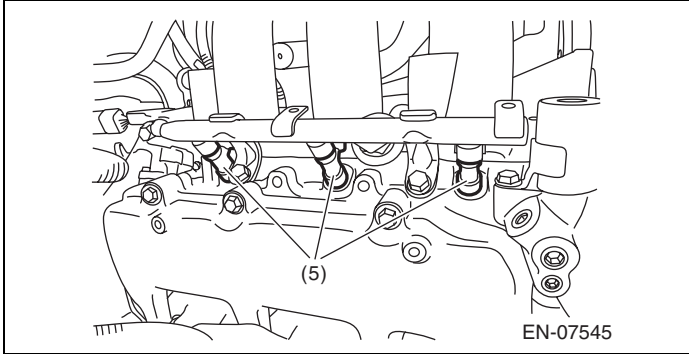
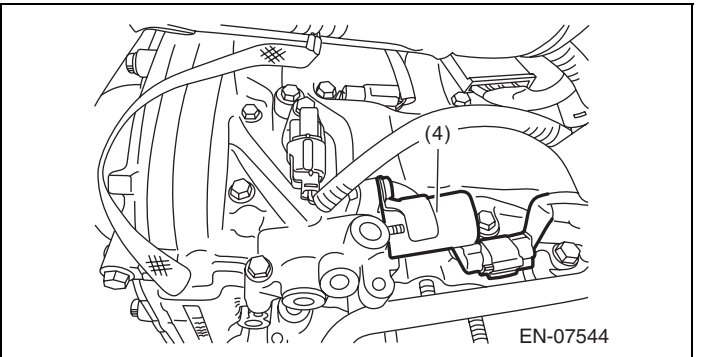
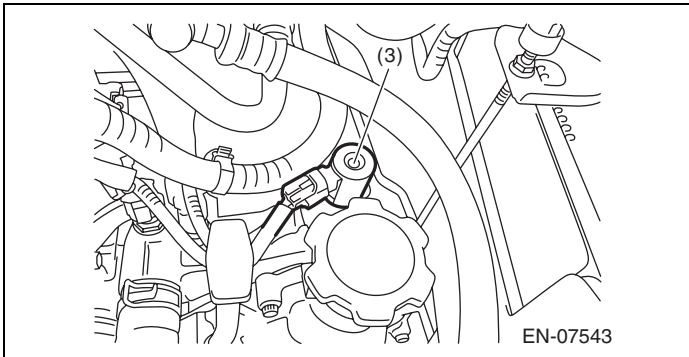
EN-07836



EN-07837

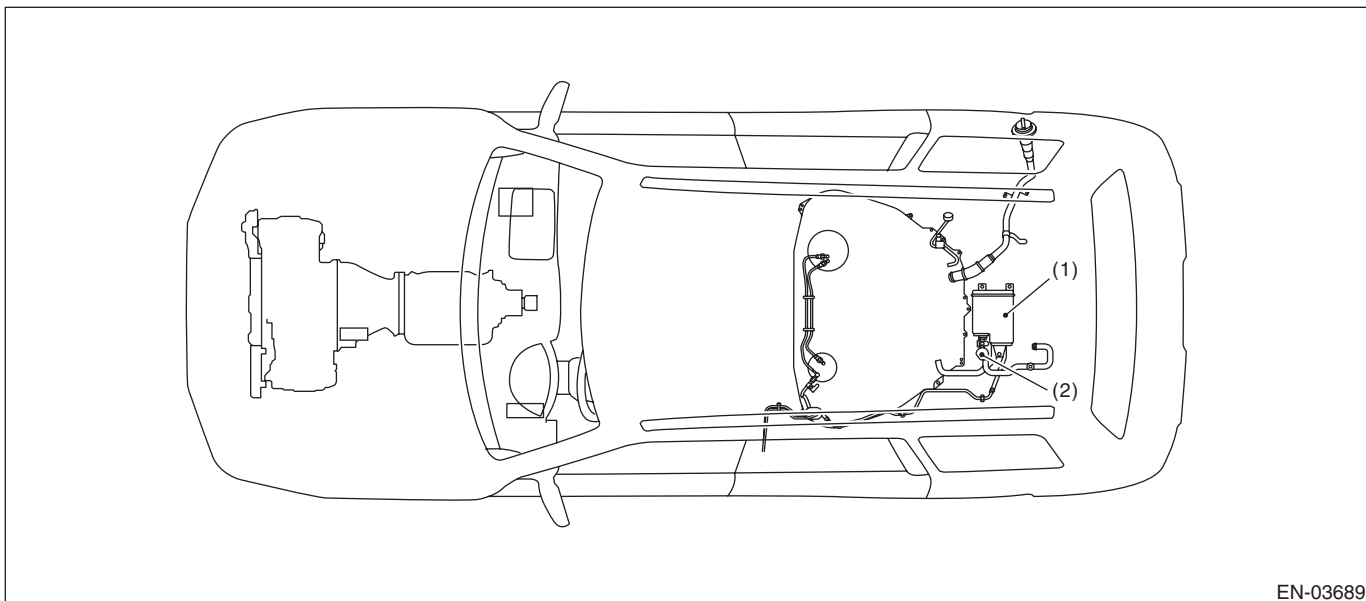
# Electrical Component Location

ENGINE (DIAGNOSTICS)



# Electrical Component Location

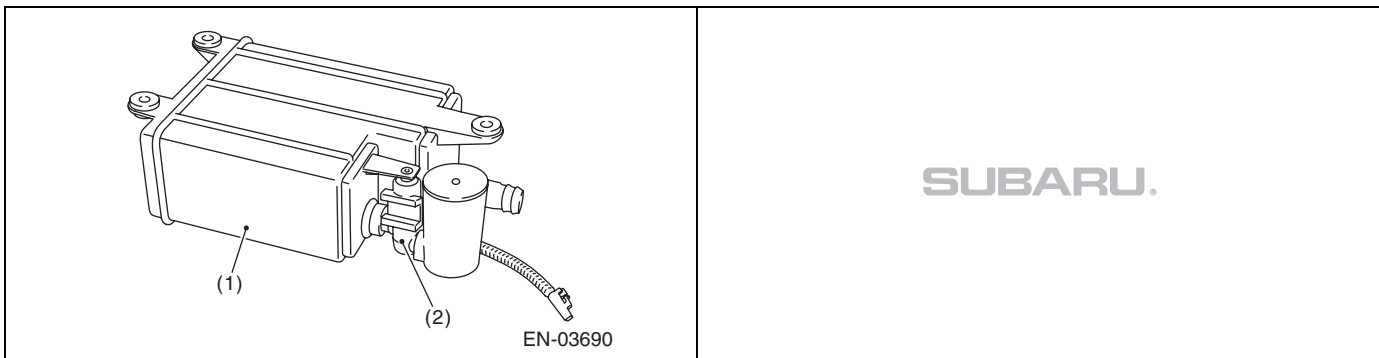
## ENGINE (DIAGNOSTICS)



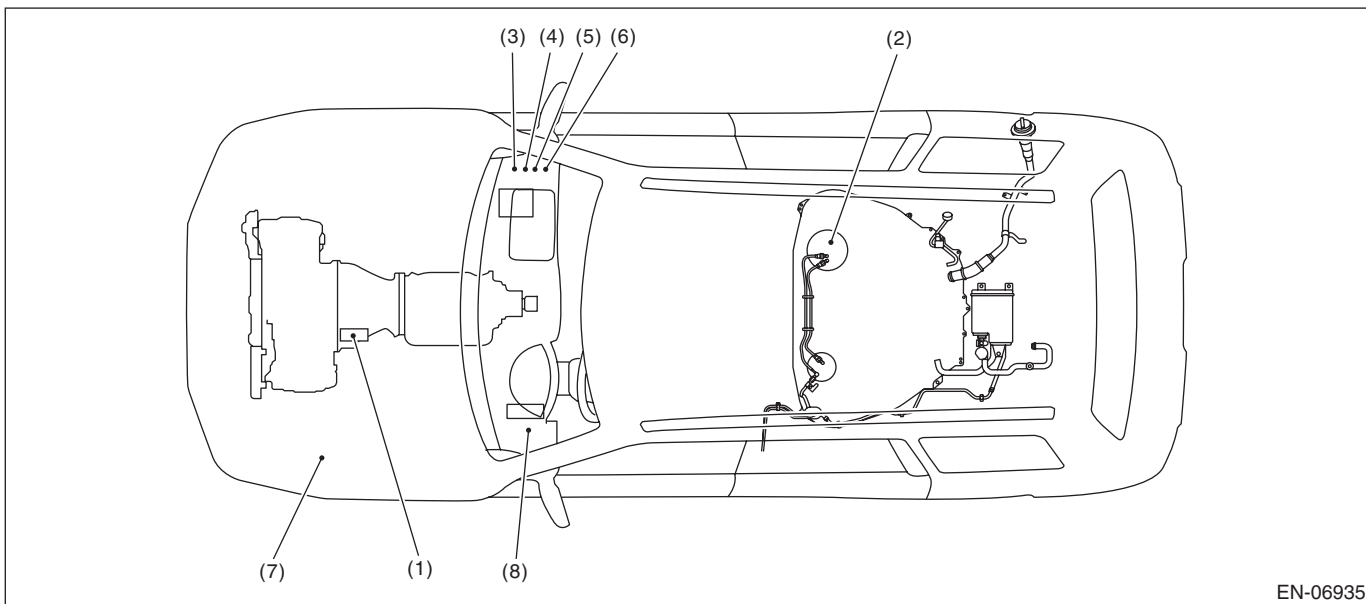
EN-03689

(1) Canister

(2) Drain valve



EN-03690



EN-06935

(1) Starter

(2) Fuel pump

(3) Main relay 2

(4) Main relay

(5) Electronic throttle control relay

(6) Fuel pump relay

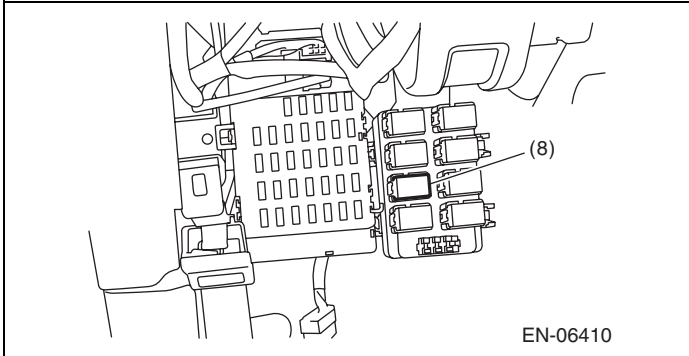
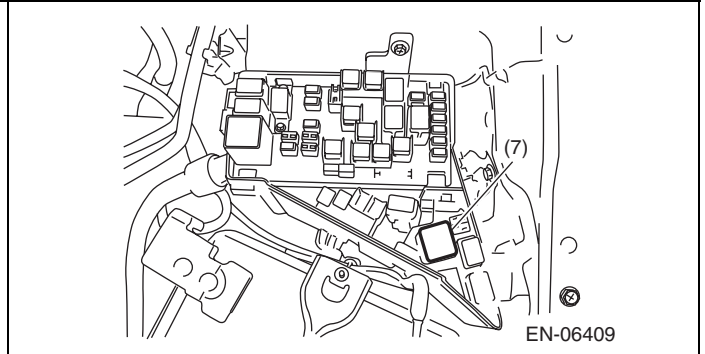
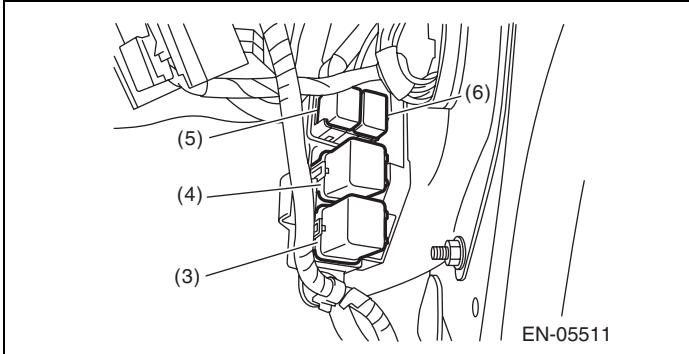
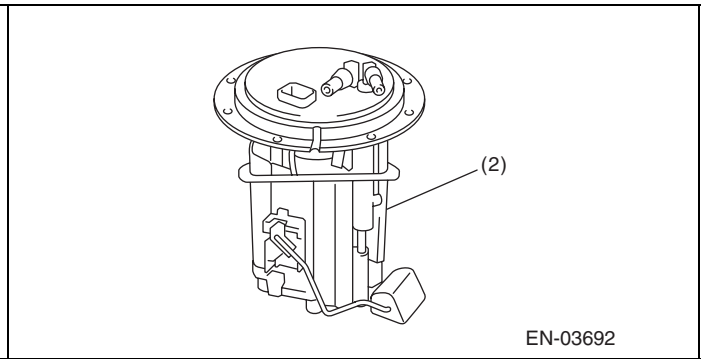
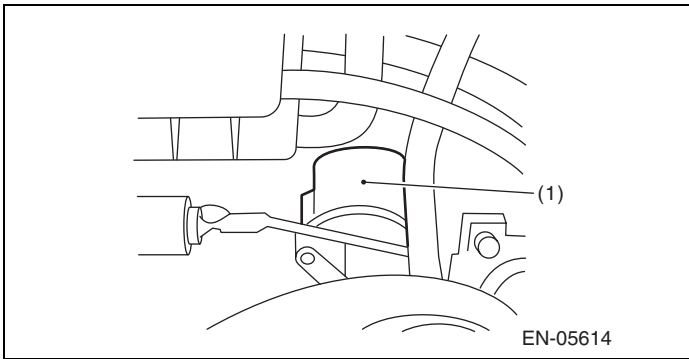
(7) Main fan relay

(8) Starter relay



# Electrical Component Location

ENGINE (DIAGNOSTICS)

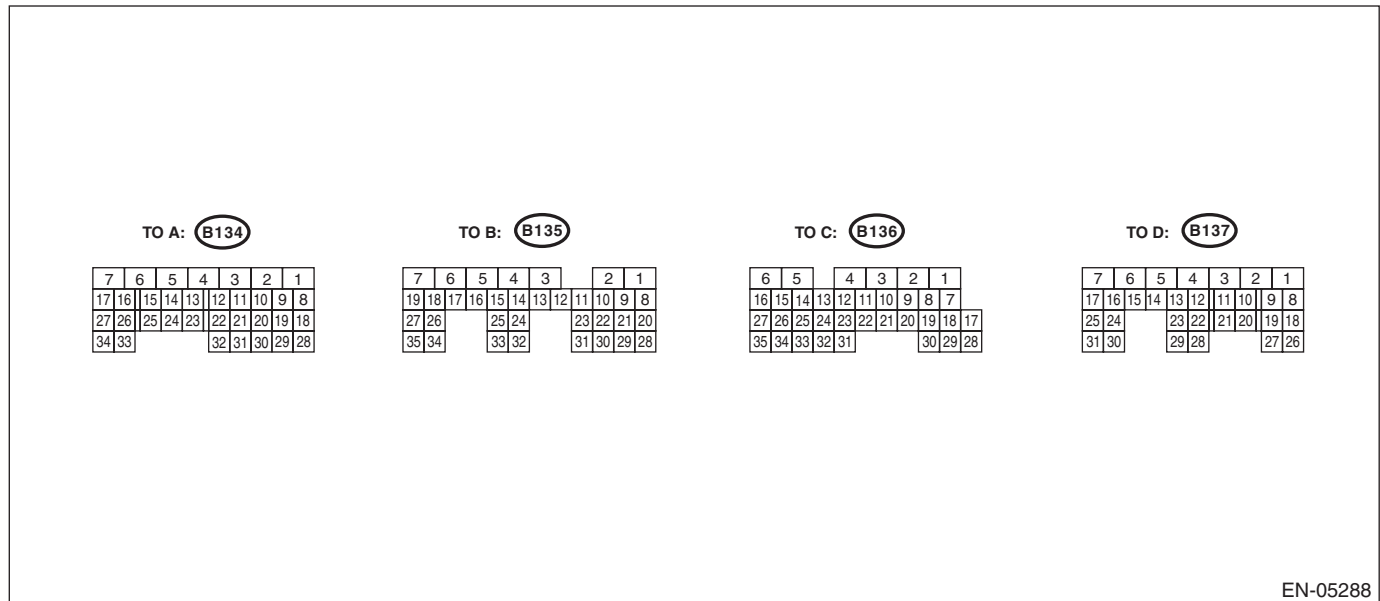


# Engine Control Module (ECM) I/O Signal

ENGINE (DIAGNOSTICS)

## 5. Engine Control Module (ECM) I/O Signal

### A: ELECTRICAL SPECIFICATION



EN-05288

Content		Connector No.	Terminal No.	Signal (V)		Note
				Ignition SW ON (engine OFF)	Engine ON (idling)	
Crankshaft position sensor	Signal (+)	B137	17	0	-7 — +7	Waveform
	Signal (-)	B137	25	0	0	—
	Shield	B137	31	0	0	—
Intake camshaft position sensor (LH)		B137	16	0 or 5	0 or 5	Waveform
Intake camshaft position sensor (RH)		B137	24	0 or 5	0 or 5	Waveform
Exhaust camshaft position sensor (LH)		B137	29	0 or 5	0 or 5	Waveform
Exhaust camshaft position sensor (RH)		B137	23	0 or 5	0 or 5	Waveform
Camshaft position sensor ground		B137	30	0	0	—
Electronic throttle control	Main	B134	18	0.64 — 0.94 Fully open: Approx. 4.04	0.64 — 0.72 (After engine is warmed up.)	Fully closed: Approx. 0.6 Fully open: Approx. 4.04
	Sub	B134	28	1.51 — 1.76 Fully open: Approx. 4.232	1.51 — 1.58 (After engine is warmed up.)	Fully closed: Approx. 1.48 Fully open: Approx. 4.23
Electronic throttle control motor (+)		B134	2	Duty waveform	Duty waveform	Drive frequency: 500 Hz
Electronic throttle control motor (-)		B134	1	Duty waveform	Duty waveform	Drive frequency: 500 Hz
Electronic throttle control motor power supply		B135	7	10 — 13	12 — 14	—
Electronic throttle control motor relay		B135	17	ON: 0 OFF: 10 — 13	ON: 0 OFF: 12 — 14	When ignition switch is turned to ON: ON

# Engine Control Module (ECM) I/O Signal

ENGINE (DIAGNOSTICS)

Content		Connector No.	Terminal No.	Signal (V)		Note
				Ignition SW ON (engine OFF)	Engine ON (idling)	
Accelerator pedal position sensor	Main sensor signal	B135	23	Fully closed: 1 Fully opened: 3.6	Fully closed: 1 Fully opened: 3.3	—
	Main power supply	B135	21	5	5	—
	Ground (main sensor)	B135	29	0	0	—
	Sub sensor signal	B135	31	Fully closed: 1 Fully opened: 3.7	Fully closed: 1 Fully opened: 3.3	—
	Sub power supply	B135	22	5	5	—
	Ground (sub sensor)	B135	30	0	0	—
Engine coolant temperature sensor		B137	22	1.0 — 1.4	1.0 — 1.4	After engine is warmed up.
Starter switch		B136	16	0	0	Cranking: 8 — 14
Starter relay		B135	26	ON: 0 OFF: 10 — 13	ON: 0 OFF: 12 — 14	—
Ignition switch		B136	30	10 — 13	12 — 14	—
Neutral position switch		B136	35	ON: 0 OFF: 12±0.5		Switch is ON when select lever is in "P" range or "N" range.
Delivery (test) mode connector		B136	34	10 — 13	12 — 14	When connected: 0
Knock sensor 1		B137	2	2.4	2.4	—
Knock sensor 2		B137	4	2.4	2.4	—
Knock sensor shield		B137	8	0	0	—
Back-up power supply		B136	2	10 — 13	12 — 14	Ignition switch "OFF": 10 — 13
Control module power supply		B137	7	10 — 13	12 — 14	—
		B136	1	10 — 13	12 — 14	—
Sensor power supply		B134	19	5	5	—
Ignition control	#1	B134	21	0	12 — 14	Waveform
	#2	B134	22	0	12 — 14	Waveform
	#3	B134	31	0	12 — 14	Waveform
	#4	B134	32	0	12 — 14	Waveform
	#5	B134	25	0	12 — 14	Waveform
	#6	B134	26	0	12 — 14	Waveform
Fuel injector	#1	B134	10	10 — 13	1 — 14	Waveform
	#2	B134	11	10 — 13	1 — 14	Waveform
	#3	B134	12	10 — 13	1 — 14	Waveform
	#4	B134	13	10 — 13	1 — 14	Waveform
	#5	B134	23	10 — 13	1 — 14	Waveform
	#6	B134	24	10 — 13	1 — 14	Waveform
A/C switch		B136	29	ON: 10 — 13 OFF: 0	ON: 13 — 14 OFF: 0	—
A/C middle pressure switch		B136	7	ON: 0 OFF: 10 — 13	ON: 0 OFF: 13 — 14	—

# Engine Control Module (ECM) I/O Signal

## ENGINE (DIAGNOSTICS)

Content	Connector No.	Terminal No.	Signal (V)		Note	
			Ignition SW ON (engine OFF)	Engine ON (idling)		
A/C relay control	B135	35	ON: 0.5 or less OFF: 10 — 13	ON: 0.5 or less OFF: 13 — 14	—	
Radiator fan control	B135	11	ON: 0.5 or less OFF: 10 — 13	ON: 0.5 or less OFF: 12 — 14	—	
Radiator fan control power supply	B135	12	ON: 0.5 or less OFF: 10 — 13	ON: 0.5 or less OFF: 12 — 14	—	
Self-shutoff control	B135	13	0	0	—	
Engine speed output	B135	15	—	0 — 13 or more	Waveform	
Purge control solenoid valve	B137	6	ON: 1 or less OFF: 10 — 13	ON: 1 or less OFF: 12 — 14	—	
EGR control valve	Signal 1	B134	8	0 or 10 — 13	0 or 12 — 14	—
	Signal 2	B134	9	0 or 10 — 13	0 or 12 — 14	—
	Signal 3	B134	20	0 or 10 — 13	0 or 12 — 14	—
	Signal 4	B134	30	0 or 10 — 13	0 or 12 — 14	—
Manifold absolute pressure sensor	B137	20	3.5 — 4.8	1.1 — 1.9	—	
Air flow sensor	Signal	B136	22	0.74	0.3 — 4.5	—
	Shield	B136	10	0	0	—
	Ground	B136	11	0	0	—
Intake air temperature sensor	B136	31	3.15 — 3.33	3.15 — 3.33	Ambient air temperature	
Front oxygen (A/F) sensor LH	Signal (+)	B135	8	2.8 — 3.2	2.8 — 3.2	—
	Signal (-)	B135	20	2.4 — 2.7	2.4 — 2.7	—
	Shield	B136	9	0	0	—
Front oxygen (A/F) sensor heater LH	Signal 1	B135	2	12 — 14	—	Waveform
	Signal 2	B135	1	12 — 14	—	Waveform
Front oxygen (A/F) sensor RH	Signal (+)	B136	19	2.8 — 3.2	2.8 — 3.2	—
	Signal (-)	B136	18	2.4 — 2.7	2.4 — 2.7	—
	Shield	B136	9	0	0	—
Front oxygen (A/F) sensor heater RH	Signal 1	B136	6	12 — 14	—	Waveform
	Signal 2	B136	5	12 — 14	—	Waveform
Rear oxygen sensor LH	Signal	B135	28	0	0 — 0.9	—
	Shield	B136	9	0	0	—
Rear oxygen sensor heater LH signal	B135	5	12 — 14	—	Waveform	
Rear oxygen sensor RH	Signal	B136	20	0	0 — 0.9	—
	Shield	B136	9	0	0	—
Rear oxygen sensor heater RH signal	B135	6	12 — 14	—	Waveform	
Immobilizer	Communication 1	B135	25	—	—	—
	Communication 2	B135	24	—	—	—
Fuel pump control unit	Control	B136	33	0 or 5	0 or 5	Waveform
	Diagnostic signal	B135	10	0 or 10 — 13	12 — 14	—

# Engine Control Module (ECM) I/O Signal

ENGINE (DIAGNOSTICS)

Content	Connector No.	Terminal No.	Signal (V)		Note	
			Ignition SW ON (engine OFF)	Engine ON (idling)		
Brake switch 1 (brake switch)	B136	15	When brake pedal is depressed: 0 When brake pedal is released: 10 — 13	When brake pedal is depressed: 0 When brake pedal is released: 12 — 14	—	
Brake switch 2 (stop light switch)	B136	3	When brake pedal is depressed: 10 — 13 When brake pedal is released: 0	When brake pedal is depressed: 12 — 14 When brake pedal is released: 0	—	
Cruise control command switch	B136	12	When operating nothing: 3.5 — 4.5 When operating RES/ACC: 2.5 — 3.5 When operating vehicle distance setting: 1.5 — 2.5 When operating SET/COAST: 0.5 — 1.5 When operating CANCEL: 0 — 0.5	When operating nothing: 3.5 — 4.5 When operating RES/ACC: 2.5 — 3.5 When operating vehicle distance setting: 1.5 — 2.5 When operating SET/COAST: 0.5 — 1.5 When operating CANCEL: 0 — 0.5	—	
Cruise control main switch	B136	13	ON: 0 OFF: 5	ON: 0 OFF: 5	—	
Intake oil flow control solenoid valve LH	Signal (+)	B134	17	0	0.6	—
	Signal (–)	B134	16	0	0	—
Intake oil flow control solenoid valve RH	Signal (+)	B134	34	0	0.6	—
	Signal (–)	B134	27	0	0	—
Exhaust oil flow control solenoid valve LH	Signal (+)	B134	5	0	1.9	—
	Signal (–)	B134	14	0	0	—
Exhaust oil flow control solenoid valve RH	Signal (+)	B134	7	0	1.9	—
	Signal (–)	B134	15	0	0	—
Engine oil temperature sensor signal	B137	21	1.0 — 1.4	1.0 — 1.4	After engine is warmed up.	
Power steering oil pressure switch	B137	28	ON: 1 or less OFF: 10 — 13	ON: 1 or less OFF: 12 — 14	—	
SSM communication	B135	14	1 or less ←→ 4 or more	1 or less ←→ 4 or more	—	
Ground	Sensor	B134	29	0	0	—
		B135	30	0	0	—
	Engine 1	B134	6	0	0	—
	Engine 2	B134	4	0	0	—
	Engine 3	B134	3	0	0	—
	Engine 4	B137	1	0	0	—
	Engine 5	B137	3	0	0	—
	Engine 6	B137	5	0	0	—
Body	B136	4	0	0	—	
CAN communication	(Hi)	B136	17	Pulse signal		—
	(Lo)	B136	28	Pulse signal		—

## Engine Control Module (ECM) I/O Signal

### ENGINE (DIAGNOSTICS)

Content	Connector No.	Terminal No.	Signal (V)		Note
			Ignition SW ON (engine OFF)	Engine ON (idling)	
Fuel tank pressure sensor	B136	21	2.3 — 2.7	2.3 — 2.7	Value after detaching and attaching the fuel filler cap
Drain valve	B135	4	ON: 1 or less OFF: 10 — 13	ON: 1 or less OFF: 12 — 14	—
Fuel temperature sensor	B136	23	2.5 — 3.8	2.5 — 3.8	Ambient temperature: 25°C (77°F)
Brake vacuum sensor	B137	9	1 — 3.8	1 — 3.8	—
Brake vacuum pump	B136	8	0 (When pump is OFF)	0 (When pump is OFF)	—
			10 — 13 (When pump is ON)	12 — 14 (When pump is ON)	
Brake vacuum pump relay	B135	27	10 — 13 (When pump is OFF)	12 — 14 (When pump is OFF)	—
			0 (When pump is ON)	0 (When pump is ON)	

**Input/output name:**

- Crankshaft position sensor
- Intake camshaft position sensor RH
- Intake camshaft position sensor LH
- Exhaust camshaft position sensor RH
- Exhaust camshaft position sensor LH

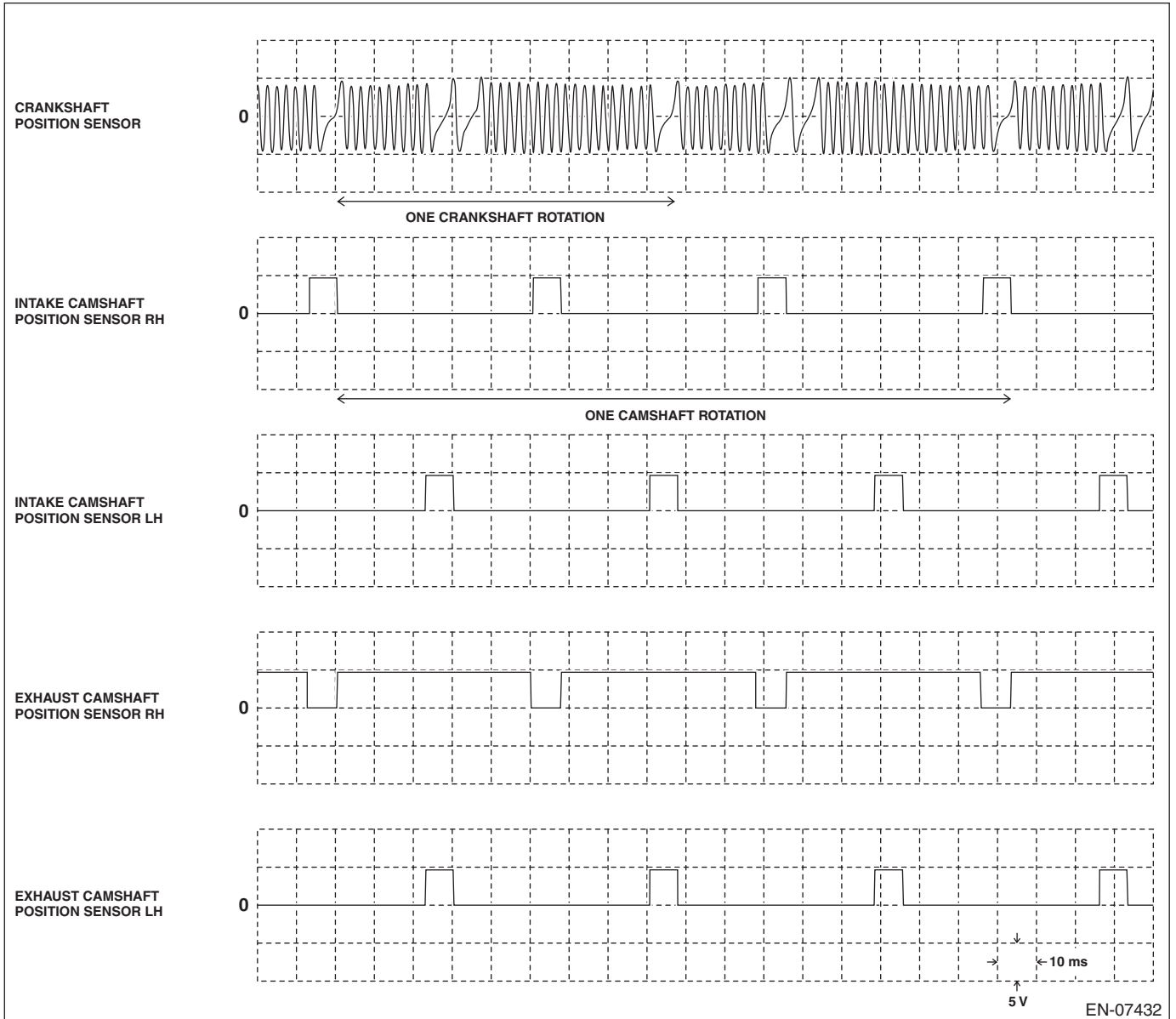
**Measuring condition:**

- After warming-up

# Engine Control Module (ECM) I/O Signal

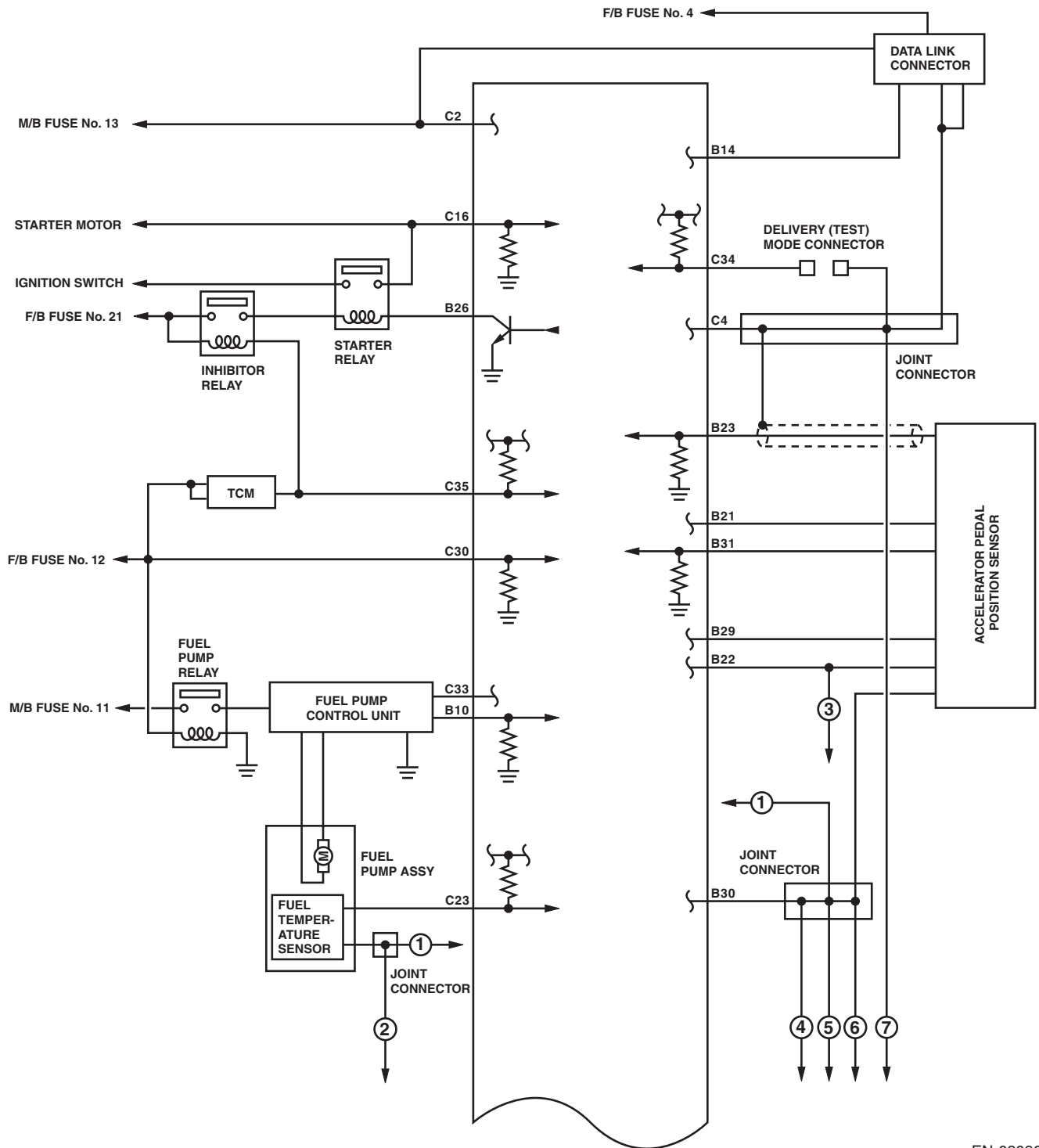
ENGINE (DIAGNOSTICS)

- At idling



# Engine Control Module (ECM) I/O Signal

ENGINE (DIAGNOSTICS)

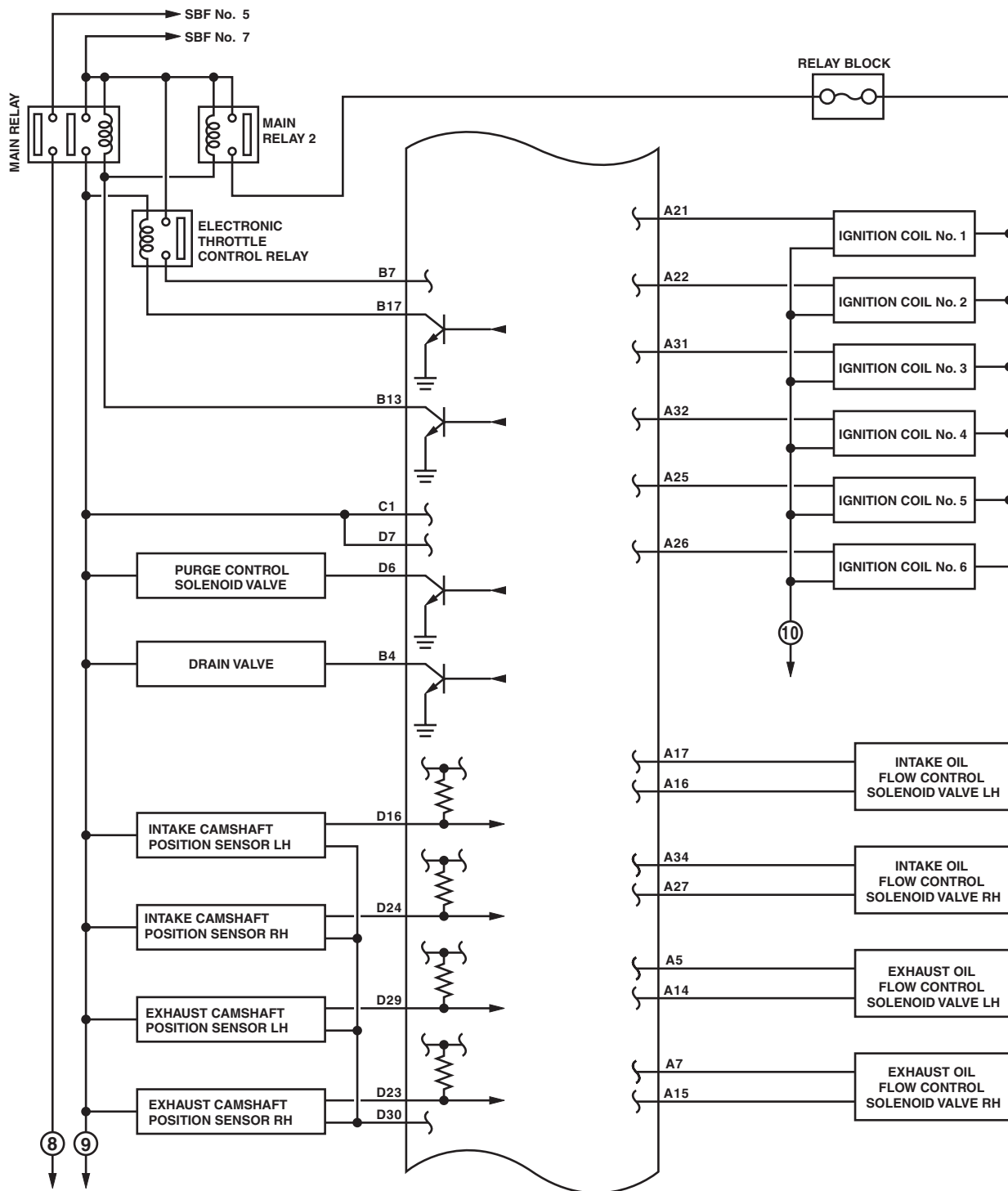


EN-08096



# Engine Control Module (ECM) I/O Signal

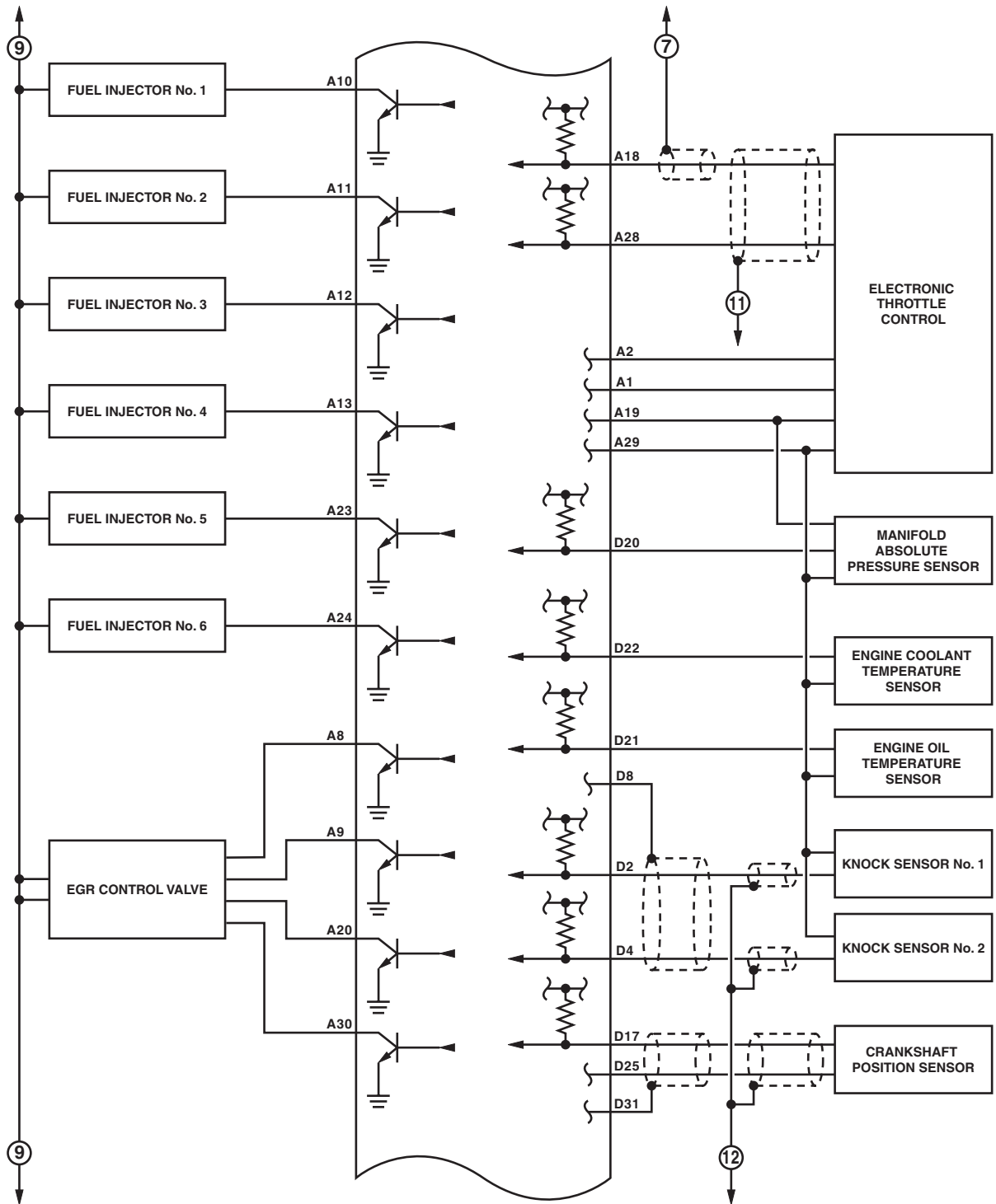
ENGINE (DIAGNOSTICS)



EN-08097

# Engine Control Module (ECM) I/O Signal

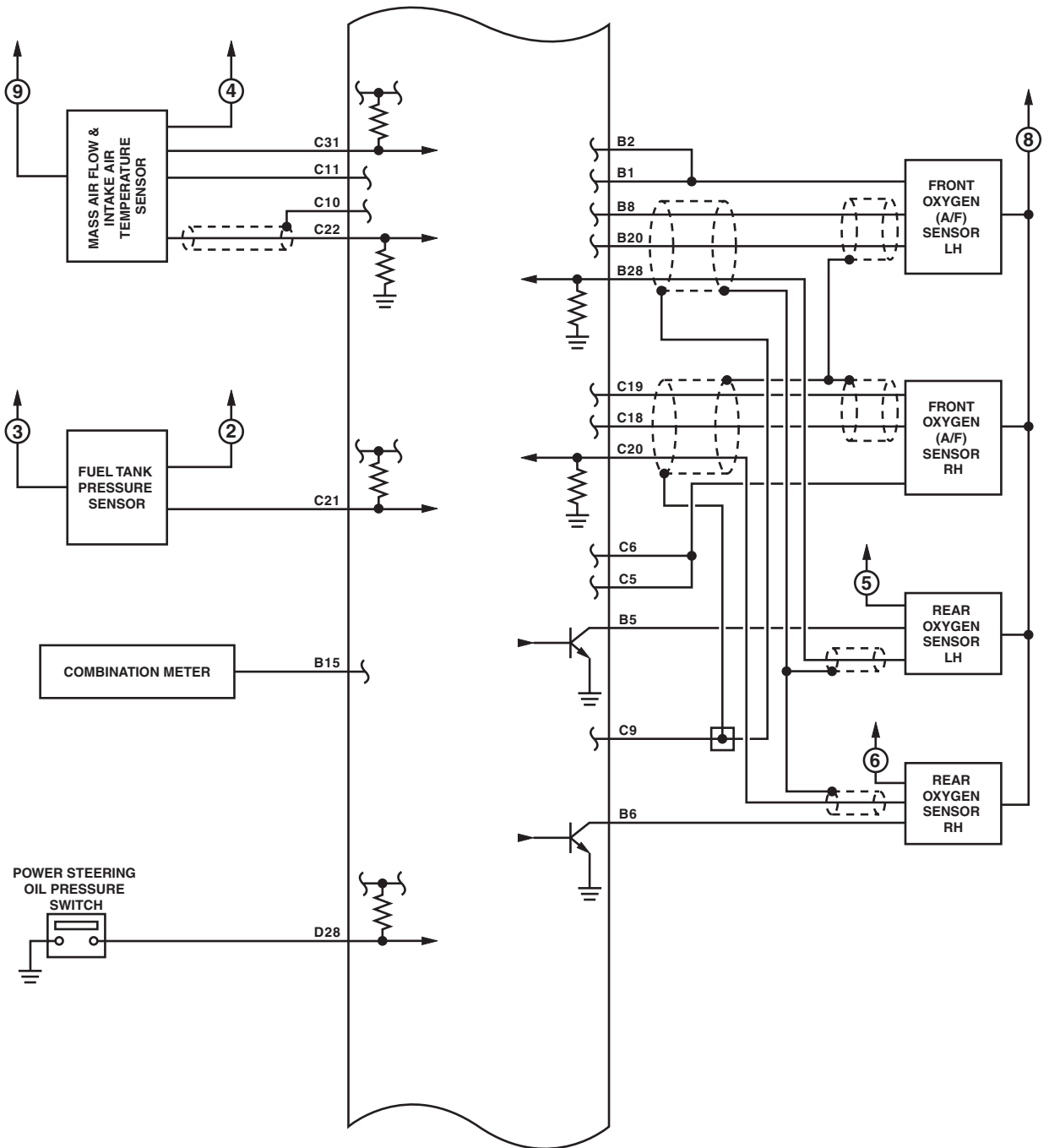
ENGINE (DIAGNOSTICS)



EN-09362

# Engine Control Module (ECM) I/O Signal

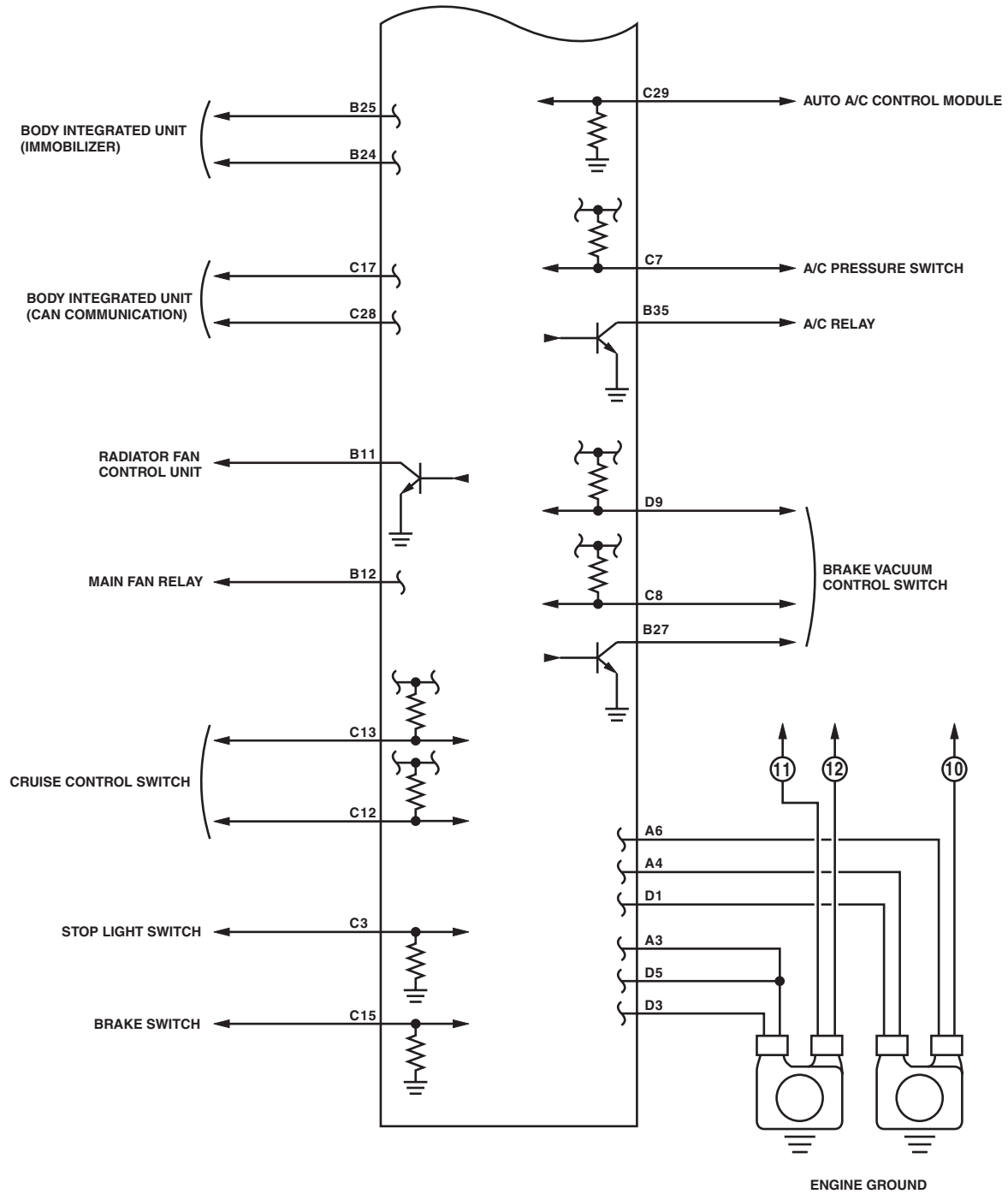
ENGINE (DIAGNOSTICS)



EN-09363

# Engine Control Module (ECM) I/O Signal

ENGINE (DIAGNOSTICS)



EN-08100

## 6. Engine Condition Data

### A: ELECTRICAL SPECIFICATION

Content	Specifications
Engine load	17.9 — 38.8(%): Idling
	16.6 — 33.7(%): 2,500 rpm racing

Measuring condition:

- After engine is warmed up.
- Place the select lever in “P” range or “N” range.
- Turn the A/C to OFF.
- Turn all the accessory switches to OFF.

# Data Link Connector

ENGINE (DIAGNOSTICS)

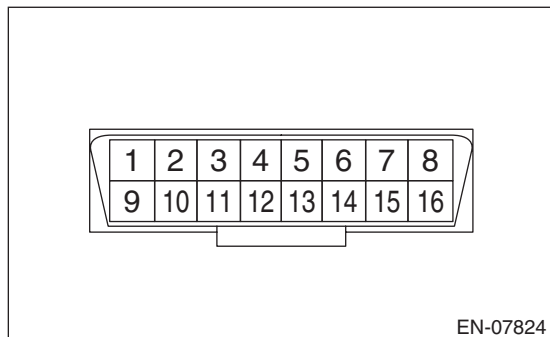
## 7. Data Link Connector

### A: NOTE

This connector is used for Subaru Select Monitor.

### CAUTION:

Do not connect any scan tools other than Subaru Select Monitor or general scan tool because the circuit for Subaru Select Monitor may be damaged.



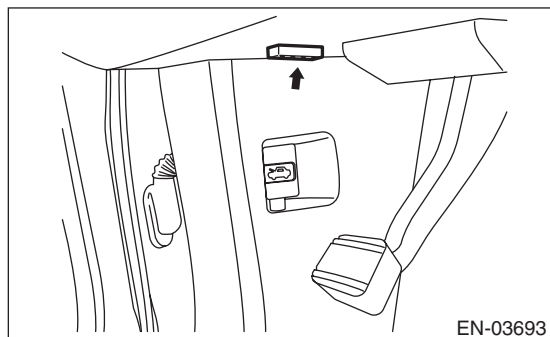
Terminal No.	Content	Terminal No.	Content
1	Blank	9	Blank
2	Blank	10	Blank
3	Blank	11	Blank
4	Ground	12	Blank
5	Ground	13	Blank
6	CAN communication (Hi)	14	CAN communication (Lo)
7	Subaru Select Monitor signal	15	Blank
8	Blank	16	Power supply

## 8. General Scan Tool

### A: OPERATION

#### 1. HOW TO USE GENERAL SCAN TOOL

- 1) Prepare a scan tool (general scan tool) required by SAE J1978.
- 2) Connect the general scan tool to data link connector located in the lower portion of the instrument panel (on the driver's side).



- 3) Using the general scan tool, call up each data. 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 DTC
  - (4) MODE \$04: Clear/Reset emission-related diagnostic information
  - (5) MODE \$06: Request on-board monitoring test results for intermittently monitored systems
  - (6) MODE \$07: Request on-board monitoring test results for continuously monitored systems
  - (7) MODE \$09: Request vehicle information
- 4) Read out the data according to repair procedures. (For detailed operation procedure, refer to the general scan tool operation manual.)

**NOTE:**

For details concerning DTC, refer to "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6DO)(diag)-84, List of Diagnostic Trouble Code (DTC).>

#### 2. MODE \$01 (CURRENT POWERTRAIN DIAGNOSTIC DATA)

Refer to data denoting the current operating condition of analog input/output, digital input/output 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 DTC and malfunction indicator light status	—
\$03	Fuel system control status	—
\$04	Calculated engine load value	%
\$05	Engine coolant temperature	°C
\$06	Short term fuel trim (Bank 1)	%
\$07	Long term fuel trim (Bank 1)	%
\$08	Short term fuel trim (Bank 2)	%
\$09	Long term fuel trim (Bank 2)	%
\$0B	Intake manifold absolute pressure	kPa
\$0C	Engine speed	rpm
\$0D	Vehicle speed	MPH
\$0E	Ignition timing advance	°
\$0F	Intake air temperature	°C
\$10	Intake air amount	g/s
\$11	Throttle valve opening angle	%
\$13	Air fuel ratio sensor	—

## General Scan Tool

### ENGINE (DIAGNOSTICS)

PID	Data	Unit of measure
\$15	Oxygen sensor output voltage (Bank 1 Sensor 2)	V
\$15	Oxygen sensor correction (Bank 1 Sensor 2)	%
\$19	Oxygen sensor output voltage (Bank 2 Sensor 2)	V
\$19	Oxygen sensor correction (Bank 2 Sensor 2)	%
\$1C	On-board diagnostic system	—
\$1F	Elapsed time after starting the engine	sec
\$21	Travel distance after the malfunction indicator light illuminates	miles
\$24	Oxygen sensor output voltage and short term fuel trim associated with oxygen sensor (Bank 1)	– and V
\$28	Oxygen sensor output voltage and short term fuel trim associated with oxygen sensor (Bank 2)	– and V
\$2C	Target EGR	%
\$2D	EGR deviation	%
\$2E	Evaporative purge	%
\$2F	Fuel level	%
\$30	Number of warm ups after DTC clear	—
\$31	Travel distance after DTC clear	miles
\$32	Fuel tank pressure	Pa
\$33	Barometric pressure	kPa
\$34	A/F sensor lambda value (Bank 1 Sensor 1)	—
\$34	A/F sensor current value (Bank 1 Sensor 1)	mA
\$38	A/F sensor lambda value (Bank 2 Sensor 1)	—
\$38	A/F sensor current value (Bank 2 Sensor 1)	mA
\$3C	Catalyst temperature #1	°C
\$3D	Catalyst temperature #2	°C
\$41	Diagnostic monitor of each drive cycle	—
\$42	ECM power voltage	V
\$43	Absolute load	%
\$44	A/F target lambda	—
\$45	Relative throttle opening angle	%
\$46	Ambient temperature	°C
\$47	Absolute throttle opening angle 2	%
\$49	Absolute accelerator opening angle 1	%
\$4A	Absolute accelerator opening angle 2	%
\$4C	Target throttle opening angle	%
\$4D	Engine operating time while malfunction indicator light lit	min
\$4E	Elapsed time after DTC clear	min
\$51	Fuel used	—
\$5A	Relative accelerator opening angle	%
\$65	Neutral status	—

**NOTE:**

Refer to general scan tool manufacturer's operation manual to access current powertrain diagnostic data (MODE \$01).



### 3. MODE \$02 (POWERTRAIN FREEZE FRAME DATA)

Refer to data denoting the operating condition when trouble is detected by 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	DTC that caused the freeze frame data storage required by CARB	—
\$03	Fuel system control status	—
\$04	Calculated engine load value	%
\$05	Engine coolant temperature	°C
\$06	Short term fuel trim (Bank 1)	%
\$07	Long term fuel trim (Bank 1)	%
\$08	Short term fuel trim (Bank 2)	%
\$09	Long term fuel trim (Bank 2)	%
\$0B	Intake manifold absolute pressure	kPa
\$0C	Engine speed	rpm
\$0D	Vehicle speed	MPH
\$0E	Ignition timing advance	°
\$0F	Intake air temperature	°C
\$10	Intake air amount	g/s
\$11	Throttle valve opening angle	%
\$13	Air fuel ratio sensor	—
\$15	Oxygen sensor output voltage (Bank 1 Sensor 2)	V
\$15	Oxygen sensor correction (Bank 1 Sensor 2)	%
\$19	Oxygen sensor output voltage (Bank 2 Sensor 2)	V
\$19	Oxygen sensor correction (Bank 2 Sensor 2)	%
\$1C	On-board diagnostic system	—
\$1F	Elapsed time after starting the engine	sec
\$2C	Target EGR	%
\$2D	EGR deviation	%
\$2E	Evaporative purge	%
\$2F	Fuel level	%
\$32	Fuel tank pressure	Pa
\$33	Barometric pressure	kPa
\$42	ECM power voltage	V
\$43	Absolute load	%
\$44	A/F target lambda	—
\$45	Relative throttle opening angle	%
\$46	Ambient temperature	°C
\$47	Absolute throttle opening angle 2	%
\$49	Absolute accelerator opening angle 1	%
\$4A	Absolute accelerator opening angle 2	%
\$4C	Target throttle opening angle	%
\$65	Neutral status	—

**NOTE:**

Refer to general scan tool manufacturer's operation manual to access freeze frame data (MODE \$02).

### 4. MODE \$03 (EMISSION-RELATED POWERTRAIN DTC)

Refer to "List of Diagnostic Trouble Code (DTC)" for information about data denoting emission-related powertrain DTC. <Ref. to EN(H6DO)(diag)-84, List of Diagnostic Trouble Code (DTC).>

# General Scan Tool

## ENGINE (DIAGNOSTICS)

### 5. MODE \$04 (CLEAR/RESET EMISSION-RELATED DIAGNOSTIC INFORMATION)

Refer to the mode used to clear or reset emission-related diagnostic information (OBD-II trouble diagnostic information).

**NOTE:**

Refer to general scan tool manufacturer's instruction manual to clear the emission-related diagnostic information (MODE \$04).

### 6. MODE \$06

Refer to diagnostic value of troubleshooting and data of test limit indicated on the support data bit sequence table. A list of the support data is shown in the following table.

OBDMID	TID	SID	Diagnostic item
\$01	\$84	\$1E	A/F sensor range failure (Bank 1 Sensor 1)
	\$85	\$1E	
	\$86	\$20	A/F sensor response failure (Bank 1 Sensor 1)
	\$91	\$20	
	\$92	\$10	
	\$A3	\$20	
	\$A4	\$10	
	\$AC	\$10	
	\$AD	\$10	
	\$AE	\$10	
	\$AF	\$10	
	\$CD	\$20	
\$CF	\$20		
\$02	\$07	\$0B	Oxygen sensor drop failure (Bank 1 Sensor 2)
	\$08	\$0B	
	\$A5	\$0B	
	\$05	\$10	Oxygen sensor response failure (Bank 1 Sensor 2)
	\$06	\$10	
	\$D1	\$10	Oxygen sensor delay failure (Bank 1 Sensor 2)
\$D2	\$01		
\$05	\$84	\$1E	A/F sensor range failure (Bank 2 Sensor 1)
	\$85	\$1E	
	\$86	\$20	A/F sensor response failure (Bank 2 Sensor 1)
	\$91	\$20	
	\$92	\$10	
	\$A3	\$20	
	\$A4	\$10	
	\$AC	\$10	
	\$AD	\$10	
	\$AE	\$10	
	\$AF	\$10	
	\$CE	\$20	
\$D0	\$20		
\$06	\$07	\$0B	Oxygen sensor drop failure (Bank 2 Sensor 2)
	\$08	\$0B	
	\$A5	\$0B	
	\$05	\$10	Oxygen sensor response failure (Bank 2 Sensor 2)
	\$06	\$10	
	\$D1	\$10	Oxygen sensor delay failure (Bank 2 Sensor 2)
\$D2	\$01		

# General Scan Tool

ENGINE (DIAGNOSTICS)

OBDMID	TID	SID	Diagnostic item
\$21	\$89	\$20	Catalyst deterioration diagnosis (Bank 1)
\$31	\$8A	\$FD	EGR system diagnosis
\$35	\$8B	\$9D	VVT monitor (Bank 1)
	\$8C	\$9D	
	\$8D	\$9D	
	\$8E	\$9D	
\$36	\$8B	\$9D	VVT monitor (Bank 2)
	\$8C	\$9D	
	\$8D	\$9D	
	\$8E	\$9D	
\$39	\$93	\$FE	Evaporative emission control system (Cap off)
\$3B	\$94	\$FE	Evaporative emission control system (0.04 inch leak)
	\$95	\$FE	
	\$A6	\$FE	
\$3C	\$96	\$FE	Evaporative emission control system (0.02 inch leak)
	\$C1	\$FE	
	\$C2	\$FE	
	\$C3	\$FE	
	\$C4	\$FE	
	\$C5	\$FE	
	\$C6	\$35	
	\$C7	\$FE	
	\$C8	\$FE	
	\$C9	\$FE	
\$CA	\$FE		
\$3D	\$98	\$FE	Evaporative emission control system (Purge flow)
\$41	\$9B	\$14	A/F sensor heater characteristics failure (Bank 1 Sensor 1)
\$42	\$A2	\$24	Oxygen sensor heater characteristics failure (Bank 1 Sensor 2)
\$45	\$9B	\$14	A/F sensor heater characteristics failure (Bank 2 Sensor 1)
\$46	\$A2	\$24	Oxygen sensor heater characteristics failure (Bank 2 Sensor 2)
\$A1	\$0B	\$24	Misfire monitoring (All cylinders)
	\$0C	\$24	
\$A2	\$0B	\$24	Misfire monitoring (#1 cylinder)
	\$0C	\$24	
\$A3	\$0B	\$24	Misfire monitoring (#2 cylinder)
	\$0C	\$24	
\$A4	\$0B	\$24	Misfire monitoring (#3 cylinder)
	\$0C	\$24	
\$A5	\$0B	\$24	Misfire monitoring (#4 cylinder)
	\$0C	\$24	
\$A6	\$0B	\$24	Misfire monitoring (#5 cylinder)
	\$0C	\$24	
\$A7	\$0B	\$24	Misfire monitoring (#6 cylinder)
	\$0C	\$24	

## 7. MODE \$07

Refer to the data of DTC (pending code) for troubleshooting result about emission in the first time.

## 8. MODE \$09

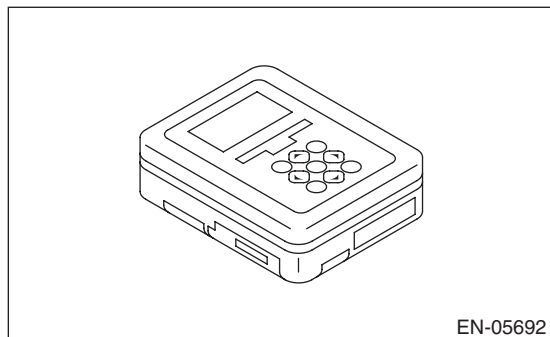
Refer to the data of vehicle specification (V.I.N., calibration ID, diagnosis frequency, etc.).

### 9. Subaru Select Monitor

#### A: OPERATION

##### 1. HOW TO USE THE SUBARU SELECT MONITOR

1) Prepare the Subaru Select Monitor kit. <Ref. to EN(H6DO)(diag)-8, PREPARATION TOOL, General Description.>



2) Prepare PC with Subaru Select Monitor installed.

3) Connect the USB cable to SDI (Subaru Diagnosis Interface) and USB port on the personal computer (dedicated port for the Subaru Select Monitor).

#### NOTE:

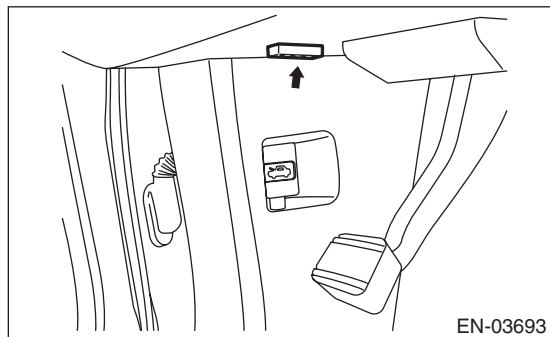
The dedicated port for the Subaru Select Monitor means the USB port which was used to install the Subaru Select Monitor.

4) Connect the diagnosis cable to SDI.

5) Connect SDI to data link connector located in the lower portion of the instrument panel (on the driver's side).

#### CAUTION:

**Do not connect any scan tools except Subaru Select Monitor or general scan tool.**



6) Start the PC.

7) Turn the ignition switch to ON (engine OFF) and run the "PC application for Subaru Select Monitor".

8) Call up DTC and data, then record them.

#### NOTE:

For detailed operation procedures, refer to "PC application help for Subaru Select Monitor".

## 2. READ CURRENT DATA FOR ENGINE (NORMAL MODE)

- 1) On «Main Menu» display, select {Each System Check}.
- 2) On «System Selection Menu» display, select {Engine Control System}.
- 3) Click the [OK] button after the information of engine type has been displayed.
- 4) On «Engine Diagnosis» display, select {Current Data Display & Save}.
- 5) On «Current Data Display & Save» display, select {Normal sampling}.
- 6) Using the scroll key, scroll the display screen up or down until the desired data is shown.

### NOTE:

- For detailed operation procedures, refer to “PC application help for Subaru Select Monitor”.
- A list of the support data is shown in the following table.

Content	Display	Unit of measure	Note (at idling)
Engine load	Engine Load	%	2.4%
Engine coolant temperature signal	Coolant Temperature	°C or °F	≥ 85°C or 185°F (after warm-up)
A/F correction #1	A/F Correction #1	%	-10% — +10%
A/F learning #1	A/F Learning #1	%	-10% — +10%
A/F correction #2	A/F Correction #2	%	-10% — +10%
A/F learning #2	A/F Learning #2	%	-10% — +10%
Intake manifold absolute pressure	Mani. Absolute Pressure	mmHg, kPa, inHg or psig	210 mmHg, 28 kPa, 8.3 inHg or 4.1 psig
Engine speed signal	Engine Revolutions	rpm	600 — 800 rpm (after warm-up)
Meter vehicle speed signal	Vehicle Speed	km/h or MPH	0 km/h or 0 MPH
Ignition timing signal	Ignition Timing	deg	13 — 15 deg
Intake air temperature signal	Intake Air Temp.	°C or °F	(Ambient air temperature)
Intake air amount	Mass Air Flow	g/s or lb/m	2.5 g/s — 5.0 g/s or 0.31 lb/m — 0.71 lb/m
Throttle opening angle signal	Throttle Opening Angle	%	2%
Front oxygen sensor voltage value 1	Front O2 Sensor #1	V	0.900 V
Front oxygen sensor voltage value 2	Front O2 Sensor #2	V	0.900 V
Battery voltage	Battery Voltage	V	12 — 13 V
Mass air flow voltage	Air Flow Sensor Voltage	V	1.2 — 1.3 V
Injection 1 pulse width	Fuel Injection #1 Pulse	ms	2.5 ms — 3.5 ms
Injection 2 pulse width	Fuel Injection #2 Pulse	ms	2.5 ms — 3.5 ms
Atmospheric pressure signal	Atmosphere Pressure	mmHg, kPa, inHg or psig	(Atmospheric pressure)
Intake manifold relative pressure	Mani. Relative Pressure	mmHg, kPa, inHg or psig	(Air intake absolute pressure — Atmospheric pressure)
Learned ignition timing	Learned Ignition Timing	deg	+0.0 deg
Acceleration opening angle signal	Accel. Opening Angle	%	0%
Fuel temperature signal	Fuel Temperature	°C or °F	+28°C or +82°F
Radiator fan output	Radiator Fan Control	%	0% (Water temperature 90°C (194°F) when air conditioner is OFF)
Purge control solenoid valve duty ratio	CPC Valve Duty Ratio	%	18%
Number of EGR steps	No. of EGR steps	STEP	0 STEP
Fuel pump duty ratio	Fuel Pump Duty	%	33%
AVCS advance angle amount RH	VVT Adv. Ang. Amount R	deg	0 deg — +1 deg
AVCS advance angle amount LH	VVT Adv. Ang. Amount L	deg	0 deg — +1 deg
Oil flow control solenoid valve duty ratio RH	OCV Duty R	%	9.4%

# Subaru Select Monitor

## ENGINE (DIAGNOSTICS)

Content	Display	Unit of measure	Note (at idling)
Oil flow control solenoid valve duty ratio LH	OCV Duty L	%	9.4%
Oil flow control solenoid valve current RH	OCV Current R	mA	64 mA
Oil flow control solenoid valve current LH	OCV Current L	mA	64 mA
Front oxygen (A/F) sensor current value 1	A/F Sensor #1 Current	mA	0.0 mA
Front oxygen (A/F) sensor current value 2	A/F Sensor #2 Current	mA	0.0 mA
Front oxygen (A/F) sensor resistance value 1	A/F Sensor #1 Resistance	Ω	31 Ω
Front oxygen (A/F) sensor resistance value 2	A/F Sensor #2 Resistance	Ω	31 Ω
Front oxygen (A/F) sensor output lambda 1	A/F Sensor #1	—	1.01
Front oxygen (A/F) sensor output lambda 2	A/F Sensor #2	—	1.01
A/F correction #3	A/F Correction #3	%	0% — 1%
A/F learning #3	A/F Learning #3	%	0.0%
Throttle motor duty	Throttle Motor Duty	%	-20% — +20%
Throttle motor voltage	Throttle Motor Voltage	V	(Battery voltage)
Sub throttle sensor voltage	Sub-Throttle Sensor	V	1.4 V — 1.5 V
Main throttle sensor voltage	Main-Throttle Sensor	V	0.62 V — 0.70 V
Sub accelerator sensor voltage	Sub-Accelerator Sensor	V	1.0 V — 1.2 V
Main acceleration sensor voltage	Main-Accelerator Sensor	V	0.9 V — 1.1 V
Memory vehicle speed	Memorized Cruise Speed	km/h or MPH	0 km/h or 0 MPH
A/F correction #4	A/F Correction #4	%	-1% — 1%
A/F learning #4	A/F Learning #4	%	0.0%
Fuel level sensor resistance	Fuel level resistance	Ω	4 — 96 Ω
Engine oil temperature signal	Engine Oil Temperature	°C or °F	≥ 85°C or 185°F (after warm-up)
Exhaust AVCS retard angle amount RH	Exh. VVT Retard Ang. R	deg	0 deg — +1 deg
Exhaust AVCS retard angle amount LH	Exh. VVT Retard Ang. L	deg	0 deg — +1 deg
Exhaust oil flow control solenoid valve duty ratio RH	Exh. OCV Duty R	%	9.4%
Exhaust oil flow control solenoid valve duty ratio LH	Exh. OCV Duty L	%	9.4%
Exhaust oil flow control solenoid valve current RH	Exh. OCV Current R	mA	64 mA
Exhaust oil flow control solenoid valve current LH	Exh. OCV Current L	mA	64 mA
#1 cylinder roughness monitor	Roughness Monitor #1	—	0
#2 cylinder roughness monitor	Roughness Monitor #2	—	0
#3 cylinder roughness monitor	Roughness Monitor #3	—	0
#4 cylinder roughness monitor	Roughness Monitor #4	—	0
#5 cylinder roughness monitor	Roughness Monitor #5	—	0
#6 cylinder roughness monitor	Roughness Monitor #6	—	0
Knock sensor correction	Knocking Correction	deg	0 deg
Fuel tank pressure signal	Fuel Tank Pressure	mmHg, kPa, inHg or psig	7.5 mmHg, 1 kPa, 0.3 inHg or 0.14 psi
AT/MT identification	AT Vehicle ID Signal	—	AT vehicle
D-check require Flag	D-check Require Flag	—	OFF
Delivery (test) mode terminal	Delivery Mode Connector (Test Mode Connector)	—	OFF
Neutral position switch signal	Neutral Position Switch	—	ON
Idle switch signal	Idle Switch Signal	—	ON
Ignition switch signal	Ignition Switch	—	ON
Power steering switch signal	P/S Switch	—	OFF (when OFF)

# Subaru Select Monitor

## ENGINE (DIAGNOSTICS)

Content	Display	Unit of measure	Note (at idling)
Air conditioning switch signal	A/C Switch	—	OFF (when OFF)
Starter switch signal	Starter Switch	—	OFF
Front oxygen monitor 1	Front O2 #1 Rich Signal	—	Rich, Lean
Front oxygen monitor 2	Front O2 #2 Rich Signal	—	Rich, Lean
Knocking signal	Knocking Signal	—	OFF
Crankshaft position sensor signal	Crankshaft Position Sig.	—	ON
Camshaft position sensor signal	Camshaft Position Sig.	—	ON
Rear defogger switch signal	Rear Defogger SW	—	OFF (when OFF)
Blower fan switch signal	Blower Fan SW	—	OFF (when OFF)
Light switch signal	Light Switch	—	OFF (when OFF)
A/C middle pressure switch signal	A/C Mid Pressure Switch	—	OFF (when A/C OFF)
A/C compressor relay signal	A/C Compressor Signal	—	OFF (when A/C OFF)
Drain valve signal	Vent. Solenoid Valve	—	OFF (when OFF)
AT coordinate retard angle demand signal	Retard Signal from AT	—	OFF
AT coordinate fuel cut demand signal	Fuel Cut signal from AT	—	OFF
Vehicle dynamics control (VDC) torque down prohibition output	Ban of Torque Down	—	ON
Vehicle dynamics control (VDC) torque down demand	Request Torque Down VDC	—	OFF
AT coordinate permission signal	Torque Permission Signal	—	ON
Electronic throttle control motor relay signal	ETC Motor Relay	—	ON
Stop light switch signal	Stop Light Switch	—	OFF (when brake is OFF)
SET/COAST switch signal	SET/COAST Switch	—	OFF (when levers are not operated)
RESUME/ACCEL switch signal	RESUME/ACCEL Switch	—	OFF (when levers are not operated)
Brake switch signal	Brake Switch	—	OFF (when brake is OFF)
Main switch signal	Main Switch	—	OFF (when levers are not operated)
Cruise control cancel switch signal	CC Cancel SW	—	OFF (when levers are not operated)
Malfunction indicator light on flag	MIL On Flag	—	Light OFF

# Subaru Select Monitor

## ENGINE (DIAGNOSTICS)

### 3. READ CURRENT DATA FOR ENGINE (OBD MODE)

- 1) On «Main Menu» display, select {Each System Check}.
- 2) On «System Selection Menu» display, select {Engine Control System}.
- 3) Click the [OK] button after the information of engine type has been displayed.
- 4) On «Engine Diagnosis» display, select {OBD System}.
- 5) On «OBD Menu» display, select {Current Data Display & Save}.
- 6) On «Current Data Display & Save» display, select {All data display}.
- 7) Using the scroll key, scroll the display screen up or down until the desired data is shown.

#### NOTE:

- For detailed operation procedures, refer to “PC application help for Subaru Select Monitor”.
- A list of the support data is shown in the following table.

Content	Display	Note (at idling)	Unit of measure
Number of diagnosis code	Number of Diag. Code:	0	—
Condition of malfunction indicator light	MI(MIL)	OFF	—
Monitoring test of misfire	Misfire monitoring (Supp)	YES	—
Monitoring test of misfire	Misfire monitoring (Rdy)	YES	—
Monitoring test of fuel system	Fuel system monitoring (Supp)	YES	—
Monitoring test of fuel system	Fuel system monitoring (Rdy)	YES	—
Monitoring test of comprehensive component	Component monitoring (Supp)	YES	—
Monitoring test of comprehensive component	Component monitoring (Rdy)	YES	—
Test of catalyst	Catalyst Diagnosis (Supp)	YES	—
Test of catalyst	Catalyst Diagnosis (Rdy)	NO	—
Test of heating-type catalyst	Heated catalyst (Supp)	NO	—
Test of heating-type catalyst	Heated catalyst (Rdy)	N/A	—
Test of evaporative emission purge control system	Evaporative purge system (Supp)	YES	—
Test of evaporative emission purge control system	Evaporative purge system (Rdy)	NO	—
Secondary air system test	Secondary air system (Supp)	NO	—
Secondary air system test	Secondary air system (Rdy)	N/A	—
Test of air conditioning system refrigerant	A/C system refrigerant (Supp)	NO	—
Test of air conditioning system refrigerant	A/C system refrigerant (Rdy)	N/A	—
Test of oxygen sensor	Oxygen sensor (Supp)	YES	—
Test of oxygen sensor	Oxygen sensor (Rdy)	NO	—
Test of oxygen sensor heater	O <sub>2</sub> Heater Diagnosis (Supp)	YES	—
Test of oxygen sensor heater	O <sub>2</sub> Heater Diagnosis (Rdy)	NO	—
Test of EGR system	EGR system (Supp)	YES	—
Test of EGR system	EGR system (Rdy)	NO	—
Air fuel ratio control system for bank 1	Fuel system for Bank 1	Cl_normal	—
Air fuel ratio control system for bank 2	Fuel system for Bank 2	Cl_normal	—
Engine load data	Calculated load value	21.0	%
Engine coolant temperature signal	Coolant Temp.	91	°C
Short term fuel trim by front oxygen (A/F) sensor (Bank 1)	Short term fuel trim B1	17.2	%
Long term fuel trim by front oxygen (A/F) sensor (Bank 1)	Long term fuel trim B1	5.5	%
Short term fuel trim by front oxygen (A/F) sensor (Bank 2)	Short term fuel trim B2	17.2	%
Long term fuel trim by front oxygen (A/F) sensor (Bank 2)	Long term fuel trim B2	5.5	%
Intake manifold absolute pressure signal	Mani. Absolute Pressure	233	mmHg
Engine speed signal	Engine Speed	700	rpm
Vehicle speed signal	Vehicle Speed	0	km/h



# Subaru Select Monitor

## ENGINE (DIAGNOSTICS)

Content	Display	Note (at idling)	Unit of measure
#1 Cylinder ignition timing	Ignition timing adv. #1	16.5	°
Intake air temperature signal	Intake Air Temp.	54	°C
Intake air amount	Mass Air Flow	2.8	g/s
Throttle position signal	Throttle Opening Angle	13	%
Oxygen sensor (Bank 1 Sensor 2)	Oxygen sensor #12	0.1 — 0.7	V
A/F correction (Bank 1 Sensor 2)	Short term fuel trim #12	0.0	%
Oxygen sensor (Bank 2 Sensor 2)	Oxygen sensor #22	0.1 — 0.7	V
A/F correction (Bank 2 Sensor 2)	Short term fuel trim #22	0.0	%
On-board diagnostic system	OBD System	OBD/OBD2	—
Front oxygen (A/F) sensor (Bank 1 Sensor 1)	Oxygen sensor #11	Supported	—
Oxygen sensor (Bank 1 Sensor 2)	Oxygen sensor #12	Supported	—
Front oxygen (A/F) sensor (Bank 2 Sensor 1)	Oxygen sensor #21	Supported	—
Oxygen sensor (Bank 2 Sensor 2)	Oxygen sensor #22	Supported	—
Elapsed time after engine start	Time Since Engine Start	—	sec
Travel distance after the malfunction indicator light illuminates	Lighted MI lamp history	—	km
A/F lambda signal (Bank 1 Sensor 1)	A/F Sensor #11	1.001	—
A/F sensor output signal (Bank 1 Sensor 1)	A/F Sensor #11	2.805	V
A/F lambda signal (Bank 2 Sensor 1)	A/F Sensor #21	1.001	—
A/F sensor output signal (Bank 2 Sensor 1)	A/F Sensor #21	2.805	V
Target EGR	Commanded EGR	0	%
EGR deviation	EGR Error	0.0	%
Evaporative purge	Commanded Evap Purge	0	%
Fuel level signal	Fuel Level	—	%
Number of warm ups after DTC clear	Number of warm-ups	—	—
Travel distance after DTC clear	Meter since DTC cleared	—	km
Fuel tank pressure signal	Fuel Tank Pressure	8.8	mmHg
Atmospheric pressure signal	Atmosphere Pressure	Atmospheric pressure	mmHg
A/F lambda signal (Bank 1 Sensor 1)	A/F Sensor #11	0.999	—
A/F sensor current (Bank 1 Sensor 1)	A/F Sensor #11	0.02	mA
A/F lambda signal (Bank 2 Sensor 1)	A/F Sensor #21	0.999	—
A/F sensor current (Bank 2 Sensor 1)	A/F Sensor #21	0.02	mA
Catalyst temperature #1	Catalyst Temperature #11	—	°C
Catalyst temperature #2	Catalyst Temperature #21	—	°C
Monitoring test of misfire	Misfire monitoring (Enable)	YES	—
Monitoring test of misfire	Misfire monitoring (Comp)	NO	—
Monitoring test of fuel system	Fuel system monitoring (Enable)	YES	—
Monitoring test of fuel system	Fuel system monitoring (Comp)	NO	—
Monitoring test of comprehensive component	Component monitoring (Enable)	YES	—
Monitoring test of comprehensive component	Component monitoring (Comp)	NO	—
Test of catalyst	Catalyst Diagnosis (Enable)	YES	—
Test of catalyst	Catalyst Diagnosis (Comp)	NO	—
Test of heating-type catalyst	Heated catalyst (Enable)	N/A	—
Test of heating-type catalyst	Heated catalyst (Comp)	N/A	—
Test of evaporative emission purge control system	Evaporative purge system (Enable)	YES	—
Test of evaporative emission purge control system	Evaporative purge system (Comp)	NO	—
Secondary air system test	Secondary air system (Enable)	N/A	—
Secondary air system test	Secondary air system (Comp)	N/A	—

# Subaru Select Monitor

## ENGINE (DIAGNOSTICS)

Content	Display	Note (at idling)	Unit of measure
Test of air conditioning system refrigerant	A/C system refrigerant (Enable)	N/A	—
Test of air conditioning system refrigerant	A/C system refrigerant (Comp)	N/A	—
Test of oxygen sensor	Oxygen sensor (Enable)	YES	—
Test of oxygen sensor	Oxygen sensor (Comp)	NO	—
Test of oxygen sensor heater	O2 Heater Diagnosis (Enable)	YES	—
Test of oxygen sensor heater	O2 Heater Diagnosis (Comp)	NO	—
Test of EGR system	EGR system (Enable)	YES	—
Test of EGR system	EGR system (Comp)	NO	—
ECM power supply voltage	Control module voltage	13.789	V
Absolute load	Absolute Load Value	22	%
A/F target lambda	Target Equivalence Ratio	0.976	—
Relative throttle opening angle	Relative Throttle Pos.	2	%
Ambient temperature	Ambient Temperature	Ambient air temperature	°C
Absolute throttle opening angle 2	Absolute Throttle Pos.#2	32	%
Absolute accelerator opening angle 1	Accelerator Pedal Pos.#1	13	%
Absolute accelerator opening angle 2	Accelerator Pedal Pos.#2	13	%
Target throttle opening angle	Target Throt. Act. Cont.	0	%
Engine operating time while malfunction indicator light lit	Time while MIL lighted	—	min
Elapsed time after DTC clear	Time since DTC cleared	—	min
Type of fuel	Type of fuel	GAS	—
Relative acceleration opening angle	Relative Accelera. Pos.	0	%
Neutral condition	AT drive status	NEUT	—

### 4. READ FREEZE FRAME DATA FOR ENGINE (OBD MODE)

- 1) On «Main Menu» display, select {Each System Check}.
- 2) On «System Selection Menu» display, select {Engine Control System}.
- 3) Click the [OK] button after the information of engine type has been displayed.
- 4) On «Engine Diagnosis» display, select {OBD System}.
- 5) On «OBD Menu» display, select {Freeze Frame Data Display}.

#### NOTE:

- For detailed operation procedures, refer to “PC application help for Subaru Select Monitor”.
- A list of the support data is shown in the following table.

Contents	Display	Unit of measure
DTC of freeze frame data	Freeze frame data	—
Air fuel ratio control system for bank 1	Fuel system for Bank 1	—
Air fuel ratio control system for bank 2	Fuel system for Bank 2	—
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 (Bank 1)	Short term fuel trim B1	%
Long term fuel trim by front oxygen (A/F) sensor (Bank 1)	Long term fuel trim B1	%
Short term fuel trim by front oxygen (A/F) sensor (Bank 2)	Short term fuel trim B2	%
Long term fuel trim by front oxygen (A/F) sensor (Bank 2)	Long term fuel trim B2	%
Intake manifold absolute pressure signal	Mani. Absolute Pressure	mmHg, kPa, inHg or psig
Engine speed signal	Engine Speed	rpm
Vehicle speed signal	Vehicle Speed	km/h or MPH
Ignition timing adv. #1	Ignition timing adv. #1	°
Intake air temperature	Intake Air Temp.	°C or °F
Amount of intake air	Mass Air Flow	g/s

# Subaru Select Monitor

ENGINE (DIAGNOSTICS)

Contents	Display	Unit of measure
Throttle valve angle	Throttle Opening Angle	%
Oxygen sensor #12	Oxygen sensor #12	V
A/F correction value #12	Short term fuel trim #12	%
Oxygen sensor #22	Oxygen sensor #22	V
A/F correction value #22	Short term fuel trim #22	%
On-board diagnostic system	OBD System	—
Oxygen sensor #11	Oxygen sensor #11	—
Oxygen sensor #12	Oxygen sensor #12	—
Oxygen sensor #21	Oxygen sensor #21	—
Oxygen sensor #22	Oxygen sensor #22	—
Elapsed time after engine start	Time Since Engine Start	sec
Target EGR	Commanded EGR	%
EGR deviation	EGR Error	%
Evaporative purge	Commanded Evap Purge	%
Fuel level signal	Fuel Level	%
Fuel tank pressure signal	Fuel Tank Pressure	mmHg, kPa, inHg or psig
Atmospheric pressure	Atmosphere Pressure	mmHg, kPa, inHg or psig
ECM power supply voltage	Control module voltage	V
Absolute load	Absolute Load Value	%
A/F target lambda	Target Equivalence Ratio	—
Relative throttle opening angle	Relative Throttle Pos.	%
Ambient temperature	Ambient Temperature	°C or °F
Absolute throttle opening angle 2	Absolute Throttle Pos.#2	%
Absolute accelerator opening angle 1	Accelerator Pedal Pos.#1	%
Absolute accelerator opening angle 2	Accelerator Pedal Pos.#2	%
Target throttle opening angle	Target Throt. Act. Cont.	%
Neutral condition	AT drive status	—

## 5. V.I.N. REGISTRATION

- 1) On «Main Menu» display, select {Each System Check}.
- 2) On «System Selection Menu» display, select {Engine Control System}.
- 3) Click the [OK] button after the information of engine type has been displayed.
- 4) On «Engine Diagnosis» display, select {Entry VIN}.
- 5) Perform the procedures shown on the display screen.

# Read Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

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## 10. Read Diagnostic Trouble Code (DTC)

### A: OPERATION

#### 1. SUBARU SELECT MONITOR (NORMAL MODE)

- 1) On the «Main Menu», select {Each System Check}.
- 2) On the «System Selection Menu», select {Engine Control System}.
- 3) Click the [OK] key after the information regarding engine type has been displayed.
- 4) On the «Engine Diagnosis» display screen, select {Diagnostic Code(s) Display}.
- 5) On the «Diagnostic Trouble Code» screen, select {Temporary Diagnostic Code(s)} or {Memorized Diagnostic Code(s)}.

#### NOTE:

- For detailed operation procedure, refer to the “PC application help for Subaru Select Monitor”.
- For details concerning DTC, refer to “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN(H6DO)(diag)-84, List of Diagnostic Trouble Code (DTC).>

#### 2. SUBARU SELECT MONITOR (OBD MODE)

- 1) On the «Main Menu», select {Each System Check}.
- 2) On the «System Selection Menu», select {Engine Control System}.
- 3) Click the [OK] key after the information regarding engine type has been displayed.
- 4) On the «Engine Diagnosis» display screen, select the {OBD System}.
- 5) On the «OBD Menu» display screen, select the {Diagnostic Code(s) Display}.
- 6) Make sure DTC is shown on the screen.

#### NOTE:

- For detailed operation procedure, refer to the “PC application help for Subaru Select Monitor”.
- For details concerning DTC, refer to “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN(H6DO)(diag)-84, List of Diagnostic Trouble Code (DTC).>

#### 3. GENERAL SCAN TOOL

Refer to the data denoting emission-related powertrain DTC.

For details concerning DTC, refer to “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN(H6DO)(diag)-84, List of Diagnostic Trouble Code (DTC).>

#### NOTE:

Refer to the general scan tool manufacturer’s operation manual to access powertrain DTC (MODE \$03).

## 11. Inspection Mode

### A: PROCEDURE

Perform the diagnosis shown in the following DTC table.

When performing the diagnosis not listed in “List of Diagnostic Trouble Code (DTC)”, refer to the item on the drive cycle. <Ref. to EN(H6DO)(diag)-51, Drive Cycle.>

DTC	Item	Condition
P0011	Intake Camshaft Position - Timing Over-Advanced or System Performance (Bank 1)	—
P0014	Exhaust AVCS System 1 (Range/Performance)	—
P0016	Crankshaft Position - Camshaft Position Correlation (Bank1)	—
P0017	Crank and Cam Timing B System Failure (Bank 1)	—
P0018	Crankshaft Position - Camshaft Position Correlation (Bank2)	—
P0019	Crank and Cam Timing B System Failure (Bank 2)	—
P0021	Intake Camshaft Position - Timing Over-Advanced or System Performance (Bank 2)	—
P0024	Exhaust AVCS System 2 (Range/Performance)	—
P0031	HO2S Heater Control Circuit Low (Bank 1 Sensor 1)	—
P0032	HO2S Heater Control Circuit High (Bank 1 Sensor 1)	—
P0037	HO2S Heater Control Circuit Low (Bank 1 Sensor 2)	—
P0038	HO2S Heater Control Circuit High (Bank 1 Sensor 2)	—
P0051	HO2S Heater Control Circuit Low (Bank 2 Sensor 1)	—
P0052	HO2S Heater Control Circuit High (Bank 2 Sensor 1)	—
P0057	HO2S Heater Control Circuit Low (Bank 2 Sensor 2)	—
P0058	HO2S Heater Control Circuit High (Bank 2 Sensor 2)	—
P0102	Mass or Volume Air Flow Circuit Low Input	—
P0103	Mass or Volume Air Flow Circuit High Input	—
P0107	Manifold Absolute Pressure/Barometric Pressure Circuit Low Input	—
P0108	Manifold Absolute Pressure/Barometric Pressure Circuit High Input	—
P0112	Intake Air Temperature Sensor 1 Circuit Low	—
P0113	Intake Air Temperature Sensor 1 Circuit High	—
P0117	Engine Coolant Temperature Circuit Low	—
P0118	Engine Coolant Temperature Circuit High	—
P0122	Throttle/Pedal Position Sensor/Switch “A” Circuit Low	—
P0123	Throttle/Pedal Position Sensor/Switch “A” Circuit High	—
P0131	O2 Sensor Circuit Low Voltage (Bank 1 Sensor 1)	—
P0132	O2 Sensor Circuit High Voltage (Bank 1 Sensor 1)	—
P0137	O2 Sensor Circuit Low Voltage (Bank 1 Sensor 2)	—
P0138	O2 Sensor Circuit High Voltage (Bank 1 Sensor 2)	—
P0140	O2 Sensor Circuit No Activity Detected (Bank1 Sensor2)	—
P0151	O2 Sensor Circuit Low Voltage (Bank 2 Sensor 1)	—
P0152	O2 Sensor Circuit High Voltage (Bank 2 Sensor 1)	—
P0157	O2 Sensor Circuit Low Voltage (Bank 2 Sensor 2)	—
P0158	O2 Sensor Circuit High Voltage (Bank 2 Sensor 2)	—
P0160	O2 Sensor Circuit No Activity Detected (Bank2 Sensor2)	—
P0182	Fuel Temperature Sensor “A” Circuit Low Input	—
P0183	Fuel Temperature Sensor “A” Circuit High Input	—
P0197	Engine Oil Temperature Sensor Low	—
P0198	Engine Oil Temperature Sensor High	—
P0201	Injector #1	—
P0202	Injector #2	—
P0203	Injector #3	—
P0204	Injector #4	—

## Inspection Mode

### ENGINE (DIAGNOSTICS)

DTC	Item	Condition
P0205	Injector #5	—
P0206	Injector #6	—
P0222	Throttle/Pedal Position Sensor/Switch "B" Circuit Low	—
P0223	Throttle/Pedal Position Sensor/Switch "B" Circuit High	—
P0230	Fuel Pump Primary Circuit	—
P0327	Knock Sensor 1 Circuit Low (Bank 1 or Single Sensor)	—
P0328	Knock Sensor 1 Circuit High (Bank 1 or Single Sensor)	—
P0332	Knock Sensor 2 Circuit Low (Bank 2)	—
P0333	Knock Sensor 2 Circuit High (Bank 2)	—
P0335	Crankshaft Position Sensor "A" Circuit	—
P0336	Crankshaft Position Sensor "A" Circuit Range/Performance	—
P0340	Camshaft Position Sensor "A" Circuit (Bank 1 or Single Sensor)	—
P0345	Camshaft Position Sensor "A" Circuit (Bank 2)	—
P0351	Ignition Coil A Primary/Secondary Circuit	—
P0352	Ignition Coil B Primary/Secondary Circuit	—
P0353	Ignition Coil C Primary/Secondary Circuit	—
P0354	Ignition Coil D Primary/Secondary Circuit	—
P0355	Ignition Coil E Primary/Secondary Circuit	—
P0356	Ignition Coil F Primary/Secondary Circuit	—
P0365	Camshaft Position Sensor "B" Circuit (Bank 1)	—
P0390	Camshaft Position Sensor "B" Circuit (Bank 2)	—
P0447	Evaporative Emission Control System Vent Control Circuit Open	—
P0448	Evaporative Emission Control System Vent Control Circuit Shorted	—
P0452	Evaporative Emission Control System Pressure Sensor Low Input	—
P0453	Evaporative Emission Control System Pressure Sensor High Input	—
P0458	Evaporative Emission System Purge Control Valve Circuit Low	—
P0462	Fuel Level Sensor "A" Circuit Low	—
P0463	Fuel Level Sensor "A" Circuit High	—
P0500	Vehicle Speed Sensor "A"	—
P0512	Starter Request Circuit	—
P0513	Incorrect Immobilizer Key	—
P0604	Internal Control Module Random Access Memory (RAM) Error	—
P0605	Internal Control Module Read Only Memory (ROM) Error	—
P0607	Throttle Control System Circuit Range/Performance	—
P0638	Throttle Actuator Control Range/Performance (Bank 1)	—
P0700	Transmission Control System (MIL Request)	—
P1152	O2 Sensor Circuit Range/Performance (Low) (Bank1 Sensor1)	—
P1153	O2 Sensor Circuit Range/Performance (High) (Bank1 Sensor1)	—
P1154	O2 Sensor Circuit Range/Performance (Low) (Bank 2 Sensor 1)	—
P1155	O2 Sensor Circuit Range/Performance (High) (Bank 2 Sensor 1)	—
P1160	Return Spring Failure	—
P1518	Starter Switch Circuit Low Input	—
P1560	Back-Up Voltage Circuit Malfunction	—
P1570	Antenna	—
P1571	Reference Code Incompatibility	—
P1572	IMM Circuit Failure	—
P1574	Key Communication Failure	—
P1576	EGI Control Module EEPROM	—
P1577	IMM Control Module EEPROM	—
P1578	Meter Failure	—

# Inspection Mode

ENGINE (DIAGNOSTICS)

DTC	Item	Condition
P2088	Intake Camshaft Position Actuator Control Circuit Low (Bank 1)	—
P2089	Intake Camshaft Position Actuator Control Circuit High (Bank 1)	—
P2090	Exhaust Camshaft Position Actuator Control Circuit Low (Bank 1)	—
P2091	Exhaust Camshaft Position Actuator Control Circuit High (Bank 1)	—
P2092	Intake Camshaft Position Actuator Control Circuit Low (Bank 2)	—
P2093	Intake Camshaft Position Actuator Control Circuit High (Bank 2)	—
P2094	Exhaust Camshaft Position Actuator Control Circuit Low (Bank 2)	—
P2095	Exhaust Camshaft Position Actuator Control Circuit High (Bank 2)	—
P2101	Throttle Actuator Control Motor Circuit Range/Performance	—
P2102	Throttle Actuator Control Motor Circuit Low	—
P2103	Throttle Actuator Control Motor Circuit High	—
P2109	Throttle/Pedal Position Sensor "A" Minimum Stop Performance	—
P2122	Throttle/Pedal Position Sensor/Switch "D" Circuit Low Input	—
P2123	Throttle/Pedal Position Sensor/Switch "D" Circuit High Input	—
P2127	Throttle/Pedal Position Sensor/Switch "E" Circuit Low Input	—
P2128	Throttle/Pedal Position Sensor/Switch "E" Circuit High Input	—
P2135	Throttle/Pedal Position Sensor/Switch "A"/"B" Voltage Correlation	—
P2138	Throttle/Pedal Position Sensor/Switch "D"/"E" Voltage Correlation	—
P2227	Barometric Pressure Circuit Range/Performance	—
P2228	Barometric Pressure Circuit Low	—
P2229	Barometric Pressure Circuit High	—
U0073	CAN Failure, Bus 'Off' Detection	—
U0101	CAN (TCU) Data Not Loaded	—
U0122	CAN (VDC) Data Not Loaded	—
U0140	CAN (BCU) Data Not Loaded	—
U0402	CAN (TCU) Data Abnormal	—
U0416	CAN (VDC) Data Abnormal	—
U0422	CAN (BCU) Data Abnormal	—

# Inspection Mode

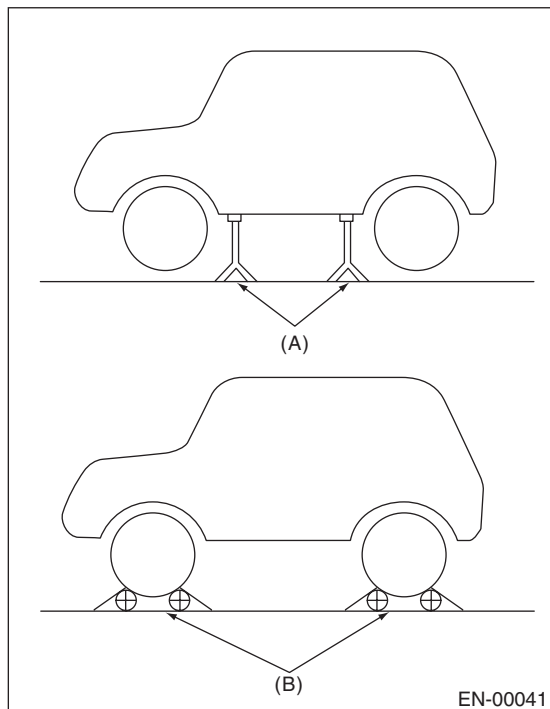
## ENGINE (DIAGNOSTICS)

### 1. PREPARATION FOR THE INSPECTION MODE

- 1) Check that the battery voltage is 12 V or more and fuel remains approx. half [20 — 40 ℓ (5.3 — 10.6 US gal, 4.4 — 8.8 Imp gal)].
- 2) Lift up the vehicle using a garage jack and place it on rigid racks, or drive the vehicle onto free rollers.

#### WARNING:

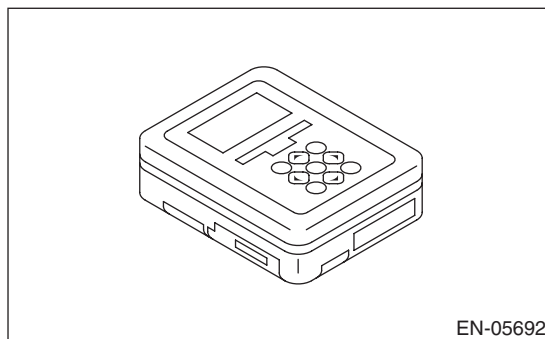
- Before lifting up the vehicle, ensure parking brake is applied.
- Do not use a pantograph jack in place of a rigid rack.
- Secure a rope or wire to the front or rear towing hooks to prevent the lateral runout of front wheels.
- Before rotating the wheels, make sure that there is no one in front of the vehicle. Besides while the wheels are rotating, make sure that no one approaches the vehicle front side.
- Make sure that there is nothing around the wheels. For AWD model, pay attention to all four wheels.
- While servicing, do not depress or release the clutch pedal or accelerator pedal quickly regardless of the engine speed. Quick operation may cause the vehicle to drop off the free roller.
- To prevent the vehicle from slipping due to vibration, do not place anything between rigid rack and the vehicle.



- (A) Rigid rack  
(B) Free roller

### 2. SUBARU SELECT MONITOR

- 1) Check that no DTC remains after clearing memory. <Ref. to EN(H6DO)(diag)-58, Clear Memory Mode.>
- 2) Warm up the engine.
- 3) Prepare the Subaru Select Monitor kit. <Ref. to EN(H6DO)(diag)-8, PREPARATION TOOL, General Description.>

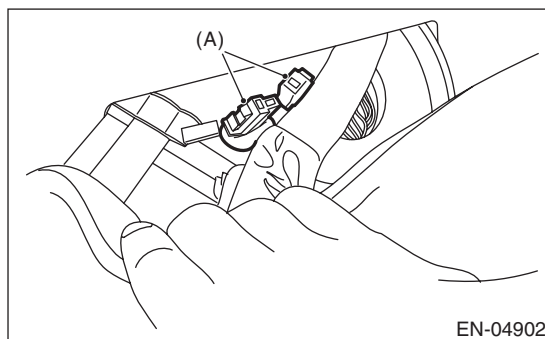


- 4) Prepare PC with Subaru Select Monitor installed.
- 5) Connect the USB cable to SDI (Subaru Diagnosis Interface) and USB port on the personal computer (dedicated port for the Subaru Select Monitor).

#### NOTE:

The dedicated port for the Subaru Select Monitor means the USB port which was used to install the Subaru Select Monitor.

- 6) Connect the diagnosis cable to SDI.
- 7) Connect the delivery (test) mode connector (A) located under the glove box.

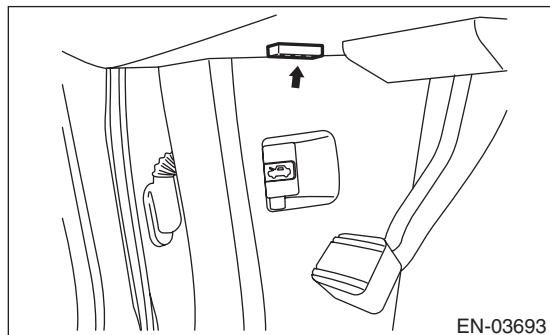




8) Connect SDI to data link connector located in the lower portion of the instrument panel (on the driver's side).

**CAUTION:**

**Do not connect the scan tools except for Subaru Select Monitor and general scan tool.**



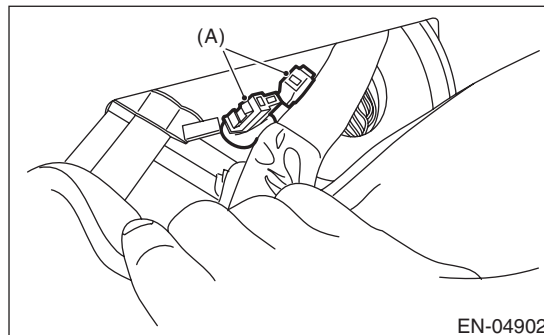
- 9) Start the PC.
- 10) Turn the ignition switch to ON (engine OFF) and run the "PC application for Subaru Select Monitor".
- 11) On «Main Menu» display, select {Each System Check}.
- 12) On «System Selection Menu» display, select {Engine Control System}.
- 13) Click the [OK] button after the information of engine type has been displayed.
- 14) On «Engine Diagnosis» display, select {Dealer Check Mode Procedure}.
- 15) When the «Perform Inspection (Dealer Check Mode?)» is shown on the screen, click the [Next] button.
- 16) Perform subsequent procedures as instructed on the display screen.
  - If trouble still remains in the memory, the corresponding DTC appears on the display screen.

**NOTE:**

- For detailed operation procedures, refer to "PC application help for Subaru Select Monitor".
- For details concerning DTC, refer to "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6DO)(diag)-84, List of Diagnostic Trouble Code (DTC).>
- Release the parking brake.
- The speed difference between front and rear wheels may illuminate the ABS warning light, but this does not indicate a malfunction. When engine control system diagnosis is finished, perform the VDC memory clearance procedure of self-diagnosis function. <Ref. to VDC(diag)-26, Clear Memory Mode.>

### 3. GENERAL SCAN TOOL

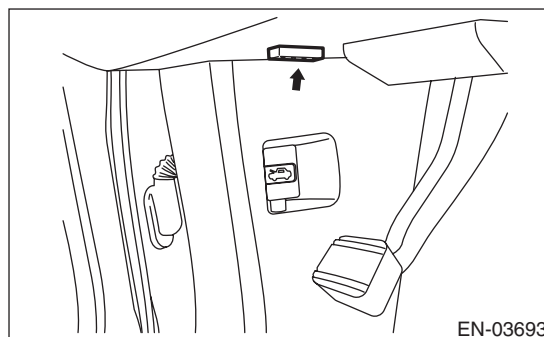
- 1) Check that no DTC remains after clearing memory. <Ref. to EN(H6DO)(diag)-58, Clear Memory Mode.>
- 2) Warm up the engine.
- 3) Connect the delivery (test) mode connector (A) located under the glove box.



4) Connect the general scan tool to data link connector located 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 general scan tool.**



5) Start the engine.

**NOTE:**

- Ensure the selector lever is placed in "P" range before starting.
- 6) Turn the neutral position switch to ON using selector lever.
  - 7) Depress the brake pedal to turn the brake switch ON.
  - 8) Keep the engine speed in 2,500 — 3,000 rpm range for 40 seconds.

## Inspection Mode

### ENGINE (DIAGNOSTICS)

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9) Shift the select lever in the “D” range and drive the vehicle at 5 to 10 km/h (3 to 6 MPH).

**NOTE:**

- For AWD model, release the parking brake.
- The speed difference between front and rear wheels may illuminate the ABS warning light, but this does not indicate a malfunction. When engine control system diagnosis is finished, perform the VDC memory clearance procedure of self-diagnosis function. <Ref. to VDC(diag)-26, Clear Memory Mode.>

10) Using the general scan tool, check for DTC and record the result(s).

**NOTE:**

- For detailed operation procedures, refer to the general scan tool operation manual.
  - For details concerning DTC, refer to “List of Diagnostic Trouble Code (DTC)”.
- <Ref. to EN(H6DO)(diag)-84, List of Diagnostic Trouble Code (DTC).>

## 12. Drive Cycle

### A: PROCEDURE

It is necessary to perform the drive cycle listed below if DTC is not found in the Inspection Mode. It is possible to complete diagnosis of the DTC by performing the indicated drive cycle. After the repair for the DTC, perform a necessary drive cycle and make sure the function recovers and the DTC is recorded.

#### 1. PREPARATION FOR DRIVE CYCLE

- 1) Check that the battery voltage is 12 V or more and fuel remains approx. half [20 — 40 ℓ (5.3 — 10.6 US gal, 4.4 — 8.8 Imp gal)].
- 2) After performing the diagnostics and Clear Memory Mode, check that no DTC remains. <Ref. to EN(H6DO)(diag)-58, Clear Memory Mode.>
- 3) Check the delivery (test) mode connector is disconnected.

#### NOTE:

- Perform the drive cycle after warming up the engine except when the engine coolant temperature at engine start is specified.
- Perform the drive cycle twice if the DTC in the list is marked with \*. After completing the first drive cycle, stop the engine and perform second diagnosis in same condition.

#### 2. DRIVE CYCLE A

DTC	Item	Condition
*P0125	Insufficient Coolant Temperature for Closed Loop Fuel Control	Engine coolant temperature at engine start is less than 20°C (68°F).
*P0126	Insufficient Engine Coolant Temperature for Stable Operation	—
*P0128	Coolant Thermostat (Engine Coolant Temperature Below Thermostat Regulating Temperature)	—
*P0141	O2 Sensor Heater Circuit (Bank1 Sensor2)	—
*P014C	O2 Sensor Slow Response - Rich to Lean (Bank 1 Sensor 1)	—
*P014D	O2 Sensor Slow Response - Lean to Rich (Bank 1 Sensor 1)	—
*P014E	O2 Sensor Slow Response - Rich to Lean (Bank 2 Sensor 1)	—
*P014F	O2 Sensor Slow Response - Lean to Rich (Bank 2 Sensor 1)	—
*P015A	O2 Sensor Delayed Response - Rich to Lean (Bank 1 Sensor 1)	—
*P015B	O2 Sensor Delayed Response - Lean to Rich (Bank 1 Sensor 1)	—
*P015C	O2 Sensor Delayed Response - Rich to Lean (Bank 2 Sensor 1)	—
*P015D	O2 Sensor Delayed Response - Lean to Rich (Bank 2 Sensor 1)	—
*P0161	O2 Sensor Heater Circuit (Bank2 Sensor2)	—
*P0171	System Too Lean (Bank 1)	Complete diagnosis with drive cycle B or C as well.
*P0172	System Too Rich (Bank 1)	Complete diagnosis with drive cycle B or C as well.
*P0174	System Too Lean (Bank 2)	Complete diagnosis with drive cycle B or C as well.
*P0175	System Too Rich (Bank 2)	Complete diagnosis with drive cycle B or C as well.
*P0196	Engine Oil Temperature Sensor Circuit Range/Performance	—
*P0301	Cylinder 1 Misfire Detected	Complete diagnosis with drive cycle B or C as well.
*P0302	Cylinder 2 Misfire Detected	Complete diagnosis with drive cycle B or C as well.
*P0303	Cylinder 3 Misfire Detected	Complete diagnosis with drive cycle B or C as well.
*P0304	Cylinder 4 Misfire Detected	Complete diagnosis with drive cycle B or C as well.

# Drive Cycle

## ENGINE (DIAGNOSTICS)

DTC	Item	Condition
*P0305	Cylinder 5 Misfire Detected	Complete diagnosis with drive cycle B or C as well.
*P0306	Cylinder 6 Misfire Detected	Complete diagnosis with drive cycle B or C as well.
*P0420	Catalyst System Efficiency Below Threshold (Bank 1)	—
*P0442	Evaporative Emission Control System Leak Detected (Small Leak)	Engine coolant temperature at engine start is less than 25°C (77°F).
*P0451	Evaporative Emission Control System Pressure Sensor	—
*P0456	Evaporative Emission Control System Leak Detected (Very Small Leak)	Engine coolant temperature at engine start is less than 25°C (77°F).
*P0457	Evaporative Emission Control System Leak Detected (Fuel Cap Loose/Off)	Engine coolant temperature at engine start is less than 25°C (77°F).
*P0464	Fuel Level Sensor Circuit Intermittent	—
P1443	Vent Control Solenoid Valve Function Problem	—
*P2096	Post Catalyst Fuel Trim System Too Lean (Bank 1)	Complete diagnosis with drive cycle B or C as well.
*P2097	Post Catalyst Fuel Trim System Too Rich (Bank 1)	Complete diagnosis with drive cycle B or C as well.
*P2098	Post Catalyst Fuel Trim System Too Lean Bank 2	Complete diagnosis with drive cycle B or C as well.
*P2099	Post Catalyst Fuel Trim System Too Rich Bank 2	Complete diagnosis with drive cycle B or C as well.

### Diagnostic procedure:

- 1) Drive for 20 minutes at a constant speed of 80 km/h (50 MPH).
- 2) Stop the vehicle and idle for one minute.

### 3. DRIVE CYCLE B

DTC	Item	Condition
*P0171	System Too Lean (Bank 1)	Complete diagnosis with drive cycle A or C as well.
*P0172	System Too Rich (Bank 1)	Complete diagnosis with drive cycle A or C as well.
*P0174	System Too Lean (Bank 2)	Complete diagnosis with drive cycle A or C as well.
*P0175	System Too Rich (Bank 2)	Complete diagnosis with drive cycle A or C as well.
*P0301	Cylinder 1 Misfire Detected	Complete diagnosis with drive cycle A or C as well.
*P0302	Cylinder 2 Misfire Detected	Complete diagnosis with drive cycle A or C as well.
*P0303	Cylinder 3 Misfire Detected	Complete diagnosis with drive cycle A or C as well.
*P0304	Cylinder 4 Misfire Detected	Complete diagnosis with drive cycle A or C as well.
*P0305	Cylinder 5 Misfire Detected	Complete diagnosis with drive cycle A or C as well.
*P0306	Cylinder 6 Misfire Detected	Complete diagnosis with drive cycle A or C as well.
*P0459	Evaporative Emission System Purge Control Valve Circuit High	—
*P0506	Idle Air Control System RPM Lower Than Expected	—
*P0507	Idle Air Control System RPM Higher Than Expected	—

# Drive Cycle

ENGINE (DIAGNOSTICS)

DTC	Item	Condition
*P2096	Post Catalyst Fuel Trim System Too Lean (Bank 1)	Complete diagnosis with drive cycle A or C as well.
*P2097	Post Catalyst Fuel Trim System Too Rich (Bank 1)	Complete diagnosis with drive cycle A or C as well.
*P2098	Post Catalyst Fuel Trim System Too Lean Bank 2	Complete diagnosis with drive cycle A or C as well.
*P2099	Post Catalyst Fuel Trim System Too Rich Bank 2	Complete diagnosis with drive cycle A or C as well.
*P219A	Bank 1 Air-Fuel Ratio Imbalance	Complete diagnosis with drive cycle C as well.
*P219B	Bank 2 Air-Fuel Ratio Imbalance	Complete diagnosis with drive cycle C as well.

## Diagnostic procedure:

- 1) Drive at 10 km/h (6 MPH) or more.
- 2) Stop the vehicle and idle for ten minutes.

## 4. DRIVE CYCLE C

DTC	Item	Condition
*P0030	HO2S Heater Control Circuit (Bank 1 Sensor 1)	—
*P0050	HO2S Heater Control Circuit (Bank 2 Sensor 1)	—
*P0068	MAP/MAF - Throttle Position Correlation	—
*P0101	Mass or Volume Air Flow Circuit Range/Performance	—
P0134	O2 Sensor Circuit No Activity Detected (Bank 1 Sensor 1)	—
*P013A	O2 Sensor Slow Response - Rich to Lean (Bank 1 Sensor 2)	—
*P013B	O2 Sensor Slow Response - Lean to Rich (Bank 1 Sensor 2)	—
*P013C	O2 Sensor Slow Response - Rich to Lean (Bank 2 Sensor 2)	—
*P013D	O2 Sensor Slow Response - Lean to Rich (Bank 2 Sensor 2)	—
*P013E	O2 Sensor Delayed Response - Rich to Lean (Bank 1 Sensor 2)	—
*P013F	O2 Sensor Delayed Response - Lean to Rich (Bank 1 Sensor 2)	—
*P014A	O2 Sensor Delayed Response - Rich to Lean (Bank 2 Sensor 2)	—
*P014B	O2 Sensor Delayed Response - Lean to Rich (Bank 2 Sensor 2)	—
P0154	O2 Sensor Circuit No Activity Detected (Bank 2 Sensor 1)	—
*P0171	System Too Lean (Bank 1)	Complete diagnosis with drive cycle A or B as well.
*P0172	System Too Rich (Bank 1)	Complete diagnosis with drive cycle A or B as well.
*P0174	System Too Lean (Bank 2)	Complete diagnosis with drive cycle A or B as well.
*P0175	System Too Rich (Bank 2)	Complete diagnosis with drive cycle A or B as well.
*P0301	Cylinder 1 Misfire Detected	Complete diagnosis with drive cycle A or B as well.
*P0302	Cylinder 2 Misfire Detected	Complete diagnosis with drive cycle A or B as well.
*P0303	Cylinder 3 Misfire Detected	Complete diagnosis with drive cycle A or B as well.
*P0304	Cylinder 4 Misfire Detected	Complete diagnosis with drive cycle A or B as well.
*P0305	Cylinder 5 Misfire Detected	Complete diagnosis with drive cycle A or B as well.
*P0306	Cylinder 6 Misfire Detected	Complete diagnosis with drive cycle A or B as well.
*P0400	Exhaust Gas Recirculation Flow	—

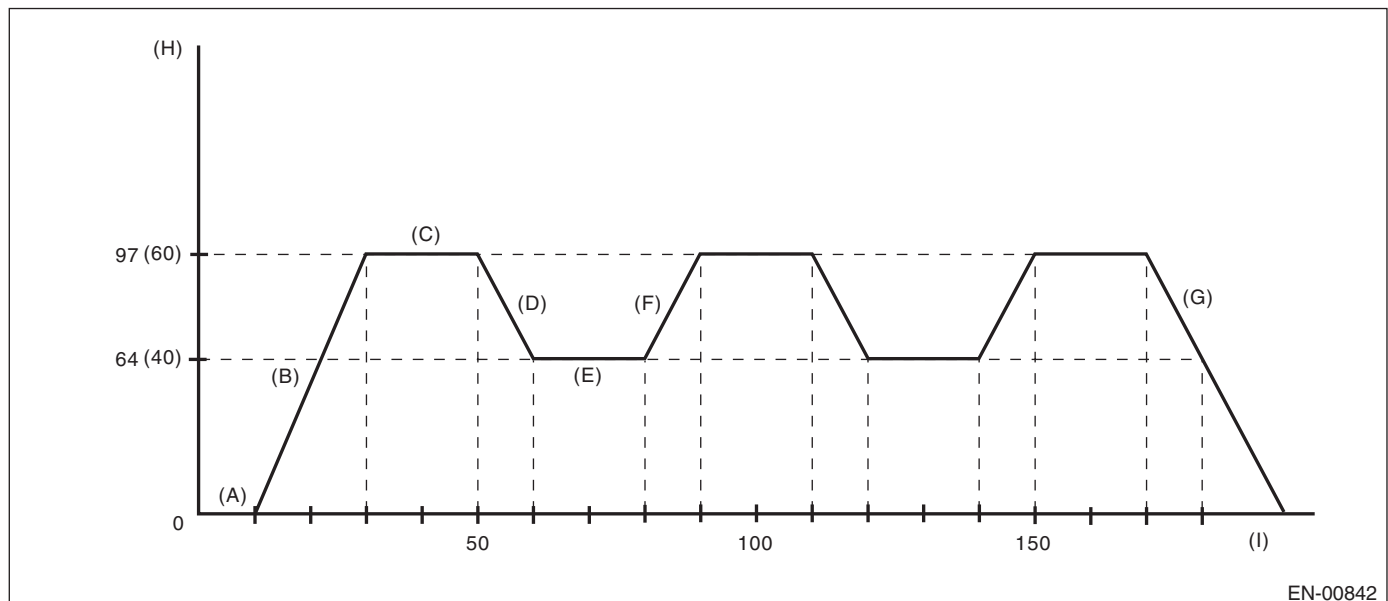
# Drive Cycle

## ENGINE (DIAGNOSTICS)

DTC	Item	Condition
P1492	EGR Solenoid Valve Signal #1 Circuit Malfunction (Low Input)	—
P1493	EGR Solenoid Valve Signal #1 Circuit Malfunction (High Input)	—
P1494	EGR Solenoid Valve Signal #2 Circuit Malfunction (Low Input)	—
P1495	EGR Solenoid Valve Signal #2 Circuit Malfunction (High Input)	—
P1496	EGR Solenoid Valve Signal #3 Circuit Malfunction (Low Input)	—
P1497	EGR Solenoid Valve Signal #3 Circuit Malfunction (High Input)	—
P1498	EGR Solenoid Valve Signal #4 Circuit Malfunction (Low Input)	—
P1499	EGR Solenoid Valve Signal #4 Circuit Malfunction (High Input)	—
*P2096	Post Catalyst Fuel Trim System Too Lean (Bank 1)	Complete diagnosis with drive cycle A or B as well.
*P2097	Post Catalyst Fuel Trim System Too Rich (Bank 1)	Complete diagnosis with drive cycle A or B as well.
*P2098	Post Catalyst Fuel Trim System Too Lean Bank 2	Complete diagnosis with drive cycle A or B as well.
*P2099	Post Catalyst Fuel Trim System Too Rich Bank 2	Complete diagnosis with drive cycle A or B as well.
*P219A	Bank 1 Air-Fuel Ratio Imbalance	Complete diagnosis with drive cycle B as well.
*P219B	Bank 2 Air-Fuel Ratio Imbalance	Complete diagnosis with drive cycle B as well.

### Diagnostic procedure:

Drive according to the drive pattern described below.



EN-00842

- |   |  |  |
|---|--|--|
| (A) Idle the engine for 10 seconds or more.               | (D) Decelerate with fully closed throttle to 64 km/h (40 MPH). | (G) Stop the vehicle with throttle fully closed. |
| (B) Accelerate to 97 km/h (60 MPH) within 20 seconds.     | (E) Drive the vehicle at 64 km/h (40 MPH) for 20 seconds.      | (H) Vehicle speed km/h (MPH)                     |
| (C) Drive the vehicle at 97 km/h (60 MPH) for 20 seconds. | (F) Accelerate to 97 km/h (60 MPH) within 10 seconds.          | (I) Sec.   |

## 5. DRIVE CYCLE D

DTC	Item	Condition
*P0181	Fuel Temperature Sensor "A" Circuit Range/Performance	—

**NOTE:**

In drive cycle D, one drive cycle will be established when both the drift diagnosis and stuck diagnosis have completed.

**Diagnostic procedure:**

**DRIFT DIAGNOSIS**

- 1) Make sure of the items below before starting the engine.
  - Engine coolant temperature is less than 30°C (86°F).
  - Remaining fuel is 10 ℓ (2.6 US gal, 2.2 Imp gal) or more.
  - Battery voltage is 10.9 V or more.
- 2) Idle the engine until engine coolant temperature is at least 10°C (18°F) higher than it was when engine started.
- 3) After the engine has reached the state of procedure 2), idle the engine for another 5 minutes or more.

**STUCK DIAGNOSIS**

- 1) Make sure that the battery voltage is 10.9 V or more.
- 2) Perform the Clear Memory Mode. <Ref. to EN(H6DO)(diag)-58, Clear Memory Mode.>
- 3) Drive for approximately 50 ℓ (13.2 US gal, 11 Imp gal) of fuel.

**NOTE:**

- It is acceptable to drive the vehicle intermittently.
- Do not disconnect the battery terminals during stuck diagnosis. (Data will be cleared by disconnecting the battery terminals.)

## 6. DRIVE CYCLE E

DTC	Item	Condition
*P0461	Fuel Level Sensor "A" Circuit Range/Performance	—

**Diagnostic procedure:**

- 1) Make sure that the battery voltage is 10.9 V or more.
- 2) Perform the Clear Memory Mode. <Ref. to EN(H6DO)(diag)-58, Clear Memory Mode.>
- 3) Drive for approximately 30 ℓ (7.9 US gal, 6.6 Imp gal) of fuel.

**NOTE:**

- It is acceptable to drive the vehicle intermittently.
- Do not disconnect the battery terminals while diagnosing. (Data will be cleared by disconnecting the battery terminals.)

## 7. DRIVE CYCLE F

DTC	Item	Condition
*P0111	Intake Air Temperature Sensor 1 Circuit Range/Performance	—

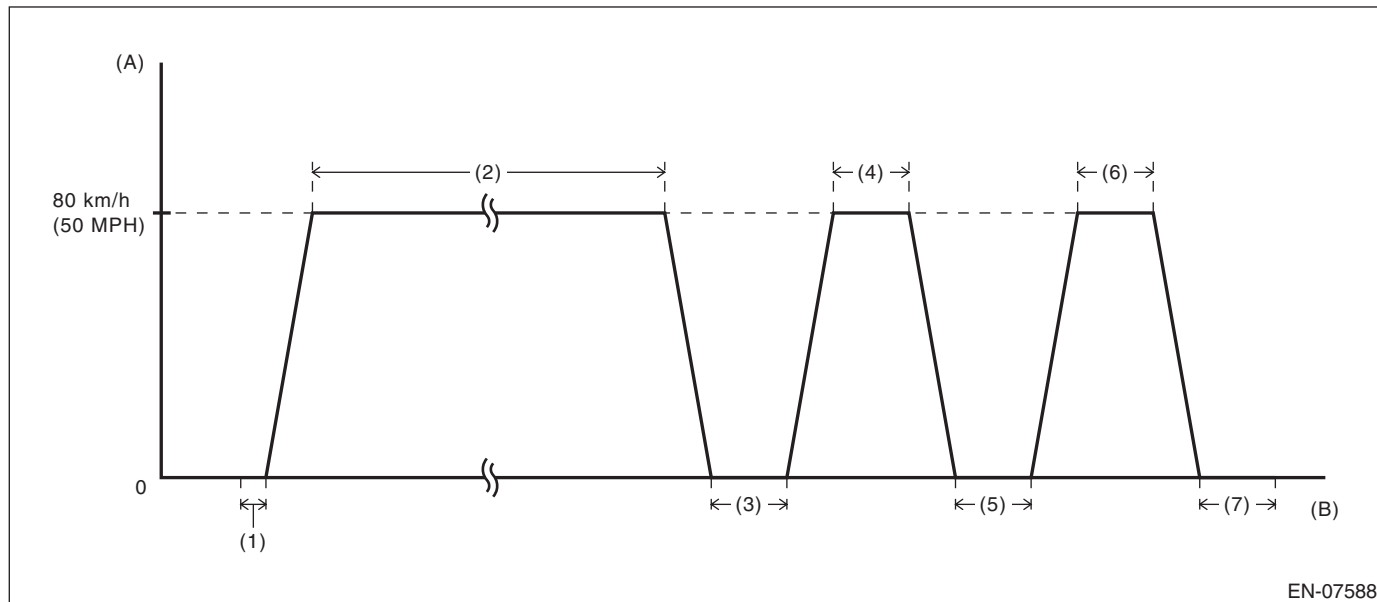
**Diagnostic procedure:**

- 1) Make sure that the engine coolant temperature is less than 30°C (86°F).

# Drive Cycle

## ENGINE (DIAGNOSTICS)

2) Drive according to the drive pattern described below.



(A) Vehicle speed

(B) Elapsed time

(1) Idle the engine for 10 seconds after engine start.

(4) Drive for 30 seconds at a constant speed of 80 km/h (50 MPH).

(6) Drive for 30 seconds at a constant speed of 80 km/h (50 MPH).

(2) Drive for 8 minutes at a constant speed of 80 km/h (50 MPH).

(5) Stop the vehicle and idle for 30 seconds.

(7) Stop the vehicle and idle for 30 seconds.

(3) Stop the vehicle and idle for 30 seconds.

### NOTE:

- There is no given transition time between idling and cruising.
- Driving at constant speed only on a downhill causes smaller engine load and may result in failure to obtain a right diagnostic result.
- When the engine stops while performing drive cycle F, perform it again from the state of procedure 1).

## 8. DRIVE CYCLE H

DTC	Item	Condition
*P050A	Cold Start Idle Air Control System Performance	—
*P050B	Cold Start Ignition Timing Performance	—

### Diagnostic procedure:

- 1) Perform the Clear Memory Mode. <Ref. to EN(H6DO)(diag)-58, Clear Memory Mode.>
- 2) With the ignition switch ON (engine OFF), read the engine coolant temperature, intake air temperature and fuel temperature. <Ref. to EN(H6DO)(diag)-37, READ CURRENT DATA FOR ENGINE (NORMAL MODE), OPERATION, Subaru Select Monitor.>
- 3) If the values from step 2) satisfy the following two conditions, idle the engine for one minute.

### Condition:

$$|\text{Engine coolant temperature} - \text{Intake air temperature}| \leq 5^{\circ}\text{C} (9^{\circ}\text{F})$$

$$|\text{Engine coolant temperature} - \text{Fuel temperature}| \leq 2^{\circ}\text{C} (3.6^{\circ}\text{F})$$

### NOTE:

- If the conditions are not satisfied, turn the ignition switch to OFF and wait until the parameters are satisfied.
- Hold the select lever in "P" range or "N" range at idling.



## 9. DRIVE CYCLE J

DTC	Item	Condition
P2610	ECM/PCM Internal Engine Off Timer Performance	—

- 1) Idle the engine for 15 minutes or more.
- 2) Turn the ignition switch to OFF.
- 3) After 6 hours passed from the start of step 2), read the temporary code using the Subaru Select Monitor.  
<Ref. to EN(H6DO)(diag)-44, OPERATION, Read Diagnostic Trouble Code (DTC).>

# Clear Memory Mode

ENGINE (DIAGNOSTICS)

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## 13. Clear Memory Mode

### A: OPERATION

#### 1. SUBARU SELECT MONITOR (NORMAL MODE)

- 1) On the «Main Menu», select {Each System Check}.
- 2) On the «System Selection Menu», select {Engine Control System}.
- 3) Select [OK] after the information of engine type has been displayed.
- 4) On the «Engine Diagnosis» display screen, select {Clear Memory}.
- 5) When the “Clear Memory?” is shown on the screen, click the [Yes] button.
- 6) When “Done” and “Turn ignition switch to OFF” are shown on the display screen, turn the ignition switch to OFF.

#### NOTE:

- Initial diagnosis of electronic throttle control is performed after memory clearance. Therefore, start the engine after 10 seconds or more have passed since turning the ignition switch to ON.
- For detailed operation procedure, refer to the “PC application help for Subaru Select Monitor”.

#### 2. SUBARU SELECT MONITOR (OBD MODE)

- 1) On the «Main Menu», select {Each System Check}.
- 2) On the «System Selection Menu», select {Engine Control System}.
- 3) Select [OK] after the information of engine type has been displayed.
- 4) On the «Engine Diagnosis» display screen, select the {OBD System}.
- 5) On the «OBD Menu» display screen, select the {Clear Diagnostic Code}.
- 6) When the “Clear Diagnostic Code?” is shown on the screen, click the [Yes] button.
- 7) When “Done” and “Turn ignition switch to OFF” are shown on the display screen, turn the ignition switch to OFF.

#### NOTE:

- Initial diagnosis of electronic throttle control is performed after memory clearance. Therefore, start the engine after 10 seconds or more have passed since turning the ignition switch to ON.
- For detailed operation procedure, refer to the “PC application help for Subaru Select Monitor”.

#### 3. GENERAL SCAN TOOL

For procedures clearing memory using the general scan tool, refer to the general scan tool operation manual.

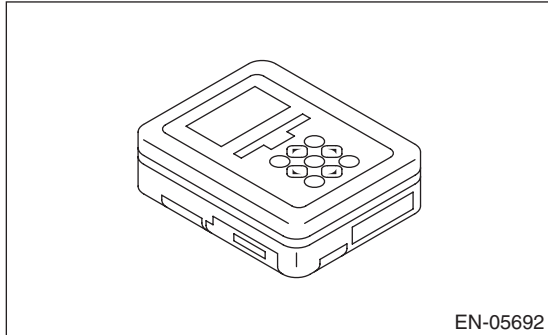
#### NOTE:

Initial diagnosis of electronic throttle control is performed after memory clearance. For this reason, start the engine after 10 seconds or more have elapsed since the ignition switch was turned to ON.

## 14. Compulsory Valve Operation Check Mode

### A: OPERATION

1) Prepare the Subaru Select Monitor kit. <Ref. to EN(H6DO)(diag)-8, PREPARATION TOOL, General Description.>



2) Prepare PC with Subaru Select Monitor installed.

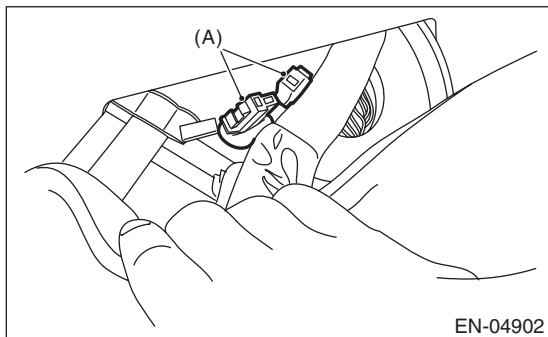
3) Connect the USB cable to SDI (Subaru Diagnosis Interface) and USB port on the personal computer (dedicated port for the Subaru Select Monitor).

#### NOTE:

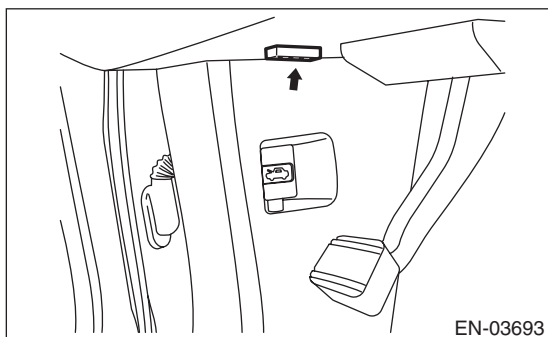
The dedicated port for the Subaru Select Monitor means the USB port which was used to install the Subaru Select Monitor.

4) Connect the diagnosis cable to SDI.

5) Connect the delivery (test) mode connector (A) located under the glove box.



6) Connect SDI to data link connector located 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 general scan tool.

7) Start the PC.

8) Turn the ignition switch to ON (engine OFF) and run the "PC application for Subaru Select Monitor".

9) On «Main Menu» display, select {Each System Check}.

10) On «System Selection Menu» display, select {Engine Control System}.

11) Click the [OK] button after the information of engine type has been displayed.

12) On «Engine Diagnosis» display, select {System Operation Check Mode}.

13) On «System Operation Check Mode» display, select {Actuator ON/OFF Operation}.

14) Select the actuator to be forcibly driven on the «Actuator ON/OFF Operation» display screen and click the [Next] button.

15) Clicking the [Finished] button completes the compulsory drive mode of actuator. The display will then return to the «Actuator ON/OFF Operation» screen.

#### NOTE:

For detailed operation procedures, refer to "PC application help for Subaru Select Monitor".

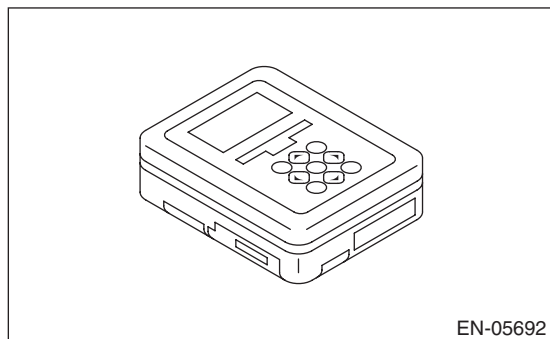
# System Operation Check Mode

ENGINE (DIAGNOSTICS)

## 15. System Operation Check Mode

### A: OPERATION

1) Prepare the Subaru Select Monitor kit. <Ref. to EN(H6DO)(diag)-8, PREPARATION TOOL, General Description.>



2) Prepare PC with Subaru Select Monitor installed.

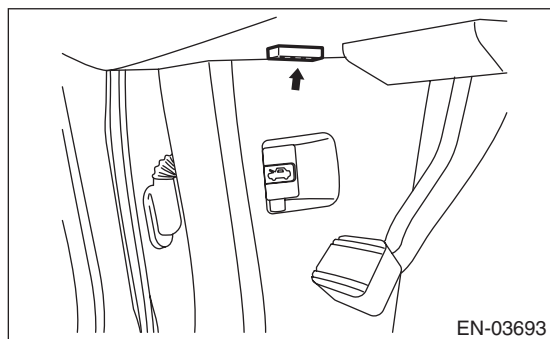
3) Connect the SDI (Subaru Diagnostic Interface) to the PC USB port (exclusively for Subaru Select Monitor) using a USB cable.

#### NOTE:

The dedicated port for the Subaru Select Monitor means the USB port which was used to install the Subaru Select Monitor.

4) Connect the diagnosis cable to SDI.

5) Connect the SDI to data link connector located 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 general scan tool.**

6) Start up the PC.

7) Turn the ignition switch to ON (engine OFF), and run the "Application for Subaru Select Monitor".

8) On the «Main Menu», select {Each System Check}.

9) On the «System Selection Menu», select {Engine Control System}.

10) Click the [OK] key after the information regarding engine type has been displayed.

11) Select {System Operation Check Mode} on the «Engine Diagnosis» display screen.

12) The following items are displayed on the monitor.

Display
Actuator ON/OFF Operation
Immobilizer System
Fuel Pump Control
Fixed Idle Ignition Timing
Idle Speed Control
Injector Control
EGR Valve Control

### 1. FUEL PUMP CONTROL (OFF OPERATION)

#### CAUTION:

**After executing the system operation check mode, execute the Clear Memory Mode. <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>**

1) On «System Operation Check Mode» display, select {Fuel Pump Control}.

2) On «Fuel Pump Control» display, select {OFF Drive}.

3) On «Start the Engine» display, start the engine and click the [OK] button.

4) On «OFF Drive» display, click the [Execution] button and execute the OFF drive.

5) Click the [Cancel] button to stop the OFF drive.

6) Click the [Exit] button to end the OFF drive. The screen will return to the «Fuel Pump Control» screen.

#### NOTE:

For detailed operation procedures, refer to "PC application help for Subaru Select Monitor".

### 2. FUEL PUMP CONTROL (ON/OFF OPERATION)

#### CAUTION:

**After executing the system operation check mode, execute the Clear Memory Mode. <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>**

1) On «System Operation Check Mode» display, select {Fuel Pump Control}.

2) On «Fuel Pump Control» display, select {ON/OFF Dr.}.

3) On «Turn Ignition Switch ON with Engine OFF» display, turn the ignition switch to ON and click the [OK] button.

4) On «ON/OFF Dr.» display, click the [Execution] button and execute the ON/OFF drive.

5) Click the [Cancel] button to stop the ON/OFF drive.

6) Click the [F12] Exit] button to end the ON/OFF drive. The screen will return to the «Fuel Pump Control» screen.

**NOTE:**

For detailed operation procedures, refer to “PC application help for Subaru Select Monitor”.

### 3. IDLING IGNITION TIMING FIXED

**CAUTION:**

**After executing the system operation check mode, execute the Clear Memory Mode. <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>**

- 1) On «System Operation Check Mode» display, select {Fixed Idle Ignition Timing}.
- 2) On «Start the Engine» display, start the engine and click the [OK] button.
- 3) On «Fixed Idle Ignition Timing» display, click the [Execution] button and execute the idling ignition timing fixed.
- 4) Click the [Cancel] button to stop the idling ignition timing fixed.
- 5) Click the [F12] Exit] button to end the idle ignition timing fixed. The screen will return to the «System Operation Check Mode» screen.

**NOTE:**

For detailed operation procedures, refer to “PC application help for Subaru Select Monitor”.

### 4. IDLE SPEED CONTROL

**CAUTION:**

**After executing the system operation check mode, execute the Clear Memory Mode. <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>**

- 1) On «System Operation Check Mode» display, select {Idle Speed Control}.
- 2) On «Start the Engine» display, start the engine and click the [OK] button.
- 3) In the «Idle Speed Control» display, click the [△] button or the [▽] button to change the setting values, then click the [OK] button.  
Setting is possible in a range between 500 rpm — 2,000 rpm, in increments of 50 rpm. However, the engine speed that can actually be controlled will vary depending on the vehicle.
- 4) Click the [Cancel] button to stop the idle speed control.
- 5) Click the [F12] Exit] button to end the idle speed control. The screen will return to the «System Operation Check Mode» screen.

**NOTE:**

For detailed operation procedures, refer to “PC application help for Subaru Select Monitor”.

### 5. INJECTOR CONTROL (INJECTION STOP MODE)

**CAUTION:**

**After executing the system operation check mode, execute the Clear Memory Mode. <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>**

- 1) On «System Operation Check Mode» display, select {Injector Control}.
- 2) On «Injector Control» display, select {Injection Stop Mode}.
- 3) On «Injection Stop Mode» display, select the fuel injector to be stopped.
- 4) On «Start the Engine» display, start the engine and click the [OK] button.
- 5) On «Fuel Injector #» display, click the [Execution] button and execute the injection stop mode.
- 6) Click the [Cancel] button to stop the injection stop mode.
- 7) Click the [F12] Exit] button to return the «Injection Stop Mode» display screen.
- 8) On «Injection Stop Mode» display, click the [Return] button to end the «Injection Stop Mode». The screen will return to the «Injector Control» screen.

**NOTE:**

For detailed operation procedures, refer to “PC application help for Subaru Select Monitor”.

### 6. INJECTOR CONTROL (INJECTION QUANTITY CONTROL)

**CAUTION:**

**After executing the system operation check mode, execute the Clear Memory Mode. <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>**

- 1) On «System Operation Check Mode» display, select {Injector Control}.
- 2) On «Injector Control» display, select {Injection Quantity Control}.
- 3) On «Start the Engine» display, start the engine and click the [OK] button.
- 4) In the «Injection Quantity Control» display, click the [△] button or the [▽] button to change the setting values, then click the [OK] button.  
Setting is possible in a range between 0 — 20%, in increments of 1%.
- 5) Click the [Cancel] button to stop the injection quantity control.
- 6) Click the [F12] Exit] button to end the injection quantity control. The screen will return to the «Injector Control» screen.

**NOTE:**

For detailed operation procedures, refer to “PC application help for Subaru Select Monitor”.

# System Operation Check Mode

ENGINE (DIAGNOSTICS)

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## 7. EGR VALVE CONTROL

### CAUTION:

**After executing the system operation check mode, execute the Clear Memory Mode. <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>**

1) On «System Operation Check Mode» display, select {EGR Valve Control}.

2) On «Start the Engine» display, start the engine and click the [OK] button.

3) In the «EGR Valve Control» display, click the [△] button or the [▽] button to change the setting values, then click the [OK] button.

Setting is possible in increments of 1 STEP. However, the STEP number that can actually be controlled will vary depending on the vehicle.

4) Click the [Cancel] button to stop the EGR valve control.

5) Click the [Exit] button to end the EGR valve control. The screen will return to the «System Operation Check Mode» screen.

### NOTE:

For detailed operation procedures, refer to “PC application help for Subaru Select Monitor”.

## 16. Malfunction Indicator Light

### A: PROCEDURE

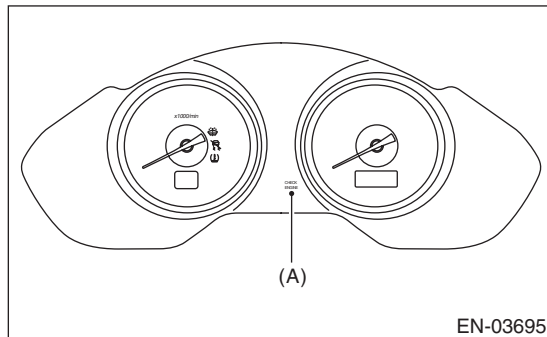
1. Activation of malfunction indicator light. <Ref. to EN(H6DO)(diag)-63, ACTIVATION OF MALFUNCTION INDICATOR LIGHT, Malfunction Indicator Light.>
↓
2. Malfunction indicator light does not come on. <Ref. to EN(H6DO)(diag)-65, MALFUNCTION INDICATOR LIGHT DOES NOT COME ON, Malfunction Indicator Light.>
↓
3. Malfunction indicator light does not go off. <Ref. to EN(H6DO)(diag)-65, MALFUNCTION INDICATOR LIGHT DOES NOT GO OFF, Malfunction Indicator Light.>
↓
4. Malfunction indicator light does not blink. <Ref. to EN(H6DO)(diag)-66, MALFUNCTION INDICATOR LIGHT DOES NOT BLINK, Malfunction Indicator Light.>
↓
5. Malfunction indicator light remains blinking. <Ref. to EN(H6DO)(diag)-68, MALFUNCTION INDICATOR LIGHT REMAINS BLINKING, Malfunction Indicator Light.>

### B: ACTIVATION OF MALFUNCTION INDICATOR LIGHT

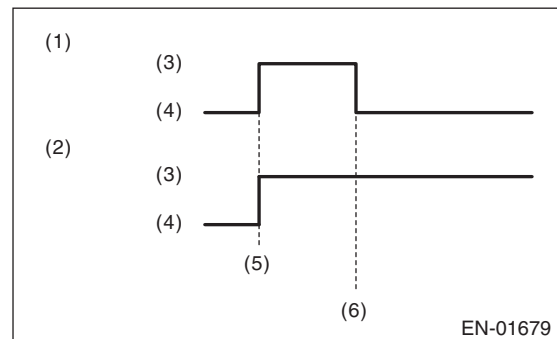
1) When the ignition switch is turned to ON (engine OFF), the malfunction indicator light (A) in the combination meter illuminates.

**NOTE:**

If the malfunction indicator light does not illuminate, perform diagnostics of the malfunction indicator light circuit or the combination meter circuit. <Ref. to EN(H6DO)(diag)-65, MALFUNCTION INDICATOR LIGHT DOES NOT COME ON, Malfunction Indicator Light.>



2) After starting the engine, the malfunction indicator light goes out. If it does not go off, any of the engine and emission control system has malfunction.

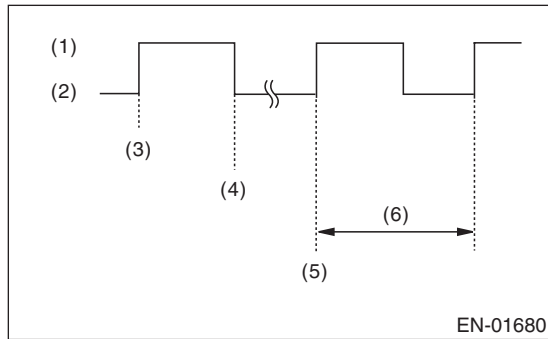


- (1) No faulty
- (2) Trouble occurs
- (3) ON
- (4) OFF
- (5) Ignition switch ON
- (6) Engine start

# Malfunction Indicator Light

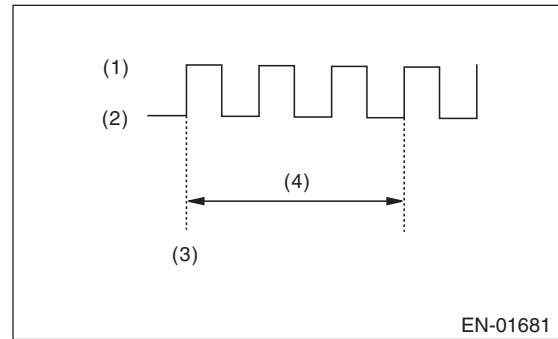
## ENGINE (DIAGNOSTICS)

3) If the diagnostic system detects a misfire which could damage the catalyst, the malfunction indicator light will blink at a cycle of 1 Hz.



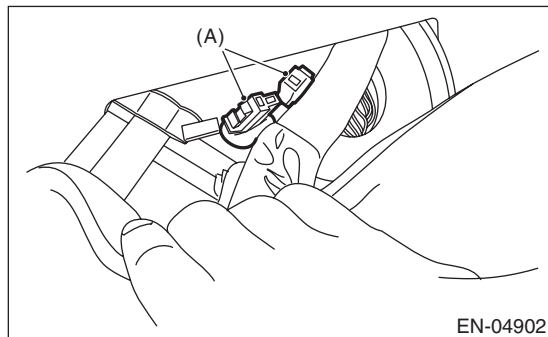
- (1) ON
- (2) OFF
- (3) Ignition switch ON
- (4) Engine start
- (5) Misfire start
- (6) 1 second

(3) Malfunction indicator light blinks at a cycle of 3 Hz after diagnosis if there is no trouble. Malfunction indicator light illuminates if faulty.



- (1) ON
- (2) OFF
- (3) Ignition switch ON
- (4) 1 seconds

4) Turn the ignition switch to OFF and connect the delivery (test) mode connector (A) located under the glove box.



- (1) When the ignition switch is turned to ON (engine OFF), the malfunction indicator light illuminates.
- (2) After the engine starts, malfunction indicator light blinks in a cycle of 0.5 Hz. (During diagnosis)



# Malfunction Indicator Light

ENGINE (DIAGNOSTICS)

## C: MALFUNCTION INDICATOR LIGHT DOES NOT COME ON

### TROUBLE SYMPTOM:

When the ignition switch is turned to ON (engine OFF), malfunction indicator light does not illuminate.

Step	Check	Yes	No
1 <b>CHECK DTC.</b>	Is DTC of LAN system displayed? <Ref. to LAN(diag)-27, OPERATION, Read Diagnostic Trouble Code (DTC).>	Check the appropriate DTC using the "List of Diagnostic Trouble Code (DTC)". <Ref. to LAN(diag)-31, List of Diagnostic Trouble Code (DTC).>	Replace the meter case assembly of combination meter. <Ref. to IDI-11, Combination Meter.>

## D: MALFUNCTION INDICATOR LIGHT DOES NOT GO OFF

### TROUBLE SYMPTOM:

Although malfunction indicator light comes on when the engine runs, DTC is not shown on the Subaru Select Monitor or general scan tool display.

Step	Check	Yes	No
1 <b>CHECK DTC.</b>	Is DTC of engine or LAN system displayed? <Ref. to EN(H6DO)(diag)-44, OPERATION, Read Diagnostic Trouble Code (DTC).>	Check the appropriate DTC using the "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6DO)(diag)-84, List of Diagnostic Trouble Code (DTC).> <Ref. to LAN(diag)-31, List of Diagnostic Trouble Code (DTC).>	Go to step 2.
2 <b>CHECK COMBINATION METER.</b> Perform the self-diagnosis for combination meter system. <Ref. to IDI-4, SELF-DIAGNOSIS, INSPECTION, Combination Meter System.>	Does the malfunction indicator light illuminate and go off normally?	Replace the ECM. <Ref. to FU(H6DO)-52, Engine Control Module (ECM).>	Replace the meter case assembly of combination meter. <Ref. to IDI-11, Combination Meter.>

# Malfunction Indicator Light

ENGINE (DIAGNOSTICS)

## E: MALFUNCTION INDICATOR LIGHT DOES NOT BLINK

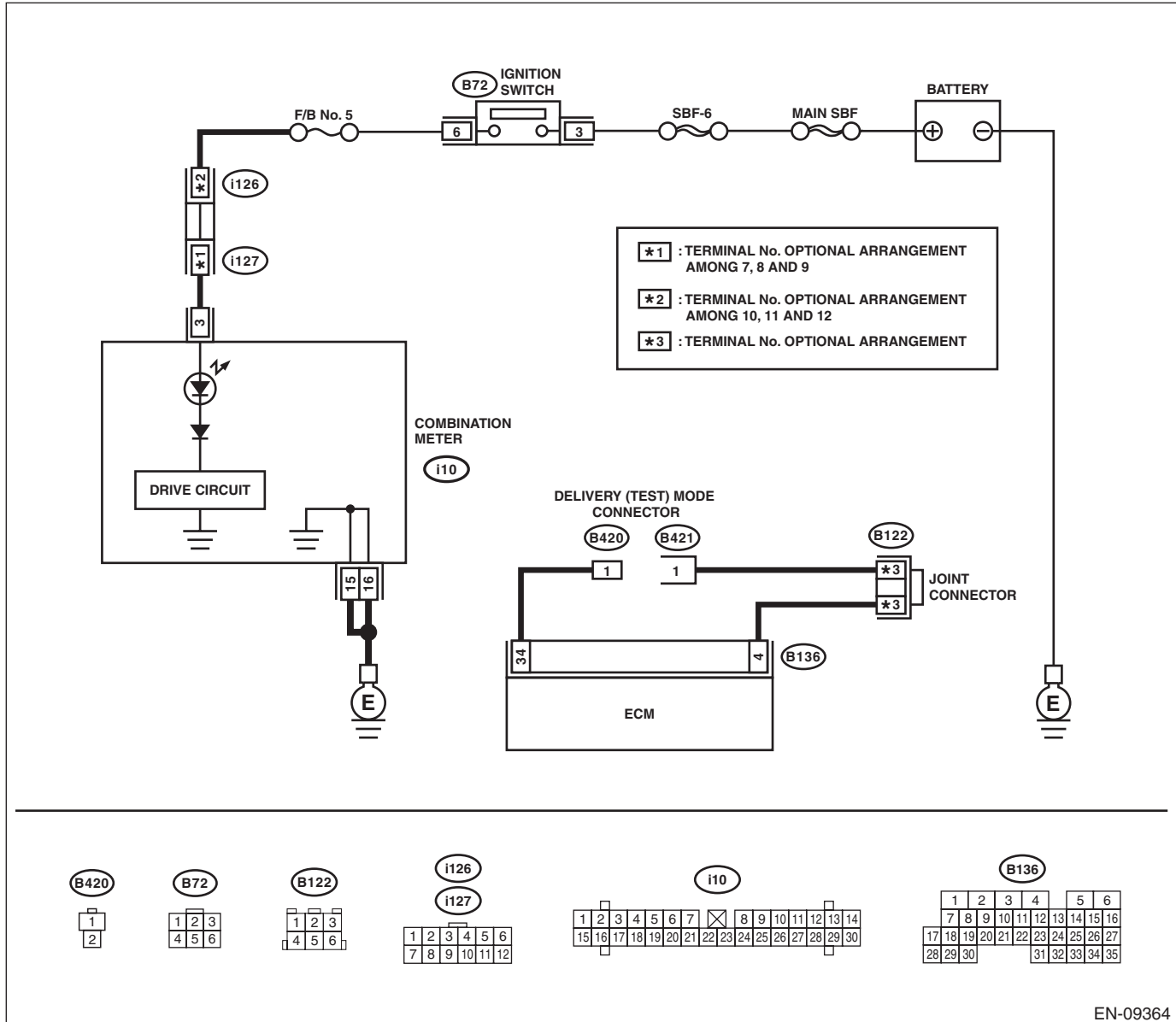
### DIAGNOSIS:

- The malfunction indicator light circuit is open or shorted.
- The delivery (test) mode connector circuit is open.

### TROUBLE SYMPTOM:

Malfunction indicator light does not blink during Inspection Mode.

### WIRING DIAGRAM:



EN-09364

# Malfunction Indicator Light

ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<b>1 CHECK STATUS OF MALFUNCTION INDICATOR LIGHT.</b> 1) Turn the ignition switch to OFF. 2) Check the delivery (test) mode connector is disconnected. 3) Turn the ignition switch to ON. (engine OFF)	Does the malfunction indicator light illuminate?	Go to step 2.	Repair the malfunction indicator light circuit. <Ref. to EN(H6DO)(diag)-65, MALFUNCTION INDICATOR LIGHT DOES NOT COME ON, Malfunction Indicator Light.>
<b>2 CHECK HARNESS BETWEEN ECM AND DELIVERY (TEST) MODE CONNECTOR.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Connect the delivery (test) mode connector. 4) Measure the resistance of harness between ECM connectors. <b>Connector &amp; terminal</b> <b>(B136) No. 34 — (B136) No. 4:</b>	Is the resistance less than 1 Ω?	Go to step 3.	Repair the harness and connector. NOTE: In this case, repair the following item: <ul style="list-style-type: none"> <li>• Open circuit in harness between ECM connector</li> <li>• Poor contact of each connector between ECM connector</li> </ul>
<b>3 CHECK FOR POOR CONTACT.</b> Check for poor contact of ECM connector.	Is there poor contact of ECM connector?	Repair the poor contact of ECM connector.	Replace the ECM. <Ref. to FU(H6DO)-52, Engine Control Module (ECM).>

# Malfunction Indicator Light

ENGINE (DIAGNOSTICS)

## F: MALFUNCTION INDICATOR LIGHT REMAINS BLINKING

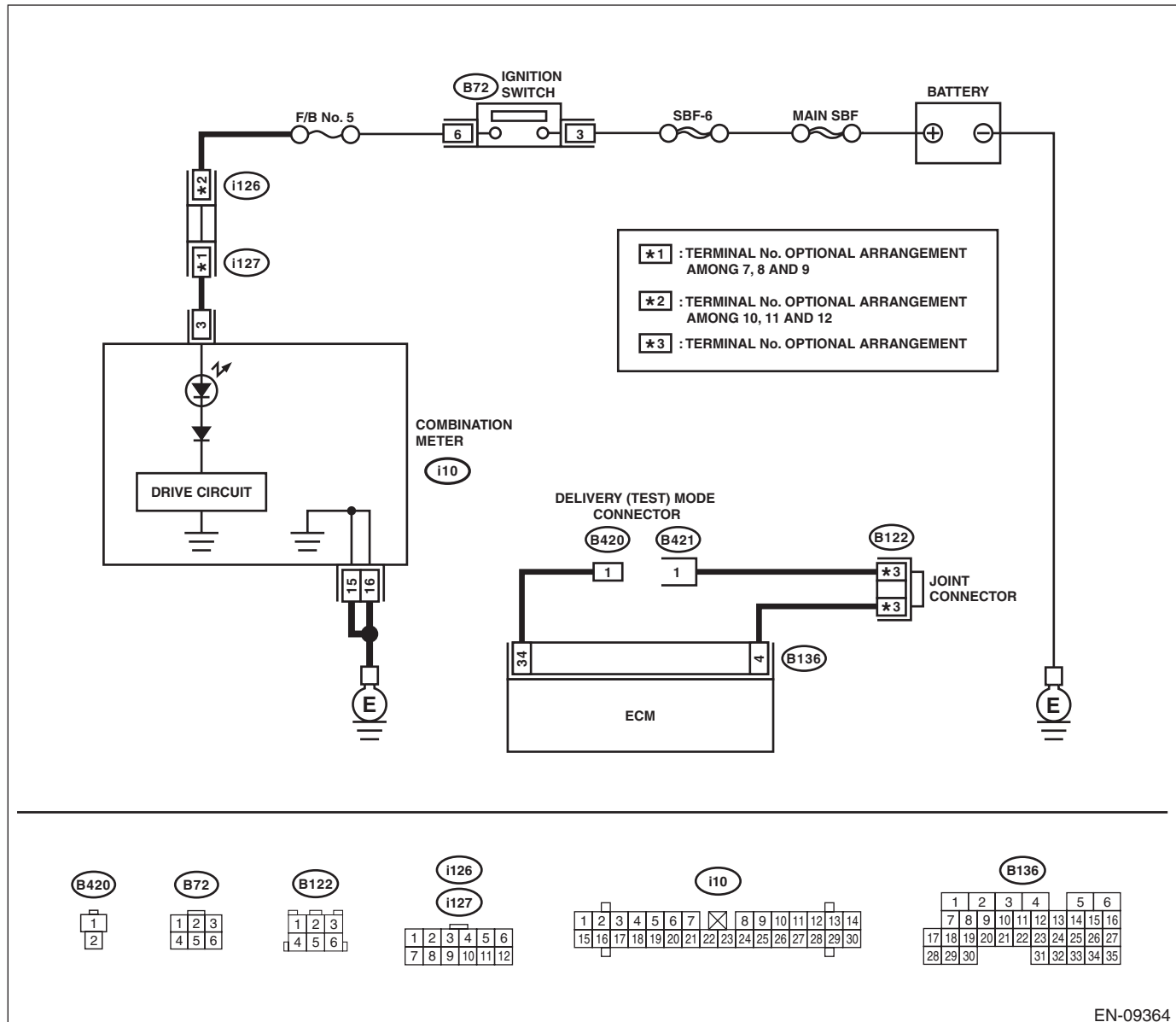
### DIAGNOSIS:

The delivery (test) mode connector circuit is short-circuited to ground.

### TROUBLE SYMPTOM:

Malfunction indicator light blinks when delivery (test) mode connector is not connected.

### WIRING DIAGRAM:



EN-09364

Step	Check	Yes	No
<b>1 CHECK DELIVERY (TEST) MODE CONNECTOR.</b> 1) Check the delivery (test) mode connector is disconnected. 2) Turn the ignition switch to ON.	Does the malfunction indicator light blink?	Go to step 2.	System is normal. NOTE: Malfunction indicator light blinks at a cycle of 3 Hz when delivery (test) mode connector is connected.

# Malfunction Indicator Light

ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<b>2</b> <b>CHECK HARNESS BETWEEN ECM AND CHASSIS GROUND.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance between ECM and chassis ground. <b>Connector &amp; terminal</b> <b>(B136) No. 34 — Chassis ground:</b>	Is the resistance 1 M $\Omega$ or more?	Replace the ECM. <Ref. to FU(H6DO)-52, Engine Control Module (ECM).>	Repair the short circuit to ground in harness between ECM and delivery (test) mode connector.

# Diagnostics for Engine Starting Failure

ENGINE (DIAGNOSTICS)

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## 17. Diagnostics for Engine Starting Failure

### A: PROCEDURE

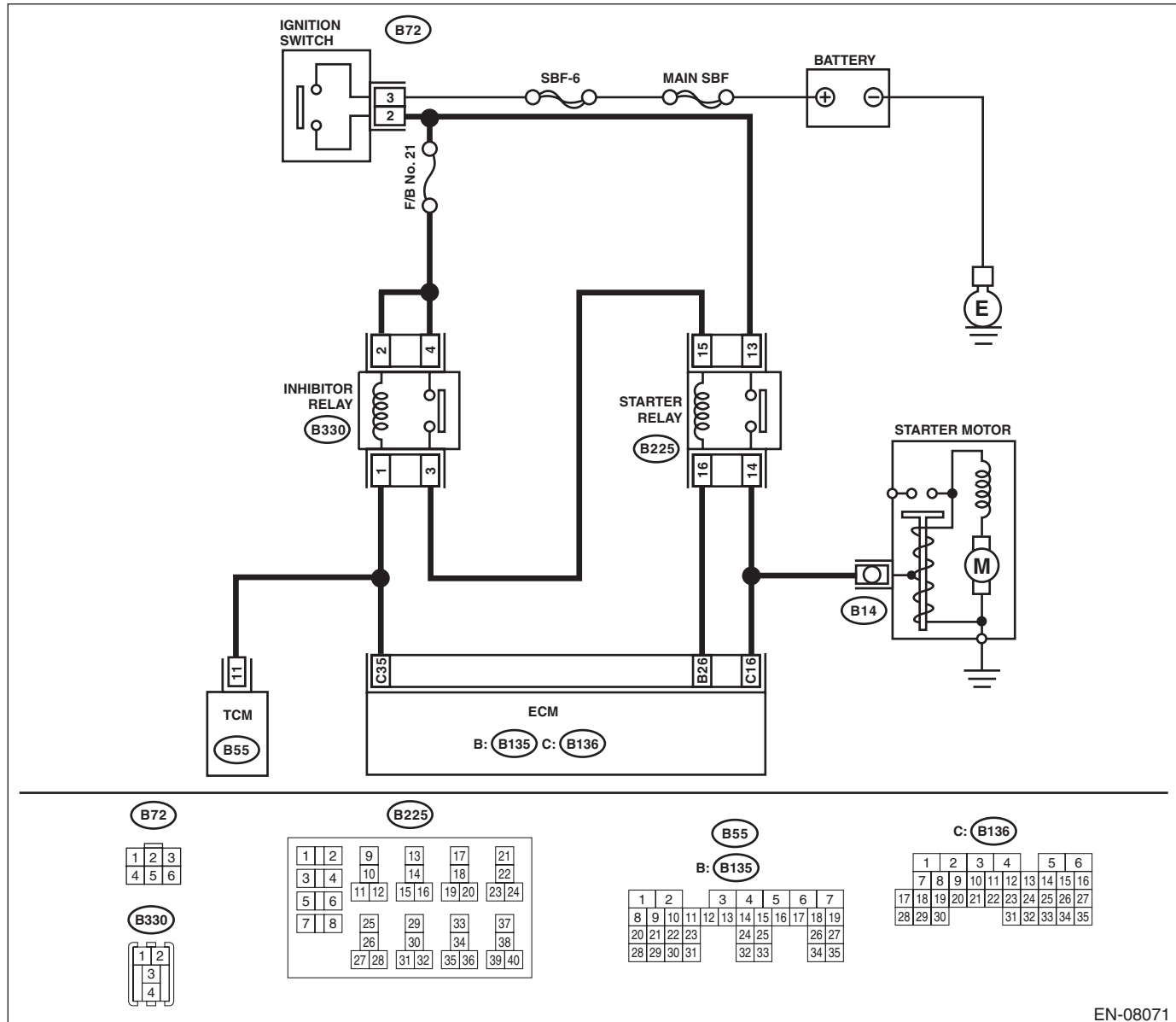
1. Check of the fuel amount
↓
2. Inspection of starter motor circuit. <Ref. to EN(H6DO)(diag)-71, STARTER MOTOR CIRCUIT, Diagnostics for Engine Starting Failure.>
↓
3. Inspection of ECM power supply and ground line. <Ref. to EN(H6DO)(diag)-75, CHECK POWER SUPPLY AND GROUND LINE OF ENGINE CONTROL MODULE (ECM), Diagnostics for Engine Starting Failure.>
↓
4. Inspection of ignition control system. <Ref. to EN(H6DO)(diag)-77, IGNITION CONTROL SYSTEM, Diagnostics for Engine Starting Failure.>
↓
5. Inspection of fuel pump circuit. <Ref. to EN(H6DO)(diag)-79, FUEL PUMP CIRCUIT, Diagnostics for Engine Starting Failure.>
↓
6. Inspection of fuel injector circuit. <Ref. to EN(H6DO)(diag)-80, FUEL INJECTOR CIRCUIT, Diagnostics for Engine Starting Failure.>

## B: STARTER MOTOR CIRCUIT

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

### WIRING DIAGRAM:



EN-08071

Step	Check	Yes	No
1	<b>CHECK BATTERY.</b> Check the battery voltage.	Go to step 2.	Charge or replace the battery.
2	<b>CHECK OPERATION OF STARTER MOTOR.</b>	Go to step 3.	Go to step 4.

# Diagnostics for Engine Starting Failure

## ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<b>3</b> <b>CHECK DTC.</b>	Is DTC displayed? <Ref. to EN(H6DO)(diag)-44, OPERATION, Read Diagnostic Trouble Code (DTC).>	Check the appropriate DTC using the "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6DO)(diag)-84, List of Diagnostic Trouble Code (DTC).>	The circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again. NOTE: In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.
<b>4</b> <b>CHECK INPUT SIGNAL FOR STARTER MOTOR.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connector from starter motor. 3) Place the select lever in "P" range or "N" range. 4) Turn the ignition switch to START. 5) Measure the voltage between the starter motor connector and the engine ground. <b>Connector &amp; terminal</b> <b>(B14) No. 1 (+) — Engine ground (-):</b>	Is the voltage 10 V or more?	Check the starter motor. <Ref. to SC(H6DO)-6, Starter.>	Go to step 5.
<b>5</b> <b>CHECK INPUT SIGNAL FOR STARTER MOTOR.</b> 1) Place the select lever in "P" range or "N" range. 2) Turn the ignition switch to START. 3) Measure the voltage between starter relay connector and chassis ground. <b>Connector &amp; terminal</b> <b>(B225) No. 14 (+) — Chassis ground (-):</b>	Is the voltage 10 V or more?	Repair the open circuit of the harness between starter relay connector and starter motor.	Go to step 6.
<b>6</b> <b>CHECK HARNESS BETWEEN BATTERY AND IGNITION SWITCH CONNECTOR.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ignition switch. 3) Measure the voltage between ignition switch connector and chassis ground. <b>Connector &amp; terminal</b> <b>(B72) No. 3 (+) — Chassis ground (-):</b>	Is the voltage 10 V or more?	Go to step 7.	Repair the power supply circuit.
<b>7</b> <b>CHECK IGNITION SWITCH.</b> Measure the resistance between ignition switch terminals after turning the ignition switch to START position. <b>Terminals</b> <b>No. 2 — No. 3:</b>	Is the resistance less than 1 $\Omega$ ?	Go to step 8.	Replace the ignition switch. <Ref. to SL-41, REPLACEMENT, Ignition Key Lock.>



# Diagnostics for Engine Starting Failure

ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<p><b>8 CHECK INPUT VOLTAGE OF STARTER RELAY.</b></p> <ol style="list-style-type: none"> <li>1) Remove the starter relay.</li> <li>2) Connect the connector to ignition switch.</li> <li>3) Turn the ignition switch to START.</li> <li>4) Measure the voltage between starter relay connector and chassis ground.</li> </ol> <p><b>Connector &amp; terminal</b> <b>(B225) No. 13 (+) — Chassis ground (-):</b></p>	Is the voltage 10 V or more?	Go to step 9.	Repair the open circuit of harness between starter relay connector and ignition switch connector.
<p><b>9 CHECK STARTER RELAY.</b></p> <ol style="list-style-type: none"> <li>1) Connect the battery to starter relay terminals No. 15 and No. 16.</li> <li>2) Measure the resistance between starter relay terminals.</li> </ol> <p><b>Terminals</b> <b>No. 13 — No. 14:</b></p>	Is the resistance less than 1 Ω?	Go to step 10.	Replace the starter relay.
<p><b>10 CHECK HARNESS BETWEEN ECM AND STARTER RELAY CONNECTOR.</b></p> <ol style="list-style-type: none"> <li>1) Turn the ignition switch to OFF.</li> <li>2) Disconnect the connector from ECM.</li> <li>3) Measure the resistance of harness between ECM and starter relay connector.</li> </ol> <p><b>Connector &amp; terminal</b> <b>(B135) No. 26 — (B225) No. 16:</b> <b>(B136) No. 16 — (B225) No. 14:</b></p>	Is the resistance less than 1 Ω?	Go to step 11.	Repair the open circuit of harness between ECM and starter relay connector.
<p><b>11 CHECK INPUT VOLTAGE OF STARTER RELAY.</b></p> <ol style="list-style-type: none"> <li>1) Connect the connector to ECM.</li> <li>2) Place the select lever in "P" range or "N" range.</li> <li>3) Turn the ignition switch to START.</li> <li>4) Measure the voltage between starter relay connector and chassis ground.</li> </ol> <p><b>Connector &amp; terminal</b> <b>(B225) No. 15 (+) — Chassis ground (-):</b></p>	Is the voltage 10 V or more?	Go to step 12.	Go to step 13.
<p><b>12 CHECK HARNESS BETWEEN ECM AND INHIBITOR RELAY CONNECTOR.</b></p> <ol style="list-style-type: none"> <li>1) Turn the ignition switch to OFF.</li> <li>2) Disconnect the inhibitor relay connector.</li> <li>3) Measure the resistance of harness between ECM and inhibitor relay connector.</li> </ol> <p><b>Connector &amp; terminal</b> <b>(B136) No. 35 — (B330) No. 1:</b></p>	Is the resistance less than 1 Ω?	Check the ECM power supply and ground line. <Ref. to EN(H6DO)(diag)-75, CHECK POWER SUPPLY AND GROUND LINE OF ENGINE CONTROL MODULE (ECM), Diagnostics for Engine Starting Failure.>	Repair the open circuit of harness between ECM and inhibitor relay connector.
<p><b>13 CHECK INPUT VOLTAGE OF INHIBITOR RELAY.</b></p> <ol style="list-style-type: none"> <li>1) Turn the ignition switch to OFF.</li> <li>2) Disconnect the inhibitor relay connector.</li> <li>3) Turn the ignition switch to START.</li> <li>4) Measure the voltage between inhibitor relay connector and chassis ground.</li> </ol> <p><b>Connector &amp; terminal</b> <b>(B330) No. 2 (+) — Chassis ground (-):</b> <b>(B330) No. 4 (+) — Chassis ground (-):</b></p>	Is the voltage 10 V or more?	Go to step 14.	Check the following item and repair if necessary. <ul style="list-style-type: none"> <li>• Blown out of fuse (F/B No. 21)</li> <li>• Open or ground short circuit of harness between ignition switch connector and inhibitor relay connector</li> </ul>

## Diagnostics for Engine Starting Failure

### ENGINE (DIAGNOSTICS)

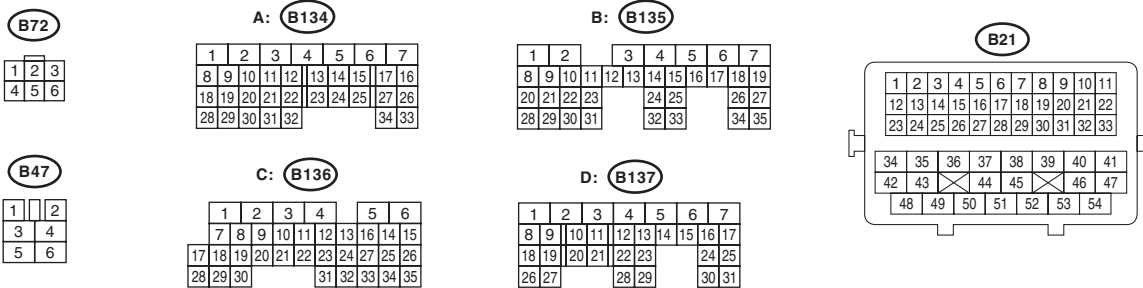
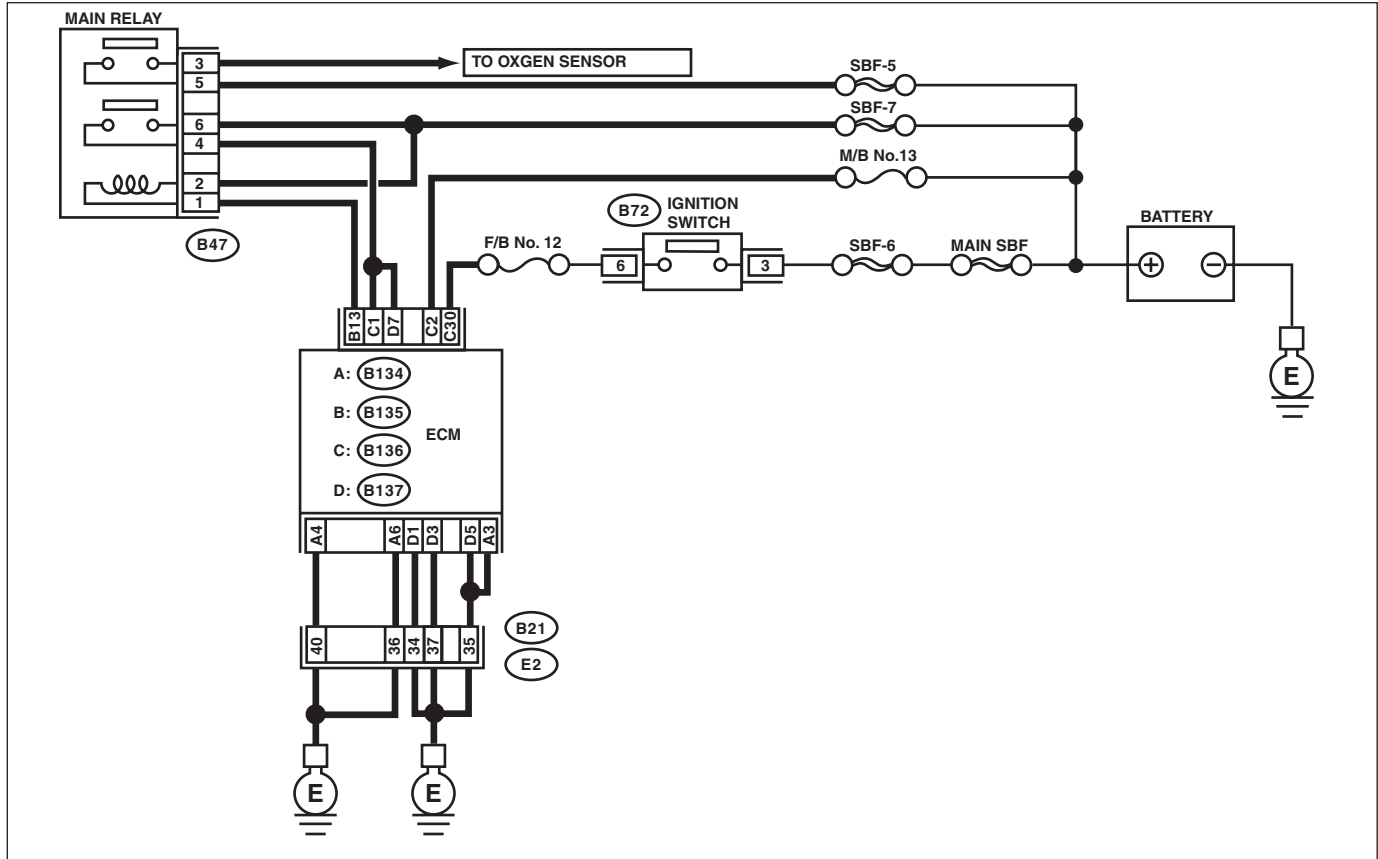
Step	Check	Yes	No
<b>14</b> <b>CHECK INHIBITOR RELAY.</b> 1) Connect the battery to inhibitor relay terminals No. 1 and No. 2. 2) Measure the resistance between inhibitor relay terminals. <i>Terminals</i> <i>No. 3 — No. 4:</i>	Is the resistance less than 1 $\Omega$ ?	Go to step 15.	Replace the inhibitor relay.
<b>15</b> <b>CHECK HARNESS BETWEEN INHIBITOR RELAY CONNECTOR AND STARTER RELAY CONNECTOR.</b> 1) Turn the ignition switch to OFF. 2) Measure the resistance of harness between inhibitor relay connector and starter relay connector. <i>Connector &amp; terminal</i> <i>(B330) No. 3 — (B225) No. 15:</i>	Is the resistance less than 1 $\Omega$ ?	Repair the open circuit of harness between TCM and inhibitor relay connector.	Repair the open circuit of harness between inhibitor relay connector and starter relay connector.

## C: CHECK POWER SUPPLY AND GROUND LINE OF ENGINE CONTROL MODULE (ECM)

**CAUTION:**

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

**WIRING DIAGRAM:**



EN-08072

Step	Check	Yes	No
<p><b>1</b></p> <p><b>CHECK MAIN RELAY.</b></p> <ol style="list-style-type: none"> <li>1) Turn the ignition switch to OFF.</li> <li>2) Remove the main relay.</li> <li>3) Connect the battery to main relay terminals No. 1 and No. 2.</li> <li>4) Measure the resistance between main relay terminals.</li> </ol> <p><b>Terminals</b></p> <p><b>No. 3 — No. 5:</b></p> <p><b>No. 4 — No. 6:</b></p>	<p>Is the resistance less than 1 Ω?</p>	<p>Go to step 2.</p>	<p>Replace the main relay. &lt;Ref. to FU(H6DO)-53, Main Relay.&gt;</p>

# Diagnostics for Engine Starting Failure

## ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<b>2 CHECK GROUND CIRCUIT FOR ECM.</b> 1) Disconnect the connectors from ECM. 2) Measure the resistance of harness between ECM connector and chassis ground. <b>Connector &amp; terminal</b> <i>(B134) No. 3 — Chassis ground:</i> <i>(B134) No. 4 — Chassis ground:</i> <i>(B134) No. 6 — Chassis ground:</i> <i>(B137) No. 1 — Chassis ground:</i> <i>(B137) No. 3 — Chassis ground:</i> <i>(B137) No. 5 — Chassis ground:</i>	Is the resistance less than 5 Ω?	Go to step 3.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit of harness between ECM connector and engine ground terminal. • Poor contact of coupling connector
<b>3 CHECK INPUT VOLTAGE OF ECM.</b> 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM connector and chassis ground. <b>Connector &amp; terminal</b> <i>(B136) No. 2 (+) — Chassis ground (-):</i> <i>(B136) No. 30 (+) — Chassis ground (-):</i>	Is the voltage 10 V or more?	Go to step 4.	Repair the open or ground short circuit of harness of power supply circuit.
<b>4 CHECK INPUT VOLTAGE OF MAIN RELAY.</b> Measure the voltage between main relay connector and chassis ground. <b>Connector &amp; terminal</b> <i>(B47) No. 2 (+) — Chassis ground (-):</i> <i>(B47) No. 5 (+) — Chassis ground (-):</i> <i>(B47) No. 6 (+) — Chassis ground (-):</i>	Is the voltage 10 V or more?	Go to step 5.	Repair the open or ground short circuit of harness of power supply circuit.
<b>5 CHECK INPUT VOLTAGE OF ECM.</b> 1) Turn the ignition switch to OFF. 2) Install the main relay. 3) Turn the ignition switch to ON. 4) Measure the voltage between ECM and chassis ground. <b>Connector &amp; terminal</b> <i>(B135) No. 13 (+) — Chassis ground (-):</i>	Is the voltage 10 V or more?	Go to step 6.	Repair the open circuit of harness between ECM connector and main relay connector.
<b>6 CHECK INPUT VOLTAGE OF ECM.</b> 1) Turn the ignition switch to OFF. 2) Connect the connector to ECM. 3) Turn the ignition switch to ON. 4) Measure the voltage between ECM connector and chassis ground. <b>Connector &amp; terminal</b> <i>(B136) No. 1 (+) — Chassis ground (-):</i> <i>(B137) No. 7 (+) — Chassis ground (-):</i>	Is the voltage 10 V or more?	Check ignition control system. <Ref. to EN(H6DO)(diag)-77, IGNITION CONTROL SYSTEM, Diagnostics for Engine Starting Failure.>	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit in harness between ECM connector and fuel injector connector • Poor contact of main relay connector • Poor contact of ECM connector

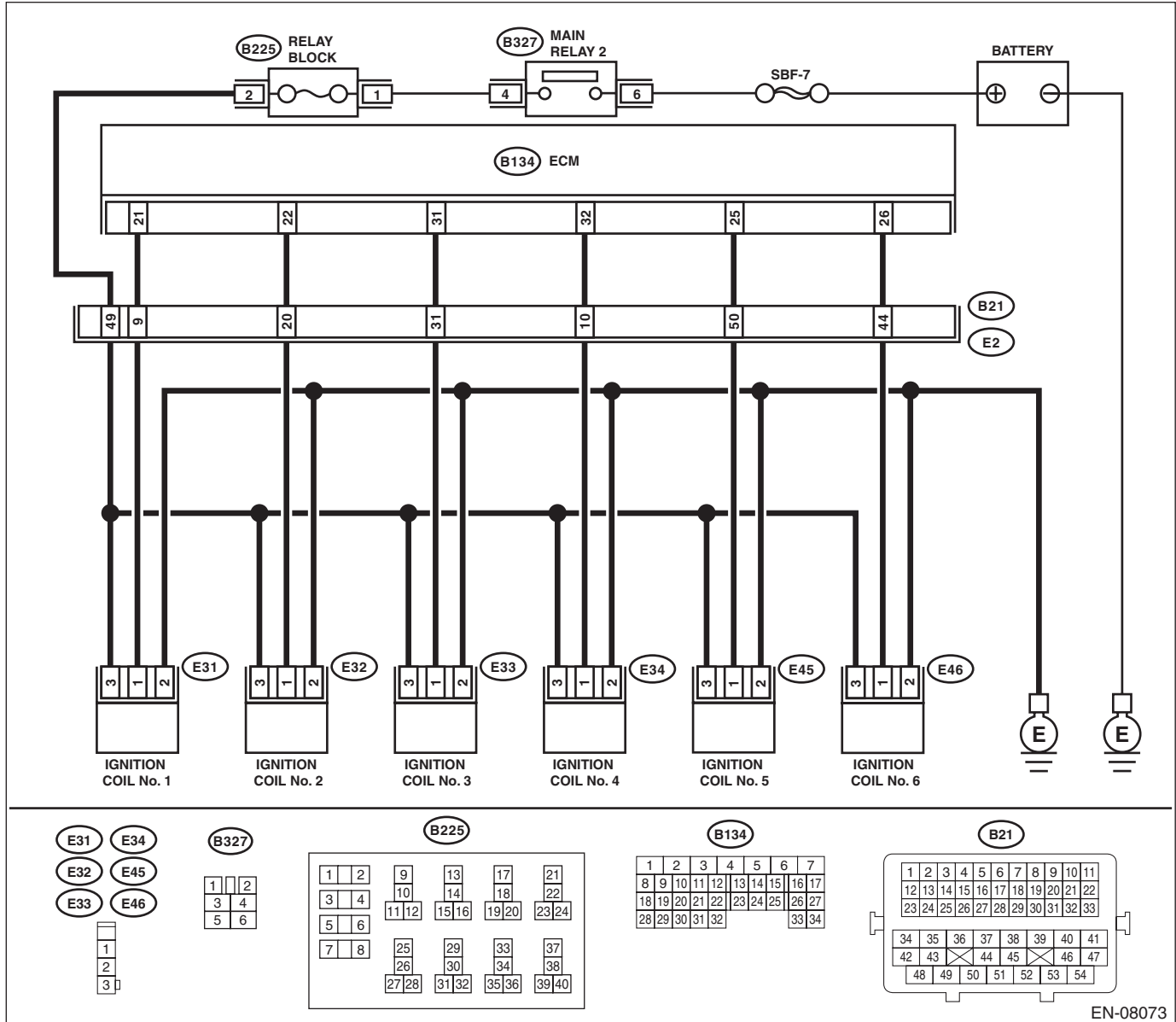
# Diagnostics for Engine Starting Failure

## D: IGNITION CONTROL SYSTEM

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

### WIRING DIAGRAM:



Step	Check	Yes	No
<b>1</b> <b>CHECK SPARK PLUG CONDITION.</b> 1) Remove the spark plug. <Ref. to IG(H6DO)-4, REMOVAL, Spark Plug.> 2) Check the spark plug condition. <Ref. to IG(H6DO)-5, INSPECTION, Spark Plug.>	Is the spark plug condition normal?	Go to step 2.	Replace the spark plug. <Ref. to IG(H6DO)-4, Spark Plug.>

# Diagnostics for Engine Starting Failure

## ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<p><b>2</b></p> <p><b>CHECK IGNITION SYSTEM FOR SPARKS.</b></p> <p>1) Connect the spark plug to ignition coil.</p> <p>2) Release the fuel pressure. &lt;Ref. to FU(H6DO)-59, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.&gt;</p> <p>3) Contact the spark plug thread portion to engine.</p> <p>4) While opening the throttle valve fully, start the engine to check if spark occurs at each cylinder.</p>	Does spark occur at each cylinder?	Check fuel pump system. <Ref. to EN(H6DO)(diag)-79, FUEL PUMP CIRCUIT, Diagnostics for Engine Starting Failure.>	Go to step 3.
<p><b>3</b></p> <p><b>CHECK IGNITION COIL POWER SUPPLY CIRCUIT.</b></p> <p>1) Turn the ignition switch to OFF.</p> <p>2) Disconnect the connector from ignition coil.</p> <p>3) Turn the ignition switch to ON.</p> <p>4) Measure the voltage between ignition coil connector and engine ground.</p> <p><b>Connector &amp; terminal</b></p> <p><b>(E31) No. 3 (+) — Engine ground (-):</b></p> <p><b>(E32) No. 3 (+) — Engine ground (-):</b></p> <p><b>(E33) No. 3 (+) — Engine ground (-):</b></p> <p><b>(E34) No. 3 (+) — Engine ground (-):</b></p> <p><b>(E45) No. 3 (+) — Engine ground (-):</b></p> <p><b>(E46) No. 3 (+) — Engine ground (-):</b></p>	Is the voltage 10 V or more?	Go to step 4.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit or short circuit to ground in harness of power supply circuit • Blown out of fuse (SBF-7) • Poor contact of coupling connector
<p><b>4</b></p> <p><b>CHECK HARNESS OF IGNITION COIL GROUND CIRCUIT.</b></p> <p>1) Turn the ignition switch to OFF.</p> <p>2) Measure the resistance of harness between ignition coil connector and engine ground.</p> <p><b>Connector &amp; terminal</b></p> <p><b>(E31) No. 2 — Engine ground:</b></p> <p><b>(E32) No. 2 — Engine ground:</b></p> <p><b>(E33) No. 2 — Engine ground:</b></p> <p><b>(E34) No. 2 — Engine ground:</b></p> <p><b>(E45) No. 2 — Engine ground:</b></p> <p><b>(E46) No. 2 — Engine ground</b></p>	Is the resistance less than 5 Ω?	Go to step 5.	Repair the open circuit in harness between ignition coil connector and engine grounding terminal.
<p><b>5</b></p> <p><b>CHECK HARNESS BETWEEN ECM AND IGNITION COIL CONNECTOR.</b></p> <p>1) Disconnect the connectors from ECM.</p> <p>2) Measure the resistance of harness between ECM and ignition coil connector.</p> <p><b>Connector &amp; terminal</b></p> <p><b>(B134) No. 21 — (E31) No. 1:</b></p> <p><b>(B134) No. 22 — (E32) No. 1:</b></p> <p><b>(B134) No. 31 — (E33) No. 1:</b></p> <p><b>(B134) No. 32 — (E34) No. 1:</b></p> <p><b>(B134) No. 25 — (E45) No. 1:</b></p> <p><b>(B134) No. 26 — (E46) No. 1:</b></p>	Is the resistance less than 1 Ω?	Go to step 6.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit of harness between ECM connector and the ignition coil connector • Poor contact of coupling connector
<p><b>6</b></p> <p><b>CHECK HARNESS BETWEEN ECM AND IGNITION COIL CONNECTOR.</b></p> <p>Measure the resistance of harness between ECM connector and chassis ground.</p> <p><b>Connector &amp; terminal:</b></p> <p><b>(B134) No. 21 — Chassis ground:</b></p> <p><b>(B134) No. 22 — Chassis ground:</b></p> <p><b>(B134) No. 31 — Chassis ground:</b></p> <p><b>(B134) No. 32 — Chassis ground:</b></p> <p><b>(B134) No. 25 — Chassis ground:</b></p> <p><b>(B134) No. 26 — Chassis ground:</b></p>	Is the resistance 1 MΩ or more?	Go to step 7.	Repair the ground short circuit of harness between ECM connector and ignition coil connector.

# Diagnostics for Engine Starting Failure

ENGINE (DIAGNOSTICS)

Step	Check	Yes	No	
7	<b>CHECK FOR POOR CONTACT.</b> Check for poor contact of ECM connector.	Is there poor contact of ECM connector?	Repair the poor contact of ECM connector.	Replace the ignition coil. <Ref. to IG(H6DO)-7, Ignition Coil.>

## E: FUEL PUMP CIRCUIT

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

Step	Check	Yes	No	
1	<b>CHECK OPERATING SOUND OF FUEL PUMP.</b> Make sure that the fuel pump operates for two seconds when turning the ignition switch to ON. NOTE: Fuel pump operation can be executed using the Subaru Select Monitor. For detailed procedures, refer to "System Operation Check". <Ref. to EN(H6DO)(diag)-60, System Operation Check Mode.>	Does the fuel pump emit operating sound?	Check the fuel injector circuit. <Ref. to EN(H6DO)(diag)-80, FUEL INJECTOR CIRCUIT, Diagnostics for Engine Starting Failure.>	Display the DTC. <Ref. to EN(H6DO)(diag)-44, OPERATION, Read Diagnostic Trouble Code (DTC).>

# Diagnostics for Engine Starting Failure

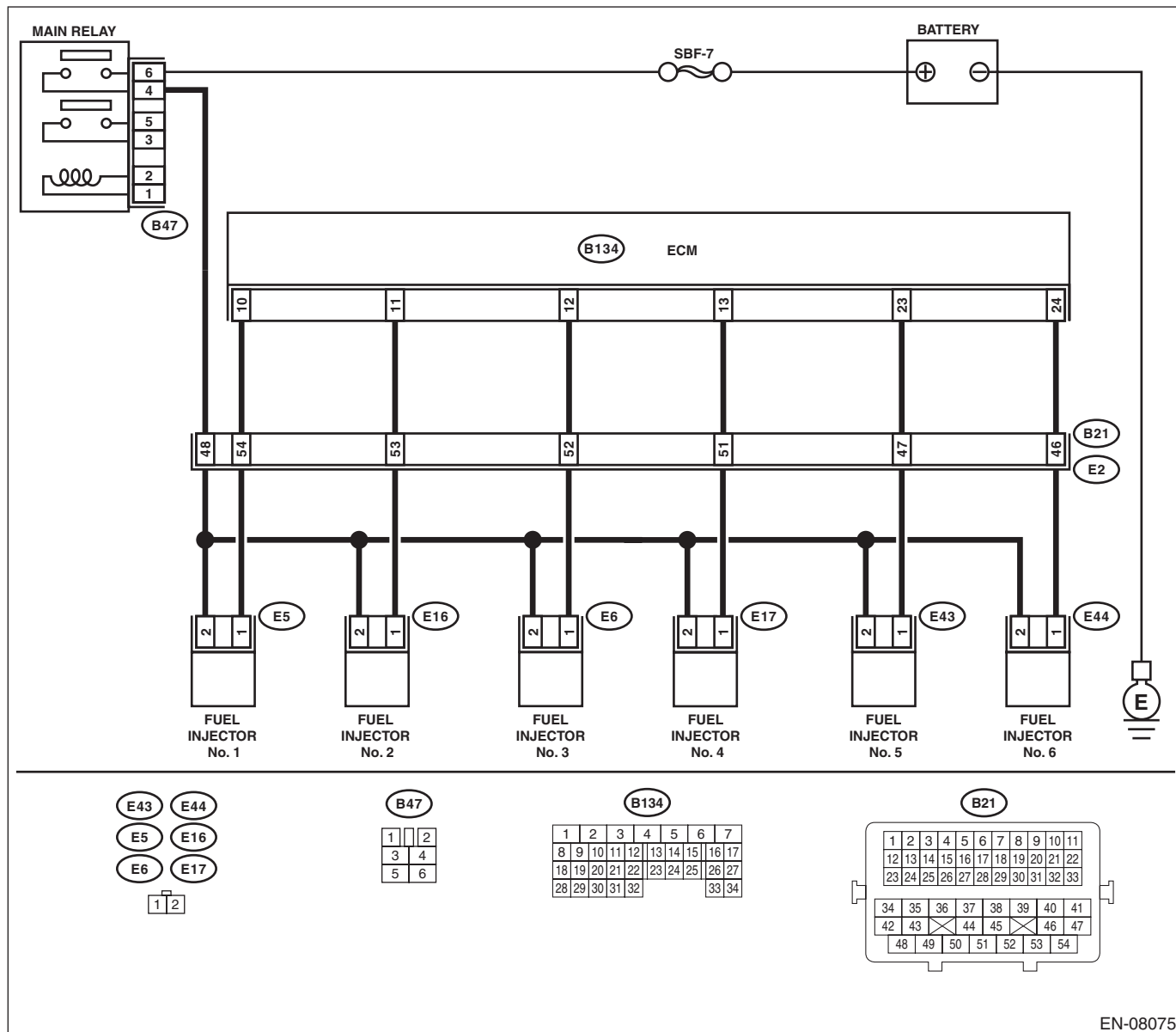
ENGINE (DIAGNOSTICS)

## F: FUEL INJECTOR CIRCUIT

### CAUTION:

- Check or repair only faulty parts.
- After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

### WIRING DIAGRAM:



EN-08075

Step	Check	Yes	No	
1	<p><b>CHECK OPERATION OF EACH FUEL INJECTOR.</b></p> <p>While cranking the engine, check each fuel injector emits operating sound. Use a sound scope or listen by attaching a screwdriver to the injector for this check.</p>	Does the fuel pump emit operating sound?	Check the fuel pressure. <Ref. to ME(H6DO)-30, INSPECTION, Fuel Pressure.>	Go to step 2.



# Diagnostics for Engine Starting Failure

ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<p><b>2 CHECK POWER SUPPLY TO EACH FUEL INJECTOR.</b></p> <p>1) Turn the ignition switch to OFF.                      2) Disconnect the connector from fuel injector.                      3) Turn the ignition switch to ON.                      4) Measure the voltage between fuel injector connector and the engine ground.</p> <p><b>Connector &amp; terminal</b>                      #1 (E5) No. 2 (+) — Engine ground (-):                      #2 (E16) No. 2 (+) — Engine ground (-):                      #3 (E6) No. 2 (+) — Engine ground (-):                      #4 (E17) No. 2 (+) — Engine ground (-):                      #5 (E43) No. 2 (+) — Engine ground (-):                      #6 (E44) No. 2 (+) — Engine ground (-):</p>	Is the voltage 10 V or more?	Go to step 3.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit in harness between main relay and fuel injector connector • Poor contact of main relay connector • Poor contact of coupling connector
<p><b>3 CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR.</b></p> <p>1) Turn the ignition switch to OFF.                      2) Disconnect the connectors from ECM.                      3) Measure the resistance of harness between ECM and fuel injector connector.</p> <p><b>Connector &amp; terminal</b>                      #1 (B134) No. 10 — (E5) No. 1:                      #2 (B134) No. 11 — (E16) No. 1:                      #3 (B134) No. 12 — (E6) No. 1:                      #4 (B134) No. 13 — (E17) No. 1:                      #5 (B134) No. 23 — (E43) No. 1:                      #6 (B134) No. 24 — (E44) No. 1:</p>	Is the resistance less than 1 Ω?	Go to step 4.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit in harness between ECM and fuel injector connector • Poor contact of coupling connector
<p><b>4 CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR.</b></p> <p>Measure the resistance between ECM and chassis ground.</p> <p><b>Connector &amp; terminal</b>                      #1 (B134) No. 10 — Chassis ground:                      #2 (B134) No. 11 — Chassis ground:                      #3 (B134) No. 12 — Chassis ground:                      #4 (B134) No. 13 — Chassis ground:                      #5 (B134) No. 23 — Chassis ground:                      #6 (B134) No. 24 — Chassis ground:</p>	Is the resistance 1 MΩ or more?	Go to step 5.	Repair the short circuit to ground in harness between ECM and fuel injector connector.
<p><b>5 CHECK EACH FUEL INJECTOR.</b></p> <p>Measure the resistance between each fuel injector terminals.</p> <p><b>Terminals</b>                      No. 1 — No. 2:</p>	Is the resistance 5 — 20 Ω?	Go to step 6.	Replace the faulty fuel injector. <Ref. to FU(H6DO)-42, Fuel Injector.>
<p><b>6 CHECK FOR POOR CONTACT.</b></p> <p>Check for poor contact of ECM connector.</p>	Is there poor contact of ECM connector?	Repair the poor contact of ECM connector.	Inspection using “General Diagnostic Table”. <Ref. to EN(H6DO)(diag)-381, INSPECTION, General Diagnostic Table.>

# Diagnostic Procedure for Subaru Select Monitor Communication

ENGINE (DIAGNOSTICS)

## 18. Diagnostic Procedure for Subaru Select Monitor Communication

### A: COMMUNICATION FOR INITIALIZING IMPOSSIBLE

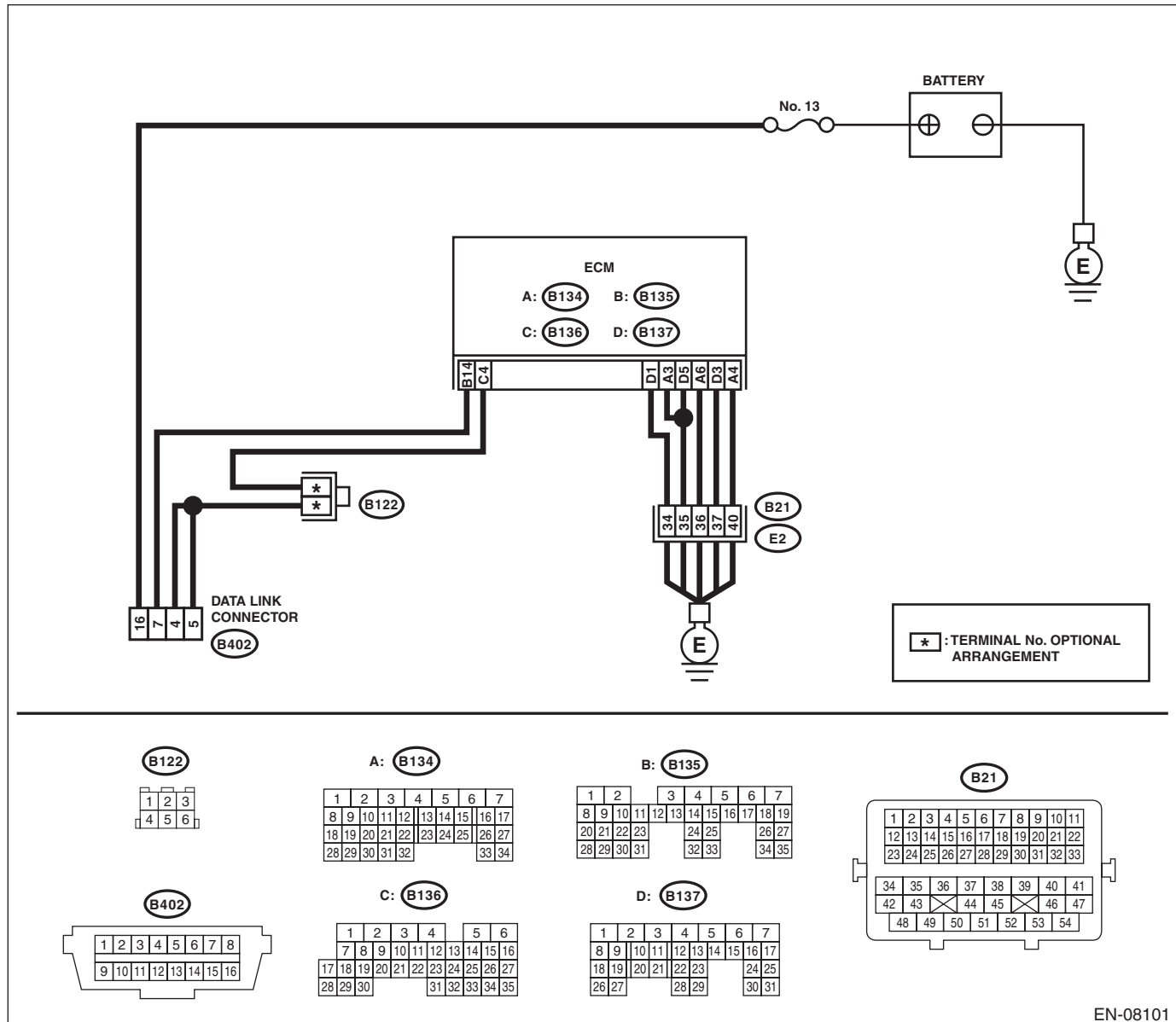
#### DIAGNOSIS:

Open or short circuit in data link connector

#### TROUBLE SYMPTOM:

Subaru Select Monitor communication failure

#### WIRING DIAGRAM:



Step	Check	Yes	No
1	<b>CHECK POWER SUPPLY CIRCUIT.</b> Connect the SDI (Subaru Diagnosis Interface) or general scan tool to data link connector.	Does SDI or general scan tool turn ON?	Go to step 4. Go to step 2.

# Diagnostic Procedure for Subaru Select Monitor Communication

ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<p><b>2</b></p> <p><b>CHECK POWER SUPPLY CIRCUIT.</b> Measure the voltage between data link connector and chassis ground. <b>Connector &amp; terminal</b> <b>(B402) No. 16 (+) — Chassis ground (-):</b></p>	Is the voltage 10 V or more?	Go to step 3.	<p>Repair the power supply circuit.</p> <p>NOTE: In this case, repair the following item:</p> <ul style="list-style-type: none"> <li>• Open or ground short circuit of harness between battery and data link connector</li> <li>• Blown out of fuse (M/B No. 13)</li> </ul>
<p><b>3</b></p> <p><b>CHECK HARNESS BETWEEN DATA LINK CONNECTOR AND CHASSIS GROUND.</b> 1) Turn the ignition switch to OFF. 2) Measure the resistance of harness between data link connector and chassis ground. <b>Connector &amp; terminal</b> <b>(B402) No. 4 — Chassis ground:</b> <b>(B402) No. 5 — Chassis ground:</b></p>	Is the resistance less than 5 Ω?	Repair the poor contact of data link connector.	<p>Repair the harness and connector.</p> <p>NOTE: In this case, repair the following item:</p> <ul style="list-style-type: none"> <li>• Open circuit of harness between ECM and data link connector</li> <li>• Open circuit of harness between ECM and engine ground</li> <li>• Poor contact of ECM connector</li> <li>• Poor contact of coupling connector</li> </ul>
<p><b>4</b></p> <p><b>CHECK HARNESS BETWEEN ECM AND DATA LINK CONNECTOR.</b> 1) Disconnect the connector from ECM, TCM, VDC CM, airbag CM and body integrated unit. <b>CAUTION:</b> <b>When disconnecting the connector from airbag control module, always follow the precautions on AB section. &lt;Ref. to AB-4, CAUTION, General Description.&gt;</b> 2) Measure the resistance of harness between ECM and data link connector. <b>Connector &amp; terminal</b> <b>(B135) No. 14 — (B402) No. 7:</b></p>	Is the resistance less than 1 Ω?	Go to step 5.	Repair the open circuit of harness between ECM and data link connector.
<p><b>5</b></p> <p><b>CHECK HARNESS BETWEEN ECM AND DATA LINK CONNECTOR.</b> Measure the resistance between data link connector and chassis ground. <b>Connector &amp; terminal</b> <b>(B407) No. 7 — Chassis ground:</b></p>	Is the resistance 1 MΩ or more?	Repair the poor contact of the ECM or data link connector.	Repair the ground short circuit of harness between ECM and data link connector.

## List of Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

### 19. List of Diagnostic Trouble Code (DTC)

#### A: LIST

DTC	Item	Note
P0011	Intake Camshaft Position - Timing Over-Advanced or System Performance (Bank 1)	<Ref. to EN(H6DO)(diag)-94, DTC P0011 INTAKE CAMSHAFT POSITION - TIMING OVER-ADVANCED OR SYSTEM PERFORMANCE (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0014	Exhaust AVCS System 1 (Range/Performance)	<Ref. to EN(H6DO)(diag)-95, DTC P0014 EXHAUST AVCS SYSTEM 1 (RANGE/PERFORMANCE), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0016	Crankshaft Position - Camshaft Position Correlation (Bank1)	<Ref. to EN(H6DO)(diag)-96, DTC P0016 CRANKSHAFT POSITION - CAMSHAFT POSITION CORRELATION (BANK1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0017	Crank and Cam Timing B System Failure (Bank 1)	<Ref. to EN(H6DO)(diag)-97, DTC P0017 CRANK AND CAM TIMING B SYSTEM FAILURE (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0018	Crankshaft Position - Camshaft Position Correlation (Bank2)	<Ref. to EN(H6DO)(diag)-98, DTC P0018 CRANKSHAFT POSITION - CAMSHAFT POSITION CORRELATION (BANK2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0019	Crank and Cam Timing B System Failure (Bank 2)	<Ref. to EN(H6DO)(diag)-99, DTC P0019 CRANK AND CAM TIMING B SYSTEM FAILURE (BANK 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0021	Intake Camshaft Position - Timing Over-Advanced or System Performance (Bank 2)	<Ref. to EN(H6DO)(diag)-100, DTC P0021 INTAKE CAMSHAFT POSITION - TIMING OVER-ADVANCED OR SYSTEM PERFORMANCE (BANK 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0024	Exhaust AVCS System 2 (Range/Performance)	<Ref. to EN(H6DO)(diag)-101, DTC P0024 EXHAUST AVCS SYSTEM 2 (RANGE/PERFORMANCE), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0030	HO2S Heater Control Circuit (Bank 1 Sensor 1)	<Ref. to EN(H6DO)(diag)-102, DTC P0030 HO2S HEATER CONTROL CIRCUIT (BANK 1 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0031	HO2S Heater Control Circuit Low (Bank 1 Sensor 1)	<Ref. to EN(H6DO)(diag)-104, DTC P0031 HO2S HEATER CONTROL CIRCUIT LOW (BANK 1 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0032	HO2S Heater Control Circuit High (Bank 1 Sensor 1)	<Ref. to EN(H6DO)(diag)-106, DTC P0032 HO2S HEATER CONTROL CIRCUIT HIGH (BANK 1 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0037	HO2S Heater Control Circuit Low (Bank 1 Sensor 2)	<Ref. to EN(H6DO)(diag)-108, DTC P0037 HO2S HEATER CONTROL CIRCUIT LOW (BANK 1 SENSOR 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0038	HO2S Heater Control Circuit High (Bank 1 Sensor 2)	<Ref. to EN(H6DO)(diag)-110, DTC P0038 HO2S HEATER CONTROL CIRCUIT HIGH (BANK 1 SENSOR 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0050	HO2S Heater Control Circuit (Bank 2 Sensor 1)	<Ref. to EN(H6DO)(diag)-112, DTC P0050 HO2S HEATER CONTROL CIRCUIT (BANK 2 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0051	HO2S Heater Control Circuit Low (Bank 2 Sensor 1)	<Ref. to EN(H6DO)(diag)-114, DTC P0051 HO2S HEATER CONTROL CIRCUIT LOW (BANK 2 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0052	HO2S Heater Control Circuit High (Bank 2 Sensor 1)	<Ref. to EN(H6DO)(diag)-116, DTC P0052 HO2S HEATER CONTROL CIRCUIT HIGH (BANK 2 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0057	HO2S Heater Control Circuit Low (Bank 2 Sensor 2)	<Ref. to EN(H6DO)(diag)-118, DTC P0057 HO2S HEATER CONTROL CIRCUIT LOW (BANK 2 SENSOR 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

# List of Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

DTC	Item	Note
P0058	HO2S Heater Control Circuit High (Bank 2 Sensor 2)	<Ref. to EN(H6DO)(diag)-120, DTC P0058 HO2S HEATER CONTROL CIRCUIT HIGH (BANK 2 SENSOR 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0068	MAP/MAF - Throttle Position Correlation	<Ref. to EN(H6DO)(diag)-122, DTC P0068 MAP/MAF - THROTTLE POSITION CORRELATION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0101	Mass or Volume Air Flow Circuit Range/Performance	<Ref. to EN(H6DO)(diag)-123, DTC P0101 MASS OR VOLUME AIR FLOW CIRCUIT RANGE/PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0102	Mass or Volume Air Flow Circuit Low Input	<Ref. to EN(H6DO)(diag)-124, DTC P0102 MASS OR VOLUME AIR FLOW CIRCUIT LOW INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0103	Mass or Volume Air Flow Circuit High Input	<Ref. to EN(H6DO)(diag)-126, DTC P0103 MASS OR VOLUME AIR FLOW CIRCUIT HIGH INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0107	Manifold Absolute Pressure/Barometric Pressure Circuit Low Input	<Ref. to EN(H6DO)(diag)-128, DTC P0107 MANIFOLD ABSOLUTE PRESSURE/BAROMETRIC PRESSURE CIRCUIT LOW INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0108	Manifold Absolute Pressure/Barometric Pressure Circuit High Input	<Ref. to EN(H6DO)(diag)-130, DTC P0108 MANIFOLD ABSOLUTE PRESSURE/BAROMETRIC PRESSURE CIRCUIT HIGH INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0111	Intake Air Temperature Sensor 1 Circuit Range/Performance	<Ref. to EN(H6DO)(diag)-132, DTC P0111 INTAKE AIR TEMPERATURE SENSOR 1 CIRCUIT RANGE/PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0112	Intake Air Temperature Sensor 1 Circuit Low	<Ref. to EN(H6DO)(diag)-133, DTC P0112 INTAKE AIR TEMPERATURE SENSOR 1 CIRCUIT LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0113	Intake Air Temperature Sensor 1 Circuit High	<Ref. to EN(H6DO)(diag)-135, DTC P0113 INTAKE AIR TEMPERATURE SENSOR 1 CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0117	Engine Coolant Temperature Circuit Low	<Ref. to EN(H6DO)(diag)-137, DTC P0117 ENGINE COOLANT TEMPERATURE CIRCUIT LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0118	Engine Coolant Temperature Circuit High	<Ref. to EN(H6DO)(diag)-139, DTC P0118 ENGINE COOLANT TEMPERATURE CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0122	Throttle/Pedal Position Sensor/Switch "A" Circuit Low	<Ref. to EN(H6DO)(diag)-141, DTC P0122 THROTTLE/PEDAL POSITION SENSOR/SWITCH "A" CIRCUIT LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0123	Throttle/Pedal Position Sensor/Switch "A" Circuit High	<Ref. to EN(H6DO)(diag)-143, DTC P0123 THROTTLE/PEDAL POSITION SENSOR/SWITCH "A" CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0125	Insufficient Coolant Temperature for Closed Loop Fuel Control	<Ref. to EN(H6DO)(diag)-145, DTC P0125 INSUFFICIENT COOLANT TEMPERATURE FOR CLOSED LOOP FUEL CONTROL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0126	Insufficient Engine Coolant Temperature for Stable Operation	<Ref. to EN(H6DO)(diag)-146, DTC P0126 INSUFFICIENT ENGINE COOLANT TEMPERATURE FOR STABLE OPERATION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0128	Coolant Thermostat (Engine Coolant Temperature Below Thermostat Regulating Temperature)	<Ref. to EN(H6DO)(diag)-147, DTC P0128 COOLANT THERMOSTAT (ENGINE COOLANT TEMPERATURE BELOW THERMOSTAT REGULATING TEMPERATURE), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0131	O2 Sensor Circuit Low Voltage (Bank 1 Sensor 1)	<Ref. to EN(H6DO)(diag)-148, DTC P0131 O2 SENSOR CIRCUIT LOW VOLTAGE (BANK 1 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

## List of Diagnostic Trouble Code (DTC)

### ENGINE (DIAGNOSTICS)

DTC	Item	Note
P0132	O2 Sensor Circuit High Voltage (Bank 1 Sensor 1)	<Ref. to EN(H6DO)(diag)-150, DTC P0132 O2 SENSOR CIRCUIT HIGH VOLTAGE (BANK 1 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0134	O2 Sensor Circuit No Activity Detected (Bank 1 Sensor 1)	<Ref. to EN(H6DO)(diag)-152, DTC P0134 O2 SENSOR CIRCUIT NO ACTIVITY DETECTED (BANK 1 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0137	O2 Sensor Circuit Low Voltage (Bank 1 Sensor 2)	<Ref. to EN(H6DO)(diag)-154, DTC P0137 O2 SENSOR CIRCUIT LOW VOLTAGE (BANK 1 SENSOR 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0138	O2 Sensor Circuit High Voltage (Bank 1 Sensor 2)	<Ref. to EN(H6DO)(diag)-156, DTC P0138 O2 SENSOR CIRCUIT HIGH VOLTAGE (BANK 1 SENSOR 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P013A	O2 Sensor Slow Response - Rich to Lean (Bank 1 Sensor 2)	<Ref. to EN(H6DO)(diag)-158, DTC P013A O2 SENSOR SLOW RESPONSE - RICH TO LEAN (BANK 1 SENSOR 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P013B	O2 Sensor Slow Response - Lean to Rich (Bank 1 Sensor 2)	<Ref. to EN(H6DO)(diag)-159, DTC P013B O2 SENSOR SLOW RESPONSE - LEAN TO RICH (BANK 1 SENSOR 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P013C	O2 Sensor Slow Response - Rich to Lean (Bank 2 Sensor 2)	<Ref. to EN(H6DO)(diag)-160, DTC P013C O2 SENSOR SLOW RESPONSE - RICH TO LEAN (BANK 2 SENSOR 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P013D	O2 Sensor Slow Response - Lean to Rich (Bank 2 Sensor 2)	<Ref. to EN(H6DO)(diag)-161, DTC P013D O2 SENSOR SLOW RESPONSE - LEAN TO RICH (BANK 2 SENSOR 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P013E	O2 Sensor Delayed Response - Rich to Lean (Bank 1 Sensor 2)	<Ref. to EN(H6DO)(diag)-161, DTC P013E O2 SENSOR DELAYED RESPONSE - RICH TO LEAN (BANK 1 SENSOR 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P013F	O2 Sensor Delayed Response - Lean to Rich (Bank 1 Sensor 2)	<Ref. to EN(H6DO)(diag)-161, DTC P013F O2 SENSOR DELAYED RESPONSE - LEAN TO RICH (BANK 1 SENSOR 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0140	O2 Sensor Circuit No Activity Detected (Bank1 Sensor2)	<Ref. to EN(H6DO)(diag)-162, DTC P0140 O2 SENSOR CIRCUIT NO ACTIVITY DETECTED (BANK1 SENSOR2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0141	O2 Sensor Heater Circuit (Bank1 Sensor2)	<Ref. to EN(H6DO)(diag)-165, DTC P0141 O2 SENSOR HEATER CIRCUIT (BANK1 SENSOR2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P014A	O2 Sensor Delayed Response - Rich to Lean (Bank 2 Sensor 2)	<Ref. to EN(H6DO)(diag)-165, DTC P014A O2 SENSOR DELAYED RESPONSE - RICH TO LEAN (BANK 2 SENSOR 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P014B	O2 Sensor Delayed Response - Lean to Rich (Bank 2 Sensor 2)	<Ref. to EN(H6DO)(diag)-165, DTC P014B O2 SENSOR DELAYED RESPONSE - LEAN TO RICH (BANK 2 SENSOR 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P014C	O2 Sensor Slow Response - Rich to Lean (Bank 1 Sensor 1)	<Ref. to EN(H6DO)(diag)-166, DTC P014C O2 SENSOR SLOW RESPONSE - RICH TO LEAN (BANK 1 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P014D	O2 Sensor Slow Response - Lean to Rich (Bank 1 Sensor 1)	<Ref. to EN(H6DO)(diag)-166, DTC P014D O2 SENSOR SLOW RESPONSE - LEAN TO RICH (BANK 1 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P014E	O2 Sensor Slow Response - Rich to Lean (Bank 2 Sensor 1)	<Ref. to EN(H6DO)(diag)-167, DTC P014E O2 SENSOR SLOW RESPONSE - RICH TO LEAN (BANK 2 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P014F	O2 Sensor Slow Response - Lean to Rich (Bank 2 Sensor 1)	<Ref. to EN(H6DO)(diag)-167, DTC P014F O2 SENSOR SLOW RESPONSE - LEAN TO RICH (BANK 2 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0151	O2 Sensor Circuit Low Voltage (Bank 2 Sensor 1)	<Ref. to EN(H6DO)(diag)-168, DTC P0151 O2 SENSOR CIRCUIT LOW VOLTAGE (BANK 2 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

# List of Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

DTC	Item	Note
P0152	O2 Sensor Circuit High Voltage (Bank 2 Sensor 1)	<Ref. to EN(H6DO)(diag)-170, DTC P0152 O2 SENSOR CIRCUIT HIGH VOLTAGE (BANK 2 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0154	O2 Sensor Circuit No Activity Detected (Bank 2 Sensor 1)	<Ref. to EN(H6DO)(diag)-172, DTC P0154 O2 SENSOR CIRCUIT NO ACTIVITY DETECTED (BANK 2 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0157	O2 Sensor Circuit Low Voltage (Bank 2 Sensor 2)	<Ref. to EN(H6DO)(diag)-174, DTC P0157 O2 SENSOR CIRCUIT LOW VOLTAGE (BANK 2 SENSOR 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0158	O2 Sensor Circuit High Voltage (Bank 2 Sensor 2)	<Ref. to EN(H6DO)(diag)-176, DTC P0158 O2 SENSOR CIRCUIT HIGH VOLTAGE (BANK 2 SENSOR 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P015A	O2 Sensor Delayed Response - Rich to Lean (Bank 1 Sensor 1)	<Ref. to EN(H6DO)(diag)-178, DTC P015A O2 SENSOR DELAYED RESPONSE - RICH TO LEAN (BANK 1 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P015B	O2 Sensor Delayed Response - Lean to Rich (Bank 1 Sensor 1)	<Ref. to EN(H6DO)(diag)-178, DTC P015B O2 SENSOR DELAYED RESPONSE - LEAN TO RICH (BANK 1 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P015C	O2 Sensor Delayed Response - Rich to Lean (Bank 2 Sensor 1)	<Ref. to EN(H6DO)(diag)-178, DTC P015C O2 SENSOR DELAYED RESPONSE - RICH TO LEAN (BANK 2 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P015D	O2 Sensor Delayed Response - Lean to Rich (Bank 2 Sensor 1)	<Ref. to EN(H6DO)(diag)-178, DTC P015D O2 SENSOR DELAYED RESPONSE - LEAN TO RICH (BANK 2 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0160	O2 Sensor Circuit No Activity Detected (Bank2 Sensor2)	<Ref. to EN(H6DO)(diag)-179, DTC P0160 O2 SENSOR CIRCUIT NO ACTIVITY DETECTED (BANK2 SENSOR2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0161	O2 Sensor Heater Circuit (Bank2 Sensor2)	<Ref. to EN(H6DO)(diag)-181, DTC P0161 O2 SENSOR HEATER CIRCUIT (BANK2 SENSOR2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0171	System Too Lean (Bank 1)	<Ref. to EN(H6DO)(diag)-181, DTC P0171 SYSTEM TOO LEAN (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0172	System Too Rich (Bank 1)	<Ref. to EN(H6DO)(diag)-181, DTC P0172 SYSTEM TOO RICH (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0174	System Too Lean (Bank 2)	<Ref. to EN(H6DO)(diag)-181, DTC P0174 SYSTEM TOO LEAN (BANK 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0175	System Too Rich (Bank 2)	<Ref. to EN(H6DO)(diag)-182, DTC P0175 SYSTEM TOO RICH (BANK 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0181	Fuel Temperature Sensor "A" Circuit Range/Performance	<Ref. to EN(H6DO)(diag)-184, DTC P0181 FUEL TEMPERATURE SENSOR "A" CIRCUIT RANGE/PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0182	Fuel Temperature Sensor "A" Circuit Low Input	<Ref. to EN(H6DO)(diag)-185, DTC P0182 FUEL TEMPERATURE SENSOR "A" CIRCUIT LOW INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0183	Fuel Temperature Sensor "A" Circuit High Input	<Ref. to EN(H6DO)(diag)-187, DTC P0183 FUEL TEMPERATURE SENSOR "A" CIRCUIT HIGH INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0196	Engine Oil Temperature Sensor Circuit Range/Performance	<Ref. to EN(H6DO)(diag)-189, DTC P0196 ENGINE OIL TEMPERATURE SENSOR CIRCUIT RANGE/PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0197	Engine Oil Temperature Sensor Low	<Ref. to EN(H6DO)(diag)-190, DTC P0197 ENGINE OIL TEMPERATURE SENSOR LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0198	Engine Oil Temperature Sensor High	<Ref. to EN(H6DO)(diag)-192, DTC P0198 ENGINE OIL TEMPERATURE SENSOR HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

## List of Diagnostic Trouble Code (DTC)

### ENGINE (DIAGNOSTICS)

DTC	Item	Note
P0201	Injector #1	<Ref. to EN(H6DO)(diag)-194, DTC P0201 INJECTOR #1, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0202	Injector #2	<Ref. to EN(H6DO)(diag)-196, DTC P0202 INJECTOR #2, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0203	Injector #3	<Ref. to EN(H6DO)(diag)-196, DTC P0203 INJECTOR #3, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0204	Injector #4	<Ref. to EN(H6DO)(diag)-196, DTC P0204 INJECTOR #4, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0205	Injector #5	<Ref. to EN(H6DO)(diag)-196, DTC P0205 INJECTOR #5, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0206	Injector #6	<Ref. to EN(H6DO)(diag)-196, DTC P0206 INJECTOR #6, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0222	Throttle/Pedal Position Sensor/Switch "B" Circuit Low	<Ref. to EN(H6DO)(diag)-197, DTC P0222 THROTTLE/PEDAL POSITION SENSOR/SWITCH "B" CIRCUIT LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0223	Throttle/Pedal Position Sensor/Switch "B" Circuit High	<Ref. to EN(H6DO)(diag)-199, DTC P0223 THROTTLE/PEDAL POSITION SENSOR/SWITCH "B" CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0230	Fuel Pump Primary Circuit	<Ref. to EN(H6DO)(diag)-201, DTC P0230 FUEL PUMP PRIMARY CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0301	Cylinder 1 Misfire Detected	<Ref. to EN(H6DO)(diag)-204, DTC P0301 CYLINDER 1 MISFIRE DETECTED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0302	Cylinder 2 Misfire Detected	<Ref. to EN(H6DO)(diag)-204, DTC P0302 CYLINDER 2 MISFIRE DETECTED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0303	Cylinder 3 Misfire Detected	<Ref. to EN(H6DO)(diag)-204, DTC P0303 CYLINDER 3 MISFIRE DETECTED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0304	Cylinder 4 Misfire Detected	<Ref. to EN(H6DO)(diag)-204, DTC P0304 CYLINDER 4 MISFIRE DETECTED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0305	Cylinder 5 Misfire Detected	<Ref. to EN(H6DO)(diag)-204, DTC P0305 CYLINDER 5 MISFIRE DETECTED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0306	Cylinder 6 Misfire Detected	<Ref. to EN(H6DO)(diag)-205, DTC P0306 CYLINDER 6 MISFIRE DETECTED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0327	Knock Sensor 1 Circuit Low (Bank 1 or Single Sensor)	<Ref. to EN(H6DO)(diag)-210, DTC P0327 KNOCK SENSOR 1 CIRCUIT LOW (BANK 1 OR SINGLE SENSOR), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0328	Knock Sensor 1 Circuit High (Bank 1 or Single Sensor)	<Ref. to EN(H6DO)(diag)-212, DTC P0328 KNOCK SENSOR 1 CIRCUIT HIGH (BANK 1 OR SINGLE SENSOR), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0332	Knock Sensor 2 Circuit Low (Bank 2)	<Ref. to EN(H6DO)(diag)-214, DTC P0332 KNOCK SENSOR 2 CIRCUIT LOW (BANK 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0333	Knock Sensor 2 Circuit High (Bank 2)	<Ref. to EN(H6DO)(diag)-216, DTC P0333 KNOCK SENSOR 2 CIRCUIT HIGH (BANK 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0335	Crankshaft Position Sensor "A" Circuit	<Ref. to EN(H6DO)(diag)-218, DTC P0335 CRANKSHAFT POSITION SENSOR "A" CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0336	Crankshaft Position Sensor "A" Circuit Range/Performance	<Ref. to EN(H6DO)(diag)-220, DTC P0336 CRANKSHAFT POSITION SENSOR "A" CIRCUIT RANGE/PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0340	Camshaft Position Sensor "A" Circuit (Bank 1 or Single Sensor)	<Ref. to EN(H6DO)(diag)-221, DTC P0340 CAMSHAFT POSITION SENSOR "A" CIRCUIT (BANK 1 OR SINGLE SENSOR), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0345	Camshaft Position Sensor "A" Circuit (Bank 2)	<Ref. to EN(H6DO)(diag)-223, DTC P0345 CAMSHAFT POSITION SENSOR "A" CIRCUIT (BANK 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>



# List of Diagnostic Trouble Code (DTC)

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DTC	Item	Note
P0351	Ignition Coil A Primary/Secondary Circuit	<Ref. to EN(H6DO)(diag)-225, DTC P0351 IGNITION COIL A PRIMARY/SECONDARY CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0352	Ignition Coil B Primary/Secondary Circuit	<Ref. to EN(H6DO)(diag)-227, DTC P0352 IGNITION COIL B PRIMARY/SECONDARY CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0353	Ignition Coil C Primary/Secondary Circuit	<Ref. to EN(H6DO)(diag)-227, DTC P0353 IGNITION COIL C PRIMARY/SECONDARY CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0354	Ignition Coil D Primary/Secondary Circuit	<Ref. to EN(H6DO)(diag)-227, DTC P0354 IGNITION COIL D PRIMARY/SECONDARY CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0355	Ignition Coil E Primary/Secondary Circuit	<Ref. to EN(H6DO)(diag)-227, DTC P0355 IGNITION COIL E PRIMARY/SECONDARY CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0356	Ignition Coil F Primary/Secondary Circuit	<Ref. to EN(H6DO)(diag)-227, DTC P0356 IGNITION COIL F PRIMARY/SECONDARY CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0365	Camshaft Position Sensor "B" Circuit (Bank 1)	<Ref. to EN(H6DO)(diag)-228, DTC P0365 CAMSHAFT POSITION SENSOR "B" CIRCUIT (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0390	Camshaft Position Sensor "B" Circuit (Bank 2)	<Ref. to EN(H6DO)(diag)-230, DTC P0390 CAMSHAFT POSITION SENSOR "B" CIRCUIT (BANK 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0400	Exhaust Gas Recirculation Flow	<Ref. to EN(H6DO)(diag)-232, DTC P0400 EXHAUST GAS RECIRCULATION FLOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0420	Catalyst System Efficiency Below Threshold (Bank 1)	<Ref. to EN(H6DO)(diag)-233, DTC P0420 CATALYST SYSTEM EFFICIENCY BELOW THRESHOLD (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0442	Evaporative Emission Control System Leak Detected (Small Leak)	<Ref. to EN(H6DO)(diag)-237, DTC P0442 EVAPORATIVE EMISSION CONTROL SYSTEM LEAK DETECTED (SMALL LEAK), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0447	Evaporative Emission Control System Vent Control Circuit Open	<Ref. to EN(H6DO)(diag)-239, DTC P0447 EVAPORATIVE EMISSION CONTROL SYSTEM VENT CONTROL CIRCUIT OPEN, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0448	Evaporative Emission Control System Vent Control Circuit Shorted	<Ref. to EN(H6DO)(diag)-241, DTC P0448 EVAPORATIVE EMISSION CONTROL SYSTEM VENT CONTROL CIRCUIT SHORTED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0451	Evaporative Emission Control System Pressure Sensor	<Ref. to EN(H6DO)(diag)-243, DTC P0451 EVAPORATIVE EMISSION CONTROL SYSTEM PRESSURE SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0452	Evaporative Emission Control System Pressure Sensor Low Input	<Ref. to EN(H6DO)(diag)-244, DTC P0452 EVAPORATIVE EMISSION CONTROL SYSTEM PRESSURE SENSOR LOW INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0453	Evaporative Emission Control System Pressure Sensor High Input	<Ref. to EN(H6DO)(diag)-246, DTC P0453 EVAPORATIVE EMISSION CONTROL SYSTEM PRESSURE SENSOR HIGH INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0456	Evaporative Emission Control System Leak Detected (Very Small Leak)	<Ref. to EN(H6DO)(diag)-248, DTC P0456 EVAPORATIVE EMISSION CONTROL SYSTEM LEAK DETECTED (VERY SMALL LEAK), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0457	Evaporative Emission Control System Leak Detected (Fuel Cap Loose/Off)	<Ref. to EN(H6DO)(diag)-250, DTC P0457 EVAPORATIVE EMISSION CONTROL SYSTEM LEAK DETECTED (FUEL CAP LOOSE/OFF), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0458	Evaporative Emission System Purge Control Valve Circuit Low	<Ref. to EN(H6DO)(diag)-252, DTC P0458 EVAPORATIVE EMISSION SYSTEM PURGE CONTROL VALVE CIRCUIT LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

## List of Diagnostic Trouble Code (DTC)

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DTC	Item	Note
P0459	Evaporative Emission System Purge Control Valve Circuit High	<Ref. to EN(H6DO)(diag)-254, DTC P0459 EVAPORATIVE EMISSION SYSTEM PURGE CONTROL VALVE CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0461	Fuel Level Sensor "A" Circuit Range/Performance	<Ref. to EN(H6DO)(diag)-256, DTC P0461 FUEL LEVEL SENSOR "A" CIRCUIT RANGE/PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0462	Fuel Level Sensor "A" Circuit Low	<Ref. to EN(H6DO)(diag)-256, DTC P0462 FUEL LEVEL SENSOR "A" CIRCUIT LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0463	Fuel Level Sensor "A" Circuit High	<Ref. to EN(H6DO)(diag)-257, DTC P0463 FUEL LEVEL SENSOR "A" CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0464	Fuel Level Sensor Circuit Intermittent	<Ref. to EN(H6DO)(diag)-258, DTC P0464 FUEL LEVEL SENSOR CIRCUIT INTERMITTENT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0500	Vehicle Speed Sensor "A"	<Ref. to EN(H6DO)(diag)-259, DTC P0500 VEHICLE SPEED SENSOR "A", Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0506	Idle Air Control System RPM Lower Than Expected	<Ref. to EN(H6DO)(diag)-260, DTC P0506 IDLE AIR CONTROL SYSTEM RPM LOWER THAN EXPECTED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0507	Idle Air Control System RPM Higher Than Expected	<Ref. to EN(H6DO)(diag)-261, DTC P0507 IDLE AIR CONTROL SYSTEM RPM HIGHER THAN EXPECTED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P050A	Cold Start Idle Air Control System Performance	<Ref. to EN(H6DO)(diag)-262, DTC P050A COLD START IDLE AIR CONTROL SYSTEM PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P050B	Cold Start Ignition Timing Performance	<Ref. to EN(H6DO)(diag)-270, DTC P050B COLD START IGNITION TIMING PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0512	Starter Request Circuit	<Ref. to EN(H6DO)(diag)-271, DTC P0512 STARTER REQUEST CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0513	Incorrect Immobilizer Key	<Ref. to IM(diag)-16, DTC P0513 INCORRECT IMMOBILIZER KEY, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0604	Internal Control Module Random Access Memory (RAM) Error	<Ref. to EN(H6DO)(diag)-273, DTC P0604 INTERNAL CONTROL MODULE RANDOM ACCESS MEMORY (RAM) ERROR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0605	Internal Control Module Read Only Memory (ROM) Error	<Ref. to EN(H6DO)(diag)-273, DTC P0605 INTERNAL CONTROL MODULE READ ONLY MEMORY (ROM) ERROR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0607	Throttle Control System Circuit Range/Performance	<Ref. to EN(H6DO)(diag)-274, DTC P0607 THROTTLE CONTROL SYSTEM CIRCUIT RANGE/PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0638	Throttle Actuator Control Range/Performance (Bank 1)	<Ref. to EN(H6DO)(diag)-275, DTC P0638 THROTTLE ACTUATOR CONTROL RANGE/PERFORMANCE (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0700	Transmission Control System (MIL Request)	<Ref. to EN(H6DO)(diag)-275, DTC P0700 TRANSMISSION CONTROL SYSTEM (MIL REQUEST), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1152	O2 Sensor Circuit Range/Performance (Low) (Bank1 Sensor1)	<Ref. to EN(H6DO)(diag)-276, DTC P1152 O2 SENSOR CIRCUIT RANGE/PERFORMANCE (LOW) (BANK1 SENSOR1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1153	O2 Sensor Circuit Range/Performance (High) (Bank1 Sensor1)	<Ref. to EN(H6DO)(diag)-278, DTC P1153 O2 SENSOR CIRCUIT RANGE/PERFORMANCE (HIGH) (BANK1 SENSOR1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1154	O2 Sensor Circuit Range/Performance (Low) (Bank 2 Sensor 1)	<Ref. to EN(H6DO)(diag)-280, DTC P1154 O2 SENSOR CIRCUIT RANGE/PERFORMANCE (LOW) (BANK 2 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

# List of Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

DTC	Item	Note
P1155	O2 Sensor Circuit Range/Performance (High) (Bank 2 Sensor 1)	<Ref. to EN(H6DO)(diag)-282, DTC P1155 O2 SENSOR CIRCUIT RANGE/PERFORMANCE (HIGH) (BANK 2 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1160	Return Spring Failure	<Ref. to EN(H6DO)(diag)-283, DTC P1160 RETURN SPRING FAILURE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1443	Vent Control Solenoid Valve Function Problem	<Ref. to EN(H6DO)(diag)-284, DTC P1443 VENT CONTROL SOLENOID VALVE FUNCTION PROBLEM, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1492	EGR Solenoid Valve Signal #1 Circuit Malfunction (Low Input)	<Ref. to EN(H6DO)(diag)-285, DTC P1492 EGR SOLENOID VALVE SIGNAL #1 CIRCUIT MALFUNCTION (LOW INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1493	EGR Solenoid Valve Signal #1 Circuit Malfunction (High Input)	<Ref. to EN(H6DO)(diag)-285, DTC P1493 EGR SOLENOID VALVE SIGNAL #1 CIRCUIT MALFUNCTION (HIGH INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1494	EGR Solenoid Valve Signal #2 Circuit Malfunction (Low Input)	<Ref. to EN(H6DO)(diag)-285, DTC P1494 EGR SOLENOID VALVE SIGNAL #2 CIRCUIT MALFUNCTION (LOW INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1495	EGR Solenoid Valve Signal #2 Circuit Malfunction (High Input)	<Ref. to EN(H6DO)(diag)-285, DTC P1495 EGR SOLENOID VALVE SIGNAL #2 CIRCUIT MALFUNCTION (HIGH INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1496	EGR Solenoid Valve Signal #3 Circuit Malfunction (Low Input)	<Ref. to EN(H6DO)(diag)-285, DTC P1496 EGR SOLENOID VALVE SIGNAL #3 CIRCUIT MALFUNCTION (LOW INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1497	EGR Solenoid Valve Signal #3 Circuit Malfunction (High Input)	<Ref. to EN(H6DO)(diag)-285, DTC P1497 EGR SOLENOID VALVE SIGNAL #3 CIRCUIT MALFUNCTION (HIGH INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1498	EGR Solenoid Valve Signal #4 Circuit Malfunction (Low Input)	<Ref. to EN(H6DO)(diag)-286, DTC P1498 EGR SOLENOID VALVE SIGNAL #4 CIRCUIT MALFUNCTION (LOW INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1499	EGR Solenoid Valve Signal #4 Circuit Malfunction (High Input)	<Ref. to EN(H6DO)(diag)-289, DTC P1499 EGR SOLENOID VALVE SIGNAL #4 CIRCUIT MALFUNCTION (HIGH INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1518	Starter Switch Circuit Low Input	<Ref. to EN(H6DO)(diag)-292, DTC P1518 STARTER SWITCH CIRCUIT LOW INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1560	Back-Up Voltage Circuit Malfunction	<Ref. to EN(H6DO)(diag)-294, DTC P1560 BACK-UP VOLTAGE CIRCUIT MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1570	Antenna	<Ref. to IM(diag)-17, DTC P1570 ANTENNA, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1571	Reference Code Incompatibility	<Ref. to IM(diag)-19, DTC P1571 REFERENCE CODE INCOMPATIBILITY, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1572	IMM Circuit Failure (Except Antenna Circuit)	<Ref. to IM(diag)-20, DTC P1572 IMM CIRCUIT FAILURE (EXCEPT ANTENNA CIRCUIT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1574	Key Communication Failure	<Ref. to IM(diag)-22, DTC P1574 KEY COMMUNICATION FAILURE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1576	EGI Control Module EEPROM	<Ref. to IM(diag)-23, DTC P1576 EGI CONTROL MODULE EEPROM, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1577	IMM Control Module EEPROM	<Ref. to IM(diag)-23, DTC P1577 IMM CONTROL MODULE EEPROM, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1578	Meter Failure	<Ref. to IM(diag)-24, DTC P1578 METER FAILURE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2088	Intake Camshaft Position Actuator Control Circuit Low (Bank 1)	<Ref. to EN(H6DO)(diag)-296, DTC P2088 INTAKE CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT LOW (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

## List of Diagnostic Trouble Code (DTC)

### ENGINE (DIAGNOSTICS)

DTC	Item	Note
P2089	Intake Camshaft Position Actuator Control Circuit High (Bank 1)	<Ref. to EN(H6DO)(diag)-298, DTC P2089 INTAKE CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT HIGH (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2090	Exhaust Camshaft Position Actuator Control Circuit Low (Bank 1)	<Ref. to EN(H6DO)(diag)-300, DTC P2090 EXHAUST CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT LOW (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2091	Exhaust Camshaft Position Actuator Control Circuit High (Bank 1)	<Ref. to EN(H6DO)(diag)-302, DTC P2091 EXHAUST CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT HIGH (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2092	Intake Camshaft Position Actuator Control Circuit Low (Bank 2)	<Ref. to EN(H6DO)(diag)-304, DTC P2092 INTAKE CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT LOW (BANK 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2093	Intake Camshaft Position Actuator Control Circuit High (Bank 2)	<Ref. to EN(H6DO)(diag)-306, DTC P2093 INTAKE CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT HIGH (BANK 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2094	Exhaust Camshaft Position Actuator Control Circuit Low (Bank 2)	<Ref. to EN(H6DO)(diag)-308, DTC P2094 EXHAUST CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT LOW (BANK 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2095	Exhaust Camshaft Position Actuator Control Circuit High (Bank 2)	<Ref. to EN(H6DO)(diag)-310, DTC P2095 EXHAUST CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT HIGH (BANK 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2096	Post Catalyst Fuel Trim System Too Lean (Bank 1)	<Ref. to EN(H6DO)(diag)-312, DTC P2096 POST CATALYST FUEL TRIM SYSTEM TOO LEAN (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2097	Post Catalyst Fuel Trim System Too Rich (Bank 1)	<Ref. to EN(H6DO)(diag)-318, DTC P2097 POST CATALYST FUEL TRIM SYSTEM TOO RICH (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2098	Post Catalyst Fuel Trim System Too Lean Bank 2	<Ref. to EN(H6DO)(diag)-324, DTC P2098 POST CATALYST FUEL TRIM SYSTEM TOO LEAN BANK 2, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2099	Post Catalyst Fuel Trim System Too Rich Bank 2	<Ref. to EN(H6DO)(diag)-330, DTC P2099 POST CATALYST FUEL TRIM SYSTEM TOO RICH BANK 2, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2101	Throttle Actuator Control Motor Circuit Range/Performance	<Ref. to EN(H6DO)(diag)-336, DTC P2101 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT RANGE/PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2102	Throttle Actuator Control Motor Circuit Low	<Ref. to EN(H6DO)(diag)-341, DTC P2102 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2103	Throttle Actuator Control Motor Circuit High	<Ref. to EN(H6DO)(diag)-343, DTC P2103 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2109	Throttle/Pedal Position Sensor "A" Minimum Stop Performance	<Ref. to EN(H6DO)(diag)-344, DTC P2109 THROTTLE/PEDAL POSITION SENSOR "A" MINIMUM STOP PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2122	Throttle/Pedal Position Sensor/Switch "D" Circuit Low Input	<Ref. to EN(H6DO)(diag)-345, DTC P2122 THROTTLE/PEDAL POSITION SENSOR/SWITCH "D" CIRCUIT LOW INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2123	Throttle/Pedal Position Sensor/Switch "D" Circuit High Input	<Ref. to EN(H6DO)(diag)-347, DTC P2123 THROTTLE/PEDAL POSITION SENSOR/SWITCH "D" CIRCUIT HIGH INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2127	Throttle/Pedal Position Sensor/Switch "E" Circuit Low Input	<Ref. to EN(H6DO)(diag)-349, DTC P2127 THROTTLE/PEDAL POSITION SENSOR/SWITCH "E" CIRCUIT LOW INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2128	Throttle/Pedal Position Sensor/Switch "E" Circuit High Input	<Ref. to EN(H6DO)(diag)-351, DTC P2128 THROTTLE/PEDAL POSITION SENSOR/SWITCH "E" CIRCUIT HIGH INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

# List of Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

DTC	Item	Note
P2135	Throttle/Pedal Position Sensor/Switch "A"/"B" Voltage Correlation	<Ref. to EN(H6DO)(diag)-353, DTC P2135 THROTTLE/PEDAL POSITION SENSOR/SWITCH "A"/"B" VOLTAGE CORRELATION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2138	Throttle/Pedal Position Sensor/Switch "D"/"E" Voltage Correlation	<Ref. to EN(H6DO)(diag)-356, DTC P2138 THROTTLE/PEDAL POSITION SENSOR/SWITCH "D"/"E" VOLTAGE CORRELATION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P219A	Bank 1 Air-Fuel Ratio Imbalance	<Ref. to EN(H6DO)(diag)-358, DTC P219A BANK 1 AIR-FUEL RATIO IMBALANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P219B	Bank 2 Air-Fuel Ratio Imbalance	<Ref. to EN(H6DO)(diag)-368, DTC P219B BANK 2 AIR-FUEL RATIO IMBALANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2227	Barometric Pressure Circuit Range/Performance	<Ref. to EN(H6DO)(diag)-378, DTC P2227 BAROMETRIC PRESSURE CIRCUIT RANGE/PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2228	Barometric Pressure Circuit Low	<Ref. to EN(H6DO)(diag)-378, DTC P2228 BAROMETRIC PRESSURE CIRCUIT LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2229	Barometric Pressure Circuit High	<Ref. to EN(H6DO)(diag)-379, DTC P2229 BAROMETRIC PRESSURE CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2610	ECM/PCM Internal Engine Off Timer Performance	<Ref. to EN(H6DO)(diag)-379, DTC P2610 ECM/PCM INTERNAL ENGINE OFF TIMER PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
U0073	CAN Failure, Bus 'Off' Detection	<Ref. to EN(H6DO)(diag)-380, DTC U0073 CAN FAILURE, BUS 'OFF' DETECTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
U0101	CAN (TCU) Data Not Loaded	<Ref. to EN(H6DO)(diag)-380, DTC U0101 CAN (TCU) DATA NOT LOADED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
U0122	CAN (VDC) Data Not Loaded	<Ref. to EN(H6DO)(diag)-380, DTC U0122 CAN (VDC) DATA NOT LOADED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
U0140	CAN (BCU) Data Not Loaded	<Ref. to EN(H6DO)(diag)-380, DTC U0140 CAN (BCU) DATA NOT LOADED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
U0402	CAN (TCU) Data Abnormal	<Ref. to EN(H6DO)(diag)-380, DTC U0402 CAN (TCU) DATA ABNORMAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
U0416	CAN (VDC) Data Abnormal	<Ref. to EN(H6DO)(diag)-380, DTC U0416 CAN (VDC) DATA ABNORMAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
U0422	CAN (BCU) Data Abnormal	<Ref. to EN(H6DO)(diag)-380, DTC U0422 CAN (BCU) DATA ABNORMAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## 20. Diagnostic Procedure with Diagnostic Trouble Code (DTC)

### A: DTC P0011 INTAKE CAMSHAFT POSITION - TIMING OVER-ADVANCED OR SYSTEM PERFORMANCE (BANK 1)

#### DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-11, DTC P0011 INTAKE CAMSHAFT POSITION - TIMING OVER-ADVANCED OR SYSTEM PERFORMANCE (BANK 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

#### TROUBLE SYMPTOM:

- Engine stalls.
- Improper idling

#### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

Step	Check	Yes	No
<b>1</b> <b>CHECK CURRENT DATA.</b> 1) Start the engine and let it idle. 2) Read the value of «VVT Adv. Ang. Amount R» using the Subaru Select Monitor. NOTE: For detailed operation procedures, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H6DO)(diag)-36, Subaru Select Monitor.>	Is the value of «VVT Adv. Ang. Amount R» approx. 0 deg?	Go to step 2.	Check the following item and repair or replace if necessary. <ul style="list-style-type: none"> <li>• Oil pipe (clog)</li> <li>• Oil flow control solenoid valve (clog or dirt of oil routing, setting of spring)</li> <li>• Intake camshaft (dirt, damage of camshaft)</li> </ul>
<b>2</b> <b>CHECK CURRENT DATA.</b> 1) Drive with acceleration and deceleration at 80 km/h (50 MPH) or less. NOTE: Drive to an extent that the duty output of oil flow control solenoid valve increases. 2) Read the values of «OCV Duty R» and «VVT Adv. Ang. Amount R» using the Subaru Select Monitor. NOTE: For detailed operation procedures, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H6DO)(diag)-36, Subaru Select Monitor.>	When the value of «OCV Duty R» increases more than 10%, is the value of «VVT Adv. Ang. Amount R» approx. 0 deg?	Check the following item and repair or replace if necessary. <ul style="list-style-type: none"> <li>• Oil pipe (clog)</li> <li>• Oil flow control solenoid valve (clog or dirt of oil routing, setting of spring)</li> <li>• Intake camshaft (dirt, damage of camshaft)</li> </ul>	Perform the following procedures, and clean the oil routing. Replace the engine oil and idle the engine for 5 minutes, and then replace the oil filter and engine oil. <Ref. to LU(H6DO)-9, REPLACEMENT, Engine Oil.> <Ref. to LU(H6DO)-15, Engine Oil Filter.>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## B: DTC P0014 EXHAUST AVCS SYSTEM 1 (RANGE/PERFORMANCE)

### DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-13, DTC P0014 EXHAUST AVCS SYSTEM 1 (RANGE/PERFORMANCE), Diagnostic Trouble Code (DTC) Detecting Criteria.>

### TROUBLE SYMPTOM:

- Engine stalls.
- Improper idling

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

Step	Check	Yes	No
<b>1</b> <b>CHECK CURRENT DATA.</b> 1) Start the engine and let it idle. 2) Read the value of «Exh. VVT Retard Ang. R» using the Subaru Select Monitor.  NOTE: For detailed operation procedures, refer to “READ CURRENT DATA FOR ENGINE”. <Ref. to EN(H6DO)(diag)-36, Subaru Select Monitor.>	Is the value of «Exh. VVT Retard Ang. R» approx. 0 deg?	Go to step 2.	Check the following item and repair or replace if necessary. <ul style="list-style-type: none"> <li>• Oil pipe (clog)</li> <li>• Oil flow control solenoid valve (clog or dirt of oil routing, setting of spring)</li> <li>• Exhaust camshaft (dirt, damage of camshaft)</li> </ul>
<b>2</b> <b>CHECK CURRENT DATA.</b> 1) Drive with acceleration and deceleration at 80 km/h (50 MPH) or less.  NOTE: Drive to an extent that the duty output of oil flow control solenoid valve increases. 2) Read the values of «Exh. OCV Duty R» and «Exh. VVT Retard Ang. R» using the Subaru Select Monitor.  NOTE: For detailed operation procedures, refer to “READ CURRENT DATA FOR ENGINE”. <Ref. to EN(H6DO)(diag)-36, Subaru Select Monitor.>	When the value of «Exh. OCV Duty R» increases more than 10%, is the value of «Exh. VVT Retard Ang. R» approx. 0 deg?	Check the following item and repair or replace if necessary. <ul style="list-style-type: none"> <li>• Oil pipe (clog)</li> <li>• Oil flow control solenoid valve (clog or dirt of oil routing, setting of spring)</li> <li>• Exhaust camshaft (dirt, damage of camshaft)</li> </ul>	Perform the following procedures, and clean the oil routing. Replace the engine oil and idle the engine for 5 minutes, and then replace the oil filter and engine oil. <Ref. to LU(H6DO)-9, REPLACEMENT, Engine Oil.> <Ref. to LU(H6DO)-15, Engine Oil Filter.>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## C: DTC P0016 CRANKSHAFT POSITION - CAMSHAFT POSITION CORRELATION (BANK1)

### DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-15, DTC P0016 CRANKSHAFT POSITION - CAMSHAFT POSITION CORRELATION (BANK1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

### TROUBLE SYMPTOM:

- Engine stalls.
- Improper idling

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

	Step	Check	Yes	No
1	<p><b>CHECK CURRENT DATA.</b></p> <p>1) Start the engine and let it idle.</p> <p>2) Read the values of «VVT Adv. Ang. Amount R» and «OCV Duty R» using the Subaru Select Monitor.</p> <p>NOTE: For detailed operation procedures, refer to “READ CURRENT DATA FOR ENGINE”. &lt;Ref. to EN(H6DO)(diag)-36, Subaru Select Monitor.&gt;</p>	<p>Is the value of «VVT Adv. Ang. Amount R» approx. 0 deg, and the value of «OCV Duty R» approx. 10%?</p>	<p>Perform the following procedures, and clean the oil routing.</p> <p>Replace the engine oil and idle the engine for 5 minutes, and then replace the oil filter and engine oil.</p> <p>&lt;Ref. to LU(H6DO)-9, REPLACEMENT, Engine Oil.&gt; &lt;Ref. to LU(H6DO)-15, Engine Oil Filter.&gt;</p>	<p>Check the following item and repair or replace if necessary.</p> <ul style="list-style-type: none"> <li>• Oil pipe (clog)</li> <li>• Oil flow control solenoid valve (clog or dirt of oil routing, setting of spring)</li> <li>• Intake camshaft (dirt, damage of camshaft)</li> <li>• Timing chain (matching of timing mark)</li> </ul>



# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## D: DTC P0017 CRANK AND CAM TIMING B SYSTEM FAILURE (BANK 1)

### DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-17, DTC P0017 CRANK AND CAM TIMING B SYSTEM FAILURE (BANK 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

### TROUBLE SYMPTOM:

- Engine stalls.
- Improper idling

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

Step	Check	Yes	No
<b>1</b> <b>CHECK CURRENT DATA.</b> 1) Start the engine and let it idle. 2) Read the values of «Exh. VVT Retard Ang. R» and «Exh. OCV Duty R» using the Subaru Select Monitor.  NOTE: For detailed operation procedures, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H6DO)(diag)-36, Subaru Select Monitor.>	Is the value of «Exh. VVT Retard Ang. R» approx. 0 deg, and the value of «Exh. OCV Duty R» approx. 10%?	Perform the following procedures, and clean the oil routing. Replace the engine oil and idle the engine for 5 minutes, and then replace the oil filter and engine oil. <Ref. to LU(H6DO)-9, REPLACEMENT, Engine Oil.> <Ref. to LU(H6DO)-15, Engine Oil Filter.>	Check the following item and repair or replace if necessary. <ul style="list-style-type: none"><li>• Oil pipe (clog)</li><li>• Oil flow control solenoid valve (clog or dirt of oil routing, setting of spring)</li><li>• Exhaust camshaft (dirt, damage of camshaft)</li><li>• Timing chain (matching of timing mark)</li></ul>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## E: DTC P0018 CRANKSHAFT POSITION - CAMSHAFT POSITION CORRELATION (BANK2)

### DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-19, DTC P0018 CRANKSHAFT POSITION - CAMSHAFT POSITION CORRELATION (BANK2), Diagnostic Trouble Code (DTC) Detecting Criteria.>

### TROUBLE SYMPTOM:

- Engine stalls.
- Improper idling

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

	Step	Check	Yes	No
1	<p><b>CHECK CURRENT DATA.</b></p> <p>1) Start the engine and let it idle.</p> <p>2) Read the values of «VVT Adv. Ang. Amount L» and «OCV Duty L» using the Subaru Select Monitor.</p> <p>NOTE: For detailed operation procedures, refer to “READ CURRENT DATA FOR ENGINE”. &lt;Ref. to EN(H6DO)(diag)-36, Subaru Select Monitor.&gt;</p>	<p>Is the value of «VVT Adv. Ang. Amount L» approx. 0 deg, and the value of «OCV Duty L» approx. 10%?</p>	<p>Perform the following procedures, and clean the oil routing.</p> <p>Replace the engine oil and idle the engine for 5 minutes, and then replace the oil filter and engine oil.</p> <p>&lt;Ref. to LU(H6DO)-9, REPLACEMENT, Engine Oil.&gt; &lt;Ref. to LU(H6DO)-15, Engine Oil Filter.&gt;</p>	<p>Check the following item and repair or replace if necessary.</p> <ul style="list-style-type: none"> <li>• Oil pipe (clog)</li> <li>• Oil flow control solenoid valve (clog or dirt of oil routing, setting of spring)</li> <li>• Intake camshaft (dirt, damage of camshaft)</li> <li>• Timing chain (matching of timing mark)</li> </ul>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## F: DTC P0019 CRANK AND CAM TIMING B SYSTEM FAILURE (BANK 2)

### DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-19, DTC P0019 CRANK AND CAM TIMING B SYSTEM FAILURE (BANK 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>

### TROUBLE SYMPTOM:

- Engine stalls.
- Improper idling

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

Step	Check	Yes	No
<b>1</b> <b>CHECK CURRENT DATA.</b> 1) Start the engine and let it idle. 2) Read the values of «Exh. VVT Retard Ang. L» and «Exh. OCV Duty L» using the Subaru Select Monitor.  NOTE: For detailed operation procedures, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H6DO)(diag)-36, Subaru Select Monitor.>	Is the value of «Exh. VVT Retard Ang. L» approx. 0 deg, and the value of «Exh. OCV Duty L» approx. 10%?	Perform the following procedures, and clean the oil routing. Replace the engine oil and idle the engine for 5 minutes, and then replace the oil filter and engine oil. <Ref. to LU(H6DO)-9, REPLACEMENT, Engine Oil.> <Ref. to LU(H6DO)-15, Engine Oil Filter.>	Check the following item and repair or replace if necessary. <ul style="list-style-type: none"><li>• Oil pipe (clog)</li><li>• Oil flow control solenoid valve (clog or dirt of oil routing, setting of spring)</li><li>• Exhaust camshaft (dirt, damage of camshaft)</li><li>• Timing chain (matching of timing mark)</li></ul>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## G: DTC P0021 INTAKE CAMSHAFT POSITION - TIMING OVER-ADVANCED OR SYSTEM PERFORMANCE (BANK 2)

### DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-19, DTC P0021 INTAKE CAMSHAFT POSITION - TIMING OVER-ADVANCED OR SYSTEM PERFORMANCE (BANK 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>

### TROUBLE SYMPTOM:

- Engine stalls.
- Improper idling

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

	Step	Check	Yes	No
1	<p><b>CHECK CURRENT DATA.</b></p> <p>1) Start the engine and let it idle.</p> <p>2) Read the value of «VVT Adv. Ang. Amount L» using the Subaru Select Monitor.</p> <p>NOTE: For detailed operation procedures, refer to “READ CURRENT DATA FOR ENGINE”. &lt;Ref. to EN(H6DO)(diag)-36, Subaru Select Monitor.&gt;</p>	Is the value of «VVT Adv. Ang. Amount L» approx. 0 deg?	Go to step 2.	<p>Check the following item and repair or replace if necessary.</p> <ul style="list-style-type: none"> <li>• Oil pipe (clog)</li> <li>• Oil flow control solenoid valve (clog or dirt of oil routing, setting of spring)</li> <li>• Intake camshaft (dirt, damage of camshaft)</li> </ul>
2	<p><b>CHECK CURRENT DATA.</b></p> <p>1) Drive with acceleration and deceleration at 80 km/h (50 MPH) or less.</p> <p>NOTE: Drive to an extent that the duty output of oil flow control solenoid valve increases.</p> <p>2) Read the values of «OCV Duty L» and «VVT Adv. Ang. Amount L» using the Subaru Select Monitor.</p> <p>NOTE: For detailed operation procedures, refer to “READ CURRENT DATA FOR ENGINE”. &lt;Ref. to EN(H6DO)(diag)-36, Subaru Select Monitor.&gt;</p>	When the value of «OCV Duty L» increases more than 10%, is the value of «VVT Adv. Ang. Amount L» approx. 0 deg?	<p>Check the following item and repair or replace if necessary.</p> <ul style="list-style-type: none"> <li>• Oil pipe (clog)</li> <li>• Oil flow control solenoid valve (clog or dirt of oil routing, setting of spring)</li> <li>• Intake camshaft (dirt, damage of camshaft)</li> </ul>	<p>Perform the following procedures, and clean the oil routing.</p> <p>Replace the engine oil and idle the engine for 5 minutes, and then replace the oil filter and engine oil.</p> <p>&lt;Ref. to LU(H6DO)-9, REPLACEMENT, Engine Oil.&gt; &lt;Ref. to LU(H6DO)-15, Engine Oil Filter.&gt;</p>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## H: DTC P0024 EXHAUST AVCS SYSTEM 2 (RANGE/PERFORMANCE)

### DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-19, DTC P0024 EXHAUST AVCS SYSTEM 2 (RANGE/PERFORMANCE), Diagnostic Trouble Code (DTC) Detecting Criteria.>

### TROUBLE SYMPTOM:

- Engine stalls.
- Improper idling

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

Step	Check	Yes	No
<p><b>1</b></p> <p><b>CHECK CURRENT DATA.</b></p> <p>1) Start the engine and let it idle.</p> <p>2) Read the value of «Exh. VVT Retard Ang. L» using the Subaru Select Monitor.</p> <p>NOTE: For detailed operation procedures, refer to “READ CURRENT DATA FOR ENGINE”. &lt;Ref. to EN(H6DO)(diag)-36, Subaru Select Monitor.&gt;</p>	<p>Is the value of «Exh. VVT Retard Ang. L» approx. 0 deg?</p>	<p>Go to step 2.</p>	<p>Check the following item and repair or replace if necessary.</p> <ul style="list-style-type: none"> <li>• Oil pipe (clog)</li> <li>• Oil flow control solenoid valve (clog or dirt of oil routing, setting of spring)</li> <li>• Exhaust camshaft (dirt, damage of camshaft)</li> </ul>
<p><b>2</b></p> <p><b>CHECK CURRENT DATA.</b></p> <p>1) Drive with acceleration and deceleration at 80 km/h (50 MPH) or less.</p> <p>NOTE: Drive to an extent that the duty output of oil flow control solenoid valve increases.</p> <p>2) Read the values of «Exh. OCV Duty L» and «Exh. VVT Retard Ang. L» using the Subaru Select Monitor.</p> <p>NOTE: For detailed operation procedures, refer to “READ CURRENT DATA FOR ENGINE”. &lt;Ref. to EN(H6DO)(diag)-36, Subaru Select Monitor.&gt;</p>	<p>When the value of «Exh. OCV Duty L» increases more than 10%, is the value of «Exh. VVT Retard Ang. L» approx. 0 deg?</p>	<p>Check the following item and repair or replace if necessary.</p> <ul style="list-style-type: none"> <li>• Oil pipe (clog)</li> <li>• Oil flow control solenoid valve (clog or dirt of oil routing, setting of spring)</li> <li>• Exhaust camshaft (dirt, damage of camshaft)</li> </ul>	<p>Perform the following procedures, and clean the oil routing.</p> <p>Replace the engine oil and idle the engine for 5 minutes, and then replace the oil filter and engine oil.</p> <p>&lt;Ref. to LU(H6DO)-9, REPLACEMENT, Engine Oil.&gt; &lt;Ref. to LU(H6DO)-15, Engine Oil Filter.&gt;</p>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## I: DTC P0030 HO2S HEATER CONTROL CIRCUIT (BANK 1 SENSOR 1)

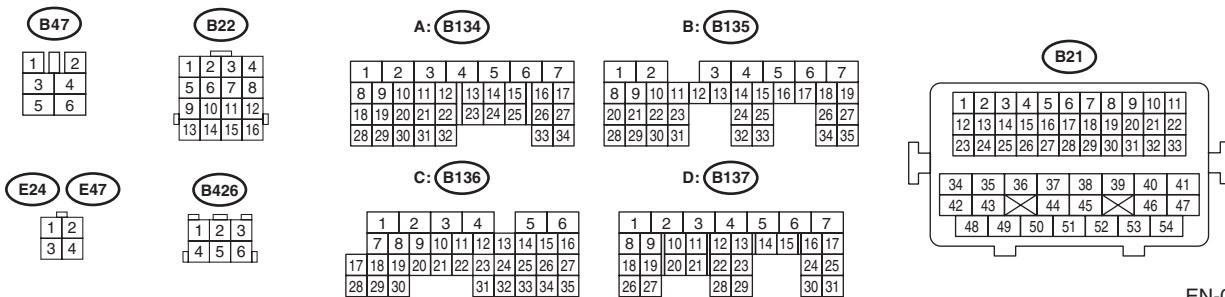
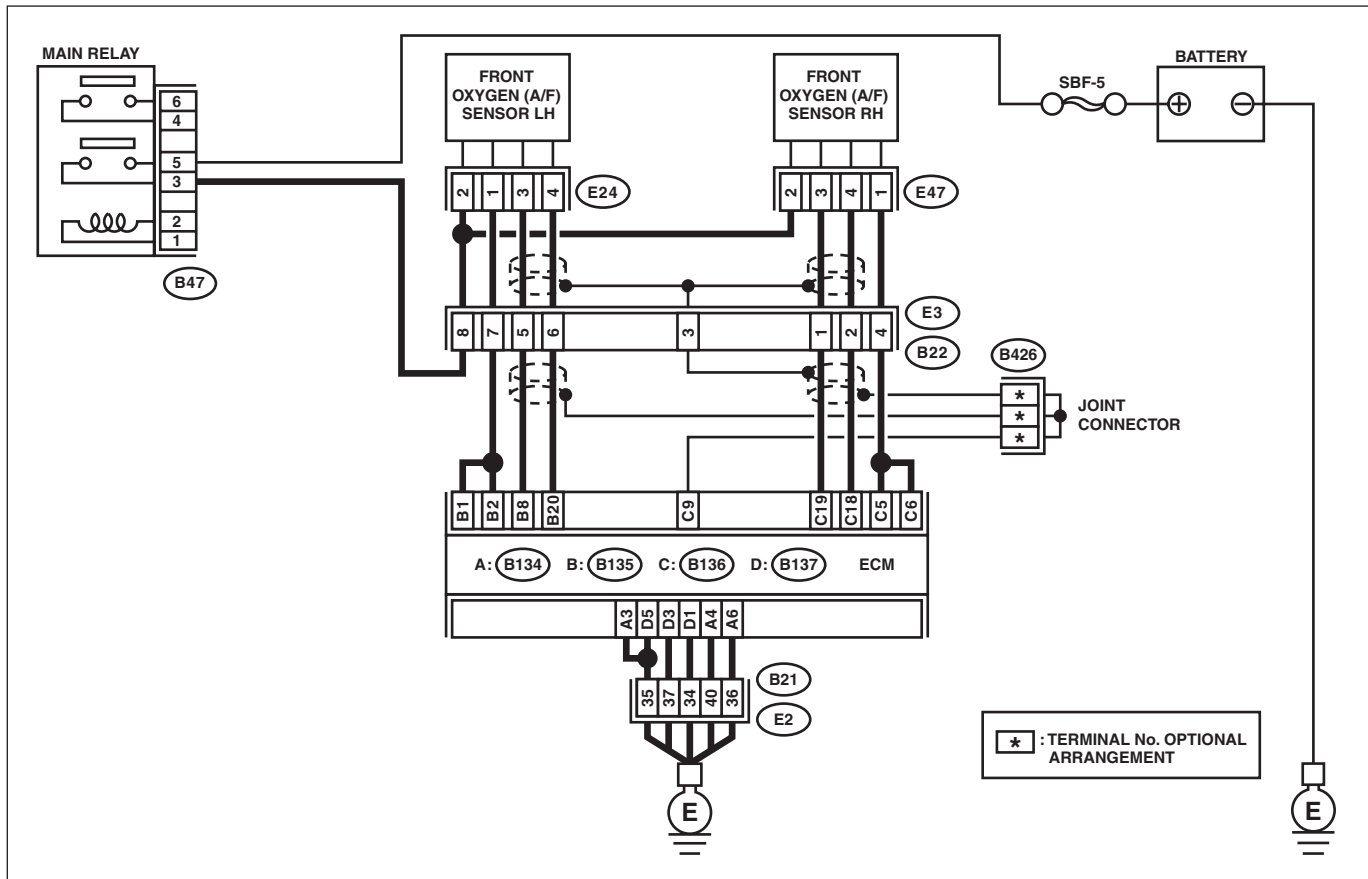
### DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-20, DTC P0030 HO2S HEATER CONTROL CIRCUIT (BANK 1 SENSOR 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

### WIRING DIAGRAM:



EN-08076

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<p><b>1</b>     <b>CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.</b></p> <p>1) Start and warm up the engine.                  2) Turn the ignition switch to OFF.                  3) Disconnect the connectors from ECM and front oxygen (A/F) sensor.                  4) Measure the resistance of harness between ECM and front oxygen (A/F) sensor connector.</p> <p><b>Connector &amp; terminal</b>  <b>(B136) No. 5 — (E47) No. 1:</b>  <b>(B136) No. 6 — (E47) No. 1:</b>  <b>(B136) No. 19 — (E47) No. 3:</b>  <b>(B136) No. 18 — (E47) No. 4:</b></p>	<p>Is the resistance less than 1 Ω?</p>	<p>Go to step 2.</p>	<p>Repair the harness and connector.</p> <p>NOTE:                  In this case, repair the following item:</p> <ul style="list-style-type: none"> <li>• Open circuit in harness between ECM and front oxygen (A/F) sensor connector</li> <li>• Poor contact of coupling connector</li> </ul>
<p><b>2</b>     <b>CHECK FRONT OXYGEN (A/F) SENSOR.</b>                  Measure the resistance between front oxygen (A/F) sensor connector terminals.</p> <p><b>Terminals</b>  <b>No. 2 — No. 1:</b></p>	<p>Is the resistance 2 — 3 Ω?</p>	<p>Go to step 3.</p>	<p>Replace the front oxygen (A/F) sensor. &lt;Ref. to FU(H6DO)-48, Front Oxygen (A/F) Sensor.&gt;</p>
<p><b>3</b>     <b>CHECK FOR POOR CONTACT.</b>                  Check for poor contact of ECM and front oxygen (A/F) sensor connector.</p>	<p>Is there poor contact of ECM or front oxygen (A/F) sensor connector?</p>	<p>Repair the poor contact of ECM or front oxygen (A/F) sensor connector.</p>	<p>Replace the front oxygen (A/F) sensor. &lt;Ref. to FU(H6DO)-48, Front Oxygen (A/F) Sensor.&gt;</p>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## J: DTC P0031 HO2S HEATER CONTROL CIRCUIT LOW (BANK 1 SENSOR 1)

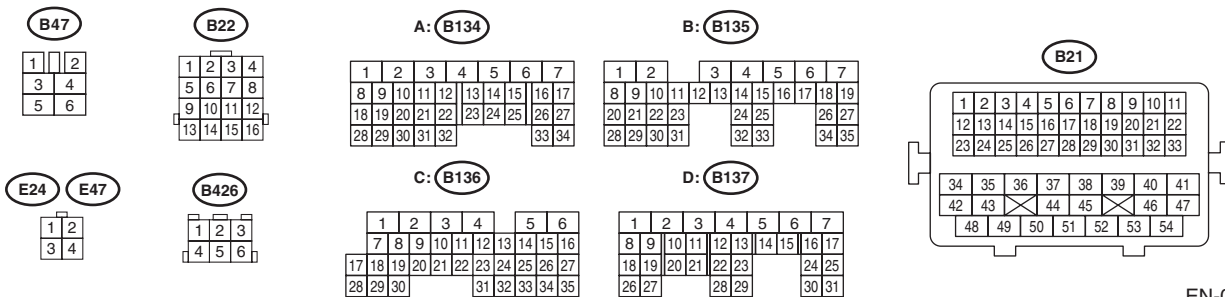
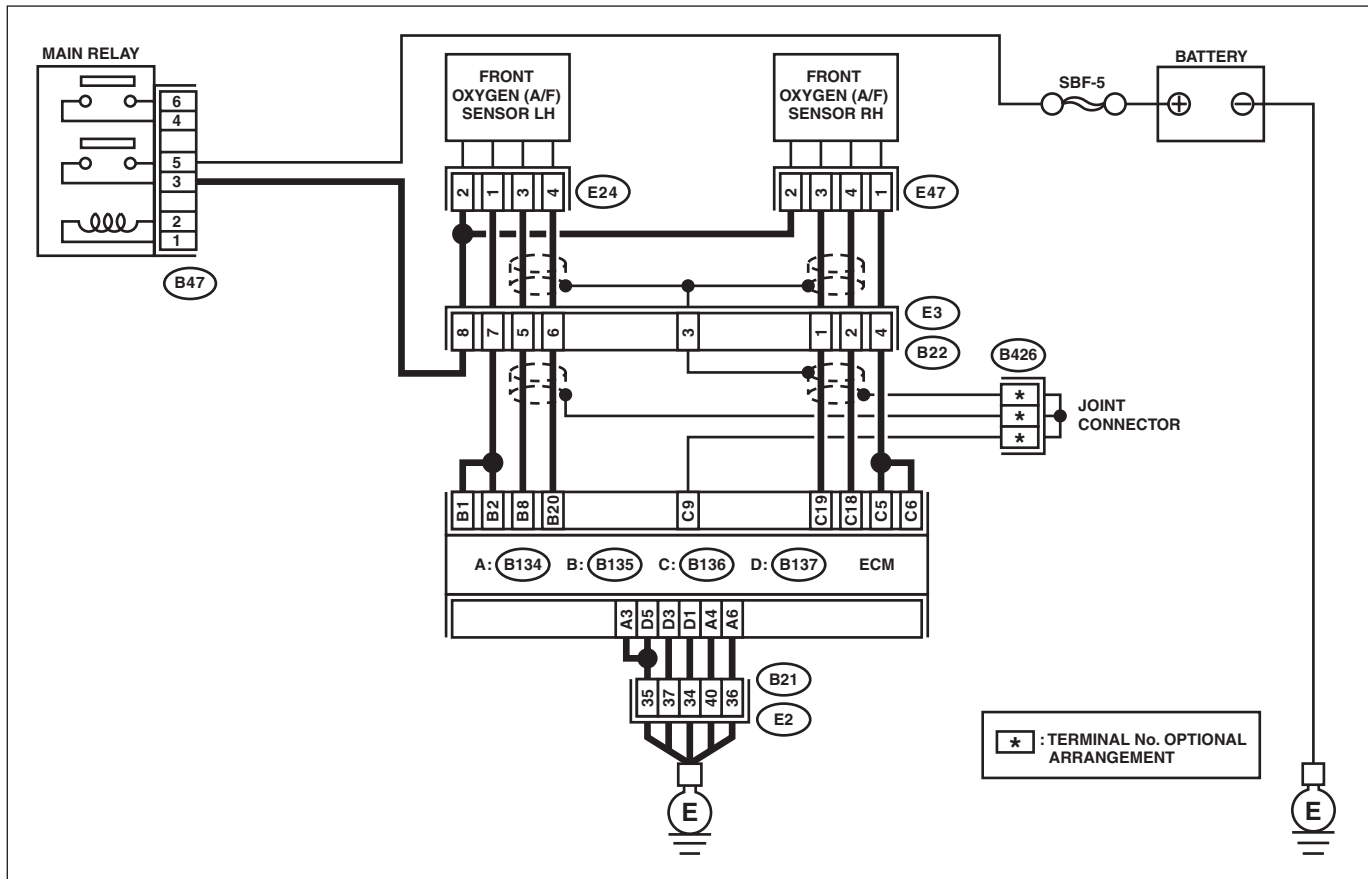
### DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-22, DTC P0031 HO2S HEATER CONTROL CIRCUIT LOW (BANK 1 SENSOR 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

### WIRING DIAGRAM:



EN-08076



# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

	Step	Check	Yes	No
1	<p><b>CHECK POWER SUPPLY TO FRONT OXYGEN (A/F) SENSOR.</b></p> <ol style="list-style-type: none"> <li>1) Turn the ignition switch to OFF.</li> <li>2) Disconnect the connectors from front oxygen (A/F) sensor.</li> <li>3) Turn the ignition switch to ON.</li> <li>4) Measure the voltage between front oxygen (A/F) sensor connector and engine ground.</li> </ol> <p><b>Connector &amp; terminal</b> <b>(E47) No. 2 (+) — Engine ground (-):</b></p>	Is the voltage 10 V or more?	Go to step 2.	<p>Repair the power supply line.</p> <p>NOTE: In this case, repair the following item:</p> <ul style="list-style-type: none"> <li>• Open circuit of harness between main relay and front oxygen (A/F) sensor connector</li> <li>• Poor contact of main relay connector</li> <li>• Poor contact of coupling connector</li> <li>• Defective main relay</li> </ul>
2	<p><b>CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.</b></p> <ol style="list-style-type: none"> <li>1) Turn the ignition switch to OFF.</li> <li>2) Disconnect the connectors from ECM.</li> <li>3) Measure the resistance between ECM and front oxygen (A/F) sensor connector.</li> </ol> <p><b>Connector &amp; terminal</b> <b>(B136) No. 5 — (E47) No. 1:</b> <b>(B136) No. 6 — (E47) No. 1:</b></p>	Is the resistance less than 1 Ω?	Go to step 3.	<p>Repair the harness and connector.</p> <p>NOTE: In this case, repair the following item:</p> <ul style="list-style-type: none"> <li>• Open circuit in harness between ECM and front oxygen (A/F) sensor connector</li> <li>• Poor contact of coupling connector</li> </ul>
3	<p><b>CHECK GROUND CIRCUIT FOR ECM.</b></p> <p>Measure the resistance of harness between ECM and chassis ground.</p> <p><b>Connector &amp; terminal</b> <b>(B134) No. 3 — Chassis ground:</b> <b>(B134) No. 4 — Chassis ground:</b> <b>(B134) No. 6 — Chassis ground:</b> <b>(B137) No. 1 — Chassis ground:</b> <b>(B137) No. 3 — Chassis ground:</b> <b>(B137) No. 5 — Chassis ground:</b></p>	Is the resistance less than 5 Ω?	Go to step 4.	<p>Repair the harness and connector.</p> <p>NOTE: In this case, repair the following item:</p> <ul style="list-style-type: none"> <li>• Open circuit of harness between ECM and engine ground</li> <li>• Poor contact of coupling connector</li> </ul>
4	<p><b>CHECK FRONT OXYGEN (A/F) SENSOR.</b></p> <p>Measure the resistance between front oxygen (A/F) sensor connector terminals.</p> <p><b>Terminals</b> <b>No. 2 — No. 1:</b></p>	Is the resistance 2 — 3 Ω?	Repair the poor contact of ECM connector.	<p>Replace the front oxygen (A/F) sensor. &lt;Ref. to FU(H6DO)-48, Front Oxygen (A/F) Sensor.&gt;</p>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## K: DTC P0032 HO2S HEATER CONTROL CIRCUIT HIGH (BANK 1 SENSOR 1)

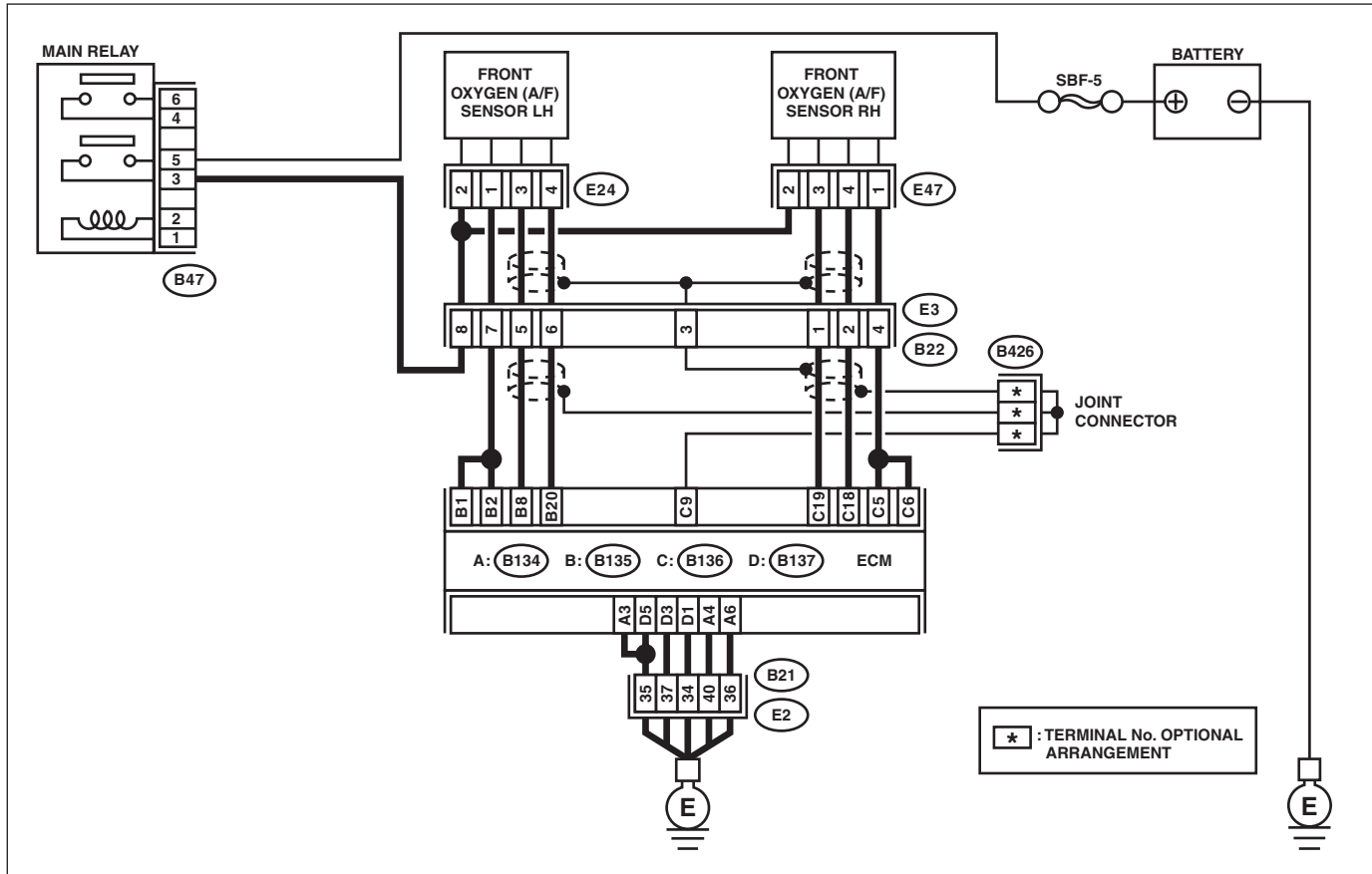
### DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-24, DTC P0032 HO2S HEATER CONTROL CIRCUIT HIGH (BANK 1 SENSOR 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

### WIRING DIAGRAM:



B47



B22



A: B134



B: B135



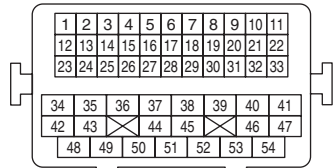
C: B136



D: B137



B21



EN-08076

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

	Step	Check	Yes	No
1	<p><b>CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.</b></p> <p>1) Turn the ignition switch to OFF.</p> <p>2) Measure the voltage between ECM and chassis ground.</p> <p><b>Connector &amp; terminal</b>  <b>(B136) No. 5 (+) — Chassis ground (-):</b>  <b>(B136) No. 6 (+) — Chassis ground (-):</b></p>	Is the voltage 10 V or more?	Repair the short circuit to power in the harness between ECM and front oxygen (A/F) sensor connector.	Go to step 2.
2	<p><b>CHECK GROUND CIRCUIT FOR ECM.</b></p> <p>1) Disconnect the connectors from ECM.</p> <p>2) Measure the resistance between ECM and chassis ground.</p> <p><b>Connector &amp; terminal</b>  <b>(B134) No. 3 — Chassis ground:</b>  <b>(B134) No. 4 — Chassis ground:</b>  <b>(B134) No. 6 — Chassis ground:</b>  <b>(B137) No. 1 — Chassis ground:</b>  <b>(B137) No. 3 — Chassis ground:</b>  <b>(B137) No. 5 — Chassis ground:</b></p>	Is the resistance less than 5 Ω?	Repair the poor contact of ECM connector.	<p>Repair the harness and connector.</p> <p><b>NOTE:</b>            In this case, repair the following item:</p> <ul style="list-style-type: none"> <li>• Open circuit of harness between ECM and engine ground</li> <li>• Poor contact of coupling connector</li> </ul>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## L: DTC P0037 HO2S HEATER CONTROL CIRCUIT LOW (BANK 1 SENSOR 2)

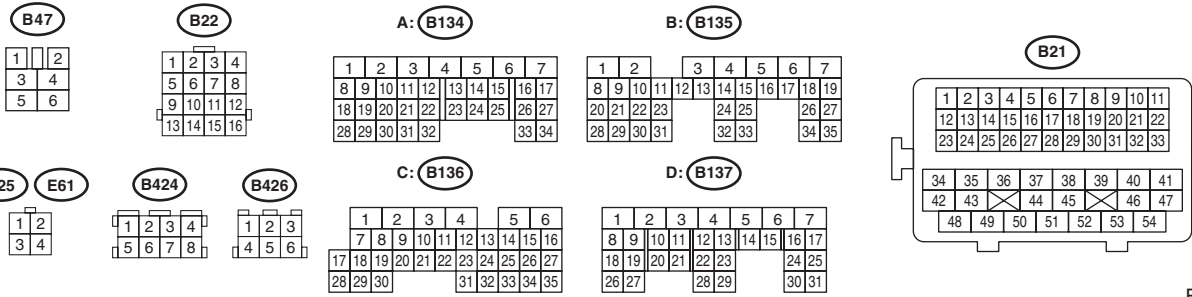
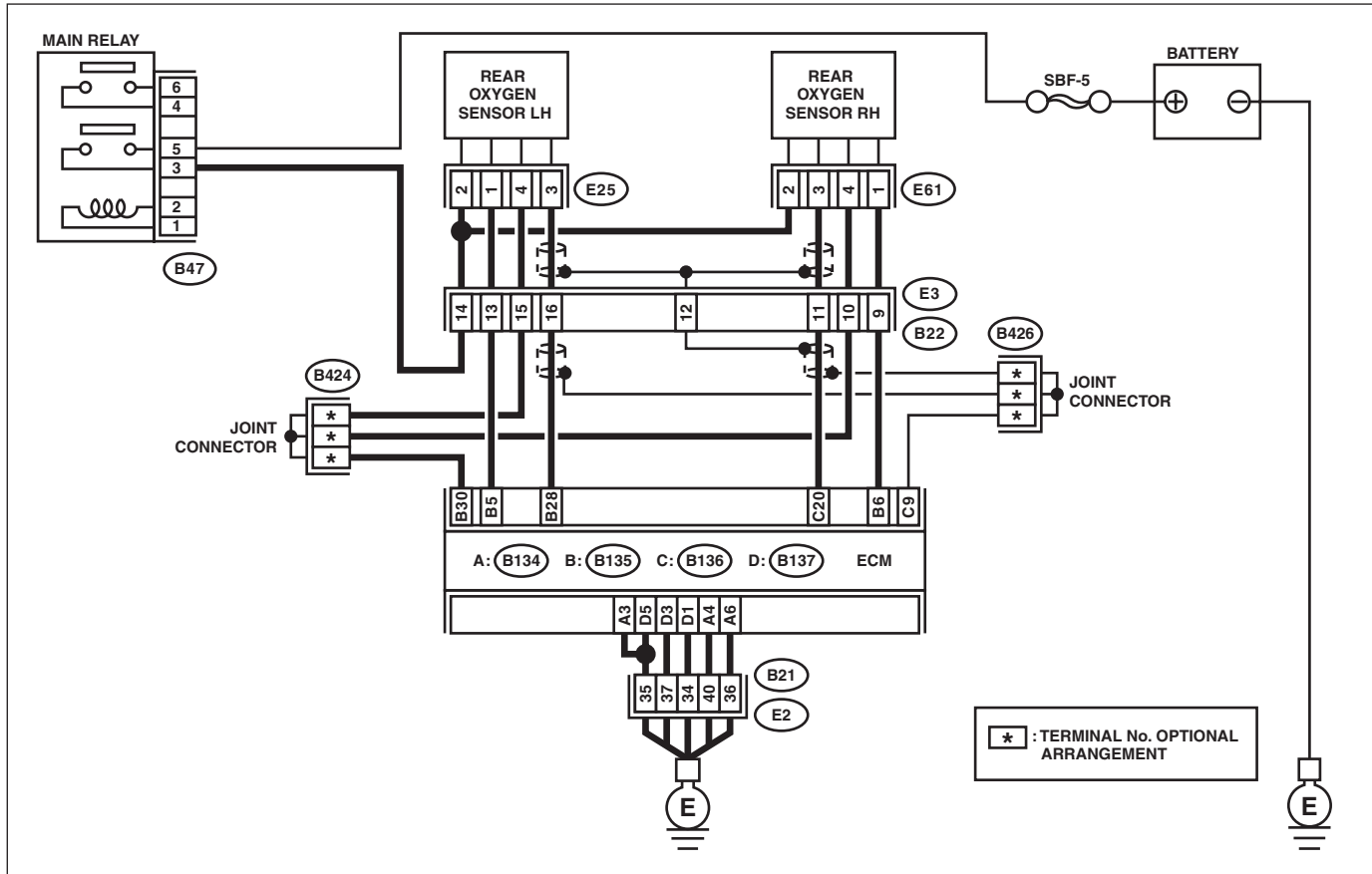
### DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-26, DTC P0037 HO2S HEATER CONTROL CIRCUIT LOW (BANK 1 SENSOR 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

### WIRING DIAGRAM:



EN-08077

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

	Step	Check	Yes	No
1	<p><b>CHECK POWER SUPPLY TO REAR OXYGEN SENSOR.</b></p> <ol style="list-style-type: none"> <li>1) Turn the ignition switch to OFF.</li> <li>2) Disconnect the connector from rear oxygen sensor.</li> <li>3) Turn the ignition switch to ON.</li> <li>4) Measure the voltage between rear oxygen sensor connector and engine ground.</li> </ol> <p><b>Connector &amp; terminal</b> <b>(E61) No. 2 (+) — Engine ground (-):</b></p>	Is the voltage 10 V or more?	Go to step 2.	<p>Repair the power supply line.</p> <p>NOTE: In this case, repair the following item:</p> <ul style="list-style-type: none"> <li>• Open circuit of harness between main relay and rear oxygen sensor connector</li> <li>• Poor contact of main relay connector</li> <li>• Poor contact of coupling connector</li> <li>• Defective main relay</li> </ul>
2	<p><b>CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.</b></p> <ol style="list-style-type: none"> <li>1) Turn the ignition switch to OFF.</li> <li>2) Disconnect the connector from ECM.</li> <li>3) Measure the resistance between ECM and oxygen sensor connector.</li> </ol> <p><b>Connector &amp; terminal</b> <b>(B135) No. 6 — (E61) No. 1:</b></p>	Is the resistance less than 1 $\Omega$ ?	Go to step 3.	<p>Repair the harness and connector.</p> <p>NOTE: In this case, repair the following item:</p> <ul style="list-style-type: none"> <li>• Open circuit in harness between ECM and rear oxygen sensor connector</li> <li>• Poor contact of coupling connector</li> </ul>
3	<p><b>CHECK GROUND CIRCUIT FOR ECM.</b></p> <p>Measure the resistance of harness between ECM and chassis ground.</p> <p><b>Connector &amp; terminal</b> <b>(B134) No. 3 — Chassis ground:</b> <b>(B134) No. 4 — Chassis ground:</b> <b>(B134) No. 6 — Chassis ground:</b> <b>(B137) No. 1 — Chassis ground:</b> <b>(B137) No. 3 — Chassis ground:</b> <b>(B137) No. 5 — Chassis ground:</b></p>	Is the resistance less than 5 $\Omega$ ?	Go to step 4.	<p>Repair the harness and connector.</p> <p>NOTE: In this case, repair the following item:</p> <ul style="list-style-type: none"> <li>• Open circuit of harness between ECM and engine ground</li> <li>• Poor contact of coupling connector</li> </ul>
4	<p><b>CHECK REAR OXYGEN SENSOR.</b></p> <p>Measure the resistance between rear oxygen sensor connector terminals.</p> <p><b>Terminals</b> <b>No. 2 — No. 1:</b></p>	Is the resistance 5 — 7 $\Omega$ ?	Repair the poor contact of ECM connector.	<p>Replace the rear oxygen sensor.</p> <p>&lt;Ref. to FU(H6DO)-50, Rear Oxygen Sensor.&gt;</p>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## M: DTC P0038 HO2S HEATER CONTROL CIRCUIT HIGH (BANK 1 SENSOR 2)

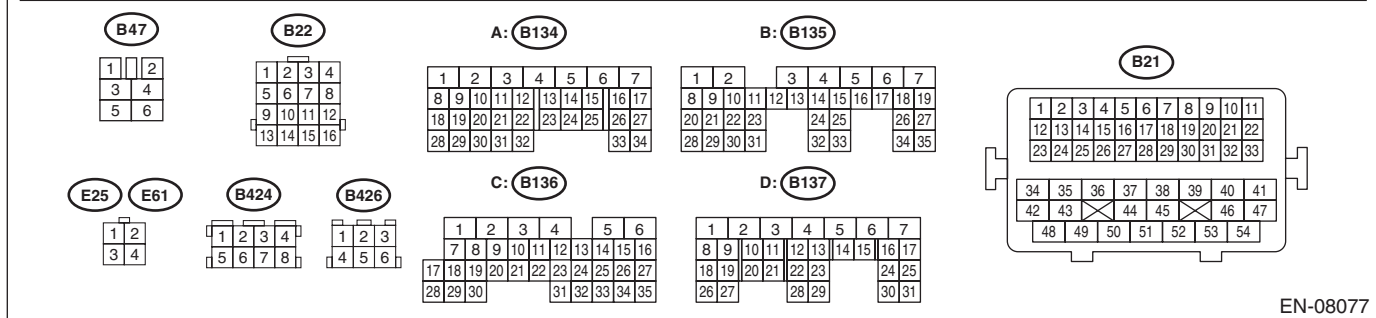
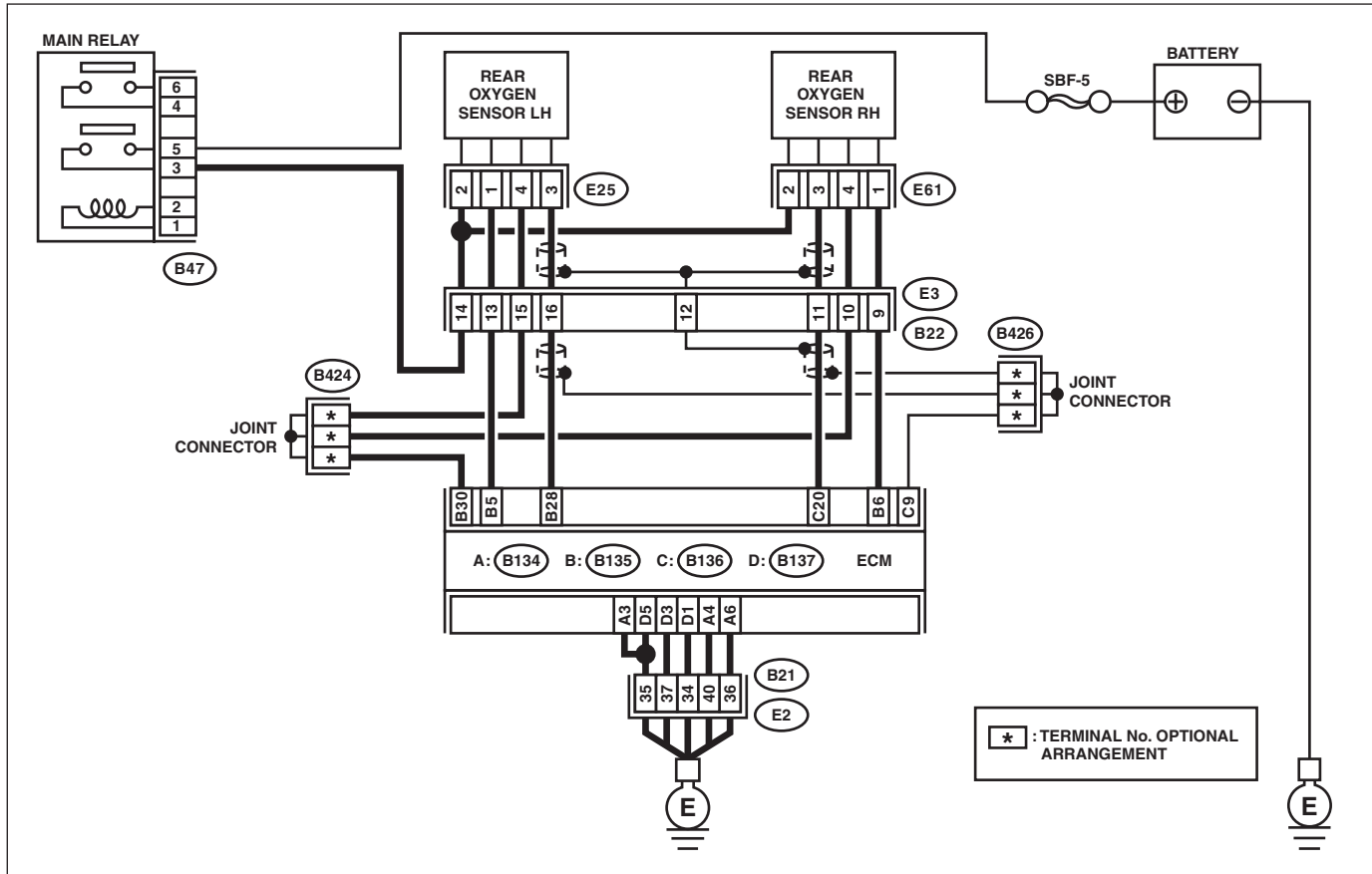
### DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-28, DTC P0038 HO2S HEATER CONTROL CIRCUIT HIGH (BANK 1 SENSOR 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

### WIRING DIAGRAM:



EN-08077

Step	Check	Yes	No
<b>1</b> <b>CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.</b> 1) Turn the ignition switch to OFF. 2) Measure the voltage between ECM and chassis ground. <i>Connector &amp; terminal (B135) No. 6 (+) — Chassis ground (-):</i>	Is the voltage 10 V or more?	Repair the short circuit to power in the harness between ECM and rear oxygen sensor connector.	Go to step 2.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<p><b>2</b>      <b>CHECK GROUND CIRCUIT FOR ECM.</b>                      1) Disconnect the connector from ECM.                      2) Measure the resistance between ECM and chassis ground.  <b>Connector &amp; terminal</b>  <i>(B134) No. 3 — Chassis ground:</i>  <i>(B134) No. 4 — Chassis ground:</i>  <i>(B134) No. 6 — Chassis ground:</i>  <i>(B137) No. 1 — Chassis ground:</i>  <i>(B137) No. 3 — Chassis ground:</i>  <i>(B137) No. 5 — Chassis ground:</i></p>	<p>Is the resistance less than 5 Ω?</p>	<p>Repair the poor contact of ECM connector.</p>	<p>Repair the harness and connector.                      NOTE:                      In this case, repair the following item:</p> <ul style="list-style-type: none"> <li>• Open circuit of harness between ECM and engine ground</li> <li>• Poor contact of coupling connector</li> </ul>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## N: DTC P0050 HO2S HEATER CONTROL CIRCUIT (BANK 2 SENSOR 1)

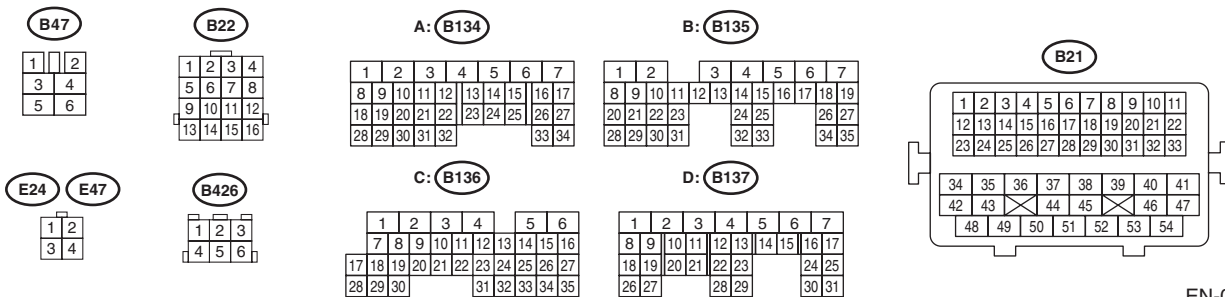
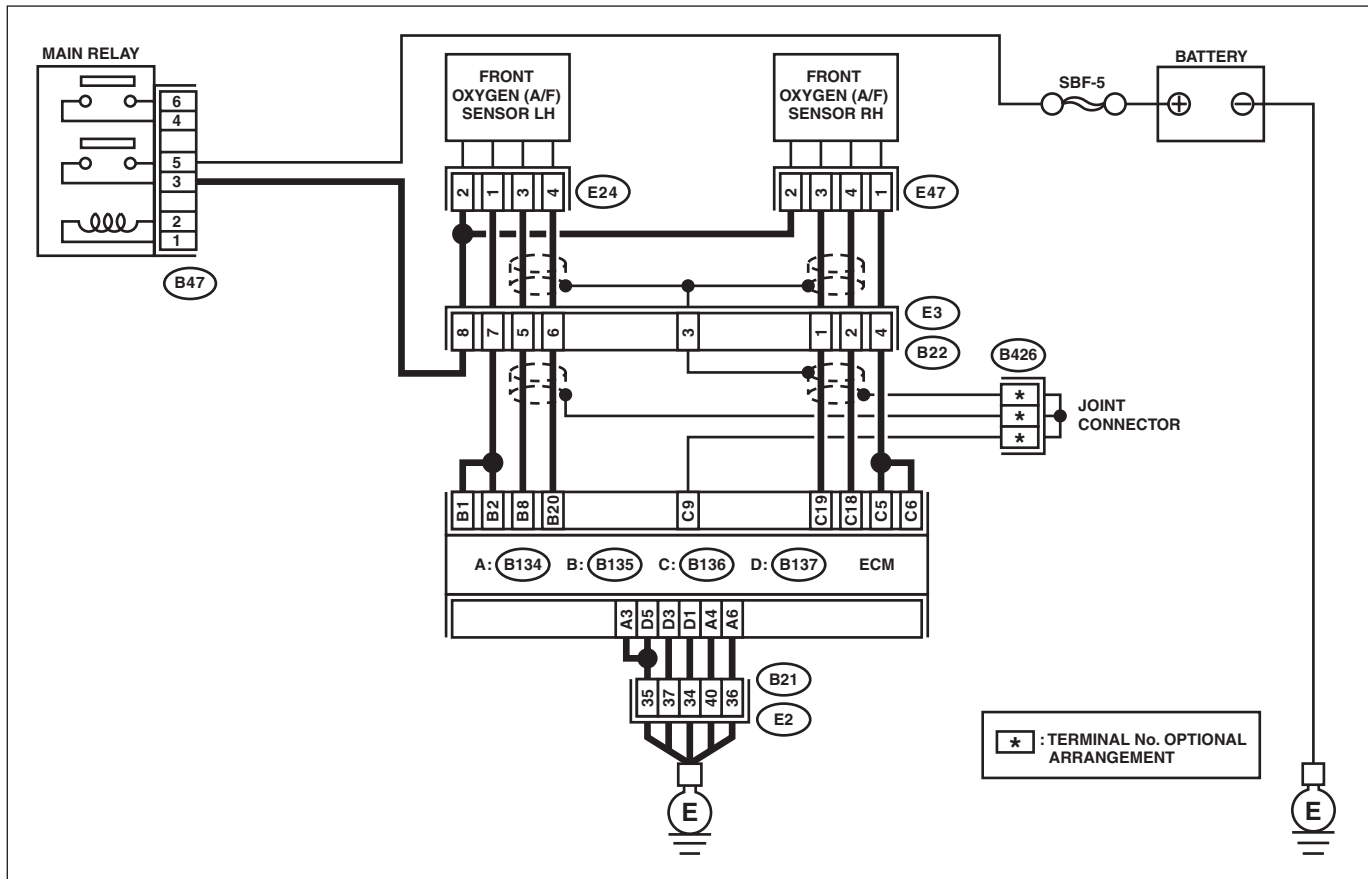
### DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-30, DTC P0050 HO2S HEATER CONTROL CIRCUIT (BANK 2 SENSOR 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

### WIRING DIAGRAM:



EN-08076



# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<p><b>1</b>     <b>CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.</b></p> <p>1) Start and warm up the engine.                      2) Turn the ignition switch to OFF.                      3) Disconnect the connectors from ECM and front oxygen (A/F) sensor.                      4) Measure the resistance of harness between ECM and front oxygen (A/F) sensor connector.</p> <p><b>Connector &amp; terminal</b>                      (B135) No. 1 — (E24) No. 1:                      (B135) No. 2 — (E24) No. 1:                      (B135) No. 8 — (E24) No. 3:                      (B135) No. 20 — (E24) No. 4:</p>	<p>Is the resistance less than 1 Ω?</p>	<p>Go to step 2.</p>	<p>Repair the harness and connector.</p> <p>NOTE:                      In this case, repair the following item:</p> <ul style="list-style-type: none"> <li>• Open circuit in harness between ECM and front oxygen (A/F) sensor connector</li> <li>• Poor contact of coupling connector</li> </ul>
<p><b>2</b>     <b>CHECK FRONT OXYGEN (A/F) SENSOR.</b>                      Measure the resistance between front oxygen (A/F) sensor connector terminals.</p> <p><b>Terminals</b>                      No. 2 — No. 1:</p>	<p>Is the resistance 2 — 3 Ω?</p>	<p>Go to step 3.</p>	<p>Replace the front oxygen (A/F) sensor. &lt;Ref. to FU(H6DO)-48, Front Oxygen (A/F) Sensor.&gt;</p>
<p><b>3</b>     <b>CHECK FOR POOR CONTACT.</b>                      Check for poor contact of ECM and front oxygen (A/F) sensor connector.</p>	<p>Is there poor contact of ECM or front oxygen (A/F) sensor connector?</p>	<p>Repair the poor contact of ECM or front oxygen (A/F) sensor connector.</p>	<p>Replace the front oxygen (A/F) sensor. &lt;Ref. to FU(H6DO)-48, Front Oxygen (A/F) Sensor.&gt;</p>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## O: DTC P0051 HO2S HEATER CONTROL CIRCUIT LOW (BANK 2 SENSOR 1)

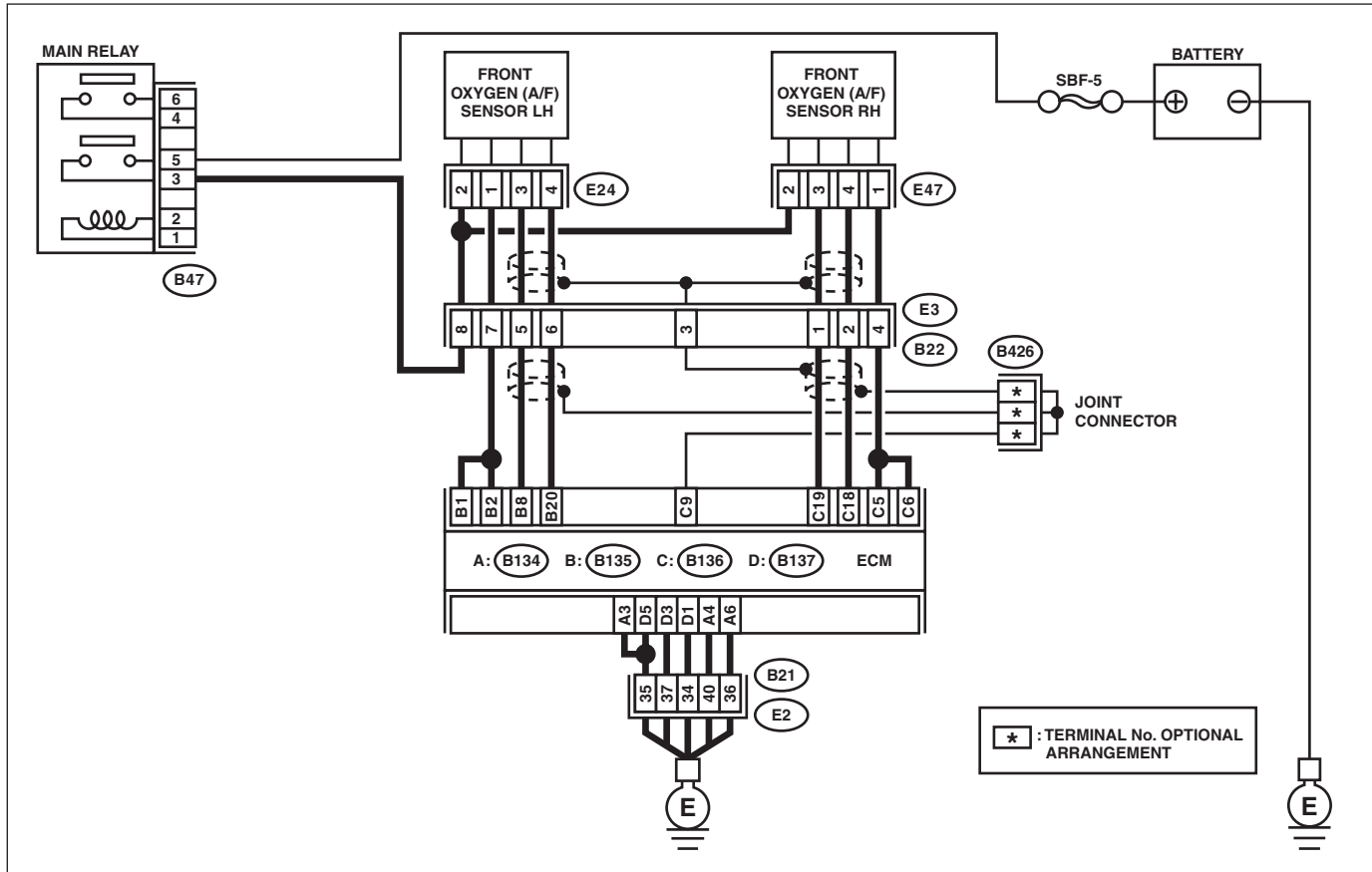
### DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-30, DTC P0051 HO2S HEATER CONTROL CIRCUIT LOW (BANK 2 SENSOR 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

### WIRING DIAGRAM:



B47



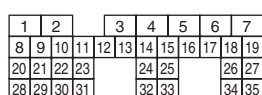
B22



A: B134



B: B135



E24 E47



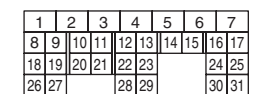
B426



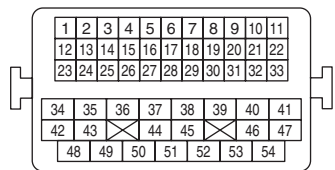
C: B136



D: B137



B21



EN-08076

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

	Step	Check	Yes	No
1	<p><b>CHECK POWER SUPPLY TO FRONT OXYGEN (A/F) SENSOR.</b></p> <ol style="list-style-type: none"> <li>1) Turn the ignition switch to OFF.</li> <li>2) Disconnect the connectors from front oxygen (A/F) sensor.</li> <li>3) Turn the ignition switch to ON.</li> <li>4) Measure the voltage between front oxygen (A/F) sensor connector and engine ground.</li> </ol> <p><b>Connector &amp; terminal</b> <b>(E24) No. 2 (+) — Engine ground (-):</b></p>	Is the voltage 10 V or more?	Go to step 2.	<p>Repair the power supply line.</p> <p>NOTE: In this case, repair the following item:</p> <ul style="list-style-type: none"> <li>• Open circuit of harness between main relay and front oxygen (A/F) sensor connector</li> <li>• Poor contact of main relay connector</li> <li>• Poor contact of coupling connector</li> <li>• Defective main relay</li> </ul>
2	<p><b>CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.</b></p> <ol style="list-style-type: none"> <li>1) Turn the ignition switch to OFF.</li> <li>2) Disconnect the connectors from ECM.</li> <li>3) Measure the resistance between ECM and front oxygen (A/F) sensor connector.</li> </ol> <p><b>Connector &amp; terminal</b> <b>(B135) No. 1 — (E24) No. 1:</b> <b>(B135) No. 2 — (E24) No. 1:</b></p>	Is the resistance less than 1 Ω?	Go to step 3.	<p>Repair the harness and connector.</p> <p>NOTE: In this case, repair the following item:</p> <ul style="list-style-type: none"> <li>• Open circuit in harness between ECM and front oxygen (A/F) sensor connector</li> <li>• Poor contact of coupling connector</li> </ul>
3	<p><b>CHECK GROUND CIRCUIT FOR ECM.</b></p> <p>Measure the resistance of harness between ECM and chassis ground.</p> <p><b>Connector &amp; terminal</b> <b>(B134) No. 3 — Chassis ground:</b> <b>(B134) No. 4 — Chassis ground:</b> <b>(B134) No. 6 — Chassis ground:</b> <b>(B137) No. 1 — Chassis ground:</b> <b>(B137) No. 3 — Chassis ground:</b> <b>(B137) No. 5 — Chassis ground:</b></p>	Is the resistance less than 5 Ω?	Go to step 4.	<p>Repair the harness and connector.</p> <p>NOTE: In this case, repair the following item:</p> <ul style="list-style-type: none"> <li>• Open circuit of harness between ECM and engine ground</li> <li>• Poor contact of coupling connector</li> </ul>
4	<p><b>CHECK FRONT OXYGEN (A/F) SENSOR.</b></p> <p>Measure the resistance between front oxygen (A/F) sensor connector terminals.</p> <p><b>Terminals</b> <b>No. 2 — No. 1:</b></p>	Is the resistance 2 — 3 Ω?	Repair the poor contact of ECM connector.	<p>Replace the front oxygen (A/F) sensor. &lt;Ref. to FU(H6DO)-48, Front Oxygen (A/F) Sensor.&gt;</p>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## P: DTC P0052 HO2S HEATER CONTROL CIRCUIT HIGH (BANK 2 SENSOR 1)

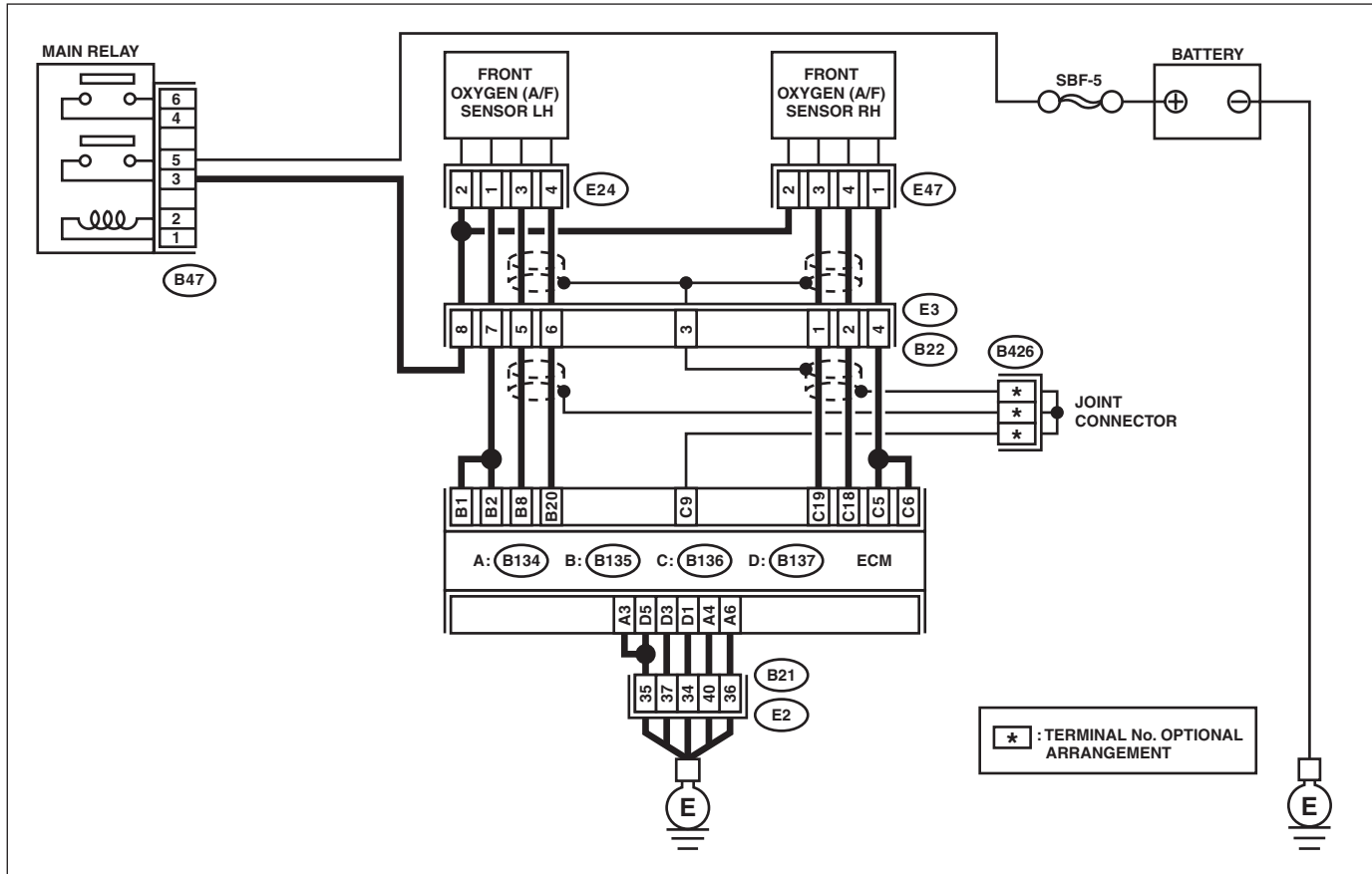
### DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-30, DTC P0052 HO2S HEATER CONTROL CIRCUIT HIGH (BANK 2 SENSOR 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

### WIRING DIAGRAM:



B47



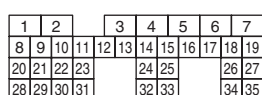
B22



A: B134



B: B135



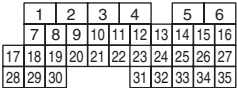
E24 E47



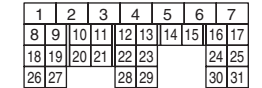
B426



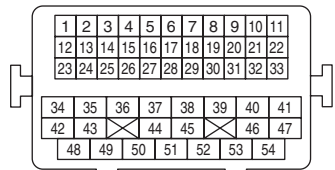
C: B136



D: B137



B21



EN-08076

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

	Step	Check	Yes	No
1	<p><b>CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.</b></p> <p>1) Turn the ignition switch to OFF.</p> <p>2) Measure the voltage between ECM and chassis ground.</p> <p><b>Connector &amp; terminal</b>  <b>(B135) No. 1 (+) — Chassis ground (-):</b>  <b>(B135) No. 2 (+) — Chassis ground (-):</b></p>	Is the voltage 10 V or more?	Repair the short circuit to power in the harness between ECM and front oxygen (A/F) sensor connector.	Go to step 2.
2	<p><b>CHECK GROUND CIRCUIT FOR ECM.</b></p> <p>1) Disconnect the connectors from ECM.</p> <p>2) Measure the resistance between ECM and chassis ground.</p> <p><b>Connector &amp; terminal</b>  <b>(B134) No. 3 — Chassis ground:</b>  <b>(B134) No. 4 — Chassis ground:</b>  <b>(B134) No. 6 — Chassis ground:</b>  <b>(B137) No. 1 — Chassis ground:</b>  <b>(B137) No. 3 — Chassis ground:</b>  <b>(B137) No. 5 — Chassis ground:</b></p>	Is the resistance less than 5 Ω?	Repair the poor contact of ECM connector.	<p>Repair the harness and connector.</p> <p><b>NOTE:</b>            In this case, repair the following item:</p> <ul style="list-style-type: none"> <li>• Open circuit of harness between ECM and engine ground</li> <li>• Poor contact of coupling connector</li> </ul>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## Q: DTC P0057 HO2S HEATER CONTROL CIRCUIT LOW (BANK 2 SENSOR 2)

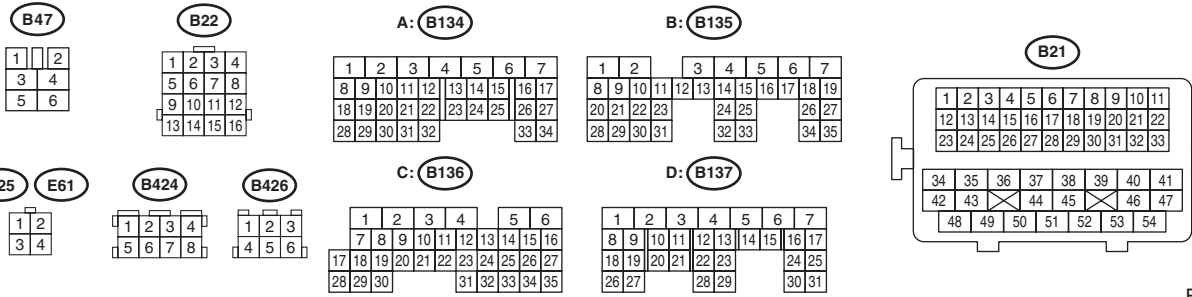
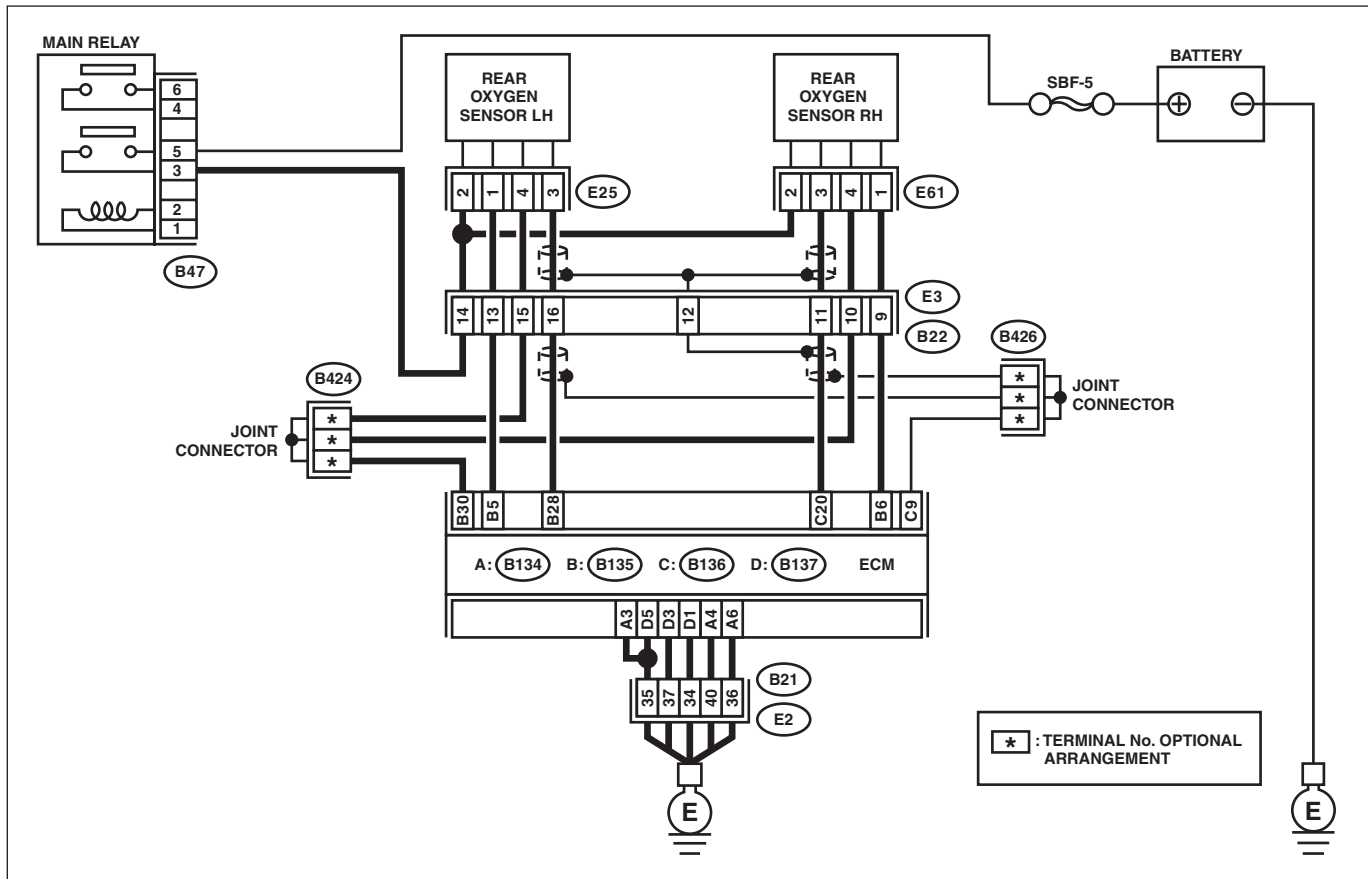
### DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-30, DTC P0057 HO2S HEATER CONTROL CIRCUIT LOW (BANK 2 SENSOR 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

### WIRING DIAGRAM:



EN-08077

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

	Step	Check	Yes	No
1	<p><b>CHECK POWER SUPPLY TO REAR OXYGEN SENSOR.</b></p> <ol style="list-style-type: none"> <li>1) Turn the ignition switch to OFF.</li> <li>2) Disconnect the connector from rear oxygen sensor.</li> <li>3) Turn the ignition switch to ON.</li> <li>4) Measure the voltage between rear oxygen sensor connector and engine ground.</li> </ol> <p><b>Connector &amp; terminal</b> <b>(E25) No. 2 (+) — Engine ground (-):</b></p>	Is the voltage 10 V or more?	Go to step 2.	<p>Repair the power supply line.</p> <p>NOTE: In this case, repair the following item:</p> <ul style="list-style-type: none"> <li>• Open circuit of harness between main relay and rear oxygen sensor connector</li> <li>• Poor contact of main relay connector</li> <li>• Poor contact of coupling connector</li> <li>• Defective main relay</li> </ul>
2	<p><b>CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.</b></p> <ol style="list-style-type: none"> <li>1) Turn the ignition switch to OFF.</li> <li>2) Disconnect the connector from ECM.</li> <li>3) Measure the resistance between ECM and oxygen sensor connector.</li> </ol> <p><b>Connector &amp; terminal</b> <b>(B135) No. 5 — (E25) No. 1:</b></p>	Is the resistance less than 1 $\Omega$ ?	Go to step 3.	<p>Repair the harness and connector.</p> <p>NOTE: In this case, repair the following item:</p> <ul style="list-style-type: none"> <li>• Open circuit in harness between ECM and rear oxygen sensor connector</li> <li>• Poor contact of coupling connector</li> </ul>
3	<p><b>CHECK GROUND CIRCUIT FOR ECM.</b></p> <p>Measure the resistance of harness between ECM and chassis ground.</p> <p><b>Connector &amp; terminal</b> <b>(B134) No. 3 — Chassis ground:</b> <b>(B134) No. 4 — Chassis ground:</b> <b>(B134) No. 6 — Chassis ground:</b> <b>(B137) No. 1 — Chassis ground:</b> <b>(B137) No. 3 — Chassis ground:</b> <b>(B137) No. 5 — Chassis ground:</b></p>	Is the resistance less than 5 $\Omega$ ?	Go to step 4.	<p>Repair the harness and connector.</p> <p>NOTE: In this case, repair the following item:</p> <ul style="list-style-type: none"> <li>• Open circuit of harness between ECM and engine ground</li> <li>• Poor contact of coupling connector</li> </ul>
4	<p><b>CHECK REAR OXYGEN SENSOR.</b></p> <p>Measure the resistance between rear oxygen sensor connector terminals.</p> <p><b>Terminals</b> <b>No. 2 — No. 1:</b></p>	Is the resistance 5 — 7 $\Omega$ ?	Repair the poor contact of ECM connector.	<p>Replace the rear oxygen sensor.</p> <p>&lt;Ref. to FU(H6DO)-50, Rear Oxygen Sensor.&gt;</p>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## R: DTC P0058 HO2S HEATER CONTROL CIRCUIT HIGH (BANK 2 SENSOR 2)

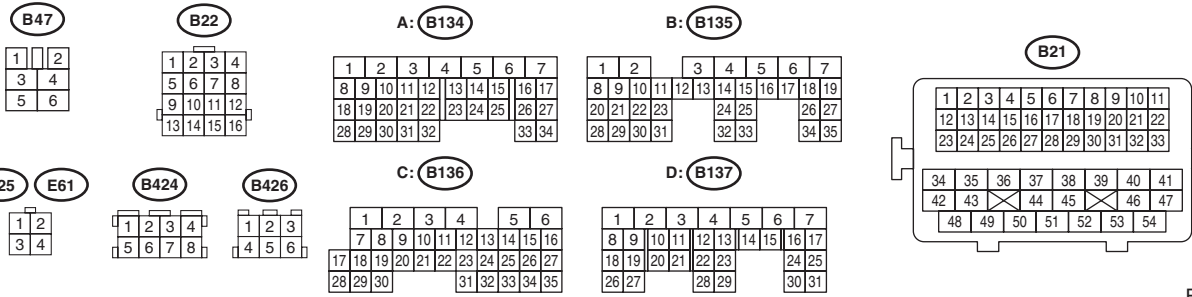
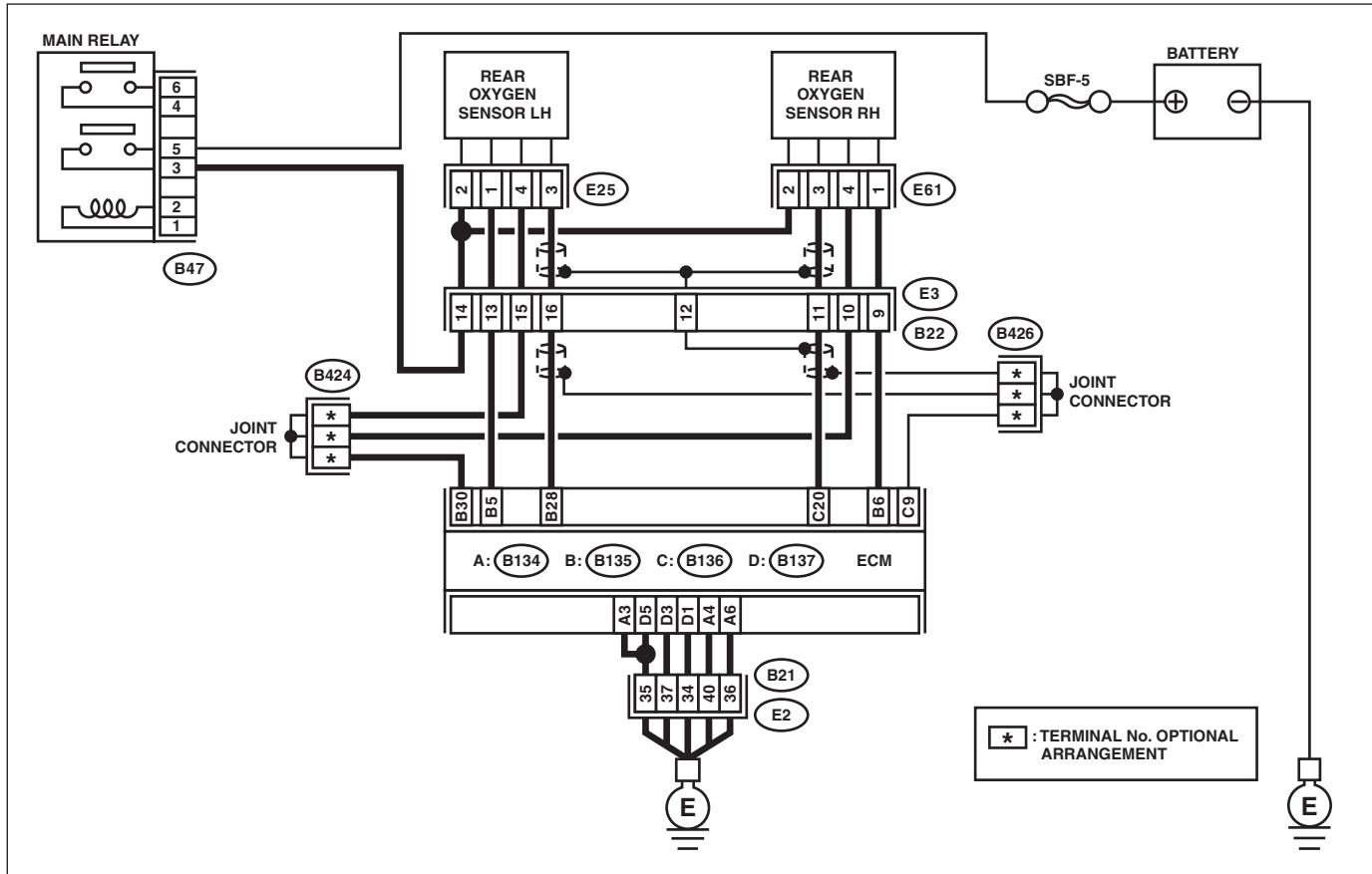
### DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-30, DTC P0058 HO2S HEATER CONTROL CIRCUIT HIGH (BANK 2 SENSOR 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

### WIRING DIAGRAM:



EN-08077

Step	Check	Yes	No
<b>1</b> <b>CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.</b> 1) Turn the ignition switch to OFF. 2) Measure the voltage between ECM and chassis ground. <i>Connector &amp; terminal (B135) No. 5 (+) — Chassis ground (-):</i>	Is the voltage 10 V or more?	Repair the short circuit to power in the harness between ECM and rear oxygen sensor connector.	Go to step 2.



# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<b>2</b> <b>CHECK GROUND CIRCUIT FOR ECM.</b> 1) Disconnect the connector from ECM. 2) Measure the resistance between ECM and chassis ground. <b>Connector &amp; terminal</b> <b>(B134) No. 3 — Chassis ground:</b> <b>(B134) No. 4 — Chassis ground:</b> <b>(B134) No. 6 — Chassis ground:</b> <b>(B137) No. 1 — Chassis ground:</b> <b>(B137) No. 3 — Chassis ground:</b> <b>(B137) No. 5 — Chassis ground:</b>	Is the resistance less than 5 $\Omega$ ?	Repair the poor contact of ECM connector.	Repair the harness and connector. <b>NOTE:</b> In this case, repair the following item: <ul style="list-style-type: none"><li>• Open circuit of harness between ECM and engine ground</li><li>• Poor contact of coupling connector</li></ul>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## S: DTC P0068 MAP/MAF - THROTTLE POSITION CORRELATION

### DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-31, DTC P0068 MAP/MAF - THROTTLE POSITION CORRELATION, Diagnostic Trouble Code (DTC) Detecting Criteria.>

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

Step	Check	Yes	No
1 <b>CHECK AIR INTAKE SYSTEM.</b>	Are there holes, loose bolts or disconnection of hose on air intake system?	Repair the air intake system.	Go to step 2.
2 <b>CHECK MANIFOLD ABSOLUTE PRESSURE SENSOR.</b> 1) Start the engine and warm up engine until coolant temperature is higher than 75°C (167°F). 2) Place the select lever in "P" range or "N" range. 3) Turn the A/C switch to OFF. 4) Turn all the accessory switches to OFF. 5) Read the value of «Mani. Absolute Pressure» using the Subaru Select Monitor or a general scan tool. <b>NOTE:</b> • Subaru Select Monitor For detailed operation procedures, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H6DO)(diag)-36, Subaru Select Monitor.> • General scan tool For detailed operation procedures, refer to the "General Scan Tool Instruction Manual".	Is the value in «Mani. Absolute Pressure» 73.3 — 106.6 kPa (550 — 800 mmHg, 21.65 — 31.50 inHg) when the ignition is turned ON, and 20.0 — 46.7 kPa (150 — 350 mmHg, 5.91 — 13.78 inHg) during idling?	Go to step 3.	Replace the manifold absolute pressure sensor. <Ref. to FU(H6DO)-38, Manifold Absolute Pressure Sensor.>
3 <b>CHECK THROTTLE OPENING ANGLE.</b> Using the Subaru Select Monitor or a general scan tool, read the value in «Throttle Opening Angle». <b>NOTE:</b> • Subaru Select Monitor For detailed operation procedures, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H6DO)(diag)-36, Subaru Select Monitor.> • General scan tool For detailed operation procedures, refer to the "General Scan Tool Instruction Manual".	Is the value in «Throttle Opening Angle» with the throttle fully closed less than 5%?	Go to step 4.	Replace the electronic throttle control. <Ref. to FU(H6DO)-19, Throttle Body.>
4 <b>CHECK THROTTLE OPENING ANGLE.</b>	Is the value in «Throttle Opening Angle» with the throttle fully open 85% or more?	Replace the manifold absolute pressure sensor. <Ref. to FU(H6DO)-38, Manifold Absolute Pressure Sensor.>	Replace the electronic throttle control. <Ref. to FU(H6DO)-19, Throttle Body.>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## T: DTC P0101 MASS OR VOLUME AIR FLOW CIRCUIT RANGE/PERFORMANCE

### DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-33, DTC P0101 MASS OR VOLUME AIR FLOW CIRCUIT RANGE/PERFORMANCE, Diagnostic Trouble Code (DTC) Detecting Criteria.>

### TROUBLE SYMPTOM:

- Improper idling
- Engine stalls.
- Poor driving performance

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

Step	Check	Yes	No
1 CHECK FOR ANY OTHER DTC ON DISPLAY.	Is any other DTC displayed?	Check the appropriate DTC using the "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6DO)(diag)-84, List of Diagnostic Trouble Code (DTC).>	Replace the mass air flow and intake air temperature sensor. <Ref. to FU(H6DO)-40, Mass Air Flow and Intake Air Temperature Sensor.>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## U: DTC P0102 MASS OR VOLUME AIR FLOW CIRCUIT LOW INPUT

### DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-35, DTC P0102 MASS OR VOLUME AIR FLOW CIRCUIT LOW INPUT, Diagnostic Trouble Code (DTC) Detecting Criteria.>

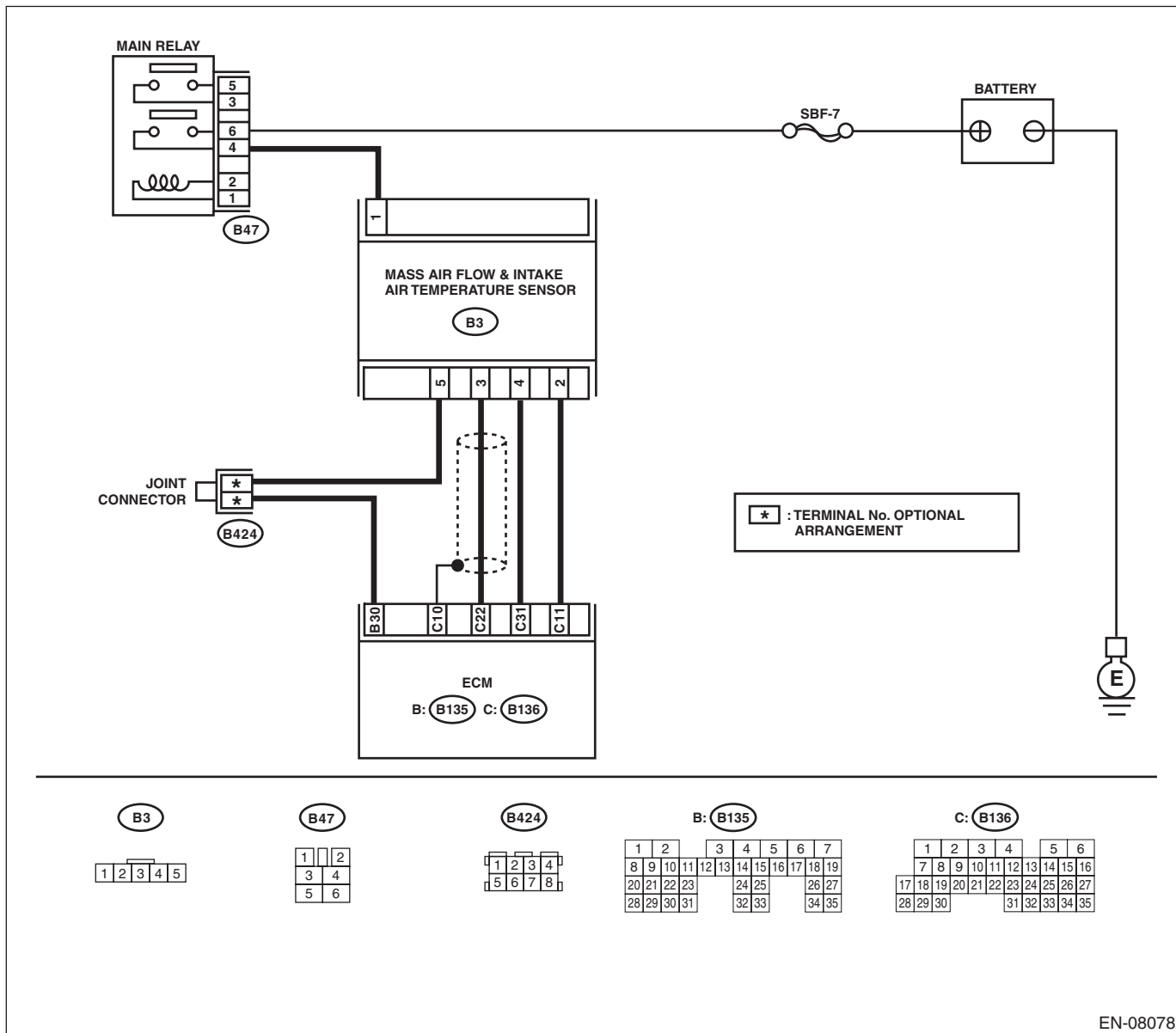
### TROUBLE SYMPTOM:

- Improper idling
- Engine stalls.
- Poor driving performance

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

### WIRING DIAGRAM:



EN-08078

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<p><b>1</b>      <b>CHECK CURRENT DATA.</b>                      1) Start the engine.                      2) Read the value of «Air Flow Sensor Voltage» using Subaru Select Monitor.                      NOTE:                      For detailed operation procedures, refer to “READ CURRENT DATA FOR ENGINE”. &lt;Ref. to EN(H6DO)(diag)-36, Subaru Select Monitor.&gt;</p>	<p>Is the value of «Air Flow Sensor Voltage» less than 0.2 V?</p>	<p>Go to step 2.</p>	<p>Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again.                      NOTE:                      In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.</p>
<p><b>2</b>      <b>CHECK POWER SUPPLY OF MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR.</b>                      1) Turn the ignition switch to OFF.                      2) Disconnect the connectors from the mass air flow and intake air temperature sensor.                      3) Turn the ignition switch to ON.                      4) Measure the voltage between mass air flow and intake air temperature sensor connector and engine ground.  <i>Connector &amp; terminal</i>  <i>(B3) No. 1 (+) — Engine ground (-):</i></p>	<p>Is the voltage 10 V or more?</p>	<p>Go to step 3.</p>	<p>Repair the harness and connector.                      NOTE:                      In this case, repair the following item:                      • Open circuit in harness between main relay and mass air flow and intake air temperature sensor connector                      • Poor contact of main relay connector</p>
<p><b>3</b>      <b>CHECK HARNESS BETWEEN ECM AND MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR CONNECTOR.</b>                      1) Turn the ignition switch to OFF.                      2) Disconnect the connector from ECM.                      3) Measure the resistance of harness between ECM and the mass air flow and intake air temperature sensor connector.  <i>Connector &amp; terminal</i>  <i>(B136) No. 22 — (B3) No. 3:</i></p>	<p>Is the resistance less than 1 Ω?</p>	<p>Go to step 4.</p>	<p>Repair the open circuit in harness between ECM and the mass air flow and intake air temperature sensor connector.</p>
<p><b>4</b>      <b>CHECK HARNESS BETWEEN ECM AND MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR CONNECTOR.</b>                      Measure the resistance between ECM and chassis ground.  <i>Connector &amp; terminal</i>  <i>(B136) No. 22 — Chassis ground:</i></p>	<p>Is the resistance 1 MΩ or more?</p>	<p>Go to step 5.</p>	<p>Repair the short circuit to ground in harness between ECM and mass air flow and intake air temperature sensor connector.</p>
<p><b>5</b>      <b>CHECK FOR POOR CONTACT.</b>                      Check for poor contact of ECM and mass air flow and intake air temperature sensor connector.</p>	<p>Is there poor contact of ECM or mass air flow and intake air temperature sensor connector?</p>	<p>Repair the poor contact of ECM or mass air flow and intake air temperature sensor connector.</p>	<p>Replace the mass air flow and intake air temperature sensor. &lt;Ref. to FU(H6DO)-40, Mass Air Flow and Intake Air Temperature Sensor.&gt;</p>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## V: DTC P0103 MASS OR VOLUME AIR FLOW CIRCUIT HIGH INPUT

### DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-37, DTC P0103 MASS OR VOLUME AIR FLOW CIRCUIT HIGH INPUT, Diagnostic Trouble Code (DTC) Detecting Criteria.>

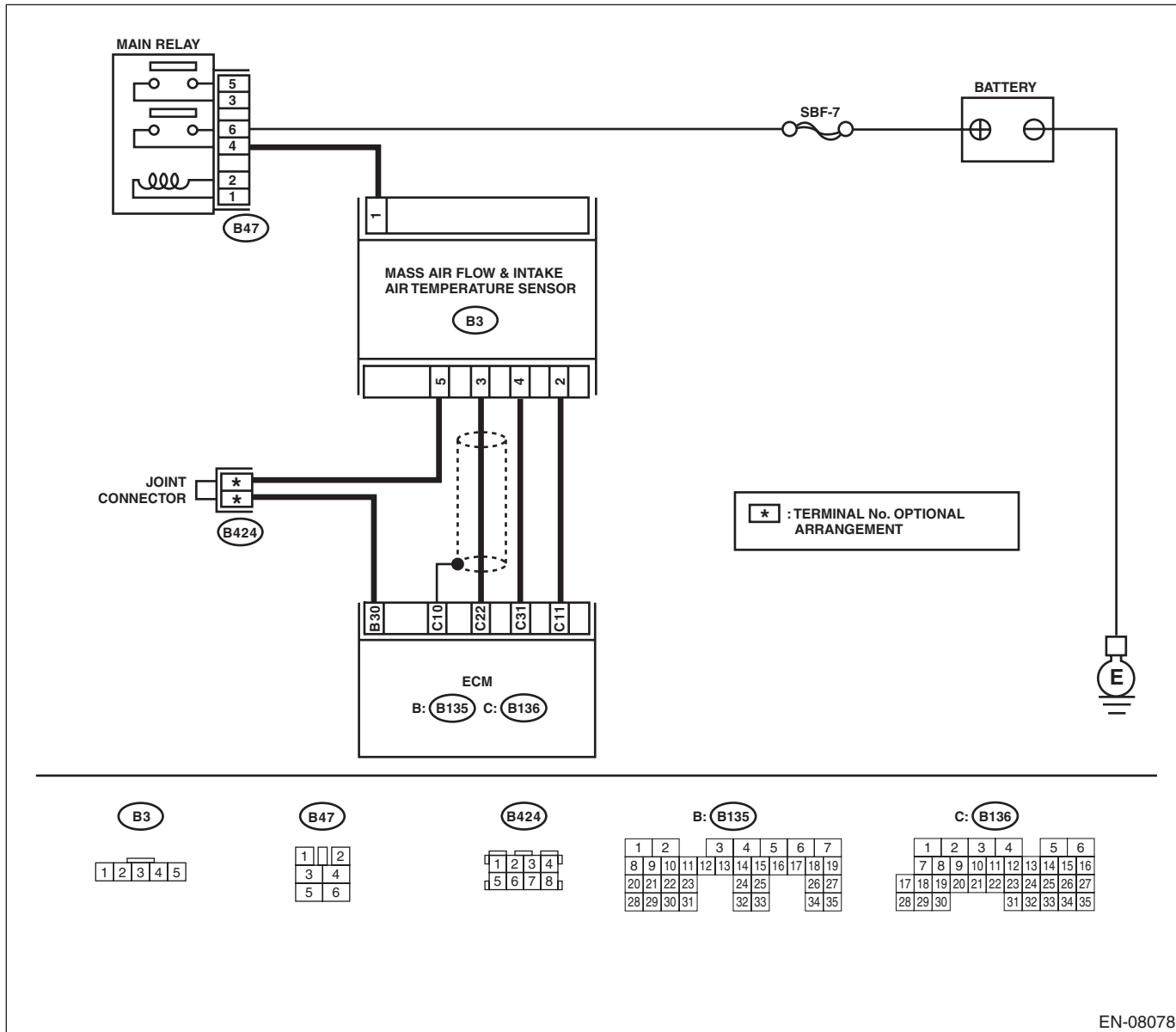
### TROUBLE SYMPTOM:

- Improper idling
- Engine stalls.
- Poor driving performance

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

### WIRING DIAGRAM:



EN-08078

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

	Step	Check	Yes	No
1	<p><b>CHECK CURRENT DATA.</b></p> <p>1) Start the engine.</p> <p>2) Read the value of «Air Flow Sensor Voltage» using Subaru Select Monitor.</p> <p>NOTE: For detailed operation procedures, refer to “READ CURRENT DATA FOR ENGINE”. &lt;Ref. to EN(H6DO)(diag)-36, Subaru Select Monitor.&gt;</p>	Is the value of «Air Flow Sensor Voltage» 5 V or more?	Go to step 2.	<p>Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again.</p> <p>NOTE: In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.</p>
2	<p><b>CHECK HARNESS BETWEEN ECM AND MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR CONNECTOR.</b></p> <p>1) Turn the ignition switch to OFF.</p> <p>2) Disconnect the connectors from the mass air flow and intake air temperature sensor.</p> <p>3) Start the engine.</p> <p>4) Read the value of «Air Flow Sensor Voltage» using Subaru Select Monitor.</p> <p>NOTE: For detailed operation procedures, refer to “READ CURRENT DATA FOR ENGINE”. &lt;Ref. to EN(H6DO)(diag)-36, Subaru Select Monitor.&gt;</p>	Is the value of «Air Flow Sensor Voltage» 5 V or more?	Repair the short circuit of harness to power supply between ECM and mass air flow and intake air temperature sensor connector.	Go to step 3.
3	<p><b>CHECK HARNESS BETWEEN ECM AND MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR CONNECTOR.</b></p> <p>1) Turn the ignition switch to OFF.</p> <p>2) Measure the resistance of harness between mass air flow and intake air temperature sensor connector and engine ground.</p> <p><b>Connector &amp; terminal</b> <b>(B3) No. 2 — Engine ground:</b></p>	Is the resistance less than 5 Ω?	Go to step 4.	<p>Repair the harness and connector.</p> <p>NOTE: In this case, repair the following item:</p> <ul style="list-style-type: none"> <li>• Open circuit in harness between ECM and mass air flow and intake air temperature sensor connector</li> <li>• Poor contact of ECM connector</li> </ul>
4	<p><b>CHECK FOR POOR CONTACT.</b></p> <p>Check for poor contact of mass air flow and intake air temperature sensor connector.</p>	Is there poor contact of mass air flow and intake air temperature sensor connector?	Repair the poor contact of mass air flow and intake air temperature sensor connector.	Replace the mass air flow and intake air temperature sensor. <Ref. to FU(H6DO)-40, Mass Air Flow and Intake Air Temperature Sensor.>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## W: DTC P0107 MANIFOLD ABSOLUTE PRESSURE/BAROMETRIC PRESSURE CIRCUIT LOW INPUT

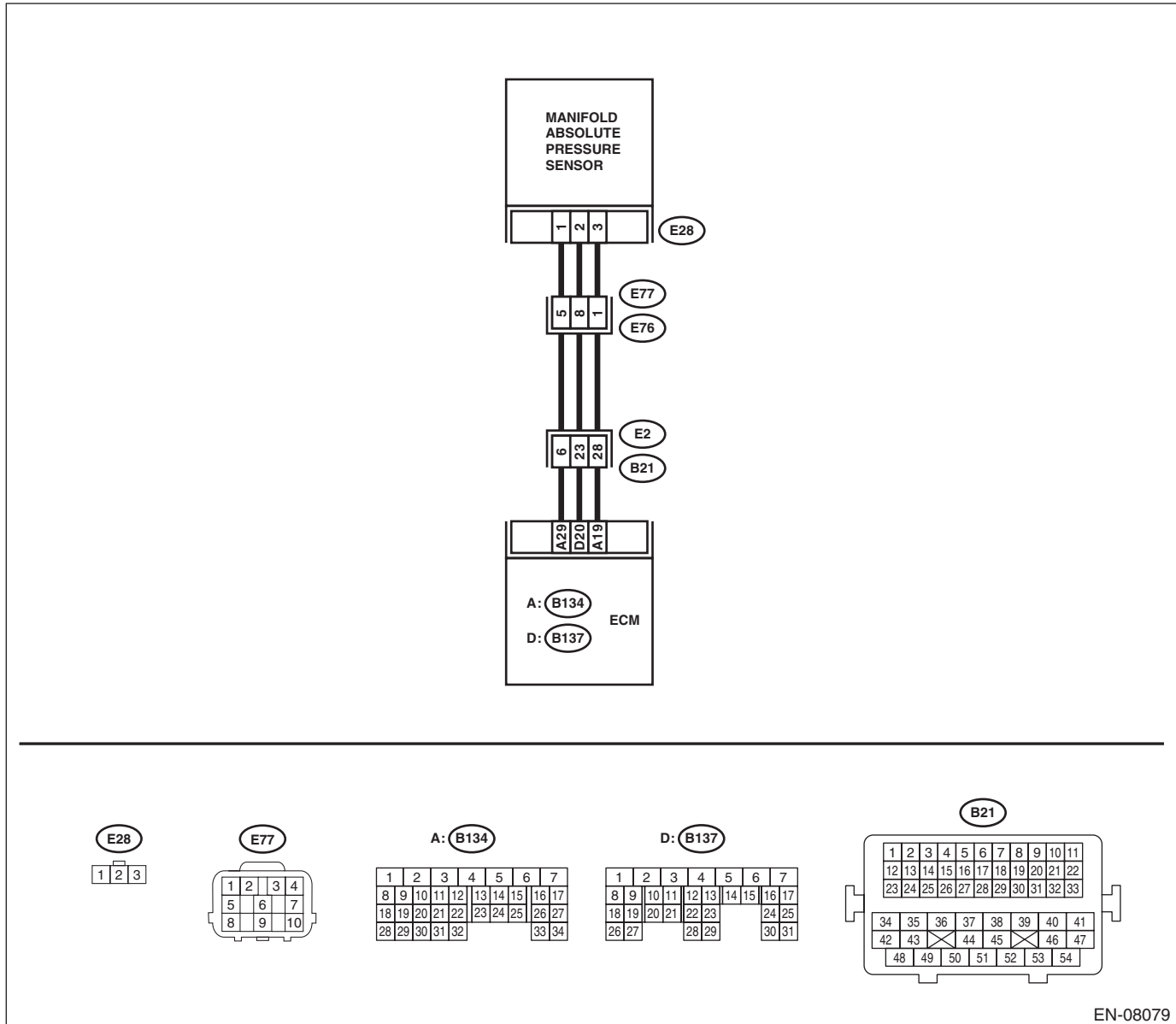
### DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-39, DTC P0107 MANIFOLD ABSOLUTE PRESSURE/BAROMETRIC PRESSURE CIRCUIT LOW INPUT, Diagnostic Trouble Code (DTC) Detecting Criteria.>

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

### WIRING DIAGRAM:



EN-08079



# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<p><b>1</b></p> <p><b>CHECK CURRENT DATA.</b></p> <p>1) Start the engine.</p> <p>2) Read the value of «Mani. Absolute Pressure» using the Subaru Select Monitor or a general scan tool.</p> <p>NOTE:</p> <ul style="list-style-type: none"> <li>• Subaru Select Monitor</li> </ul> <p>For detailed operation procedures, refer to "READ CURRENT DATA FOR ENGINE". &lt;Ref. to EN(H6DO)(diag)-36, Subaru Select Monitor.&gt;</p> <ul style="list-style-type: none"> <li>• General scan tool</li> </ul> <p>For detailed operation procedures, refer to the general scan tool operation manual.</p>	<p>Is the value of «Mani. Absolute Pressure» less than 13.3 kPa (100 mmHg, 3.94 inHg)?</p>	<p>Go to step 2.</p>	<p>Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again.</p> <p>NOTE:</p> <p>In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.</p>
<p><b>2</b></p> <p><b>CHECK POWER SUPPLY OF MANIFOLD ABSOLUTE PRESSURE SENSOR.</b></p> <p>1) Turn the ignition switch to OFF.</p> <p>2) Disconnect the connector from manifold absolute pressure sensor.</p> <p>3) Turn the ignition switch to ON.</p> <p>4) Measure the voltage between manifold absolute pressure sensor connector and engine ground.</p> <p><b>Connector &amp; terminal</b> <b>(E28) No. 3 (+) — Engine ground (-):</b></p>	<p>Is the voltage 4.5 V or more?</p>	<p>Go to step 3.</p>	<p>Repair the harness and connector.</p> <p>NOTE:</p> <p>In this case, repair the following item:</p> <ul style="list-style-type: none"> <li>• Open circuit of harness between ECM and manifold absolute pressure sensor connector.</li> <li>• Poor contact of ECM connector</li> <li>• Poor contact of coupling connector</li> </ul>
<p><b>3</b></p> <p><b>CHECK HARNESS BETWEEN ECM AND MANIFOLD ABSOLUTE PRESSURE SENSOR CONNECTOR.</b></p> <p>1) Turn the ignition switch to OFF.</p> <p>2) Disconnect the connector from ECM.</p> <p>3) Measure the resistance of harness between ECM and manifold absolute pressure sensor connector.</p> <p><b>Connector &amp; terminal</b> <b>(B137) No. 20 — (E28) No. 2:</b></p>	<p>Is the resistance less than 1 Ω?</p>	<p>Go to step 4.</p>	<p>Repair the harness and connector.</p> <p>NOTE:</p> <p>In this case, repair the following item:</p> <ul style="list-style-type: none"> <li>• Open circuit of harness between ECM and manifold absolute pressure sensor connector.</li> <li>• Poor contact of coupling connector</li> </ul>
<p><b>4</b></p> <p><b>CHECK HARNESS BETWEEN ECM AND MANIFOLD ABSOLUTE PRESSURE SENSOR CONNECTOR.</b></p> <p>Measure the resistance between ECM and chassis ground.</p> <p><b>Connector &amp; terminal</b> <b>(B137) No. 20 — Chassis ground:</b></p>	<p>Is the resistance 1 MΩ or more?</p>	<p>Go to step 5.</p>	<p>Repair ground short circuit of harness between ECM and manifold absolute pressure sensor connector.</p>
<p><b>5</b></p> <p><b>CHECK FOR POOR CONTACT.</b></p> <p>Check for poor contact of ECM and manifold absolute pressure sensor connector.</p>	<p>Is there poor contact of ECM or manifold absolute pressure sensor connector?</p>	<p>Repair the poor contact of ECM or manifold absolute pressure sensor connector.</p>	<p>Replace the manifold absolute pressure sensor. &lt;Ref. to FU(H6DO)-38, Manifold Absolute Pressure Sensor.&gt;</p>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## X: DTC P0108 MANIFOLD ABSOLUTE PRESSURE/BAROMETRIC PRESSURE CIRCUIT HIGH INPUT

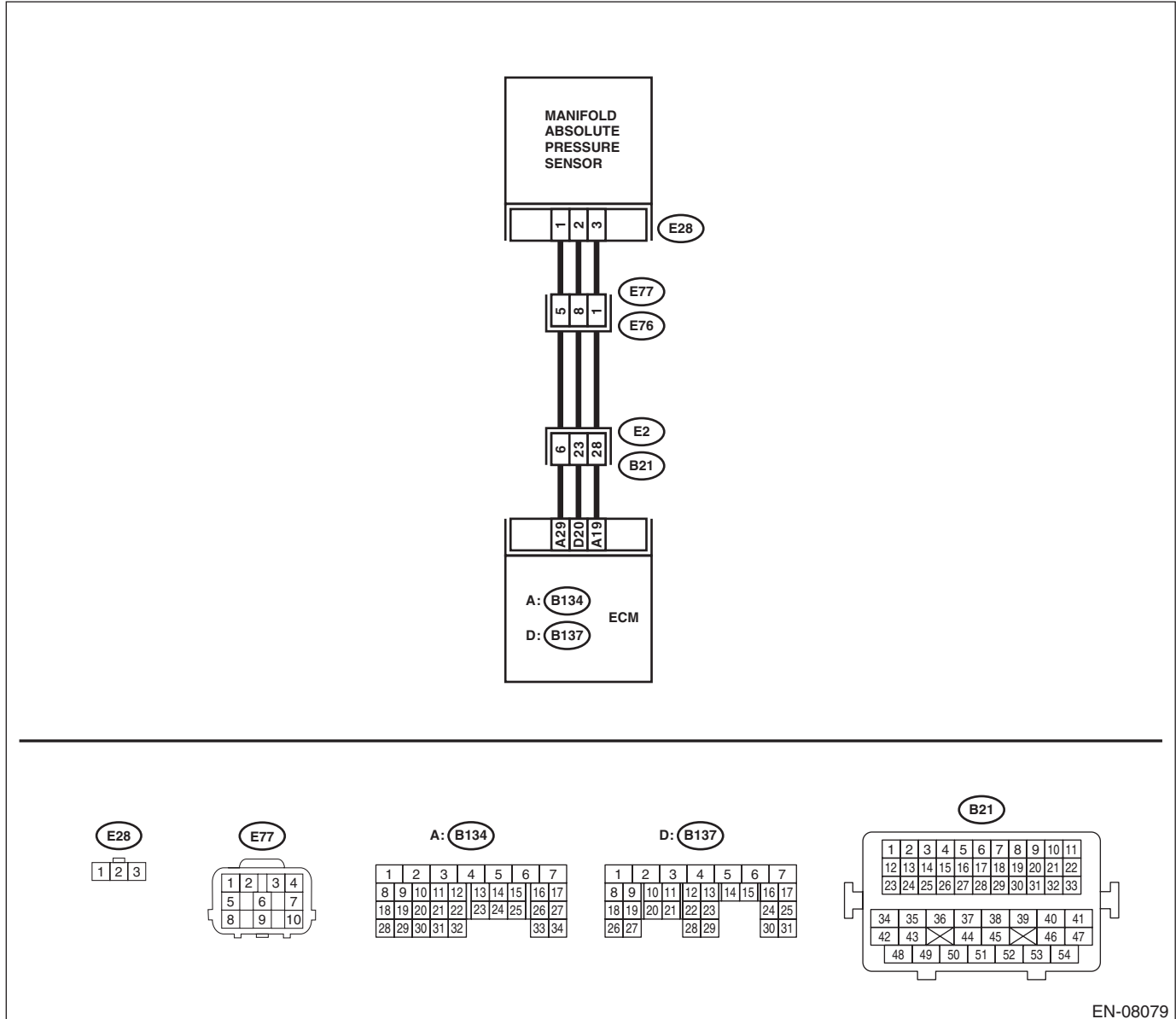
### DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-41, DTC P0108 MANIFOLD ABSOLUTE PRESSURE/BAROMETRIC PRESSURE CIRCUIT HIGH INPUT, Diagnostic Trouble Code (DTC) Detecting Criteria.>

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

### WIRING DIAGRAM:



EN-08079

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

	Step	Check	Yes	No
1	<p><b>CHECK CURRENT DATA.</b></p> <p>1) Start the engine.</p> <p>2) Read the value of «Mani. Absolute Pressure» using the Subaru Select Monitor or a general scan tool.</p> <p>NOTE:</p> <ul style="list-style-type: none"> <li>• Subaru Select Monitor</li> </ul> <p>For detailed operation procedures, refer to "READ CURRENT DATA FOR ENGINE". &lt;Ref. to EN(H6DO)(diag)-36, Subaru Select Monitor.&gt;</p> <ul style="list-style-type: none"> <li>• General scan tool</li> </ul> <p>For detailed operation procedures, refer to the general scan tool operation manual.</p>	<p>Is the value of «Mani. Absolute Pressure» 119.5 kPa (896.5 mmHg, 35.29 inHg) or more?</p>	<p>Go to step 2.</p>	<p>Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again.</p> <p>NOTE:</p> <p>In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.</p>
2	<p><b>CHECK HARNESS BETWEEN ECM AND MANIFOLD ABSOLUTE PRESSURE SENSOR CONNECTOR.</b></p> <p>1) Turn the ignition switch to OFF.</p> <p>2) Disconnect the connector from manifold absolute pressure sensor.</p> <p>3) Start the engine.</p> <p>4) Read the value of «Mani. Absolute Pressure» using the Subaru Select Monitor or a general scan tool.</p> <p>NOTE:</p> <ul style="list-style-type: none"> <li>• Subaru Select Monitor</li> </ul> <p>For detailed operation procedures, refer to "READ CURRENT DATA FOR ENGINE". &lt;Ref. to EN(H6DO)(diag)-36, Subaru Select Monitor.&gt;</p> <ul style="list-style-type: none"> <li>• General scan tool</li> </ul> <p>For detailed operation procedures, refer to the general scan tool operation manual.</p>	<p>Is the value of «Mani. Absolute Pressure» 119.5 kPa (896.5 mmHg, 35.29 inHg) or more?</p>	<p>Repair the short circuit to power in harness between ECM and manifold absolute pressure sensor connector.</p>	<p>Go to step 3.</p>
3	<p><b>CHECK HARNESS BETWEEN ECM AND MANIFOLD ABSOLUTE PRESSURE SENSOR CONNECTOR.</b></p> <p>1) Turn the ignition switch to OFF.</p> <p>2) Measure the resistance of harness between manifold absolute pressure sensor connector and engine ground.</p> <p><b>Connector &amp; terminal</b> <b>(E28) No. 1 — Engine ground:</b></p>	<p>Is the resistance less than 5 Ω?</p>	<p>Go to step 4.</p>	<p>Repair the harness and connector.</p> <p>NOTE:</p> <p>In this case, repair the following item:</p> <ul style="list-style-type: none"> <li>• Open circuit of harness between ECM and manifold absolute pressure sensor connector.</li> <li>• Poor contact of ECM connector</li> <li>• Poor contact of coupling connector</li> </ul>
4	<p><b>CHECK FOR POOR CONTACT.</b></p> <p>Check for poor contact of manifold absolute pressure sensor connector.</p>	<p>Is there poor contact of manifold absolute pressure sensor connector?</p>	<p>Repair the poor contact of manifold absolute pressure sensor connector.</p>	<p>Replace the manifold absolute pressure sensor. &lt;Ref. to FU(H6DO)-38, Manifold Absolute Pressure Sensor.&gt;</p>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## Y: DTC P0111 INTAKE AIR TEMPERATURE SENSOR 1 CIRCUIT RANGE/PERFORMANCE

### DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-43, DTC P0111 INTAKE AIR TEMPERATURE SENSOR 1 CIRCUIT RANGE/PERFORMANCE, Diagnostic Trouble Code (DTC) Detecting Criteria.>

### TROUBLE SYMPTOM:

- Improper idling
- Poor driving performance

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

	Step	Check	Yes	No
1	<p><b>CHECK ENGINE COOLANT TEMPERATURE.</b></p> <p>1) Start the engine and warm up completely.</p> <p>2) Using the Subaru Select Monitor or a general scan tool, measure the value in «Coolant Temp.».</p> <p>NOTE:</p> <ul style="list-style-type: none"> <li>• Subaru Select Monitor</li> </ul> <p>For detailed operation procedures, refer to “READ CURRENT DATA FOR ENGINE”. &lt;Ref. to EN(H6DO)(diag)-36, Subaru Select Monitor.&gt;</p> <ul style="list-style-type: none"> <li>• General scan tool</li> </ul> <p>For detailed operation procedures, refer to the general scan tool operation manual.</p>	<p>Is the value of «Coolant Temp.» 75°C (167°F) or more?</p>	<p>Replace the mass air flow and intake air temperature sensor. &lt;Ref. to FU(H6DO)-40, Mass Air Flow and Intake Air Temperature Sensor.&gt;</p>	<p>Check for DTC P0125. &lt;Ref. to EN(H6DO)(diag)-145, DTC P0125 INSUFFICIENT COOLANT TEMPERATURE FOR CLOSED LOOP FUEL CONTROL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).&gt;</p>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## Z: DTC P0112 INTAKE AIR TEMPERATURE SENSOR 1 CIRCUIT LOW

### DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-46, DTC P0112 INTAKE AIR TEMPERATURE SENSOR 1 CIRCUIT LOW, Diagnostic Trouble Code (DTC) Detecting Criteria.>

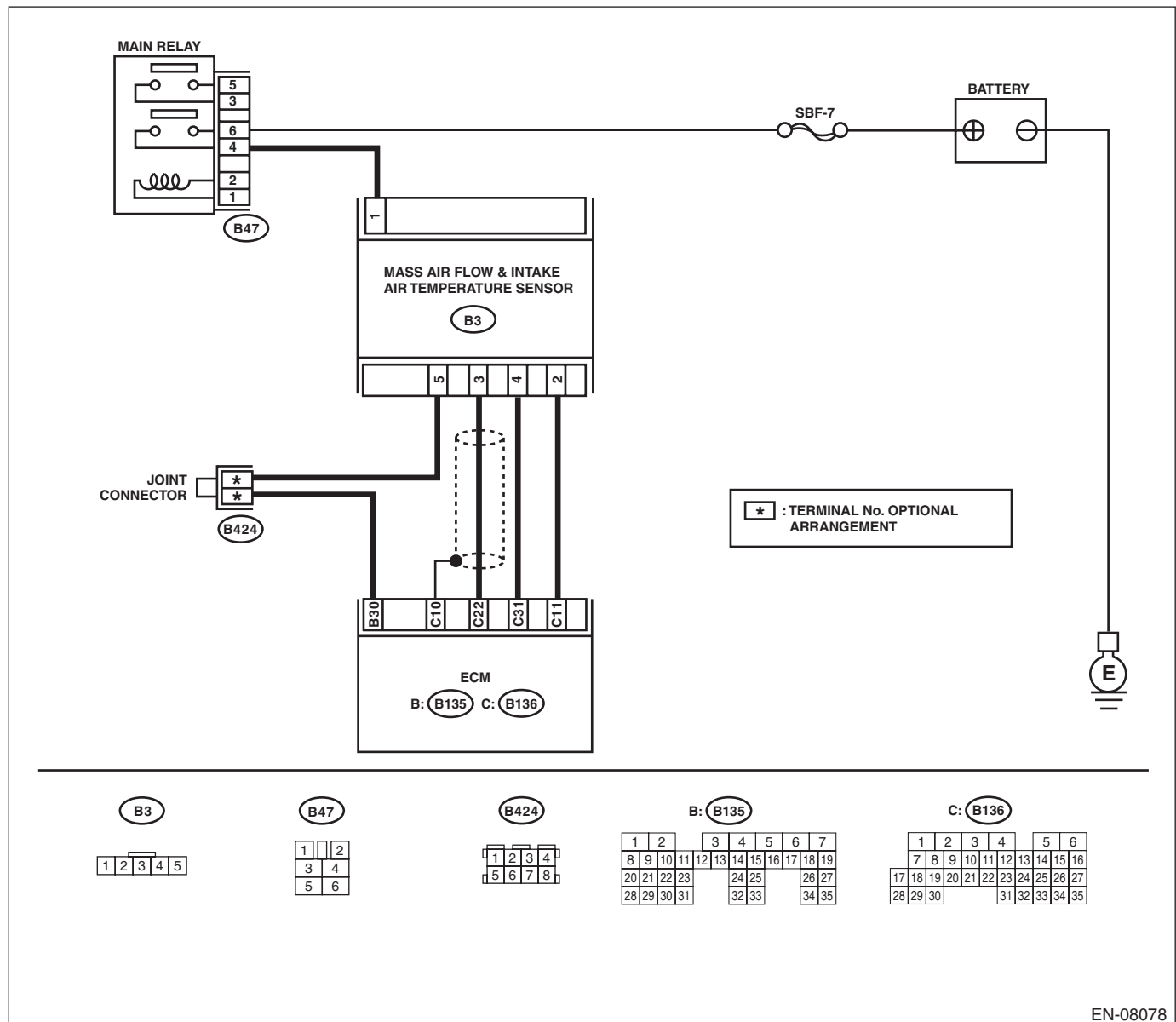
### TROUBLE SYMPTOM:

- Improper idling
- Poor driving performance

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

### WIRING DIAGRAM:



EN-08078

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## ENGINE (DIAGNOSTICS)

	Step	Check	Yes	No
1	<p><b>CHECK CURRENT DATA.</b></p> <p>1) Start the engine.</p> <p>2) Read the value of «Intake Air Temp.» using the Subaru Select Monitor or a general scan tool.</p> <p>NOTE:</p> <ul style="list-style-type: none"> <li>• Subaru Select Monitor</li> </ul> <p>For detailed operation procedures, refer to “READ CURRENT DATA FOR ENGINE”. &lt;Ref. to EN(H6DO)(diag)-36, Subaru Select Monitor.&gt;</p> <ul style="list-style-type: none"> <li>• General scan tool</li> </ul> <p>For detailed operation procedures, refer to the general scan tool operation manual.</p>	Is the value of «Intake Air Temp.» 120°C (248°F) or more?	Go to step 2.	<p>Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again.</p> <p>NOTE:</p> <p>In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.</p>
2	<p><b>CHECK HARNESS BETWEEN ECM AND MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR CONNECTOR.</b></p> <p>1) Turn the ignition switch to OFF.</p> <p>2) Disconnect the connector from ECM and the mass air flow and intake air temperature sensor.</p> <p>3) Measure the resistance between ECM and chassis ground.</p> <p><b>Connector &amp; terminal</b> <b>(B136) No. 31 — Chassis ground:</b></p>	Is the resistance 1 MΩ or more?	Replace the mass air flow and intake air temperature sensor. <Ref. to FU(H6DO)-40, Mass Air Flow and Intake Air Temperature Sensor.>	Repair the short circuit to ground in harness between ECM and mass air flow and intake air temperature sensor connector.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## AA:DTC P0113 INTAKE AIR TEMPERATURE SENSOR 1 CIRCUIT HIGH

### DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-48, DTC P0113 INTAKE AIR TEMPERATURE SENSOR 1 CIRCUIT HIGH, Diagnostic Trouble Code (DTC) Detecting Criteria.>

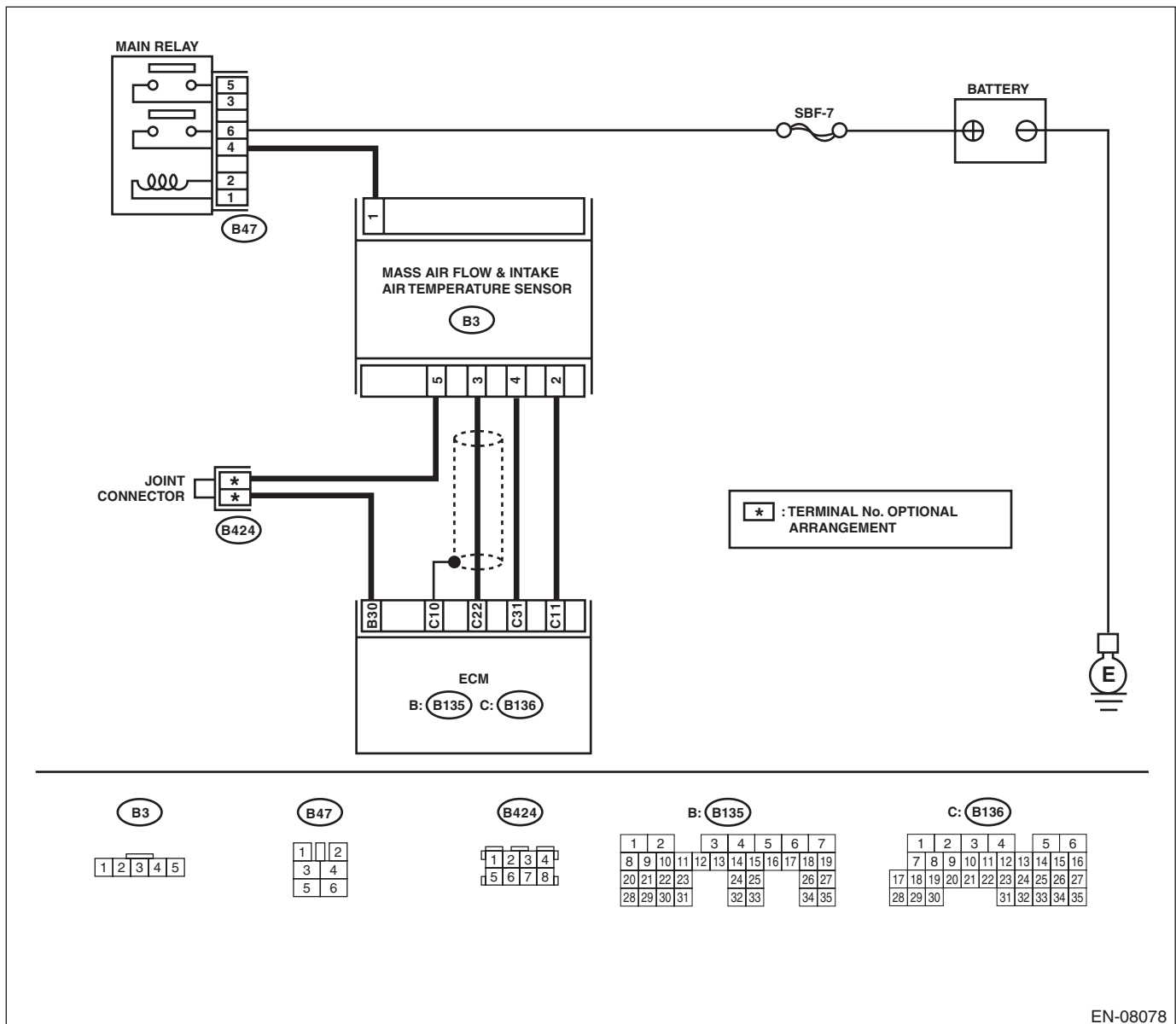
### TROUBLE SYMPTOM:

- Improper idling
- Poor driving performance

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

### WIRING DIAGRAM:



EN-08078

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## ENGINE (DIAGNOSTICS)

	Step	Check	Yes	No
1	<p><b>CHECK CURRENT DATA.</b></p> <p>1) Start the engine.</p> <p>2) Read the value of «Intake Air Temp.» using the Subaru Select Monitor or a general scan tool.</p> <p>NOTE:</p> <ul style="list-style-type: none"> <li>Subaru Select Monitor</li> </ul> <p>For detailed operation procedures, refer to “READ CURRENT DATA FOR ENGINE”. &lt;Ref. to EN(H6DO)(diag)-36, Subaru Select Monitor.&gt;</p> <ul style="list-style-type: none"> <li>General scan tool</li> </ul> <p>For detailed operation procedures, refer to the general scan tool operation manual.</p>	Is the value of «Intake Air Temp.» less than $-40^{\circ}\text{C}$ ( $-40^{\circ}\text{F}$ )?	Go to step 2.	<p>Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again.</p> <p>NOTE:</p> <p>In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.</p>
2	<p><b>CHECK FOR POOR CONTACT.</b></p> <p>Check for poor contact of ECM and mass air flow and intake air temperature sensor connector.</p>	Is there poor contact of ECM or mass air flow and intake air temperature sensor connector?	Repair the poor contact of ECM or mass air flow and intake air temperature sensor connector.	Go to step 3.
3	<p><b>CHECK HARNESS BETWEEN ECM AND MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR CONNECTOR.</b></p> <p>1) Turn the ignition switch to OFF.</p> <p>2) Disconnect the connector from ECM and the mass air flow and intake air temperature sensor.</p> <p>3) Measure the resistance of harness between ECM and the mass air flow and intake air temperature sensor connector.</p> <p><b>Connector &amp; terminal</b></p> <p><b>(B136) No. 31 — (B3) No. 4:</b></p> <p><b>(B135) No. 30 — (B3) No. 5:</b></p>	Is the resistance less than $1\ \Omega$ ?	Go to step 4.	<p>Repair the harness and connector.</p> <p>NOTE:</p> <p>In this case, repair the following item:</p> <ul style="list-style-type: none"> <li>Open circuit in harness between ECM and mass air flow and intake air temperature sensor connector</li> <li>Poor contact of joint connector</li> </ul>
4	<p><b>CHECK HARNESS BETWEEN ECM AND MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR CONNECTOR.</b></p> <p>1) Connect all connectors.</p> <p>2) Turn the ignition switch to ON.</p> <p>3) Disconnect the connectors from the mass air flow and intake air temperature sensor.</p> <p>4) Measure the voltage between ECM and chassis ground.</p> <p><b>Connector &amp; terminal</b></p> <p><b>(B136) No. 31 (+) — Chassis ground (-):</b></p>	Is the voltage 5 V or more?	Repair the short circuit of harness to power supply between ECM and mass air flow and intake air temperature sensor connector.	Replace the mass air flow and intake air temperature sensor. <Ref. to FU(H6DO)-40, Mass Air Flow and Intake Air Temperature Sensor.>



# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## AB:DTC P0117 ENGINE COOLANT TEMPERATURE CIRCUIT LOW

### DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-50, DTC P0117 ENGINE COOLANT TEMPERATURE CIRCUIT LOW, Diagnostic Trouble Code (DTC) Detecting Criteria.>

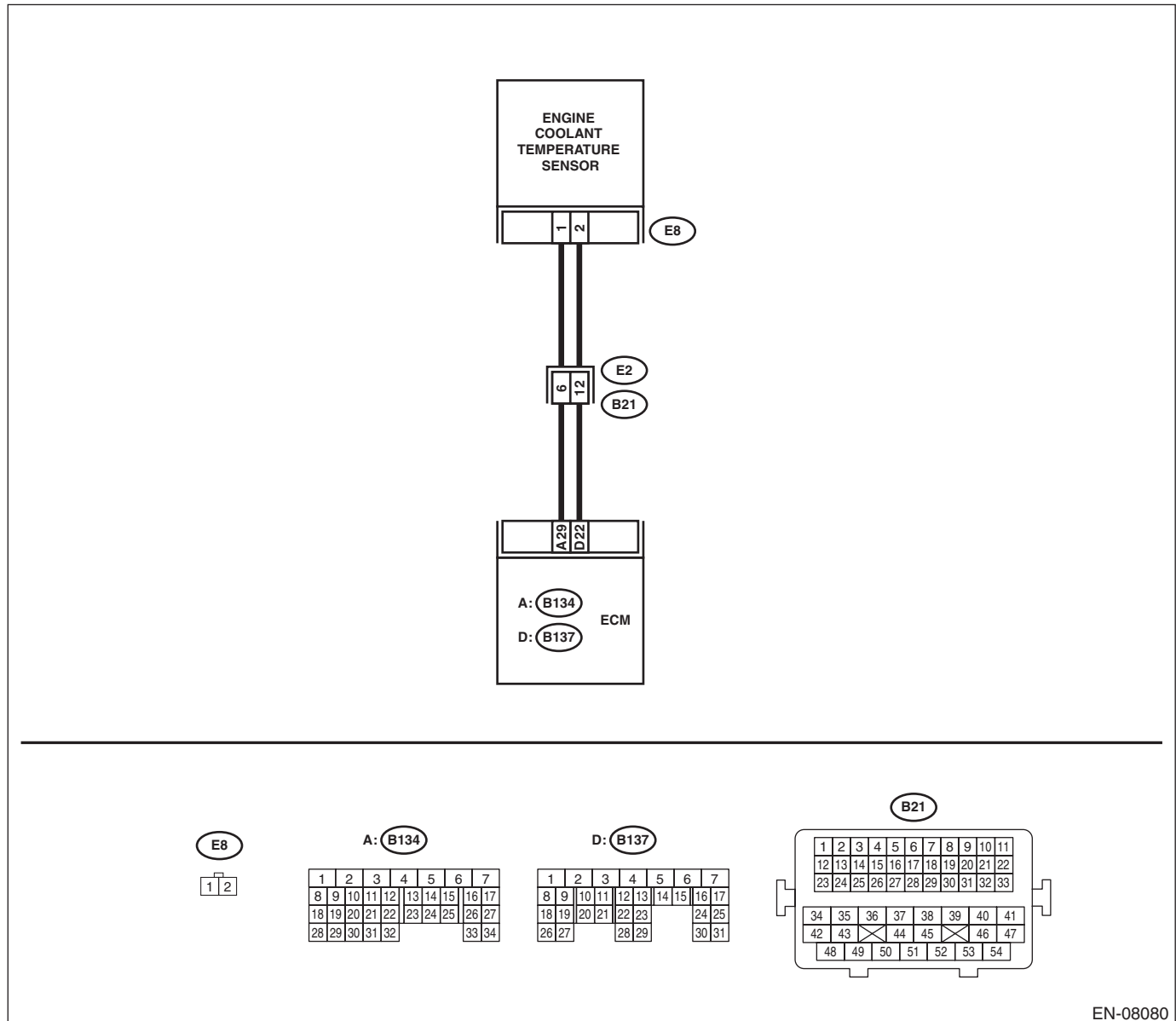
### TROUBLE SYMPTOM:

- Hard to start
- Improper idling
- Poor driving performance

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

### WIRING DIAGRAM:



EN-08080

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## ENGINE (DIAGNOSTICS)

	Step	Check	Yes	No
1	<p><b>CHECK CURRENT DATA.</b></p> <p>1) Start the engine.</p> <p>2) Read the value of «Coolant Temp.» using the Subaru Select Monitor or a general scan tool.</p> <p>NOTE:</p> <ul style="list-style-type: none"> <li>Subaru Select Monitor</li> </ul> <p>For detailed operation procedures, refer to "READ CURRENT DATA FOR ENGINE". &lt;Ref. to EN(H6DO)(diag)-36, Subaru Select Monitor.&gt;</p> <ul style="list-style-type: none"> <li>General scan tool</li> </ul> <p>For detailed operation procedures, refer to the general scan tool operation manual.</p>	Is the value of «Coolant Temp.» 150°C (302°F) or more?	Go to step 2.	<p>Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again.</p> <p>NOTE:</p> <p>In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.</p>
2	<p><b>CHECK HARNESS BETWEEN ECM AND ENGINE COOLANT TEMPERATURE SENSOR CONNECTOR.</b></p> <p>1) Turn the ignition switch to OFF.</p> <p>2) Disconnect the connectors from ECM and engine coolant temperature sensor.</p> <p>3) Measure the resistance between ECM and chassis ground.</p> <p><b>Connector &amp; terminal</b> <b>(B137) No. 22 — Chassis ground:</b></p>	Is the resistance 1 MΩ or more?	Replace the engine coolant temperature sensor. <Ref. to FU(H6DO)-30, Engine Coolant Temperature Sensor.>	Repair short circuit in harness to ground between ECM and engine coolant temperature sensor connector.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## AC:DTC P0118 ENGINE COOLANT TEMPERATURE CIRCUIT HIGH

### DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-52, DTC P0118 ENGINE COOLANT TEMPERATURE CIRCUIT HIGH, Diagnostic Trouble Code (DTC) Detecting Criteria.>

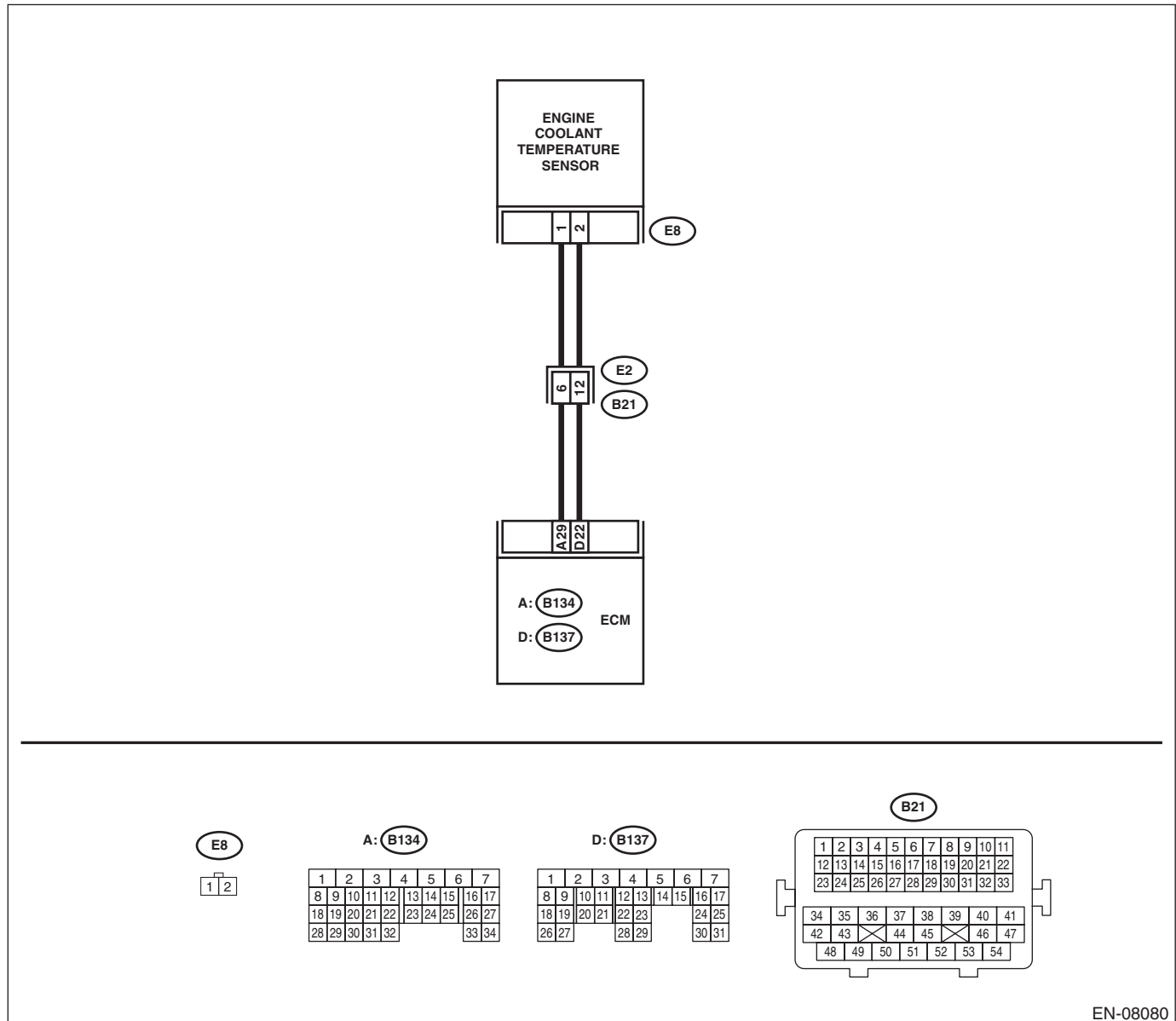
### TROUBLE SYMPTOM:

- Hard to start
- Improper idling
- Poor driving performance

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

### WIRING DIAGRAM:



EN-08080

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<p><b>1 CHECK CURRENT DATA.</b></p> <p>1) Start the engine.</p> <p>2) Read the value of «Coolant Temp.» using the Subaru Select Monitor or a general scan tool.</p> <p>NOTE:</p> <ul style="list-style-type: none"> <li>• Subaru Select Monitor</li> </ul> <p>For detailed operation procedures, refer to “READ CURRENT DATA FOR ENGINE”. &lt;Ref. to EN(H6DO)(diag)-36, Subaru Select Monitor.&gt;</p> <ul style="list-style-type: none"> <li>• General scan tool</li> </ul> <p>For detailed operation procedures, refer to the general scan tool operation manual.</p>	<p>Is the value of «Coolant Temp.» less than <math>-40^{\circ}\text{C}</math> (<math>-40^{\circ}\text{F}</math>)?</p>	<p>Go to step 2.</p>	<p>Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again.</p> <p>NOTE:</p> <p>In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.</p>
<p><b>2 CHECK FOR POOR CONTACT.</b></p> <p>Check for poor contact of ECM and engine coolant temperature sensor connector.</p>	<p>Is there poor contact of ECM or engine coolant temperature sensor connector?</p>	<p>Repair the poor contact of ECM or engine coolant temperature sensor connector.</p>	<p>Go to step 3.</p>
<p><b>3 CHECK HARNESS BETWEEN ECM AND ENGINE COOLANT TEMPERATURE SENSOR CONNECTOR.</b></p> <p>1) Turn the ignition switch to OFF.</p> <p>2) Disconnect the connectors from ECM and engine coolant temperature sensor.</p> <p>3) Measure the resistance of harness between ECM and engine coolant temperature sensor connector.</p> <p><b>Connector &amp; terminal</b></p> <p><b>(B134) No. 29 — (E8) No. 1:</b></p> <p><b>(B137) No. 22 — (E8) No. 2:</b></p>	<p>Is the resistance less than <math>1\ \Omega</math>?</p>	<p>Go to step 4.</p>	<p>Repair the harness and connector.</p> <p>NOTE:</p> <p>In this case, repair the following item:</p> <ul style="list-style-type: none"> <li>• Open circuit in harness between ECM and engine coolant temperature sensor connector</li> <li>• Poor contact of coupling connector</li> </ul>
<p><b>4 CHECK HARNESS BETWEEN ECM AND ENGINE COOLANT TEMPERATURE SENSOR CONNECTOR.</b></p> <p>1) Connect all connectors.</p> <p>2) Turn the ignition switch to ON.</p> <p>3) Measure the voltage between ECM and chassis ground.</p> <p><b>Connector &amp; terminal</b></p> <p><b>(B137) No. 22 (+) — Chassis ground (-):</b></p>	<p>Is the voltage 5 V or more?</p>	<p>Repair the short circuit to power in harness between ECM and engine coolant temperature sensor connector.</p>	<p>Replace the engine coolant temperature sensor. &lt;Ref. to FU(H6DO)-30, Engine Coolant Temperature Sensor.&gt;</p>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## AD:DTC P0122 THROTTLE/PEDAL POSITION SENSOR/SWITCH "A" CIRCUIT LOW

### DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-54, DTC P0122 THROTTLE/PEDAL POSITION SENSOR/SWITCH "A" CIRCUIT LOW, Diagnostic Trouble Code (DTC) Detecting Criteria.>

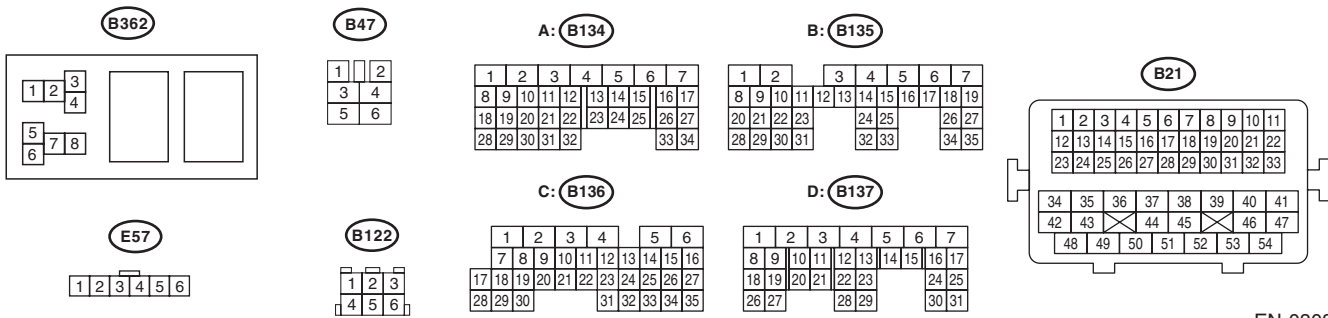
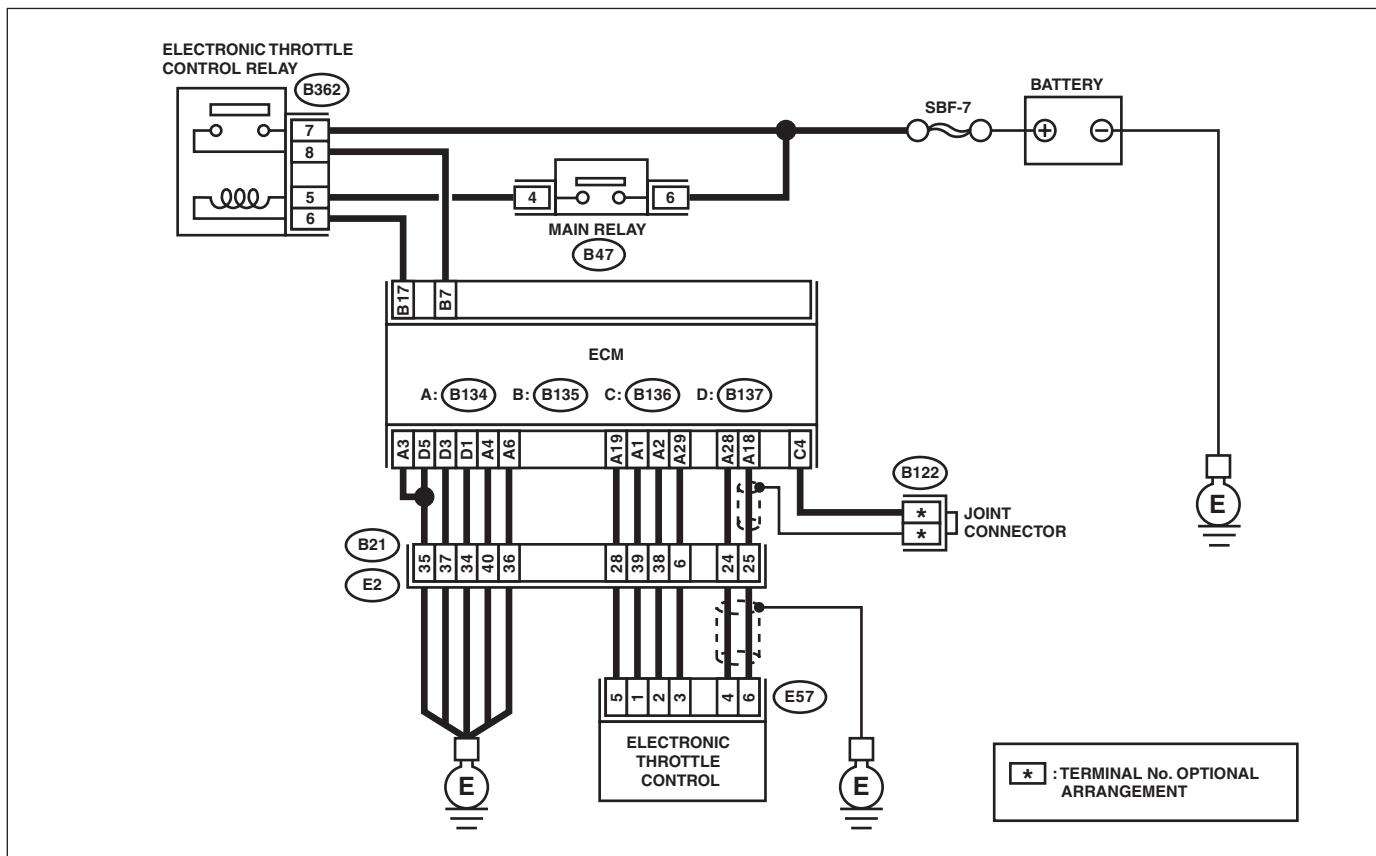
### TROUBLE SYMPTOM:

- Improper idling
- Engine stalls.
- Poor driving performance

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

### WIRING DIAGRAM:



EN-08081

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<p><b>1</b></p> <p><b>CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.</b></p> <p>1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM and electronic throttle control. 3) Measure the resistance between ECM and chassis ground.</p> <p><b>Connector &amp; terminal</b> <b>(B134) No. 19 — Chassis ground:</b> <b>(B134) No. 18 — Chassis ground:</b> <b>(B134) No. 18 — (B136) No. 4:</b></p>	<p>Is the resistance 1 MΩ or more?</p>	<p>Go to step 2.</p>	<p>Repair the short circuit to ground in harness between ECM and electronic throttle control connector.</p>
<p><b>2</b></p> <p><b>CHECK SHORT CIRCUIT INSIDE THE ECM.</b></p> <p>1) Connect the connector to ECM. 2) Measure the resistance between electronic throttle control connector and engine ground.</p> <p><b>Connector &amp; terminal</b> <b>(E57) No. 6 — Engine ground:</b></p>	<p>Is the resistance 1 MΩ or more?</p>	<p>Replace the electronic throttle control. &lt;Ref. to FU(H6DO)-19, Throttle Body.&gt;</p>	<p>Repair the short circuit to ground in harness between ECM and electronic throttle control connector. Replace the ECM if defective. &lt;Ref. to FU(H6DO)-52, Engine Control Module (ECM).&gt;</p>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## AE:DTC P0123 THROTTLE/PEDAL POSITION SENSOR/SWITCH "A" CIRCUIT HIGH

### DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-56, DTC P0123 THROTTLE/PEDAL POSITION SENSOR/SWITCH "A" CIRCUIT HIGH, Diagnostic Trouble Code (DTC) Detecting Criteria.>

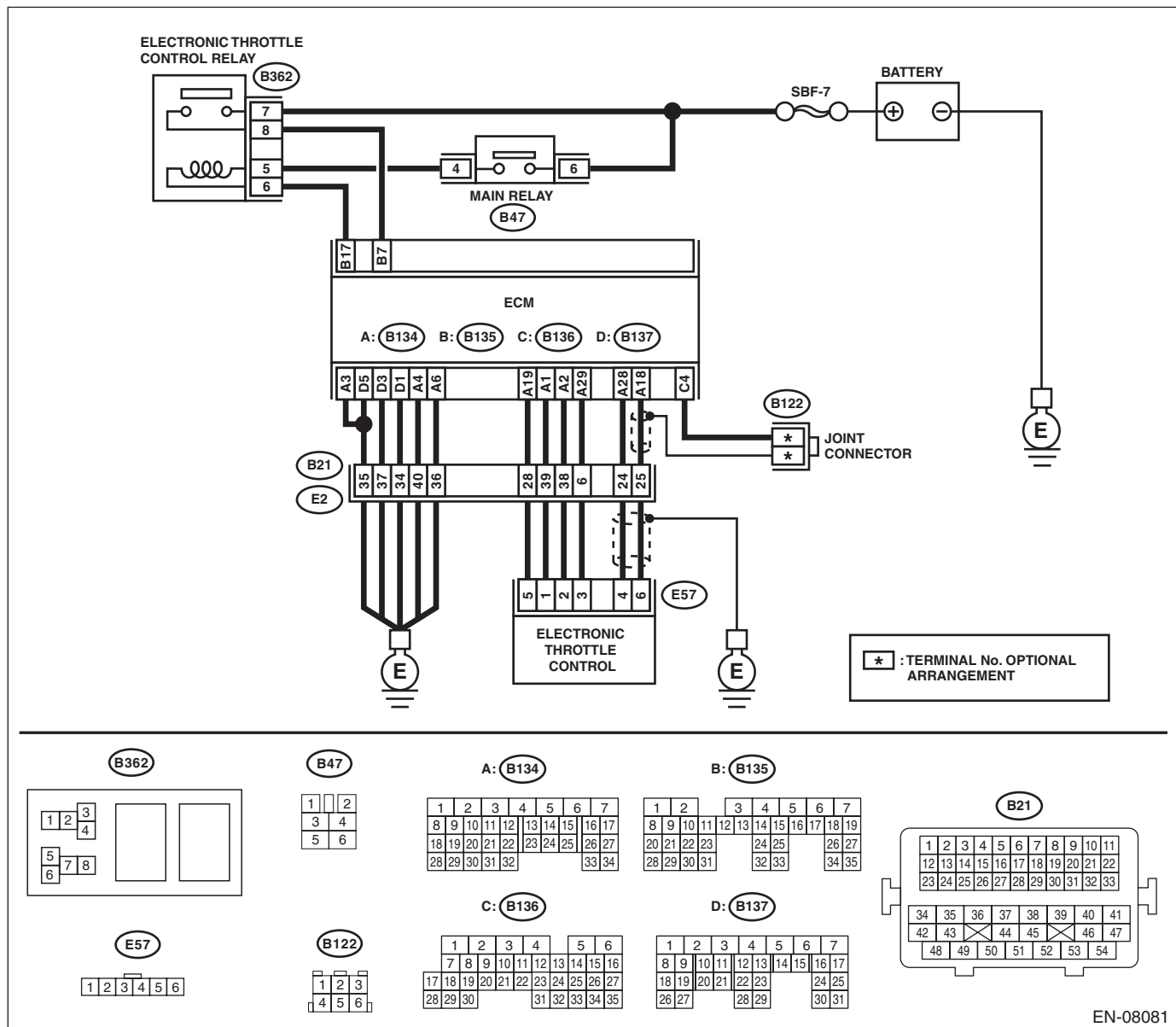
### TROUBLE SYMPTOM:

- Improper idling
- Engine stalls.
- Poor driving performance

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

### WIRING DIAGRAM:



EN-08081

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<b>1 CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM and electronic throttle control. 3) Measure the resistance of harness between ECM and electronic throttle control connector. <b>Connector &amp; terminal</b> <b>(B134) No. 18 — (E57) No. 6:</b> <b>(B134) No. 29 — (E57) No. 3:</b>	Is the resistance less than 1 $\Omega$ ?	Go to step 2.	Repair the harness and connector.  NOTE: In this case, repair the following item: <ul style="list-style-type: none"> <li>• Open circuit in harness between ECM and electronic throttle control connector</li> <li>• Poor contact of coupling connector</li> </ul>
<b>2 CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.</b> 1) Connect the connector to ECM. 2) Measure the resistance between electronic throttle control connector and engine ground. <b>Connector &amp; terminal</b> <b>(E57) No. 3 — Engine ground:</b>	Is the resistance less than 5 $\Omega$ ?	Go to step 3.	Repair the harness and connector.  NOTE: In this case, repair the following item: <ul style="list-style-type: none"> <li>• Open circuit of harness between ECM and engine ground</li> <li>• Poor contact of ECM connector</li> <li>• Poor contact of coupling connector</li> </ul>
<b>3 CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.</b> 1) Turn the ignition switch to ON. 2) Measure the voltage between electronic throttle control connector and engine ground. <b>Connector &amp; terminal</b> <b>(E57) No. 6 (+) — Engine ground (-):</b>	Is the voltage 5 V or more?	Repair the short circuit to power in harness between ECM and electronic throttle control connector.	Go to step 4.
<b>4 CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM. 3) Measure the resistance between ECM connectors. <b>Connector &amp; terminal</b> <b>(B134) No. 19 — (B134) No. 18:</b>	Is the resistance 1 M $\Omega$ or more?	Repair the poor contact of electronic throttle control connector. Replace the electronic throttle control if defective. <Ref. to FU(H6DO)-19, Throttle Body.>	Repair the short circuit to power in harness between ECM and electronic throttle control connector.



# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## AF:DTC P0125 INSUFFICIENT COOLANT TEMPERATURE FOR CLOSED LOOP FUEL CONTROL

### DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-58, DTC P0125 INSUFFICIENT COOLANT TEMPERATURE FOR CLOSED LOOP FUEL CONTROL, Diagnostic Trouble Code (DTC) Detecting Criteria.>

### TROUBLE SYMPTOM:

Engine does not return to idle.

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

Step	Check	Yes	No
1 <b>CHECK TIRE SIZE.</b>	Is the tire size as specified and the same size as three other wheels?	Go to step 2.	Replace the tire.
2 <b>CHECK ENGINE COOLANT.</b> Check the following items: <ul style="list-style-type: none"><li>• Amount of engine coolant</li><li>• Engine coolant freeze</li><li>• Contamination of engine coolant</li></ul>	Is the engine coolant normal?	Go to step 3.	Fill or replace the engine coolant. <Ref. to CO(H6DO)-12, Engine Coolant.>
3 <b>CHECK THERMOSTAT.</b>	Does the thermostat remain opened?	Replace the thermostat. <Ref. to CO(H6DO)-15, Thermostat.>	Replace the engine coolant temperature sensor. <Ref. to FU(H6DO)-30, Engine Coolant Temperature Sensor.>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## AG:DTC P0126 INSUFFICIENT ENGINE COOLANT TEMPERATURE FOR STABLE OPERATION

### DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-60, DTC P0126 INSUFFICIENT ENGINE COOLANT TEMPERATURE FOR STABLE OPERATION, Diagnostic Trouble Code (DTC) Detecting Criteria.>

### TROUBLE SYMPTOM:

- Hard to start
- Improper idling
- Poor driving performance

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

	Step	Check	Yes	No
1	<b>CHECK ENGINE COOLANT TEMPERATURE SENSOR.</b> Measure the resistance between engine coolant temperature sensor terminals when the engine coolant is cold and after warmed up. <b>Terminals</b> <b>No. 1 — No. 2:</b>	Is the resistance of engine coolant temperature sensor different between when engine coolant is cold and after warmed up?	Repair the poor contact of ECM connector.	Replace the engine coolant temperature sensor. <Ref. to FU(H6DO)-30, Engine Coolant Temperature Sensor.>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## AH:DTC P0128 COOLANT THERMOSTAT (ENGINE COOLANT TEMPERATURE BELOW THERMOSTAT REGULATING TEMPERATURE)

### DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-62, DTC P0128 COOLANT THERMOSTAT (ENGINE COOLANT TEMPERATURE BELOW THERMOSTAT REGULATING TEMPERATURE), Diagnostic Trouble Code (DTC) Detecting Criteria.>

### TROUBLE SYMPTOM:

Thermostat remains open.

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

Step	Check	Yes	No
1 <b>CHECK ENGINE COOLANT.</b>	Is the engine coolant amount normal?	Go to step 2.	Refill the engine coolant. <Ref. to CO(H6DO)-12, Engine Coolant.>
2 <b>CHECK RADIATOR FAN.</b> 1) Start the engine. 2) Check the radiator fan operation.	Does the radiator fan continuously rotate for 3 minutes or more during idling?	Repair radiator fan circuit. <Ref. to CO(H6DO)-23, Radiator Main Fan and Fan Motor.> and <Ref. to CO(H6DO)-27, Radiator Sub Fan and Fan Motor.>	Replace the thermostat. <Ref. to CO(H6DO)-15, Thermostat.>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## AI: DTC P0131 O2 SENSOR CIRCUIT LOW VOLTAGE (BANK 1 SENSOR 1)

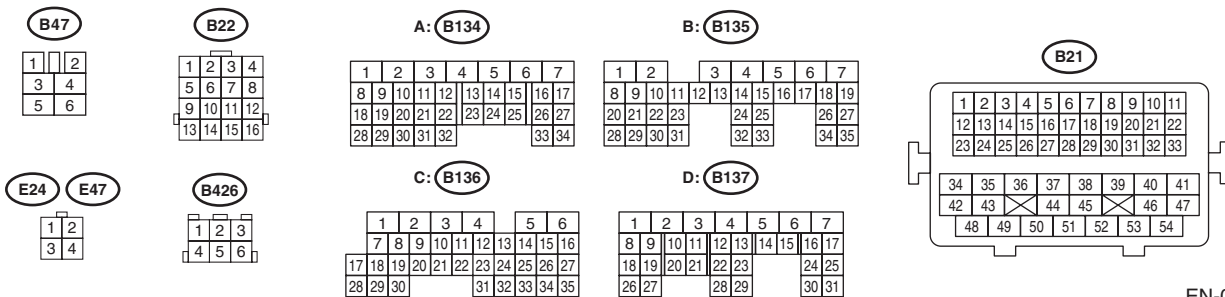
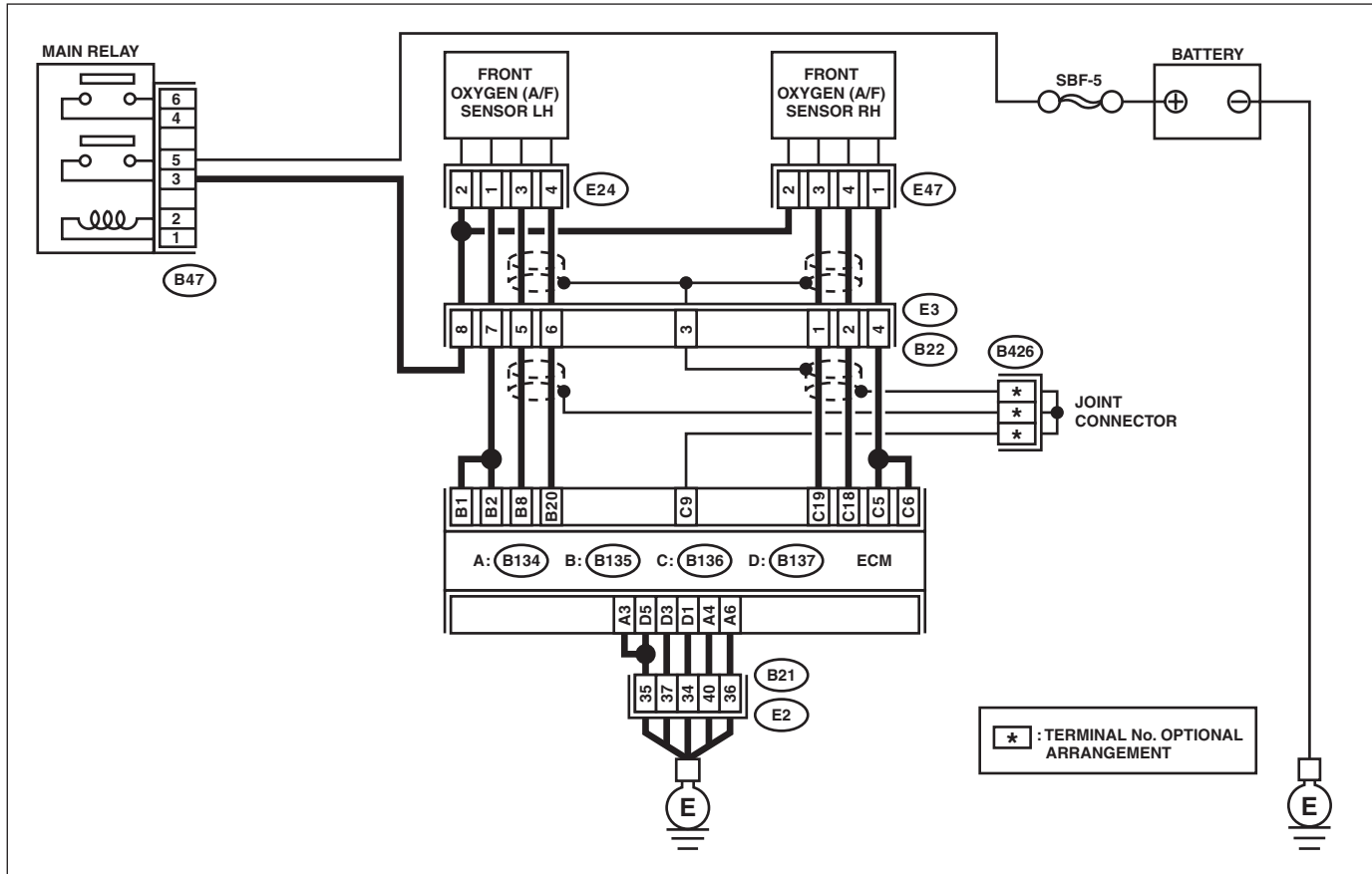
### DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-66, DTC P0131 O2 SENSOR CIRCUIT LOW VOLTAGE (BANK 1 SENSOR 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

### WIRING DIAGRAM:



EN-08076

Step	Check	Yes	No
1	<b>CHECK FRONT OXYGEN (A/F) SENSOR CONNECTOR AND COUPLING CONNECTOR.</b> Has water entered the connector?	Completely remove any water inside.	Go to step 2.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<b>2</b> <b>CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM and front oxygen (A/F) sensor connector. 3) Measure the resistance between ECM and chassis ground. <b>Connector &amp; terminal</b> <b>(B136) No. 18 — Chassis ground:</b> <b>(B136) No. 19 — Chassis ground:</b>	Is the resistance 1 M $\Omega$ or more?	Go to step 3.	Repair the ground short circuit of harness between ECM and front oxygen (A/F) sensor connector.
<b>3</b> <b>CHECK FOR POOR CONTACT.</b> Check for poor contact of the front oxygen (A/F) sensor connector.	Is there poor contact of front oxygen (A/F) sensor connector?	Repair the poor contact of front oxygen (A/F) sensor connector.	Replace the front oxygen (A/F) sensor. <Ref. to FU(H6DO)-48, Front Oxygen (A/F) Sensor.>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## AJ:DTC P0132 O2 SENSOR CIRCUIT HIGH VOLTAGE (BANK 1 SENSOR 1)

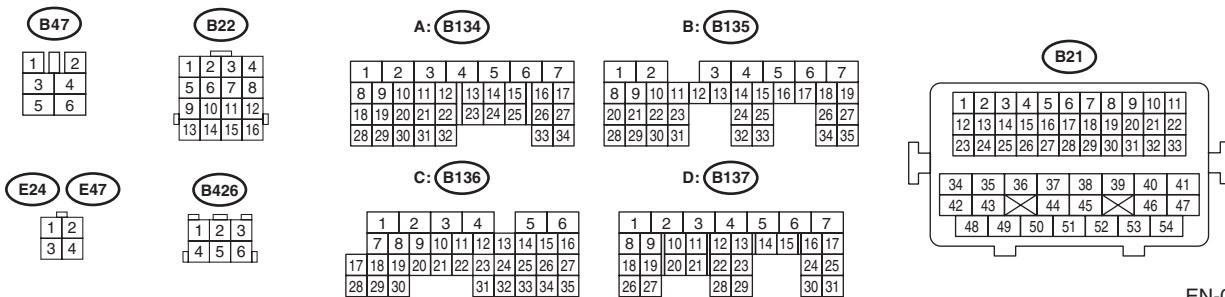
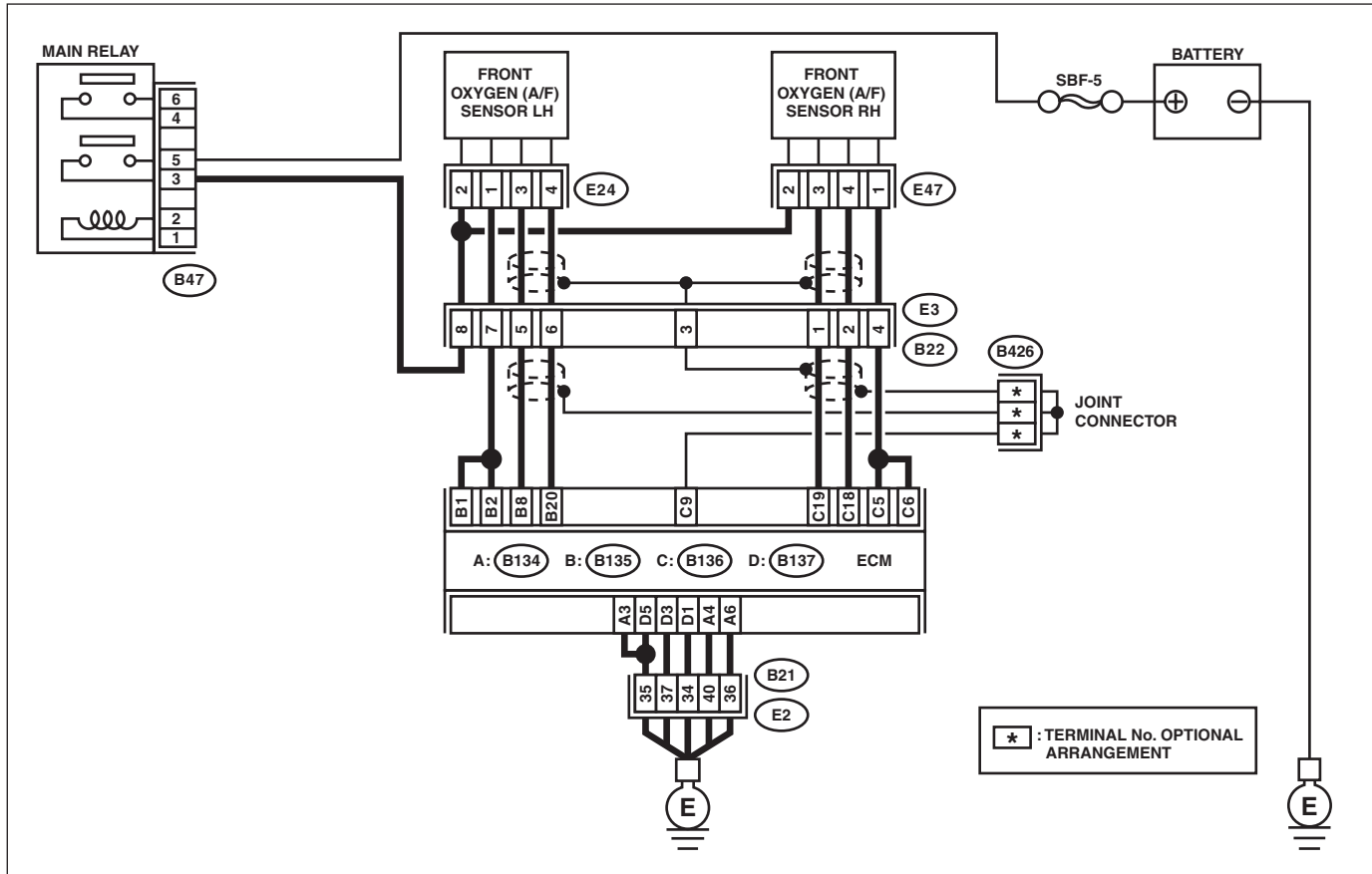
### DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-68, DTC P0132 O2 SENSOR CIRCUIT HIGH VOLTAGE (BANK 1 SENSOR 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

### WIRING DIAGRAM:



EN-08076

Step	Check	Yes	No	
1	<b>CHECK FRONT OXYGEN (A/F) SENSOR CONNECTOR AND COUPLING CONNECTOR.</b>	Has water entered the connector?	Completely remove any water inside.	Go to step 2.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<p><b>2</b>    <b>CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.</b></p> <p>1) Turn the ignition switch to OFF. 2) Disconnect the connectors from front oxygen (A/F) sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between ECM and chassis ground.</p> <p><b>Connector &amp; terminal</b> <b>(B136) No. 18 (+) — Chassis ground (-):</b> <b>(B136) No. 19 (+) — Chassis ground (-):</b></p>	Is the voltage 8 V or more?	Repair the short circuit to power in the harness between ECM and front oxygen (A/F) sensor connector.	Replace the front oxygen (A/F) sensor. <Ref. to FU(H6DO)-48, Front Oxygen (A/F) Sensor.>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## AK:DTC P0134 O2 SENSOR CIRCUIT NO ACTIVITY DETECTED (BANK 1 SENSOR 1)

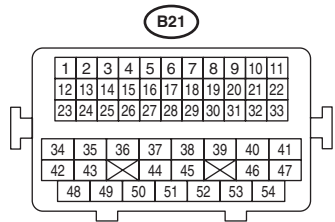
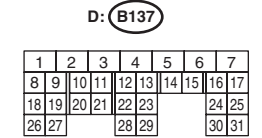
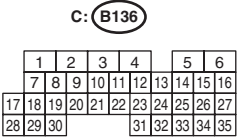
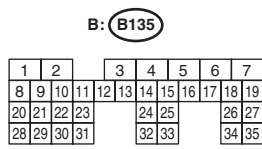
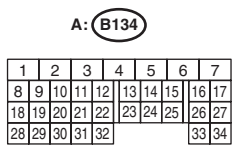
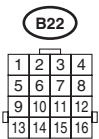
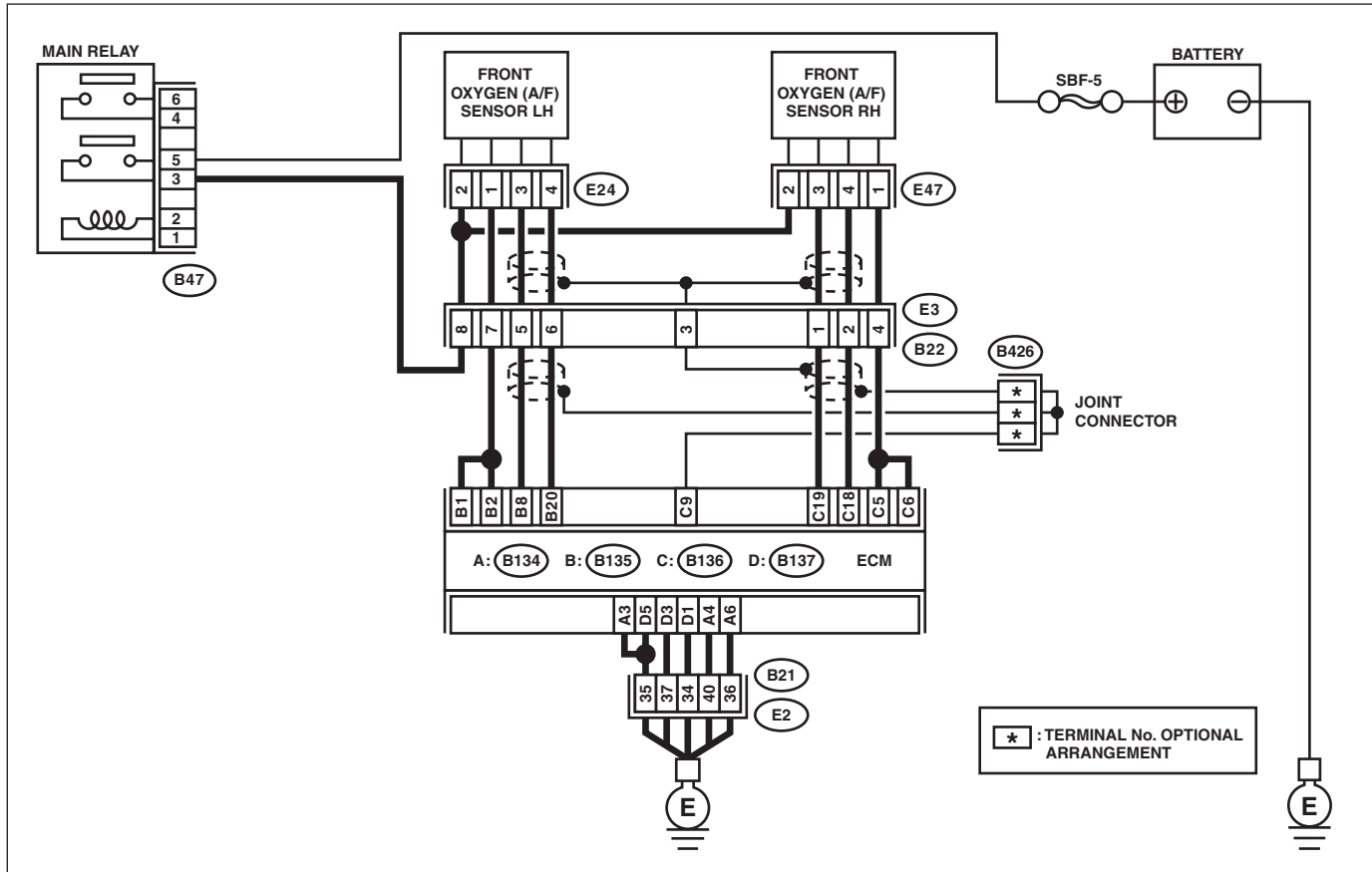
### DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-70, DTC P0134 O2 SENSOR CIRCUIT NO ACTIVITY DETECTED (BANK 1 SENSOR 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

### WIRING DIAGRAM:



EN-08076



# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

	Step	Check	Yes	No
1	<p><b>CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.</b></p> <p>1) Turn the ignition switch to OFF.                      2) Disconnect the connectors from ECM and front oxygen (A/F) sensor connector.                      3) Measure the resistance of harness between ECM and front oxygen (A/F) sensor connector.</p> <p><b>Connector &amp; terminal</b>  <b>(B136) No. 19 — (E47) No. 3:</b>  <b>(B136) No. 18 — (E47) No. 4:</b></p>	Is the resistance less than 1 Ω?	Go to step 2.	<p>Repair the harness and connector.</p> <p>NOTE:                      In this case, repair the following item:</p> <ul style="list-style-type: none"> <li>• Open circuit in harness between ECM and front oxygen (A/F) sensor connector</li> <li>• Poor contact of coupling connector</li> </ul>
2	<p><b>CHECK FOR POOR CONTACT.</b></p> <p>Check for poor contact of ECM and front oxygen (A/F) sensor connector.</p>	Is there poor contact of ECM or front oxygen (A/F) sensor connector?	Repair the poor contact of ECM or front oxygen (A/F) sensor connector.	Replace the front oxygen (A/F) sensor. <Ref. to FU(H6DO)-48, Front Oxygen (A/F) Sensor.>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## AL:DTC P0137 O2 SENSOR CIRCUIT LOW VOLTAGE (BANK 1 SENSOR 2)

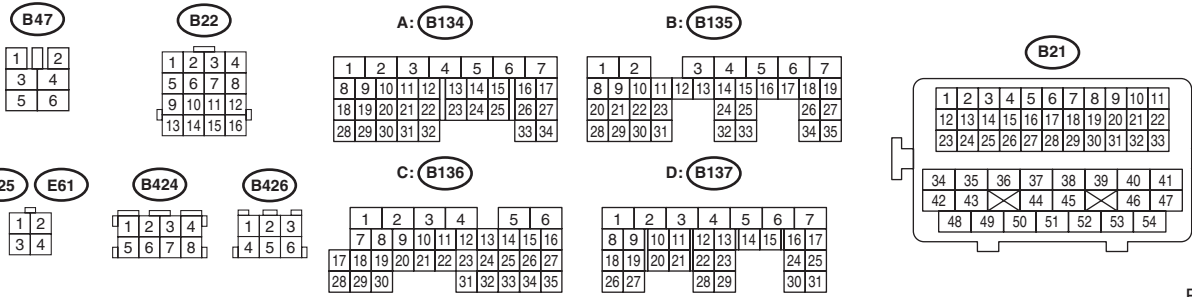
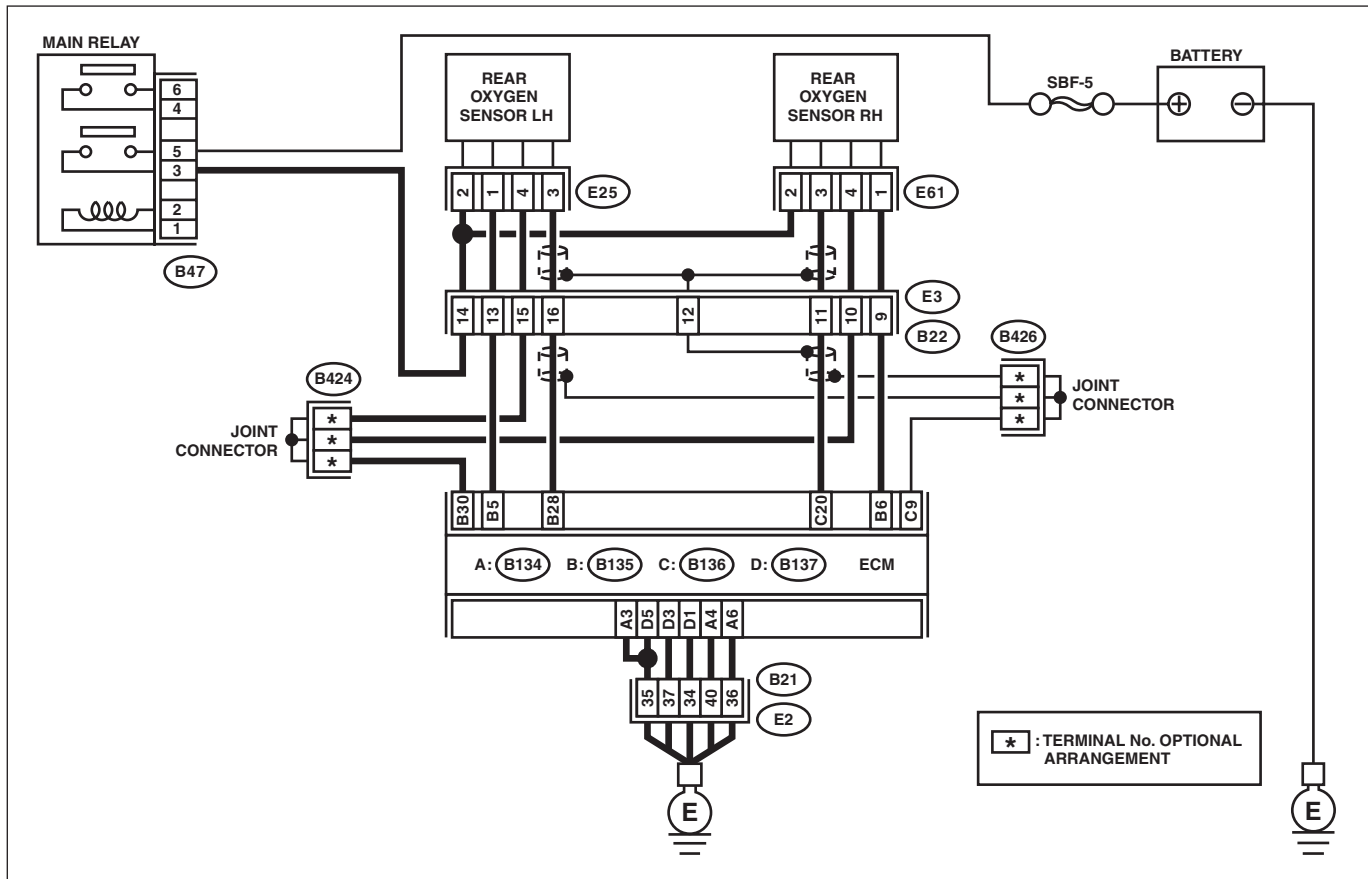
### DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-72, DTC P0137 O2 SENSOR CIRCUIT LOW VOLTAGE (BANK 1 SENSOR 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

### WIRING DIAGRAM:



EN-08077

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<p><b>1 CHECK REAR OXYGEN SENSOR DATA.</b>                      1) Warm up the engine until engine coolant temperature is higher than 75°C (167°F), and keep the engine speed at 3,000 rpm. (2 minutes maximum)                      2) Read the value of «Front O2 Sensor #1» using the Subaru Select Monitor or a general scan tool.                      NOTE:                      • Subaru Select Monitor                      For detailed operation procedures, refer to “READ CURRENT DATA FOR ENGINE”. &lt;Ref. to EN(H6DO)(diag)-36, Subaru Select Monitor.&gt;                      • General scan tool                      For detailed operation procedures, refer to the general scan tool operation manual.</p>	<p>Is the value of «Front O2 Sensor #1» 0.490 V or more?</p>	<p>Go to step 5.</p>	<p>Go to step 2.</p>
<p><b>2 CHECK REAR OXYGEN SENSOR CONNECTOR AND COUPLING CONNECTOR.</b></p>	<p>Has water entered the connector?</p>	<p>Completely remove any water inside.</p>	<p>Go to step 3.</p>
<p><b>3 CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.</b>                      1) Turn the ignition switch to OFF.                      2) Disconnect the connector from ECM and rear oxygen sensor.                      3) Measure the resistance of harness between ECM and rear oxygen sensor connector.  <i>Connector &amp; terminal</i>  <i>(B136) No. 20 — (E61) No. 3:</i>  <i>(B135) No. 30 — (E61) No. 4:</i></p>	<p>Is the resistance less than 1 Ω?</p>	<p>Go to step 4.</p>	<p>Repair the harness and connector.                      NOTE:                      In this case, repair the following item:                      • Open circuit in harness between ECM and rear oxygen sensor connector                      • Poor contact of coupling connector</p>
<p><b>4 CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.</b>                      1) Connect the connector to ECM.                      2) Turn the ignition switch to ON.                      3) Measure the voltage between rear oxygen sensor connector and chassis ground.  <i>Connector &amp; terminal</i>  <i>(E61) No. 3 (+) — Chassis ground (-):</i></p>	<p>Is the voltage 0.2 — 0.5 V?</p>	<p>Replace the rear oxygen sensor.                      &lt;Ref. to FU(H6DO)-50, Rear Oxygen Sensor.&gt;</p>	<p>Repair the harness and connector.                      NOTE:                      In this case, repair the following item:                      • Open circuit in harness between ECM and rear oxygen sensor connector                      • Poor contact of ECM connector                      • Poor contact of coupling connector</p>
<p><b>5 CHECK EXHAUST SYSTEM.</b>                      Check exhaust system parts.                      NOTE:                      Check the following items.                      • Looseness and improper fitting of exhaust system parts                      • Damage (crack, hole etc.) of parts                      • Loose part and improper installation between front oxygen (A/F) sensor and rear oxygen sensor</p>	<p>Is there any fault in exhaust system?</p>	<p>Repair or replace faulty parts.</p>	<p>Replace the rear oxygen sensor.                      &lt;Ref. to FU(H6DO)-50, Rear Oxygen Sensor.&gt;</p>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## AM:DTC P0138 O2 SENSOR CIRCUIT HIGH VOLTAGE (BANK 1 SENSOR 2)

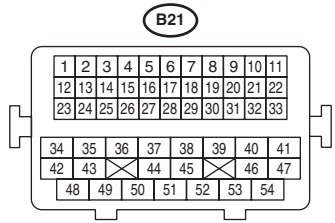
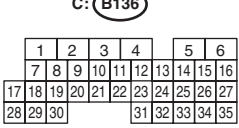
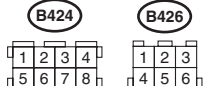
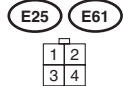
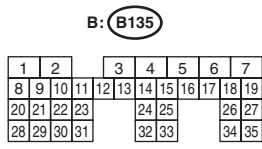
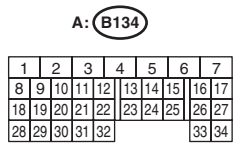
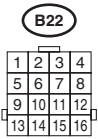
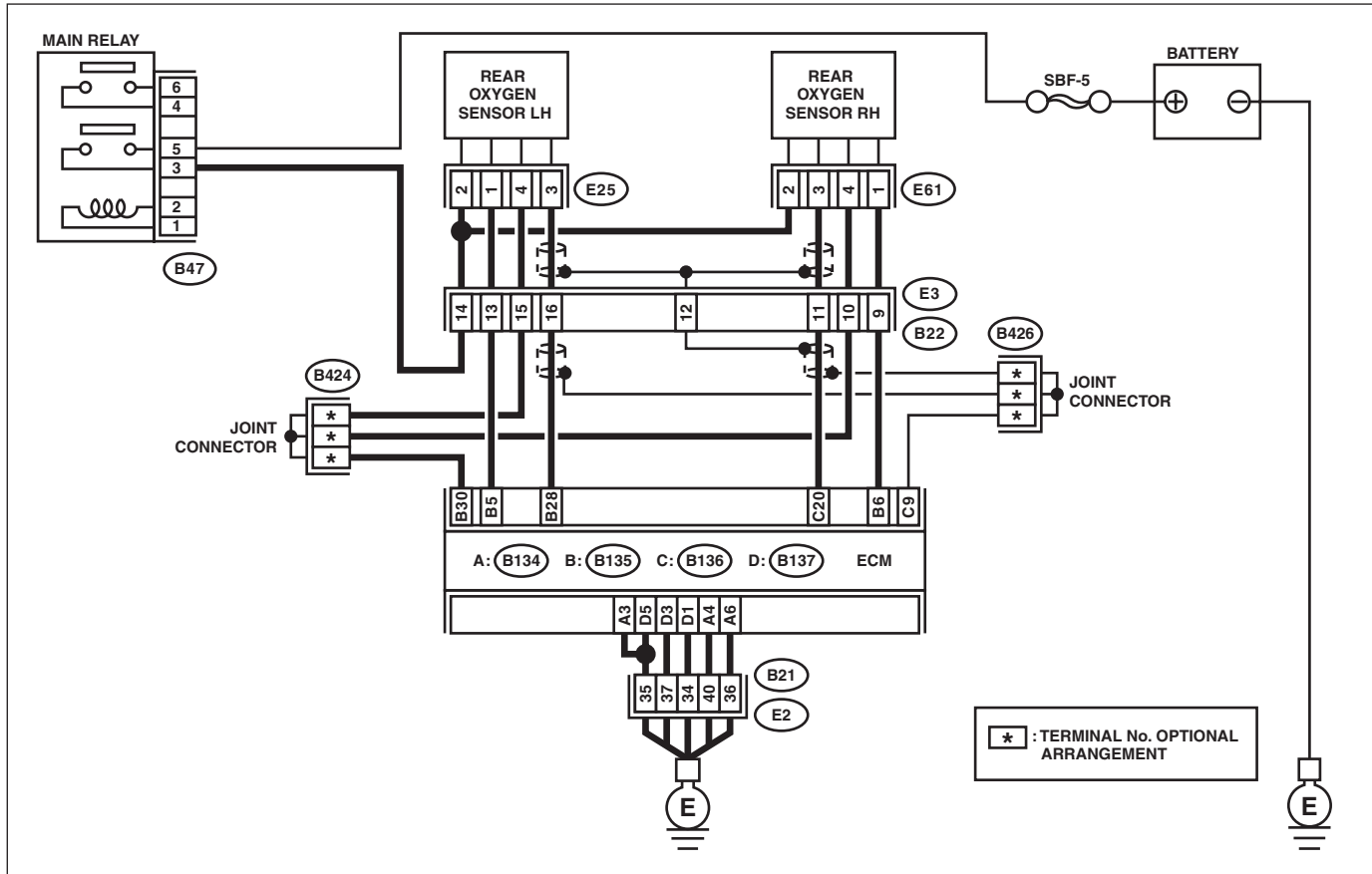
### DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-74, DTC P0138 O2 SENSOR CIRCUIT HIGH VOLTAGE (BANK 1 SENSOR 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

### WIRING DIAGRAM:



EN-08077

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<p><b>1 CHECK REAR OXYGEN SENSOR DATA.</b>                      1) Warm up the engine until engine coolant temperature is higher than 75°C (167°F), and rapidly reduce the engine speed from 3,000 rpm.                      2) Read the value of «Front O2 Sensor #1» using the Subaru Select Monitor or a general scan tool.                      NOTE:                      • Subaru Select Monitor                      For detailed operation procedures, refer to “READ CURRENT DATA FOR ENGINE”. &lt;Ref. to EN(H6DO)(diag)-36, Subaru Select Monitor.&gt;                      • General scan tool                      For detailed operation procedures, refer to the general scan tool operation manual.</p>	<p>Is the value of «Front O2 Sensor #1» 0.250 V or less?</p>	<p>Go to step 5.</p>	<p>Go to step 2.</p>
<p><b>2 CHECK REAR OXYGEN SENSOR CONNECTOR AND COUPLING CONNECTOR.</b></p>	<p>Has water entered the connector?</p>	<p>Completely remove any water inside.</p>	<p>Go to step 3.</p>
<p><b>3 CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.</b>                      1) Turn the ignition switch to OFF.                      2) Disconnect the connector from ECM and rear oxygen sensor.                      3) Measure the resistance of harness between ECM and rear oxygen sensor connector.  <i>Connector &amp; terminal</i>  <i>(B136) No. 20 — (E61) No. 3:</i>  <i>(B135) No. 30 — (E61) No. 4:</i></p>	<p>Is the resistance less than 1 Ω?</p>	<p>Go to step 4.</p>	<p>Repair the harness and connector.                      NOTE:                      In this case, repair the following item:                      • Open circuit in harness between ECM and rear oxygen sensor connector                      • Poor contact of coupling connector</p>
<p><b>4 CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.</b>                      1) Connect the connector to ECM.                      2) Turn the ignition switch to ON.                      3) Measure the voltage between rear oxygen sensor connector and chassis ground.  <i>Connector &amp; terminal</i>  <i>(E61) No. 3 (+) — Chassis ground (-):</i></p>	<p>Is the voltage 0.2 — 0.5 V?</p>	<p>Replace the rear oxygen sensor.                      &lt;Ref. to FU(H6DO)-50, Rear Oxygen Sensor.&gt;</p>	<p>Repair the harness and connector.                      NOTE:                      In this case, repair the following item:                      • Open circuit in harness between ECM and rear oxygen sensor connector                      • Poor contact of ECM connector                      • Poor contact of coupling connector</p>
<p><b>5 CHECK EXHAUST SYSTEM.</b>                      Check exhaust system parts.                      NOTE:                      Check the following items.                      • Looseness and improper fitting of exhaust system parts                      • Damage (crack, hole etc.) of parts                      • Loose part and improper installation between front oxygen (A/F) sensor and rear oxygen sensor</p>	<p>Is there any fault in exhaust system?</p>	<p>Repair or replace faulty parts.</p>	<p>Replace the rear oxygen sensor.                      &lt;Ref. to FU(H6DO)-50, Rear Oxygen Sensor.&gt;</p>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## AN:DTC P013A O2 SENSOR SLOW RESPONSE - RICH TO LEAN (BANK 1 SENSOR 2)

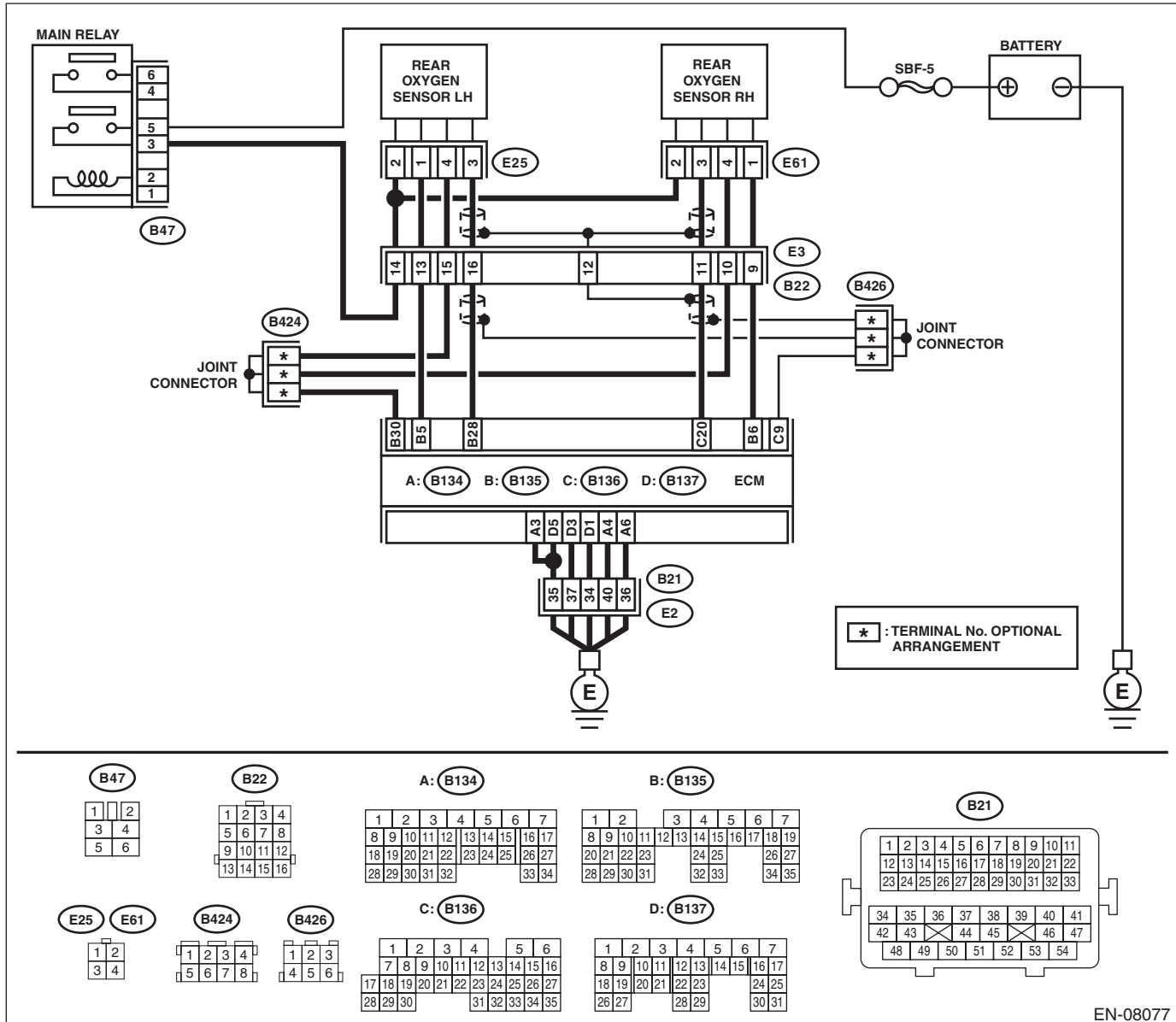
### DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-75, DTC P013A O2 SENSOR SLOW RESPONSE - RICH TO LEAN (BANK 1 SENSOR 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

### WIRING DIAGRAM:



EN-08077

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<b>1 CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM and rear oxygen sensor. 3) Measure the resistance of harness between ECM and rear oxygen sensor connector. <b>Connector &amp; terminal</b> <b>(B136) No. 20 — (E61) No. 3:</b>	Is the resistance less than 1 Ω?	Go to step 2.	Repair the harness and connector.  NOTE: In this case, repair the following item: • Open circuit in harness between ECM and rear oxygen sensor connector • Poor contact of coupling connector
<b>2 CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.</b> Measure the resistance between rear oxygen sensor connector and chassis ground. <b>Connector &amp; terminal</b> <b>(E61) No. 3 — Chassis ground:</b>	Is the resistance 1 MΩ or more?	Go to step 3.	Repair the ground short circuit of harness between ECM and rear oxygen sensor connector.
<b>3 CHECK REAR OXYGEN SENSOR.</b> Measure the resistance between rear oxygen sensor terminals. <b>Terminals</b> <b>No. 3 — No. 4</b>	Is the resistance less than 1 Ω?	Replace the rear oxygen sensor. <Ref. to FU(H6DO)-50, Rear Oxygen Sensor.>	Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again.  NOTE: In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.

## AO:DTC P013B O2 SENSOR SLOW RESPONSE - LEAN TO RICH (BANK 1 SENSOR 2)

### NOTE:

For the diagnostic procedure, refer to DTC P013A. <Ref. to EN(H6DO)(diag)-158, DTC P013A O2 SENSOR SLOW RESPONSE - RICH TO LEAN (BANK 1 SENSOR 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## AP:DTC P013C O2 SENSOR SLOW RESPONSE - RICH TO LEAN (BANK 2 SENSOR 2)

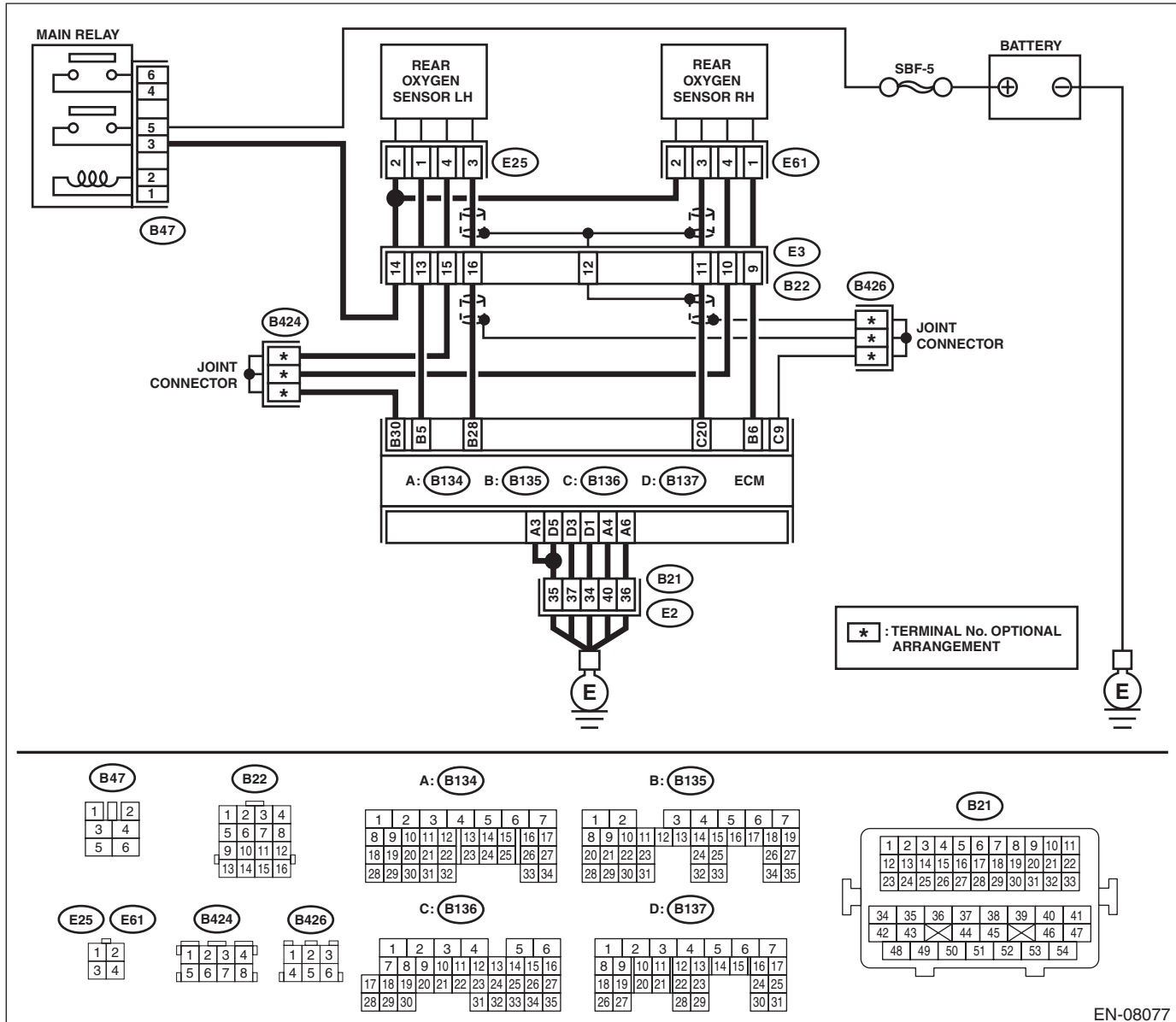
### DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-79, DTC P013C O2 SENSOR SLOW RESPONSE - RICH TO LEAN (BANK 2 SENSOR 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

### WIRING DIAGRAM:



EN-08077



# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<b>1 CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM and rear oxygen sensor. 3) Measure the resistance of harness between ECM and rear oxygen sensor connector. <b>Connector &amp; terminal</b> <b>(B135) No. 28 — (E25) No. 3:</b>	Is the resistance less than 1 Ω?	Go to step 2.	Repair the harness and connector.  NOTE: In this case, repair the following item: • Open circuit in harness between ECM and rear oxygen sensor connector • Poor contact of coupling connector
<b>2 CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.</b> Measure the resistance between rear oxygen sensor connector and chassis ground. <b>Connector &amp; terminal</b> <b>(E25) No. 3 — Chassis ground:</b>	Is the resistance 1 MΩ or more?	Go to step 3.	Repair the ground short circuit of harness between ECM and rear oxygen sensor connector.
<b>3 CHECK REAR OXYGEN SENSOR.</b> Measure the resistance between rear oxygen sensor terminals. <b>Terminals</b> <b>No. 3 — No. 4</b>	Is the resistance less than 1 Ω?	Replace the rear oxygen sensor. <Ref. to FU(H6DO)-50, Rear Oxygen Sensor.>	Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again.  NOTE: In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.

## AQ:DTC P013D O2 SENSOR SLOW RESPONSE - LEAN TO RICH (BANK 2 SENSOR 2)

NOTE:

For the diagnostic procedure, refer to DTC P013C. <Ref. to EN(H6DO)(diag)-160, DTC P013C O2 SENSOR SLOW RESPONSE - RICH TO LEAN (BANK 2 SENSOR 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

## AR:DTC P013E O2 SENSOR DELAYED RESPONSE - RICH TO LEAN (BANK 1 SENSOR 2)

NOTE:

For the diagnostic procedure, refer to DTC P013A. <Ref. to EN(H6DO)(diag)-158, DTC P013A O2 SENSOR SLOW RESPONSE - RICH TO LEAN (BANK 1 SENSOR 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

## AS:DTC P013F O2 SENSOR DELAYED RESPONSE - LEAN TO RICH (BANK 1 SENSOR 2)

NOTE:

For the diagnostic procedure, refer to DTC P013A. <Ref. to EN(H6DO)(diag)-158, DTC P013A O2 SENSOR SLOW RESPONSE - RICH TO LEAN (BANK 1 SENSOR 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## AT:DTC P0140 O2 SENSOR CIRCUIT NO ACTIVITY DETECTED (BANK1 SENSOR2)

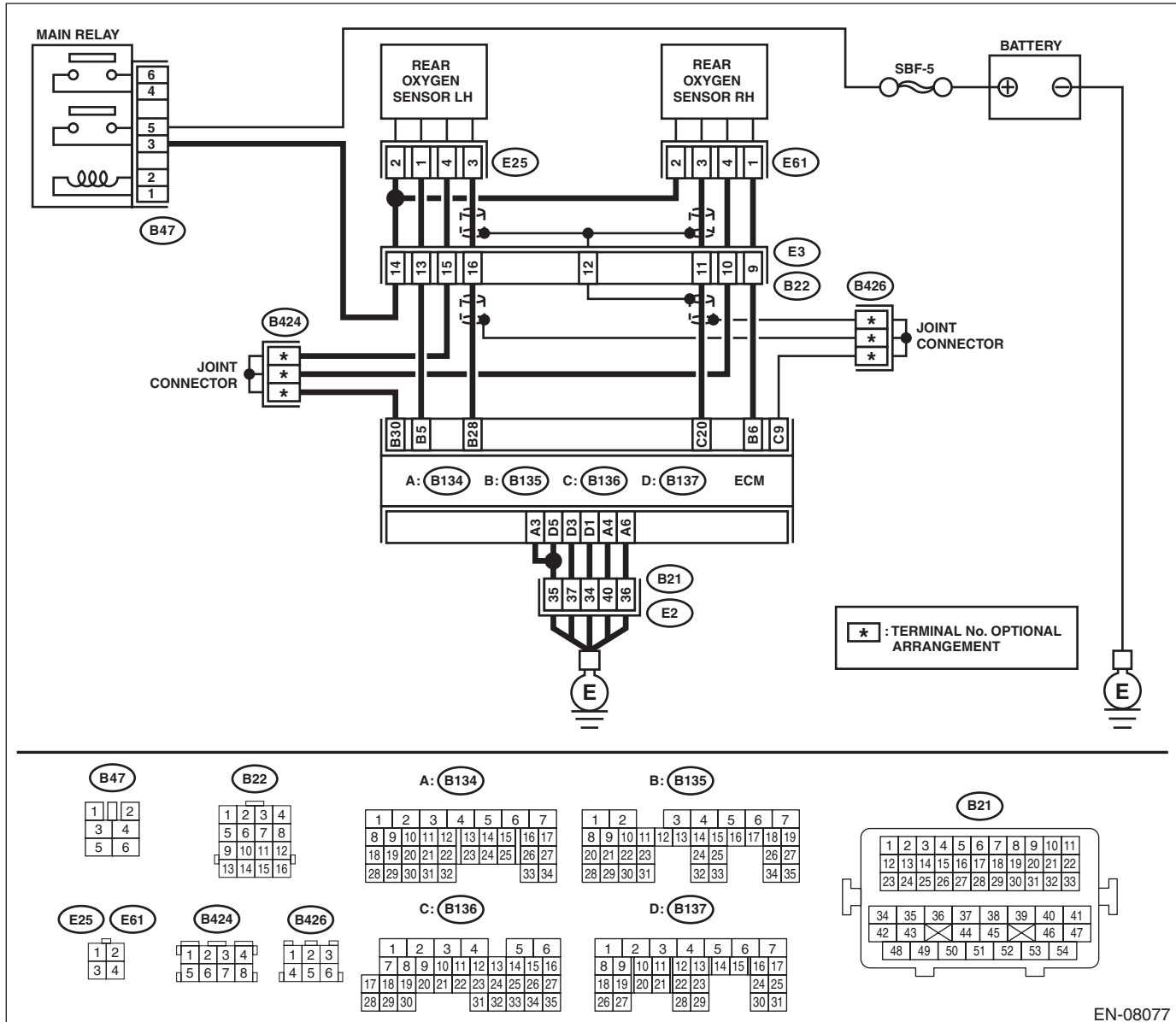
### DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-84, DTC P0140 O2 SENSOR CIRCUIT NO ACTIVITY DETECTED (BANK1 SENSOR2), Diagnostic Trouble Code (DTC) Detecting Criteria.>

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

### WIRING DIAGRAM:



EN-08077

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

	Step	Check	Yes	No
1	<p><b>CHECK REAR OXYGEN SENSOR DATA.</b></p> <p>1) Warm up the engine until engine coolant temperature is higher than 75°C (167°F), and keep the engine speed at 3,000 rpm. (2 minutes maximum)</p> <p>2) Read the value of «Front O2 Sensor #1» using the Subaru Select Monitor or a general scan tool.</p> <p>NOTE:</p> <ul style="list-style-type: none"> <li>Subaru Select Monitor</li> </ul> <p>For detailed operation procedures, refer to “READ CURRENT DATA FOR ENGINE”. &lt;Ref. to EN(H6DO)(diag)-36, Subaru Select Monitor.&gt;</p> <ul style="list-style-type: none"> <li>General scan tool</li> </ul> <p>For detailed operation procedures, refer to the general scan tool operation manual.</p>	Is the value of «Front O2 Sensor #1» 0.490 V or more?	Go to step 6.	Go to step 2.
2	<p><b>CHECK REAR OXYGEN SENSOR DATA.</b></p> <p>1) Warm up the engine until engine coolant temperature is higher than 75°C (167°F), and rapidly reduce the engine speed from 3,000 rpm.</p> <p>2) Read the value of «Front O2 Sensor #1» using the Subaru Select Monitor or a general scan tool.</p> <p>NOTE:</p> <ul style="list-style-type: none"> <li>Subaru Select Monitor</li> </ul> <p>For detailed operation procedures, refer to “READ CURRENT DATA FOR ENGINE”. &lt;Ref. to EN(H6DO)(diag)-36, Subaru Select Monitor.&gt;</p> <ul style="list-style-type: none"> <li>General scan tool</li> </ul> <p>For detailed operation procedures, refer to the general scan tool operation manual.</p>	Is the value of «Front O2 Sensor #1» 0.250 V or less?	Go to step 6.	Go to step 3.
3	<p><b>CHECK REAR OXYGEN SENSOR CONNECTOR AND COUPLING CONNECTOR.</b></p>	Has water entered the connector?	Completely remove any water inside.	Go to step 4.
4	<p><b>CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.</b></p> <p>1) Turn the ignition switch to OFF.</p> <p>2) Disconnect the connector from ECM and rear oxygen sensor.</p> <p>3) Measure the resistance of harness between ECM and rear oxygen sensor connector.</p> <p><b>Connector &amp; terminal</b></p> <p><b>(B136) No. 20 — (E61) No. 3:</b></p> <p><b>(B135) No. 30 — (E61) No. 4:</b></p>	Is the resistance less than 1 Ω?	Go to step 5.	<p>Repair the harness and connector.</p> <p>NOTE:</p> <p>In this case, repair the following item:</p> <ul style="list-style-type: none"> <li>Open circuit in harness between ECM and rear oxygen sensor connector</li> <li>Poor contact of coupling connector</li> </ul>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<p><b>5</b></p> <p><b>CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.</b></p> <p>1) Connect the connector to ECM.                      2) Turn the ignition switch to ON.                      3) Measure the voltage between rear oxygen sensor connector and chassis ground.</p> <p><b>Connector &amp; terminal</b>  <b>(E61) No. 3 (+) — Chassis ground (-):</b></p>	<p>Is the voltage 0.2 — 0.5 V?</p>	<p>Replace the rear oxygen sensor.                      &lt;Ref. to FU(H6DO)-50, Rear Oxygen Sensor.&gt;</p>	<p>Repair the harness and connector.</p> <p><b>NOTE:</b>                      In this case, repair the following item:</p> <ul style="list-style-type: none"> <li>• Open circuit in harness between ECM and rear oxygen sensor connector</li> <li>• Poor contact of ECM connector</li> <li>• Poor contact of coupling connector</li> </ul>
<p><b>6</b></p> <p><b>CHECK EXHAUST SYSTEM.</b></p> <p>Check exhaust system parts.</p> <p><b>NOTE:</b>                      Check the following items.</p> <ul style="list-style-type: none"> <li>• Looseness and improper fitting of exhaust system parts</li> <li>• Damage (crack, hole etc.) of parts</li> <li>• Loose part and improper installation between front oxygen (A/F) sensor and rear oxygen sensor</li> </ul>	<p>Is there any fault in exhaust system?</p>	<p>Repair or replace faulty parts.</p>	<p>Replace the rear oxygen sensor.                      &lt;Ref. to FU(H6DO)-50, Rear Oxygen Sensor.&gt;</p>

## **AU:DTC P0141 O2 SENSOR HEATER CIRCUIT (BANK1 SENSOR2)**

NOTE:

Refer to DTC P0037 for diagnostic procedure. <Ref. to EN(H6DO)(diag)-108, DTC P0037 HO2S HEATER CONTROL CIRCUIT LOW (BANK 1 SENSOR 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

## **AV:DTC P014A O2 SENSOR DELAYED RESPONSE - RICH TO LEAN (BANK 2 SENSOR 2)**

NOTE:

For the diagnostic procedure, refer to DTC P013C. <Ref. to EN(H6DO)(diag)-160, DTC P013C O2 SENSOR SLOW RESPONSE - RICH TO LEAN (BANK 2 SENSOR 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

## **AW:DTC P014B O2 SENSOR DELAYED RESPONSE - LEAN TO RICH (BANK 2 SENSOR 2)**

NOTE:

For the diagnostic procedure, refer to DTC P013C. <Ref. to EN(H6DO)(diag)-160, DTC P013C O2 SENSOR SLOW RESPONSE - RICH TO LEAN (BANK 2 SENSOR 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

## Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

### AX:DTC P014C O2 SENSOR SLOW RESPONSE - RICH TO LEAN (BANK 1 SENSOR 1)

#### DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-88, DTC P014C O2 SENSOR SLOW RESPONSE - RICH TO LEAN (BANK 1 SENSOR 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

#### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

	Step	Check	Yes	No
1	<b>CHECK EXHAUST SYSTEM.</b> NOTE: Check the following items. <ul style="list-style-type: none"><li>• Loose installation of front portion of exhaust pipe onto cylinder heads</li><li>• Loose connection between front exhaust pipe and front catalytic converter</li><li>• Damage of exhaust pipe resulting in a hole</li></ul>	Is there any fault in exhaust system?	Repair the exhaust system.	Replace the front oxygen (A/F) sensor. <Ref. to FU(H6DO)-48, Front Oxygen (A/F) Sensor.>

### AY:DTC P014D O2 SENSOR SLOW RESPONSE - LEAN TO RICH (BANK 1 SENSOR 1)

#### NOTE:

For the diagnostic procedure, refer to DTC P014C. <Ref. to EN(H6DO)(diag)-166, DTC P014C O2 SENSOR SLOW RESPONSE - RICH TO LEAN (BANK 1 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## AZ:DTC P014E O2 SENSOR SLOW RESPONSE - RICH TO LEAN (BANK 2 SENSOR 1)

### DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-90, DTC P014E O2 SENSOR SLOW RESPONSE - RICH TO LEAN (BANK 2 SENSOR 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

	Step	Check	Yes	No
1	<b>CHECK EXHAUST SYSTEM.</b> NOTE: Check the following items. <ul style="list-style-type: none"><li>• Loose installation of front portion of exhaust pipe onto cylinder heads</li><li>• Loose connection between front exhaust pipe and front catalytic converter</li><li>• Damage of exhaust pipe resulting in a hole</li></ul>	Is there any fault in exhaust system?	Repair the exhaust system.	Replace the front oxygen (A/F) sensor. <Ref. to FU(H6DO)-48, Front Oxygen (A/F) Sensor.>

## BA:DTC P014F O2 SENSOR SLOW RESPONSE - LEAN TO RICH (BANK 2 SENSOR 1)

### NOTE:

For the diagnostic procedure, refer to DTC P014E. <Ref. to EN(H6DO)(diag)-167, DTC P014E O2 SENSOR SLOW RESPONSE - RICH TO LEAN (BANK 2 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## BB:DTC P0151 O2 SENSOR CIRCUIT LOW VOLTAGE (BANK 2 SENSOR 1)

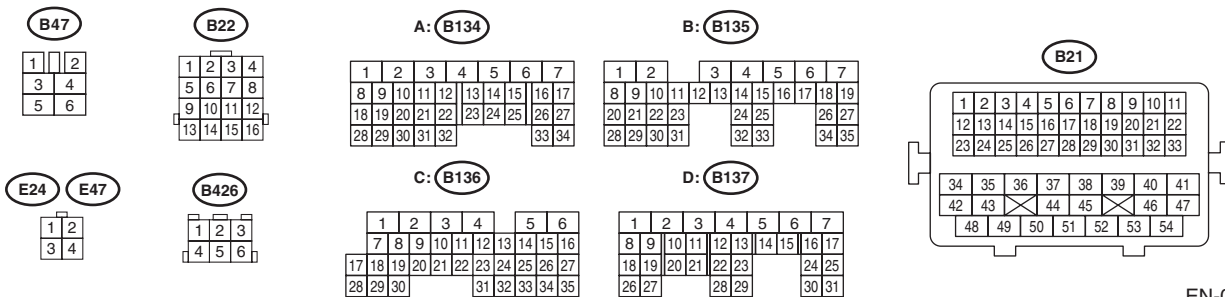
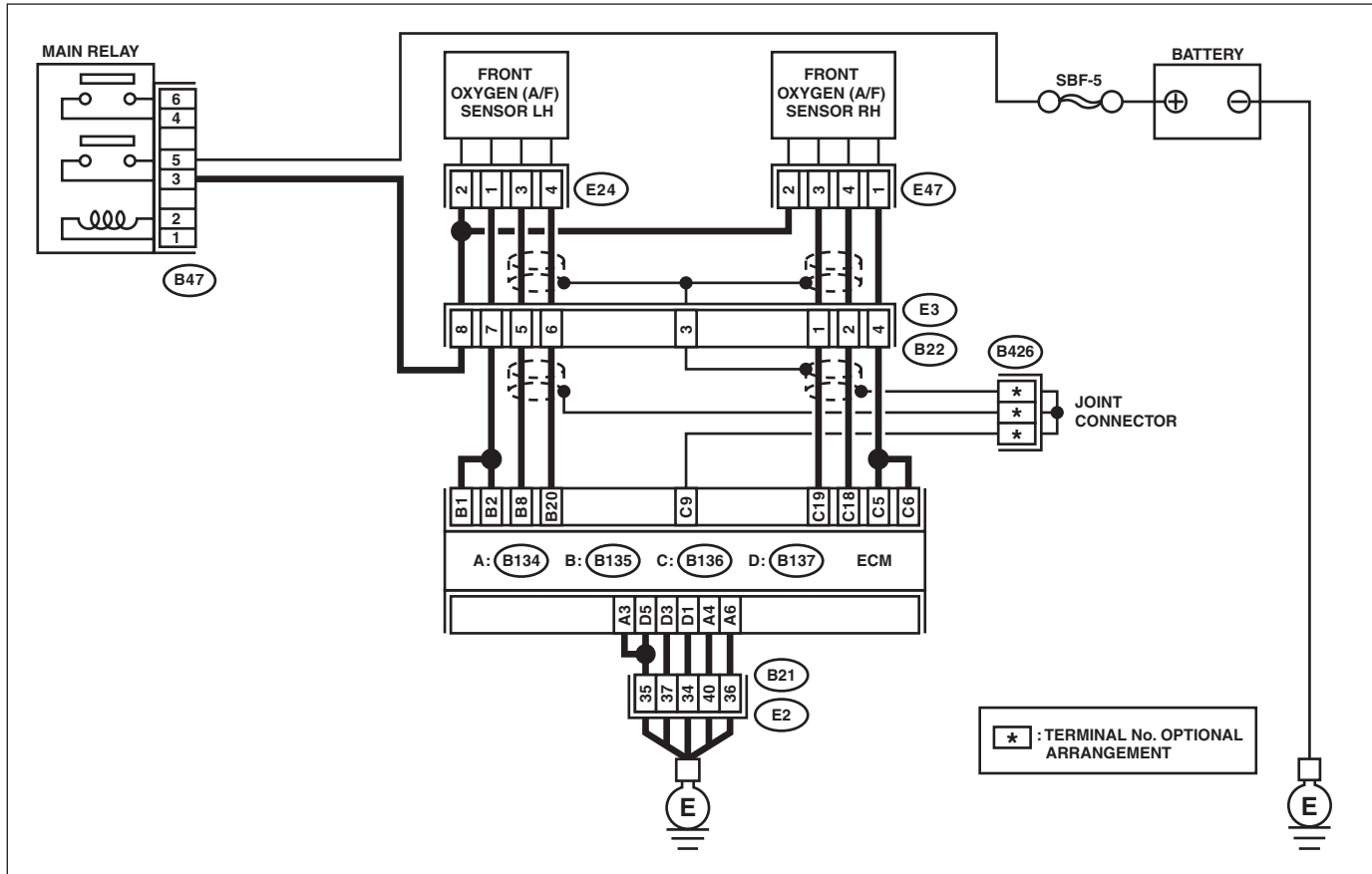
### DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-91, DTC P0151 O2 SENSOR CIRCUIT LOW VOLTAGE (BANK 2 SENSOR 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

### WIRING DIAGRAM:



EN-08076

Step	Check	Yes	No
1	<b>CHECK FRONT OXYGEN (A/F) SENSOR CONNECTOR AND COUPLING CONNECTOR.</b> Has water entered the connector?	Completely remove any water inside.	Go to step 2.



# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<p><b>2</b></p> <p><b>CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.</b></p> <p>1) Turn the ignition switch to OFF.                      2) Disconnect the connectors from ECM and front oxygen (A/F) sensor connector.                      3) Measure the resistance between ECM and chassis ground.</p> <p><b>Connector &amp; terminal</b>  <b>(B135) No. 8 — Chassis ground:</b>  <b>(B135) No. 20 — Chassis ground:</b></p>	<p>Is the resistance 1 MΩ or more?</p>	<p>Go to step 3.</p>	<p>Repair the ground short circuit of harness between ECM and front oxygen (A/F) sensor connector.</p>
<p><b>3</b></p> <p><b>CHECK FOR POOR CONTACT.</b>                      Check for poor contact of the front oxygen (A/F) sensor connector.</p>	<p>Is there poor contact of front oxygen (A/F) sensor connector?</p>	<p>Repair the poor contact of front oxygen (A/F) sensor connector.</p>	<p>Replace the front oxygen (A/F) sensor. &lt;Ref. to FU(H6DO)-48, Front Oxygen (A/F) Sensor.&gt;</p>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## BC:DTC P0152 O2 SENSOR CIRCUIT HIGH VOLTAGE (BANK 2 SENSOR 1)

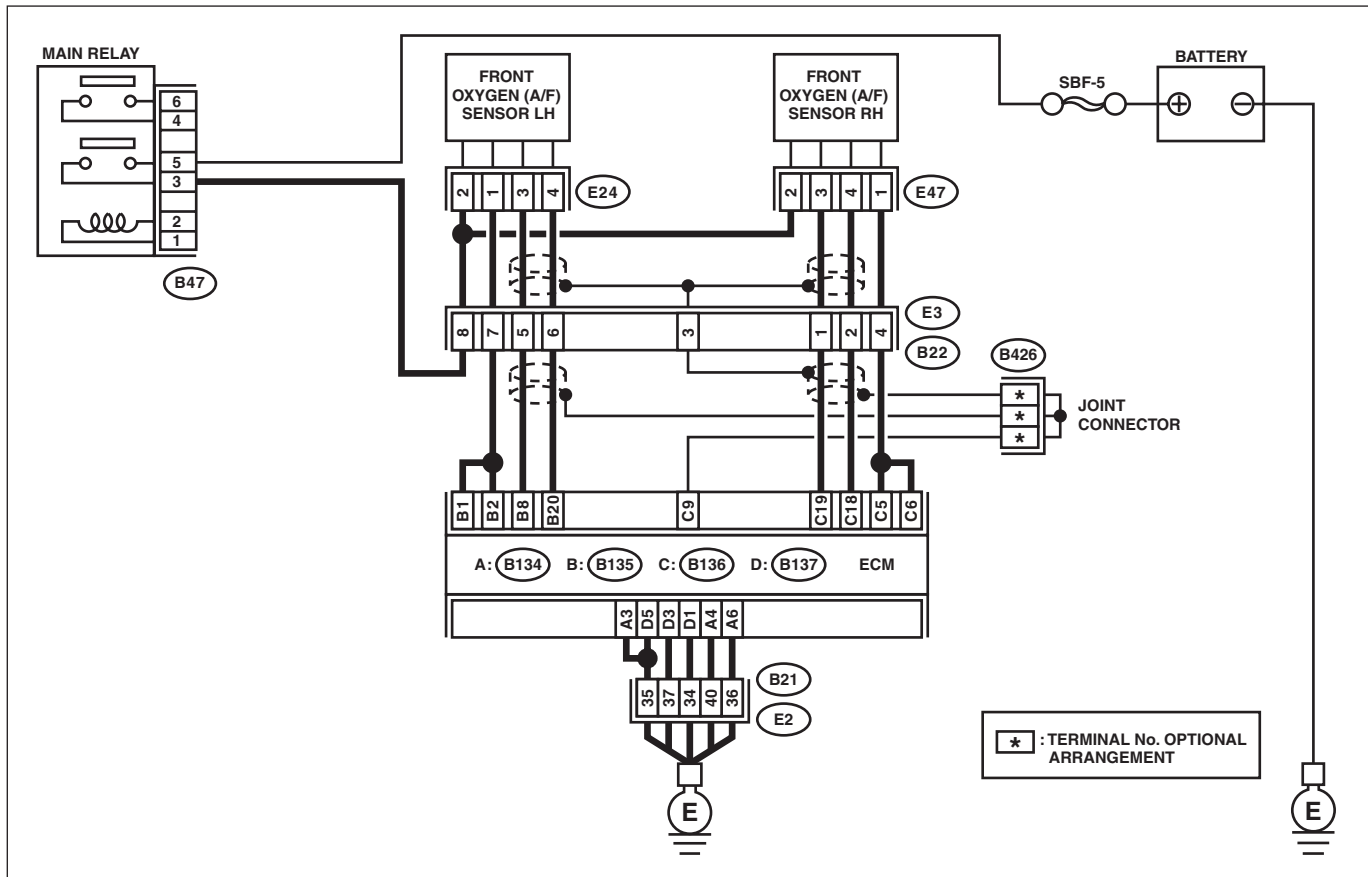
### DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-91, DTC P0152 O2 SENSOR CIRCUIT HIGH VOLTAGE (BANK 2 SENSOR 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

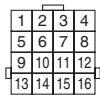
### WIRING DIAGRAM:



B47



B22



A: B134



B: B135



E24 E47



B426



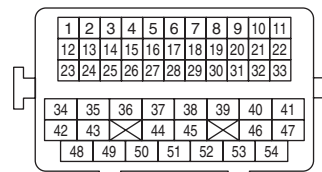
C: B136



D: B137



B21



\* : TERMINAL No. OPTIONAL ARRANGEMENT

EN-08076

Step	Check	Yes	No	
1	<b>CHECK FRONT OXYGEN (A/F) SENSOR CONNECTOR AND COUPLING CONNECTOR.</b>	Has water entered the connector?	Completely remove any water inside.	Go to step 2.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<p><b>2</b>     <b>CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.</b></p> <p>1) Turn the ignition switch to OFF. 2) Disconnect the connectors from front oxygen (A/F) sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between ECM and chassis ground.</p> <p><b>Connector &amp; terminal</b> <b>(B135) No. 8 (+) — Chassis ground (-):</b> <b>(B135) No. 20 (+) — Chassis ground (-):</b></p>	Is the voltage 8 V or more?	Repair the short circuit to power in the harness between ECM and front oxygen (A/F) sensor connector.	Replace the front oxygen (A/F) sensor. <Ref. to FU(H6DO)-48, Front Oxygen (A/F) Sensor.>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## BD:DTC P0154 O2 SENSOR CIRCUIT NO ACTIVITY DETECTED (BANK 2 SENSOR 1)

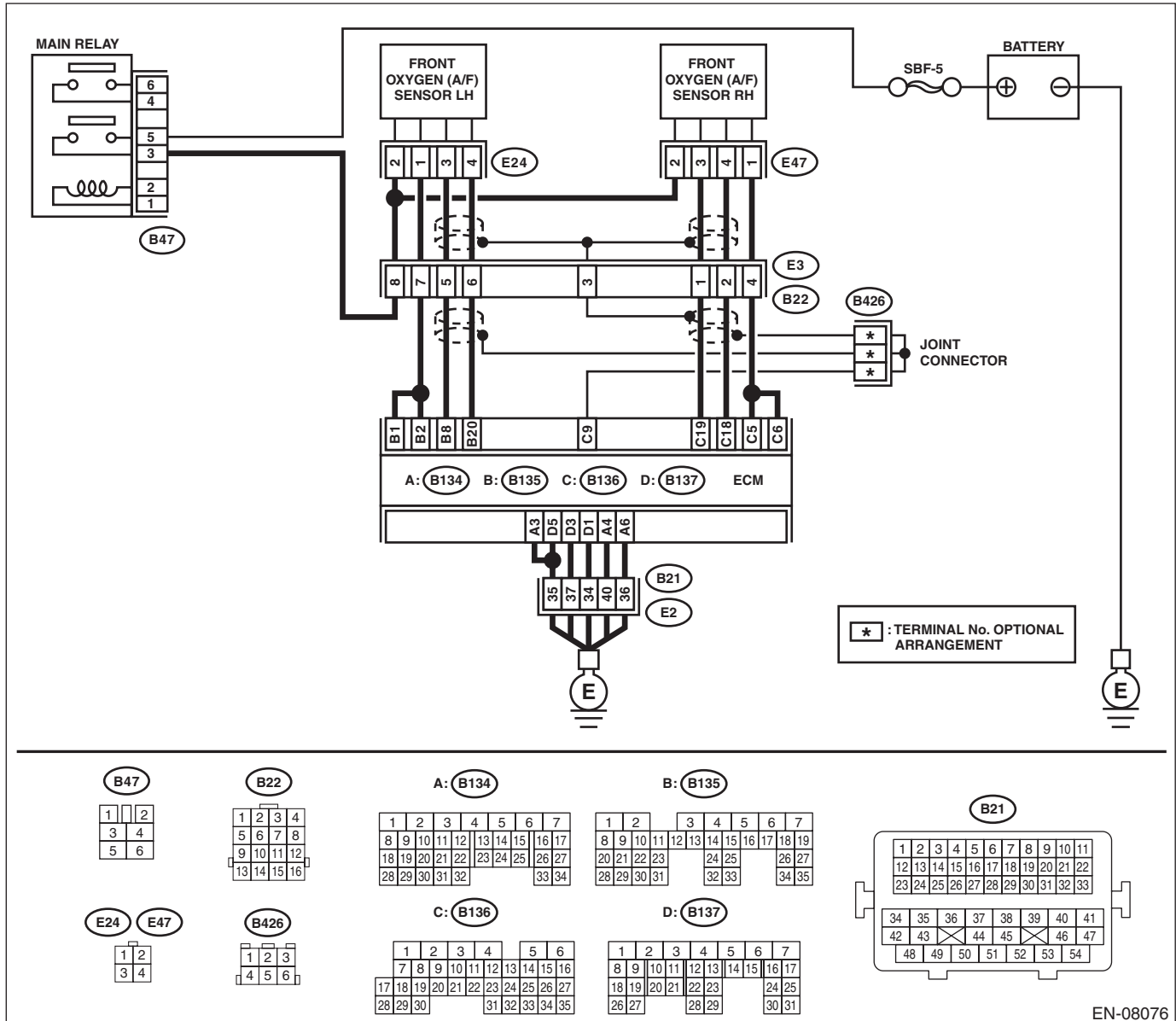
### DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-91, DTC P0154 O2 SENSOR CIRCUIT NO ACTIVITY DETECTED (BANK 2 SENSOR 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

### WIRING DIAGRAM:



EN-08076

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

	Step	Check	Yes	No
1	<p><b>CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.</b></p> <p>1) Turn the ignition switch to OFF.                      2) Disconnect the connectors from ECM and front oxygen (A/F) sensor connector.                      3) Measure the resistance of harness between ECM and front oxygen (A/F) sensor connector.</p> <p><b>Connector &amp; terminal</b>  <b>(B135) No. 8 — (E24) No. 3:</b>  <b>(B135) No. 20 — (E24) No. 4:</b></p>	Is the resistance less than 1 Ω?	Go to step 2.	<p>Repair the harness and connector.</p> <p>NOTE:                      In this case, repair the following item:</p> <ul style="list-style-type: none"> <li>• Open circuit in harness between ECM and front oxygen (A/F) sensor connector</li> <li>• Poor contact of coupling connector</li> </ul>
2	<p><b>CHECK FOR POOR CONTACT.</b></p> <p>Check for poor contact of ECM and front oxygen (A/F) sensor connector.</p>	Is there poor contact of ECM or front oxygen (A/F) sensor connector?	Repair the poor contact of ECM or front oxygen (A/F) sensor connector.	Replace the front oxygen (A/F) sensor. <Ref. to FU(H6DO)-48, Front Oxygen (A/F) Sensor.>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## BE:DTC P0157 O2 SENSOR CIRCUIT LOW VOLTAGE (BANK 2 SENSOR 2)

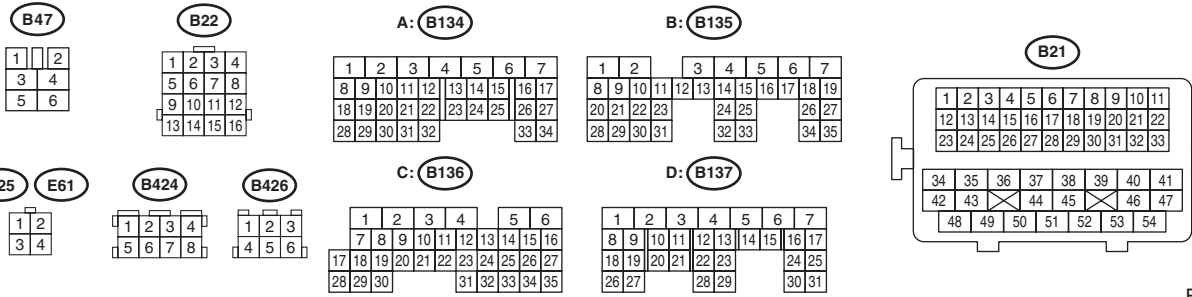
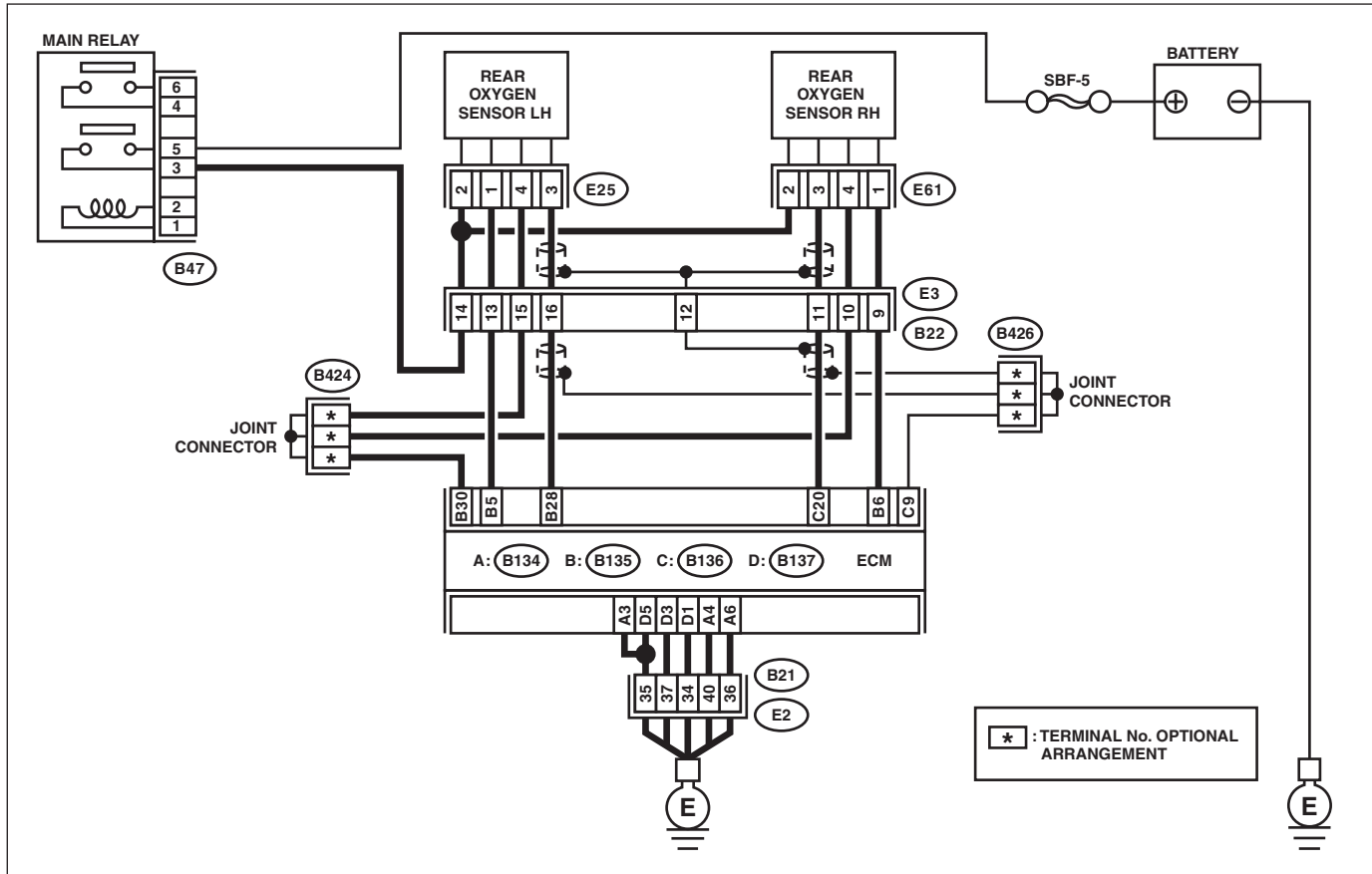
### DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-91, DTC P0157 O2 SENSOR CIRCUIT LOW VOLTAGE (BANK 2 SENSOR 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

### WIRING DIAGRAM:



EN-08077

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<p><b>1 CHECK REAR OXYGEN SENSOR DATA.</b>                      1) Warm up the engine until engine coolant temperature is higher than 75°C (167°F), and keep the engine speed at 3,000 rpm. (2 minutes maximum)                      2) Read the value of «Front O2 Sensor #2» using the Subaru Select Monitor or a general scan tool.                      NOTE:                      • Subaru Select Monitor                      For detailed operation procedures, refer to “READ CURRENT DATA FOR ENGINE”. &lt;Ref. to EN(H6DO)(diag)-36, Subaru Select Monitor.&gt;                      • General scan tool                      For detailed operation procedures, refer to the general scan tool operation manual.</p>	<p>Is the value of «Front O2 Sensor #2» 0.490 V or more?</p>	<p>Go to step 5.</p>	<p>Go to step 2.</p>
<p><b>2 CHECK REAR OXYGEN SENSOR CONNECTOR AND COUPLING CONNECTOR.</b></p>	<p>Has water entered the connector?</p>	<p>Completely remove any water inside.</p>	<p>Go to step 3.</p>
<p><b>3 CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.</b>                      1) Turn the ignition switch to OFF.                      2) Disconnect the connector from ECM and rear oxygen sensor.                      3) Measure the resistance of harness between ECM and rear oxygen sensor connector.  <i><b>Connector &amp; terminal</b></i>  <i><b>(B135) No. 28 — (E25) No. 3:</b></i>  <i><b>(B135) No. 30 — (E25) No. 4:</b></i></p>	<p>Is the resistance less than 1 Ω?</p>	<p>Go to step 4.</p>	<p>Repair the harness and connector.                      NOTE:                      In this case, repair the following item:                      • Open circuit in harness between ECM and rear oxygen sensor connector                      • Poor contact of coupling connector</p>
<p><b>4 CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.</b>                      1) Connect the connector to ECM.                      2) Turn the ignition switch to ON.                      3) Measure the voltage between rear oxygen sensor connector and chassis ground.  <i><b>Connector &amp; terminal</b></i>  <i><b>(E25) No. 3 (+) — Chassis ground (-):</b></i></p>	<p>Is the voltage 0.2 — 0.5 V?</p>	<p>Replace the rear oxygen sensor.                      &lt;Ref. to FU(H6DO)-50, Rear Oxygen Sensor.&gt;</p>	<p>Repair the harness and connector.                      NOTE:                      In this case, repair the following item:                      • Open circuit in harness between ECM and rear oxygen sensor connector                      • Poor contact of ECM connector                      • Poor contact of coupling connector</p>
<p><b>5 CHECK EXHAUST SYSTEM.</b>                      Check exhaust system parts.                      NOTE:                      Check the following items.                      • Looseness and improper fitting of exhaust system parts                      • Damage (crack, hole etc.) of parts                      • Loose part and improper installation between front oxygen (A/F) sensor and rear oxygen sensor</p>	<p>Is there any fault in exhaust system?</p>	<p>Repair or replace faulty parts.</p>	<p>Replace the rear oxygen sensor.                      &lt;Ref. to FU(H6DO)-50, Rear Oxygen Sensor.&gt;</p>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## BF:DTC P0158 O2 SENSOR CIRCUIT HIGH VOLTAGE (BANK 2 SENSOR 2)

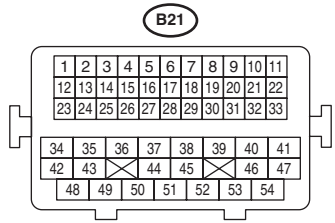
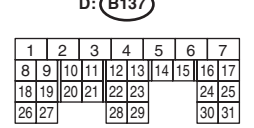
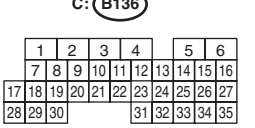
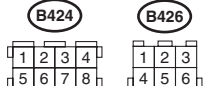
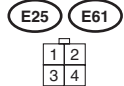
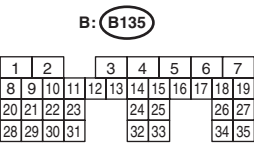
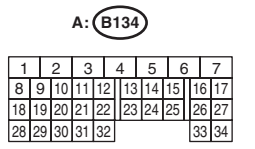
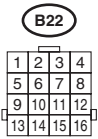
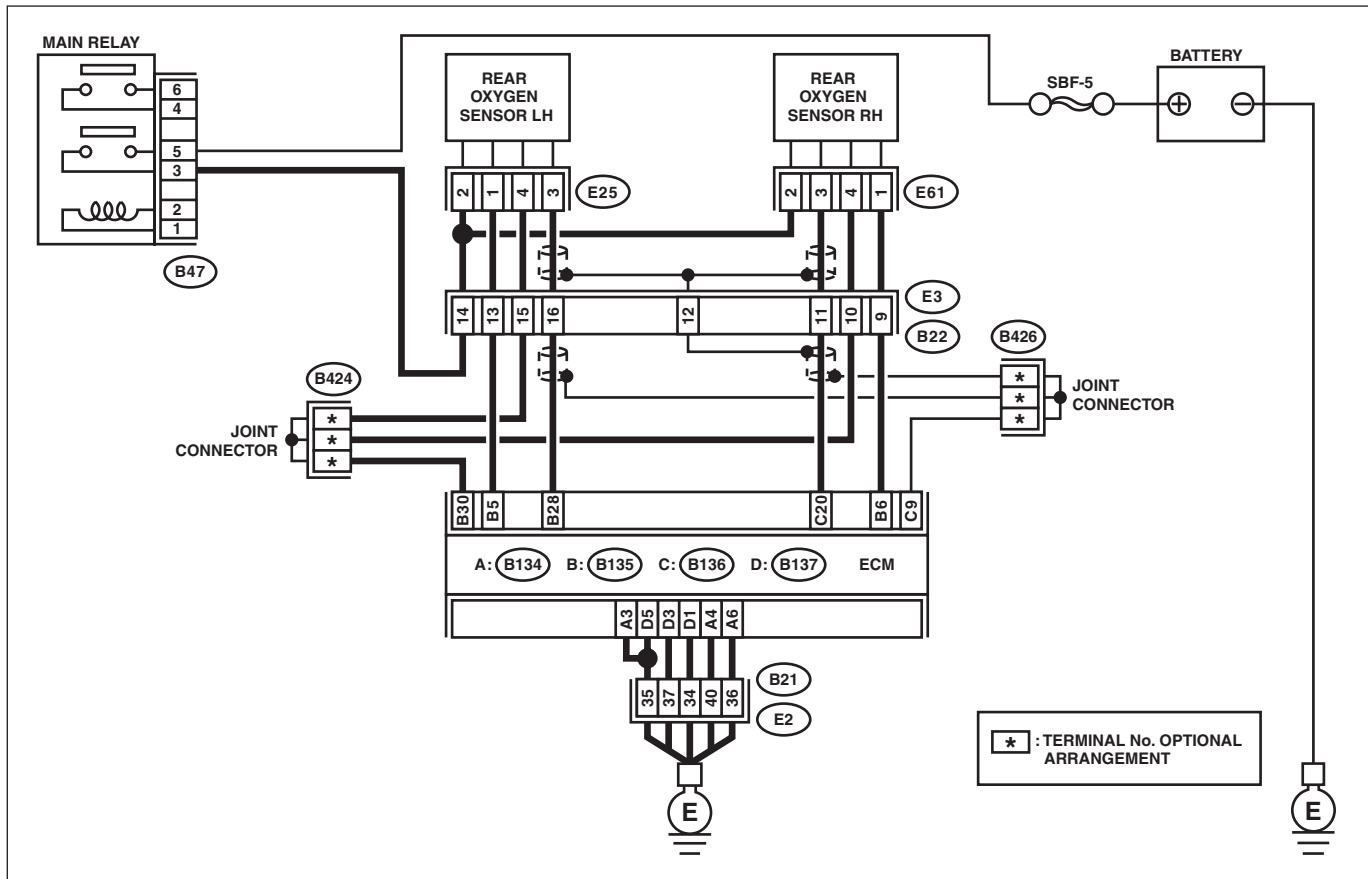
### DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-91, DTC P0158 O2 SENSOR CIRCUIT HIGH VOLTAGE (BANK 2 SENSOR 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

### WIRING DIAGRAM:



EN-08077



# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<b>1 CHECK REAR OXYGEN SENSOR DATA.</b> 1) Warm up the engine until engine coolant temperature is higher than 75°C (167°F), and rapidly reduce the engine speed from 3,000 rpm. 2) Read the value of «Front O2 Sensor #2» using the Subaru Select Monitor or a general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to “READ CURRENT DATA FOR ENGINE”. <Ref. to EN(H6DO)(diag)-36, Subaru Select Monitor.> • General scan tool For detailed operation procedures, refer to the general scan tool operation manual.	Is the value of «Front O2 Sensor #2» 0.250 V or less?	Go to step 5.	Go to step 2.
<b>2 CHECK REAR OXYGEN SENSOR CONNECTOR AND COUPLING CONNECTOR.</b>	Has water entered the connector?	Completely remove any water inside.	Go to step 3.
<b>3 CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM and rear oxygen sensor. 3) Measure the resistance of harness between ECM and rear oxygen sensor connector. <i>Connector &amp; terminal</i> (B135) No. 28 — (E25) No. 3: (B135) No. 30 — (E25) No. 4:	Is the resistance less than 1 Ω?	Go to step 4.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit in harness between ECM and rear oxygen sensor connector • Poor contact of coupling connector
<b>4 CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.</b> 1) Connect the connector to ECM. 2) Turn the ignition switch to ON. 3) Measure the voltage between rear oxygen sensor connector and chassis ground. <i>Connector &amp; terminal</i> (E25) No. 3 (+) — Chassis ground (-):	Is the voltage 0.2 — 0.5 V?	Replace the rear oxygen sensor. <Ref. to FU(H6DO)-50, Rear Oxygen Sensor.>	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit in harness between ECM and rear oxygen sensor connector • Poor contact of ECM connector • Poor contact of coupling connector
<b>5 CHECK EXHAUST SYSTEM.</b> Check exhaust system parts. NOTE: Check the following items. • Looseness and improper fitting of exhaust system parts • Damage (crack, hole etc.) of parts • Loose part and improper installation between front oxygen (A/F) sensor and rear oxygen sensor	Is there any fault in exhaust system?	Repair or replace faulty parts.	Replace the rear oxygen sensor. <Ref. to FU(H6DO)-50, Rear Oxygen Sensor.>

## Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

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### **BG:DTC P015A O2 SENSOR DELAYED RESPONSE - RICH TO LEAN (BANK 1 SENSOR 1)**

NOTE:

For the diagnostic procedure, refer to DTC P014C. <Ref. to EN(H6DO)(diag)-166, DTC P014C O2 SENSOR SLOW RESPONSE - RICH TO LEAN (BANK 1 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

### **BH:DTC P015B O2 SENSOR DELAYED RESPONSE - LEAN TO RICH (BANK 1 SENSOR 1)**

NOTE:

For the diagnostic procedure, refer to DTC P014C. <Ref. to EN(H6DO)(diag)-166, DTC P014C O2 SENSOR SLOW RESPONSE - RICH TO LEAN (BANK 1 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

### **BI: DTC P015C O2 SENSOR DELAYED RESPONSE - RICH TO LEAN (BANK 2 SENSOR 1)**

NOTE:

For the diagnostic procedure, refer to DTC P014E. <Ref. to EN(H6DO)(diag)-167, DTC P014E O2 SENSOR SLOW RESPONSE - RICH TO LEAN (BANK 2 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

### **BJ:DTC P015D O2 SENSOR DELAYED RESPONSE - LEAN TO RICH (BANK 2 SENSOR 1)**

NOTE:

For the diagnostic procedure, refer to DTC P014E. <Ref. to EN(H6DO)(diag)-167, DTC P014E O2 SENSOR SLOW RESPONSE - RICH TO LEAN (BANK 2 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## BK:DTC P0160 O2 SENSOR CIRCUIT NO ACTIVITY DETECTED (BANK2 SENSOR2)

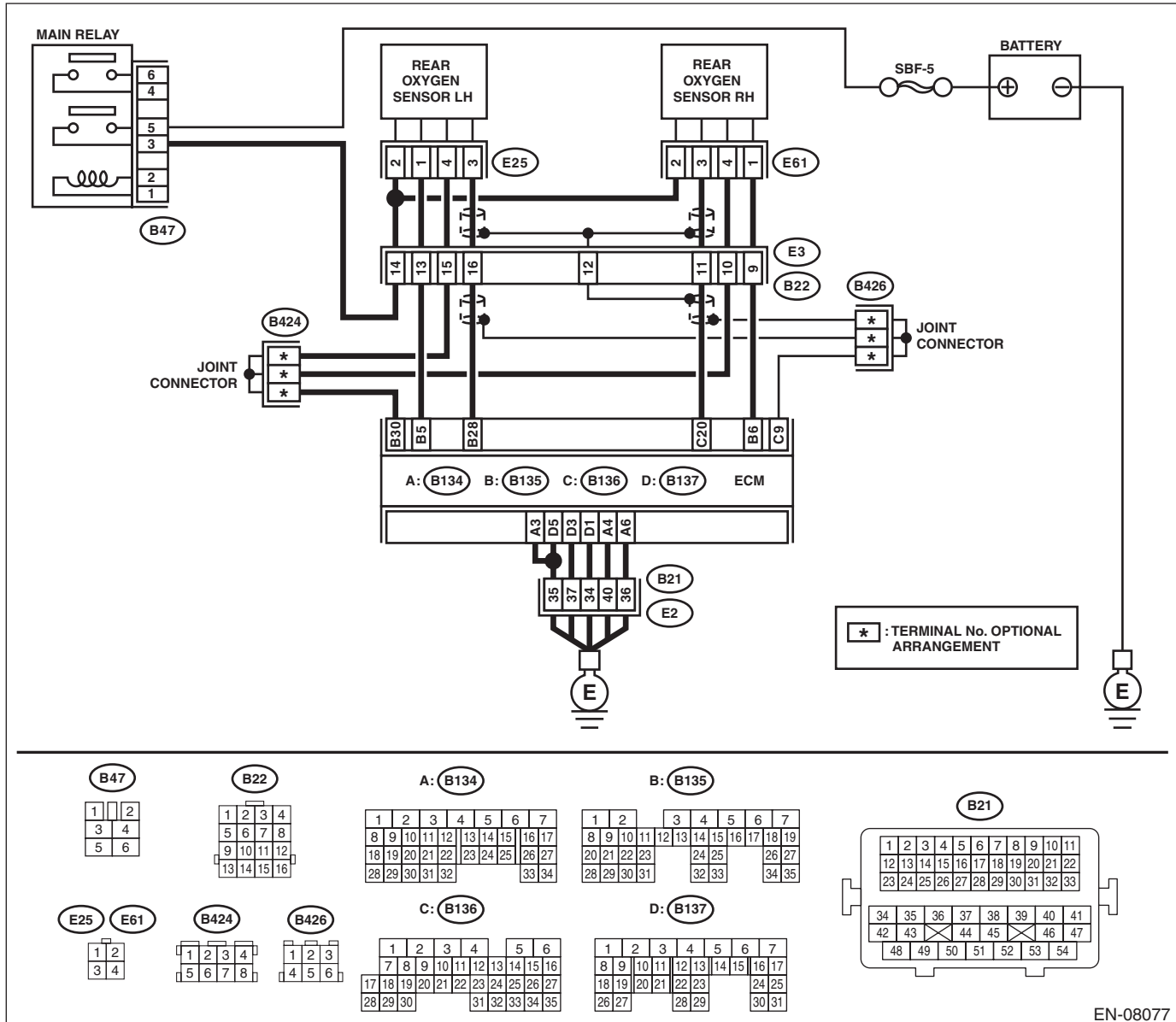
### DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-95, DTC P0160 O2 SENSOR CIRCUIT NO ACTIVITY DETECTED (BANK2 SENSOR2), Diagnostic Trouble Code (DTC) Detecting Criteria.>

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

### WIRING DIAGRAM:



# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<b>1 CHECK REAR OXYGEN SENSOR DATA.</b> 1) Warm up the engine until engine coolant temperature is higher than 75°C (167°F), and keep the engine speed at 3,000 rpm. (2 minutes maximum) 2) Read the value of «Front O2 Sensor #2» using the Subaru Select Monitor or a general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to “READ CURRENT DATA FOR ENGINE”. <Ref. to EN(H6DO)(diag)-36, Subaru Select Monitor.> • General scan tool For detailed operation procedures, refer to the general scan tool operation manual.	Is the value of «Front O2 Sensor #2» 0.490 V or more?	Go to step 6.	Go to step 2.
<b>2 CHECK REAR OXYGEN SENSOR DATA.</b> 1) Warm up the engine until engine coolant temperature is higher than 75°C (167°F), and rapidly reduce the engine speed from 3,000 rpm. 2) Read the value of «Front O2 Sensor #2» using the Subaru Select Monitor or a general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to “READ CURRENT DATA FOR ENGINE”. <Ref. to EN(H6DO)(diag)-36, Subaru Select Monitor.> • General scan tool For detailed operation procedures, refer to the general scan tool operation manual.	Is the value of «Front O2 Sensor #2» 0.250 V or less?	Go to step 6.	Go to step 3.
<b>3 CHECK REAR OXYGEN SENSOR CONNECTOR AND COUPLING CONNECTOR.</b>	Has water entered the connector?	Completely remove any water inside.	Go to step 4.
<b>4 CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM and rear oxygen sensor. 3) Measure the resistance of harness between ECM and rear oxygen sensor connector. <b>Connector &amp; terminal</b> <b>(B135) No. 28 — (E25) No. 3:</b> <b>(B135) No. 30 — (E25) No. 4:</b>	Is the resistance less than 1 Ω?	Go to step 5.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit in harness between ECM and rear oxygen sensor connector • Poor contact of coupling connector

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<b>5</b> <b>CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.</b> 1) Connect the connector to ECM. 2) Turn the ignition switch to ON. 3) Measure the voltage between rear oxygen sensor connector and chassis ground. <b>Connector &amp; terminal</b> <b>(E25) No. 3 (+) — Chassis ground (-):</b>	Is the voltage 0.2 — 0.5 V?	Replace the rear oxygen sensor. <Ref. to FU(H6DO)-50, Rear Oxygen Sensor.>	Repair the harness and connector. NOTE: In this case, repair the following item: <ul style="list-style-type: none"> <li>• Open circuit in harness between ECM and rear oxygen sensor connector</li> <li>• Poor contact of ECM connector</li> <li>• Poor contact of coupling connector</li> </ul>
<b>6</b> <b>CHECK EXHAUST SYSTEM.</b> Check exhaust system parts. NOTE: Check the following items. <ul style="list-style-type: none"> <li>• Looseness and improper fitting of exhaust system parts</li> <li>• Damage (crack, hole etc.) of parts</li> <li>• Loose part and improper installation between front oxygen (A/F) sensor and rear oxygen sensor</li> </ul>	Is there any fault in exhaust system?	Repair or replace faulty parts.	Replace the rear oxygen sensor. <Ref. to FU(H6DO)-50, Rear Oxygen Sensor.>

## BL:DTC P0161 O2 SENSOR HEATER CIRCUIT (BANK2 SENSOR2)

NOTE:

Refer to DTC P0057 for diagnostic procedure. <Ref. to EN(H6DO)(diag)-118, DTC P0057 HO2S HEATER CONTROL CIRCUIT LOW (BANK 2 SENSOR 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

## BM:DTC P0171 SYSTEM TOO LEAN (BANK 1)

NOTE:

Refer to DTC P0175 for diagnostic procedure. <Ref. to EN(H6DO)(diag)-182, DTC P0175 SYSTEM TOO RICH (BANK 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

## BN:DTC P0172 SYSTEM TOO RICH (BANK 1)

NOTE:

Refer to DTC P0175 for diagnostic procedure. <Ref. to EN(H6DO)(diag)-182, DTC P0175 SYSTEM TOO RICH (BANK 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

## BO:DTC P0174 SYSTEM TOO LEAN (BANK 2)

NOTE:

Refer to DTC P0175 for diagnostic procedure. <Ref. to EN(H6DO)(diag)-182, DTC P0175 SYSTEM TOO RICH (BANK 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## BP:DTC P0175 SYSTEM TOO RICH (BANK 2)

### DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-98, DTC P0175 SYSTEM TOO RICH (BANK 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>

### TROUBLE SYMPTOM:

- Improper idling
- Engine stalls.
- Poor driving performance

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

Step	Check	Yes	No
1	<b>CHECK EXHAUST SYSTEM.</b>	Are there holes or loose bolts on exhaust system?	Repair the exhaust system. Go to step 2.
2	<b>CHECK AIR INTAKE SYSTEM.</b>	Are there holes, loose bolts or disconnection of hose on air intake system?	Repair the air intake system. Go to step 3.
3	<b>CHECK FUEL PRESSURE.</b> <b>WARNING:</b> Place "NO OPEN FLAMES" signs near the working area. <b>CAUTION:</b> Be careful not to spill fuel. Measure the fuel pressure. <Ref. to ME(H6DO)-30, INSPECTION, Fuel Pressure.> <b>CAUTION:</b> Release fuel pressure before removing the fuel pressure gauge.	Is the measured value 340 — 400 kPa (3.5 — 4.1 kgf/cm <sup>2</sup> , 49 — 58 psi)?	Go to step 4.  Repair the following item. Fuel pressure is too high: • Clogged fuel line or bent hose Fuel pressure is too low: • Improper fuel pump discharge • Clogged fuel line
4	<b>CHECK ENGINE COOLANT TEMPERATURE SENSOR.</b> 1) Start the engine and warm up completely. 2) Read the value of «Coolant Temp.» using the Subaru Select Monitor or a general scan tool. <b>NOTE:</b> • Subaru Select Monitor For detailed operation procedures, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H6DO)(diag)-36, Subaru Select Monitor.> • General scan tool For detailed operation procedures, refer to the general scan tool operation manual.	Is the value of «Coolant Temp.» 75°C (167°F) or more?	Go to step 5.  Replace the engine coolant temperature sensor. <Ref. to FU(H6DO)-30, Engine Coolant Temperature Sensor.>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<p><b>5</b></p> <p><b>CHECK MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR SIGNAL.</b></p> <p>1) Start the engine and warm up engine until coolant temperature is higher than 75°C (167°F).</p> <p>2) Place the select lever in “P” range or “N” range.</p> <p>3) Turn the A/C switch to OFF.</p> <p>4) Turn all the accessory switches to OFF.</p> <p>5) Read the value of «Mass Air Flow» using the Subaru Select Monitor or a general scan tool.</p> <p>NOTE:</p> <ul style="list-style-type: none"> <li>• Subaru Select Monitor</li> </ul> <p>For detailed operation procedures, refer to “READ CURRENT DATA FOR ENGINE”. &lt;Ref. to EN(H6DO)(diag)-36, Subaru Select Monitor.&gt;</p> <ul style="list-style-type: none"> <li>• General scan tool</li> </ul> <p>For detailed operation procedures, refer to the general scan tool operation manual.</p>	<p>Is the value of «Mass Air Flow» 2.0 — 5.0 g/s (0.26 — 0.66 lb/m)?</p>	<p>Go to step 6.</p>	<p>Replace the mass air flow and intake air temperature sensor. &lt;Ref. to FU(H6DO)-40, Mass Air Flow and Intake Air Temperature Sensor.&gt;</p>
<p><b>6</b></p> <p><b>CHECK MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR.</b></p> <p>1) Start the engine and warm up engine until coolant temperature is higher than 75°C (167°F).</p> <p>2) Place the select lever in “P” range or “N” range.</p> <p>3) Turn the A/C switch to OFF.</p> <p>4) Turn all the accessory switches to OFF.</p> <p>5) Open the front hood.</p> <p>6) Measure the ambient temperature.</p> <p>7) Read the value of «Intake Air Temp.» using the Subaru Select Monitor or a general scan tool.</p> <p>NOTE:</p> <ul style="list-style-type: none"> <li>• Subaru Select Monitor</li> </ul> <p>For detailed operation procedures, refer to “READ CURRENT DATA FOR ENGINE”. &lt;Ref. to EN(H6DO)(diag)-36, Subaru Select Monitor.&gt;</p> <ul style="list-style-type: none"> <li>• General scan tool</li> </ul> <p>For detailed operation procedures, refer to the general scan tool operation manual.</p>	<p>Subtract ambient temperature from «Intake Air Temp.». Is the obtained value -10 — 50°C (-18 — 90°F)?</p>	<p>Repair the poor contact of ECM connector.</p>	<p>Check the mass air flow and intake air temperature sensor. &lt;Ref. to FU(H6DO)-40, Mass Air Flow and Intake Air Temperature Sensor.&gt;</p>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## BQ:DTC P0181 FUEL TEMPERATURE SENSOR “A” CIRCUIT RANGE/PERFORMANCE

### DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-99, DTC P0181 FUEL TEMPERATURE SENSOR “A” CIRCUIT RANGE/PERFORMANCE, Diagnostic Trouble Code (DTC) Detecting Criteria.>

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

Step	Check	Yes	No
1 <b>CHECK FOR ANY OTHER DTC ON DISPLAY.</b>	Is any other DTC displayed?	Check the appropriate DTC using the “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN(H6DO)(diag)-84, List of Diagnostic Trouble Code (DTC).>	Replace the fuel temperature sensor. <Ref. to EC(H6DO)-10, Fuel Temperature Sensor.>



# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## BR:DTC P0182 FUEL TEMPERATURE SENSOR "A" CIRCUIT LOW INPUT

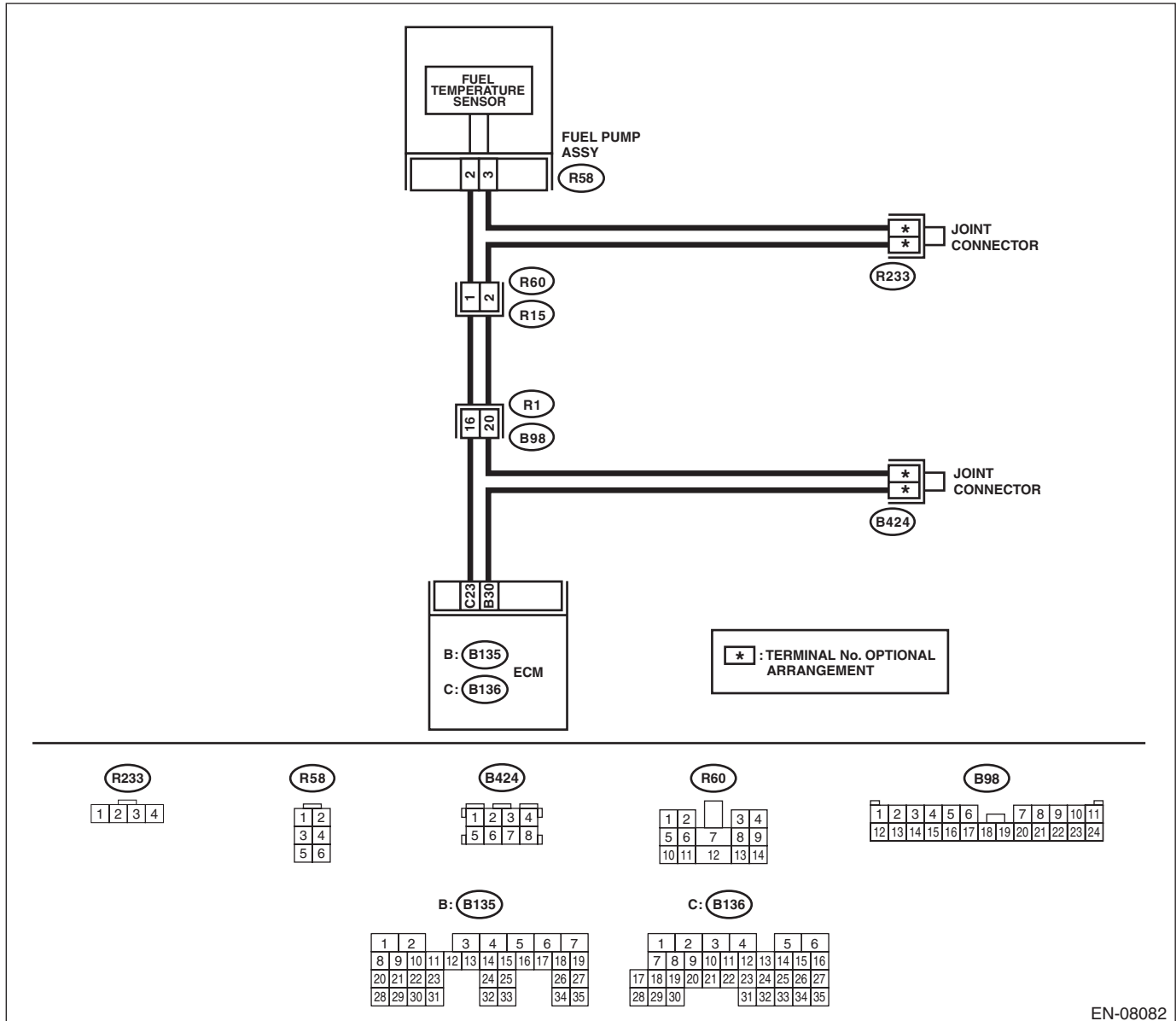
### DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-102, DTC P0182 FUEL TEMPERATURE SENSOR "A" CIRCUIT LOW INPUT, Diagnostic Trouble Code (DTC) Detecting Criteria.>

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

### WIRING DIAGRAM:



EN-08082

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<p><b>1</b></p> <p><b>CHECK CURRENT DATA.</b></p> <p>1) Start the engine.</p> <p>2) Using the Subaru Select Monitor, read the value in «Fuel Temp.».</p> <p>NOTE: For detailed operation procedures, refer to "READ CURRENT DATA FOR ENGINE". &lt;Ref. to EN(H6DO)(diag)-36, Subaru Select Monitor.&gt;</p>	<p>Is the value in «Fuel Temp.» 120°C (248°F) or more?</p>	<p>Go to step 2.</p>	<p>Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again.</p> <p>NOTE: In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.</p>
<p><b>2</b></p> <p><b>CHECK HARNESS BETWEEN ECM AND FUEL TEMPERATURE SENSOR CONNECTOR.</b></p> <p>1) Turn the ignition switch to OFF.</p> <p>2) Disconnect the connectors from ECM and fuel temperature sensor.</p> <p>3) Measure the resistance between ECM and chassis ground.</p> <p><b>Connector &amp; terminal</b> <b>(B136) No. 23 — Chassis ground:</b></p>	<p>Is the resistance 1 MΩ or more?</p>	<p>Replace the fuel temperature sensor. &lt;Ref. to EC(H6DO)-10, Fuel Temperature Sensor.&gt;</p>	<p>Repair the ground short circuit of harness between ECM and fuel pump.</p>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## BS:DTC P0183 FUEL TEMPERATURE SENSOR "A" CIRCUIT HIGH INPUT

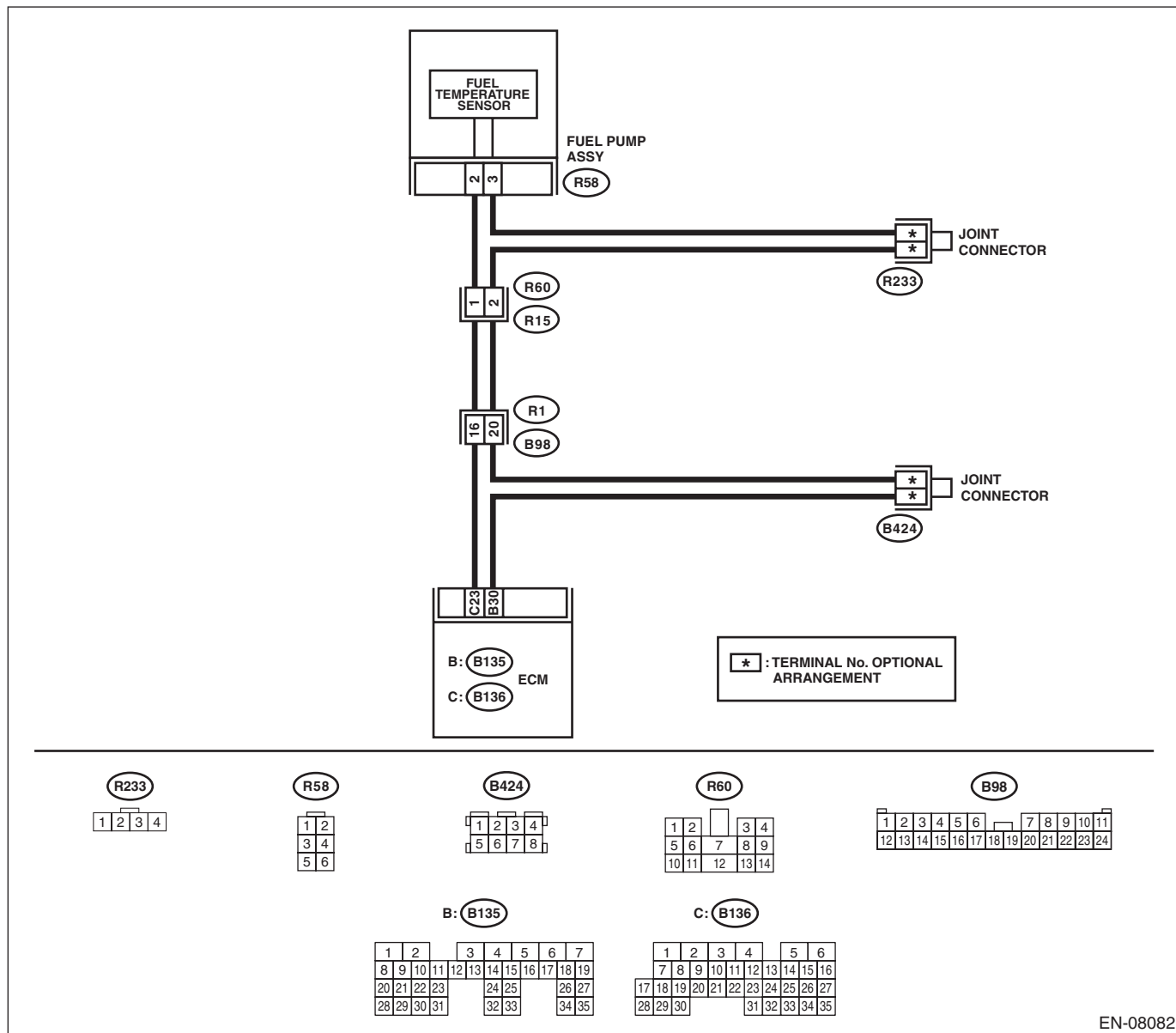
### DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-104, DTC P0183 FUEL TEMPERATURE SENSOR "A" CIRCUIT HIGH INPUT, Diagnostic Trouble Code (DTC) Detecting Criteria.>

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

### WIRING DIAGRAM:



EN-08082

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## ENGINE (DIAGNOSTICS)

	Step	Check	Yes	No
1	<p><b>CHECK CURRENT DATA.</b></p> <p>1) Start the engine.</p> <p>2) Using the Subaru Select Monitor, read the value in «Fuel Temp.».</p> <p>NOTE: For detailed operation procedures, refer to “READ CURRENT DATA FOR ENGINE”. &lt;Ref. to EN(H6DO)(diag)-36, Subaru Select Monitor.&gt;</p>	Is the value in «Fuel Temp.» less than $-40^{\circ}\text{C}$ ( $-40^{\circ}\text{F}$ )?	Go to step 2.	<p>Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again.</p> <p>NOTE: In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.</p>
2	<p><b>CHECK FOR POOR CONTACT.</b></p> <p>Check any poor contact of the ECM and fuel temperature sensor connectors.</p>	Is there poor contact of the ECM or fuel temperature sensor connectors?	Repair any poor contact of the ECM or fuel temperature sensor connectors.	Go to step 3.
3	<p><b>CHECK HARNESS BETWEEN ECM AND FUEL TEMPERATURE SENSOR CONNECTOR.</b></p> <p>1) Turn the ignition switch to OFF.</p> <p>2) Disconnect the connectors from ECM and fuel temperature sensor.</p> <p>3) Measure the resistance of the harness between the ECM and fuel temperature sensor connector.</p> <p><b>Connector &amp; terminal</b> <b>(B136) No. 23 — (R58) No. 2:</b> <b>(B135) No. 30 — (R58) No. 3:</b></p>	Is the resistance less than $1\ \Omega$ ?	Go to step 4.	<p>Repair the harness and connector.</p> <p>NOTE: In this case, repair the following item:</p> <ul style="list-style-type: none"> <li>• Open circuit in harness between ECM and fuel temperature sensor connector</li> <li>• Poor contact of coupling connector</li> </ul>
4	<p><b>CHECK HARNESS BETWEEN ECM AND FUEL TEMPERATURE SENSOR CONNECTOR.</b></p> <p>1) Connect all connectors.</p> <p>2) Turn the ignition switch to ON.</p> <p>3) Measure the voltage between ECM and chassis ground.</p> <p><b>Connector &amp; terminal</b> <b>(B136) No. 23 (+) — Chassis ground (-):</b></p>	Is the voltage 5 V or more?	Repair the short circuit to power in the harness between the ECM and fuel temperature sensor connector.	Replace the fuel temperature sensor. <Ref. to EC(H6DO)-10, Fuel Temperature Sensor.>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## BT:DTC P0196 ENGINE OIL TEMPERATURE SENSOR CIRCUIT RANGE/PERFORMANCE

### DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-106, DTC P0196 ENGINE OIL TEMPERATURE SENSOR CIRCUIT RANGE/PERFORMANCE, Diagnostic Trouble Code (DTC) Detecting Criteria.>

### TROUBLE SYMPTOM:

- Hard to start
- Improper idling
- Poor driving performance

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

Step	Check	Yes	No
1 CHECK FOR ANY OTHER DTC ON DISPLAY.	Is any other DTC displayed?	Check the appropriate DTC using the "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6DO)(diag)-84, List of Diagnostic Trouble Code (DTC).>	Replace the engine oil temperature sensor. <Ref. to FU(H6DO)-47, Oil Temperature Sensor.>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## BU:DTC P0197 ENGINE OIL TEMPERATURE SENSOR LOW

### DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-108, DTC P0197 ENGINE OIL TEMPERATURE SENSOR LOW, Diagnostic Trouble Code (DTC) Detecting Criteria.>

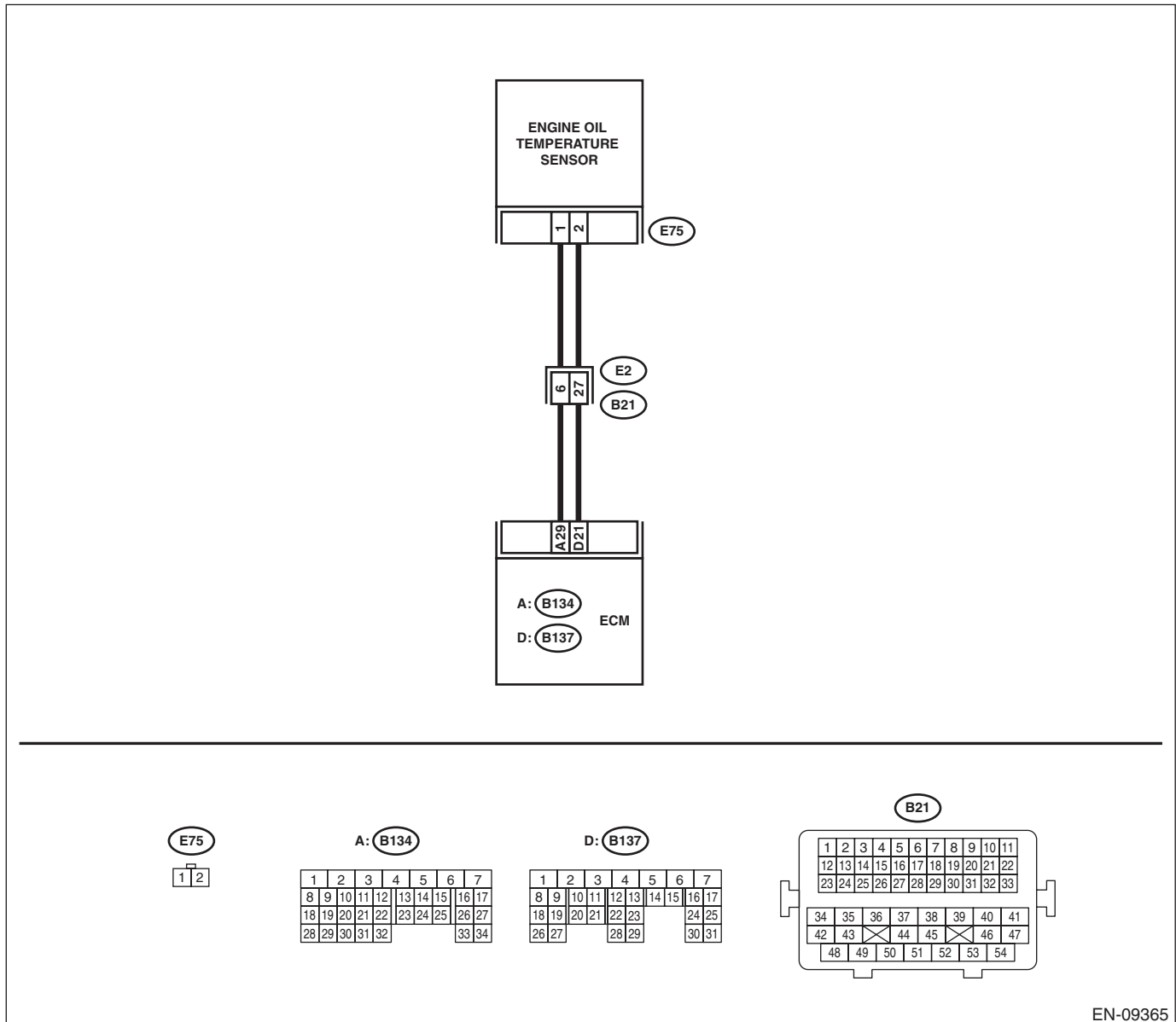
### TROUBLE SYMPTOM:

- Hard to start
- Improper idling
- Poor driving performance

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

### WIRING DIAGRAM:



EN-09365

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

	Step	Check	Yes	No
1	<p><b>CHECK CURRENT DATA.</b></p> <p>1) Start the engine.</p> <p>2) Read the value of «Oil Temperature» using Subaru Select Monitor.</p> <p>NOTE: For detailed operation procedures, refer to “READ CURRENT DATA FOR ENGINE”. &lt;Ref. to EN(H6DO)(diag)-36, Subaru Select Monitor.&gt;</p>	<p>Is the value of «Oil Temperature» 215°C (419°F) or more?</p>	<p>Go to step 2.</p>	<p>Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again.</p> <p>NOTE: In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.</p>
2	<p><b>CHECK HARNESS BETWEEN ECM AND ENGINE OIL TEMPERATURE SENSOR CONNECTOR.</b></p> <p>1) Turn the ignition switch to OFF.</p> <p>2) Disconnect the connectors from the ECM and engine oil temperature sensor.</p> <p>3) Measure the resistance between ECM and chassis ground.</p> <p><b>Connector &amp; terminal</b> <b>(B137) No. 21 — Chassis ground:</b></p>	<p>Is the resistance 1 MΩ or more?</p>	<p>Replace the engine oil temperature sensor. &lt;Ref. to FU(H6DO)-47, Oil Temperature Sensor.&gt;</p>	<p>Repair the short circuit to ground in the harness between the ECM and engine oil temperature sensor connector.</p>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## BV:DTC P0198 ENGINE OIL TEMPERATURE SENSOR HIGH

### DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-109, DTC P0198 ENGINE OIL TEMPERATURE SENSOR HIGH, Diagnostic Trouble Code (DTC) Detecting Criteria.>

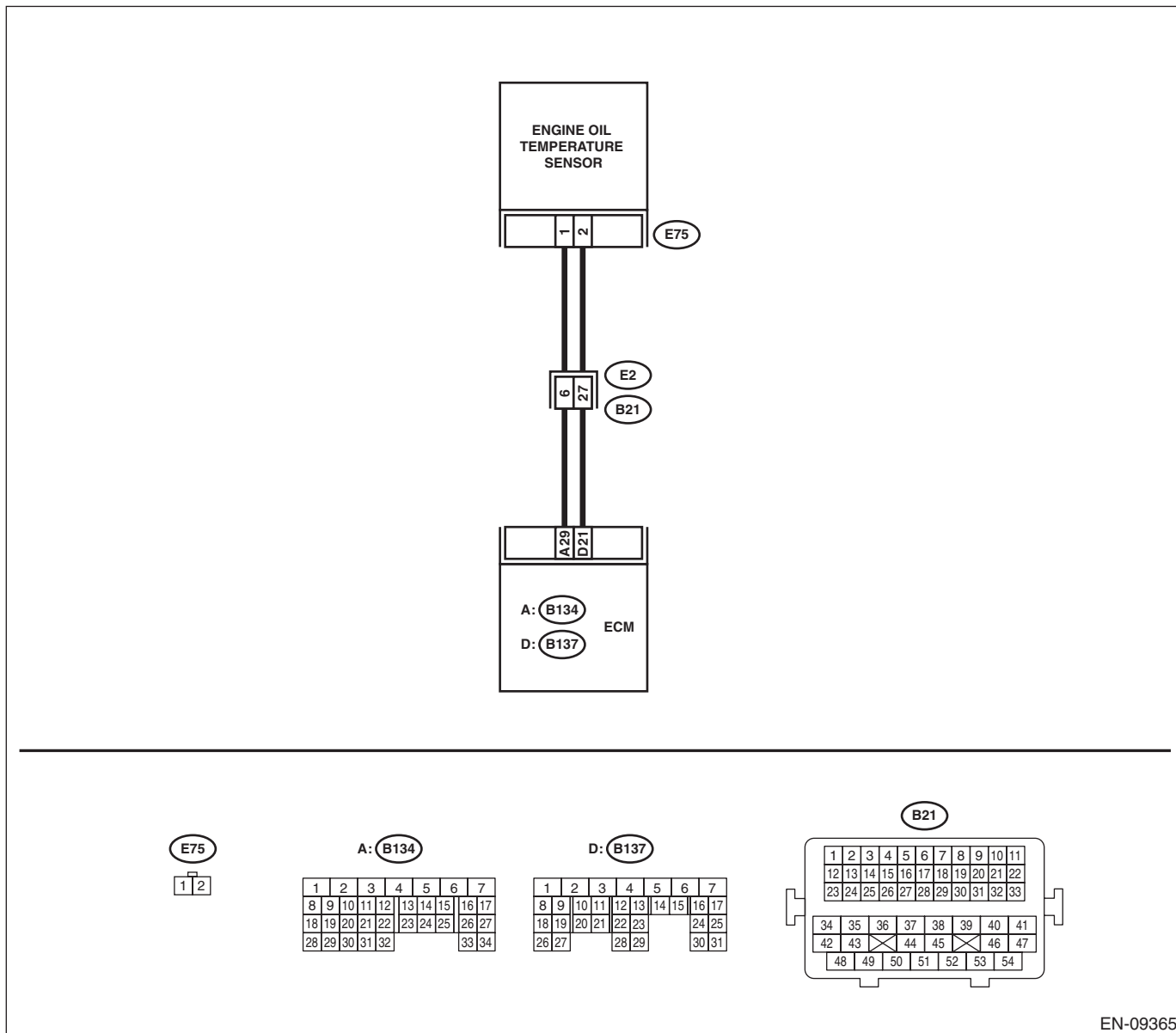
### TROUBLE SYMPTOM:

- Hard to start
- Improper idling
- Poor driving performance

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

### WIRING DIAGRAM:



EN-09365



# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<p><b>1</b>      <b>CHECK CURRENT DATA.</b>                      1) Start the engine.                      2) Read the value of «Oil Temperature» using Subaru Select Monitor.                       NOTE:                      For detailed operation procedures, refer to “READ CURRENT DATA FOR ENGINE”. &lt;Ref. to EN(H6DO)(diag)-36, Subaru Select Monitor.&gt;</p>	<p>Is the value of «Oil Temperature» less than <math>-40^{\circ}\text{C}</math> (<math>-40^{\circ}\text{F}</math>)?</p>	<p>Go to step 2.</p>	<p>Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again.                       NOTE:                      In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.</p>
<p><b>2</b>      <b>CHECK FOR POOR CONTACT.</b>                      Check for poor contact between the ECM and engine oil temperature sensor connectors.</p>	<p>Is there poor contact of the ECM or engine oil temperature sensor connectors?</p>	<p>Repair the poor contact of ECM or engine oil temperature sensor connector.</p>	<p>Go to step 3.</p>
<p><b>3</b>      <b>CHECK HARNESS BETWEEN ECM AND ENGINE OIL TEMPERATURE SENSOR CONNECTOR.</b>                      1) Turn the ignition switch to OFF.                      2) Disconnect the connectors from the ECM and engine oil temperature sensor.                      3) Measure the resistance of the harness between the ECM and engine oil temperature sensor connector.   <i>Connector &amp; terminal</i>  <i>(B134) No. 29 — (E75) No. 1:</i>  <i>(B137) No. 21 — (E75) No. 2:</i></p>	<p>Is the resistance less than <math>1\ \Omega</math>?</p>	<p>Go to step 4.</p>	<p>Repair the harness and connector.                       NOTE:                      In this case, repair the following item:                      • Open circuit in harness between ECM and engine oil temperature sensor connector                      • Poor contact of coupling connector</p>
<p><b>4</b>      <b>CHECK HARNESS BETWEEN ECM AND ENGINE OIL TEMPERATURE SENSOR CONNECTOR.</b>                      1) Connect all connectors.                      2) Turn the ignition switch to ON.                      3) Measure the voltage between ECM and chassis ground.   <i>Connector &amp; terminal</i>  <i>(B137) No. 21 (+) — Chassis ground (-):</i></p>	<p>Is the voltage 5 V or more?</p>	<p>Repair the short circuit to power in harness between ECM and engine oil temperature sensor connector.</p>	<p>Replace the engine oil temperature sensor. &lt;Ref. to FU(H6DO)-47, Oil Temperature Sensor.&gt;</p>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## BW:DTC P0201 INJECTOR #1

### DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-110, DTC P0201 INJECTOR #1, Diagnostic Trouble Code (DTC) Detecting Criteria.>

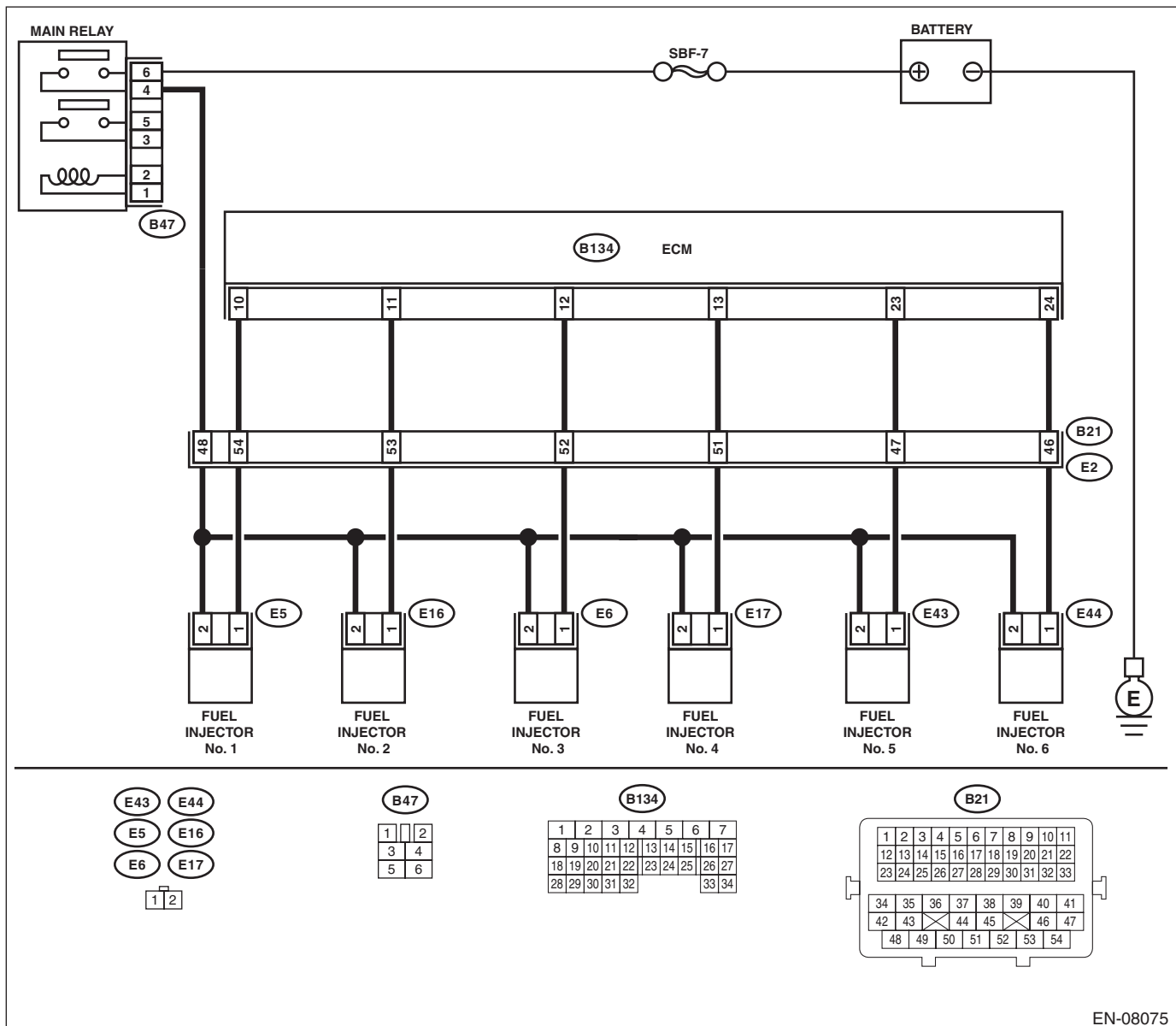
### TROUBLE SYMPTOM:

- Improper idling
- Poor driving performance

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

### WIRING DIAGRAM:



EN-08075

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<p><b>1 CHECK POWER SUPPLY TO FUEL INJECTOR.</b></p> <p>1) Turn the ignition switch to OFF.                      2) Disconnect the connector from fuel injector.                      3) Turn the ignition switch to ON.                      4) Measure the voltage between fuel injector connector and the engine ground.</p> <p><b>Connector &amp; terminal</b>  <b>DTC P0201; (E5) No. 2 (+) — Engine ground (-):</b>  <b>DTC P0202; (E16) No. 2 (+) — Engine ground (-):</b>  <b>DTC P0203; (E6) No. 2 (+) — Engine ground (-):</b>  <b>DTC P0204; (E17) No. 2 (+) — Engine ground (-):</b>  <b>DTC P0205; (E43) No. 2 (+) — Engine ground (-):</b>  <b>DTC P0206; (E44) No. 2 (+) — Engine ground (-):</b></p>	Is the voltage 10 V or more?	Go to step 2.	Repair the harness and connector.  NOTE: In this case, repair the following item: • Open circuit in harness between main relay and fuel injector connector • Poor contact of main relay connector • Poor contact of coupling connector
<p><b>2 CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR.</b></p> <p>1) Turn the ignition switch to OFF.                      2) Disconnect the connector from ECM.                      3) Measure the resistance between fuel injector connector and engine ground.</p> <p><b>Connector &amp; terminal</b>  <b>DTC P0201; (E5) No. 1 — Engine ground:</b>  <b>DTC P0202; (E16) No. 1 — Engine ground:</b>  <b>DTC P0203; (E6) No. 1 — Engine ground:</b>  <b>DTC P0204; (E17) No. 1 — Engine ground:</b>  <b>DTC P0205; (E43) No. 1 — Engine ground:</b>  <b>DTC P0206; (E44) No. 1 — Engine ground:</b></p>	Is the resistance 1 M $\Omega$ or more?	Go to step 3.	Repair the short circuit to ground in harness between ECM connector and fuel injector connector.
<p><b>3 CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR.</b></p> <p>Measure the resistance of harness between ECM connector and fuel injector connector.</p> <p><b>Connector &amp; terminal</b>  <b>DTC P0201; (B134) No. 10 — (E5) No. 1:</b>  <b>DTC P0202; (B134) No. 11 — (E16) No. 1:</b>  <b>DTC P0203; (B134) No. 12 — (E6) No. 1:</b>  <b>DTC P0204; (B134) No. 13 — (E17) No. 1:</b>  <b>DTC P0205; (B134) No. 23 — (E43) No. 1:</b>  <b>DTC P0206; (B134) No. 24 — (E44) No. 1:</b></p>	Is the resistance less than 1 $\Omega$ ?	Go to step 4.	Repair the harness and connector.  NOTE: In this case, repair the following item: • Open circuit in harness between ECM connector and fuel injector connector • Poor contact of coupling connector
<p><b>4 CHECK FUEL INJECTOR.</b></p> <p>Measure the resistance between fuel injector terminals on the corresponding cylinder.</p> <p><b>Terminals</b>  <b>No. 1 — No. 2:</b></p>	Is the resistance 5 — 20 $\Omega$ ?	Go to step 5.	Replace the fuel injector. <Ref. to FU(H6DO)-42, Fuel Injector.>
<p><b>5 CHECK FOR POOR CONTACT.</b></p> <p>Check for poor contact of ECM connector.</p>	Is there poor contact of ECM connector?	Repair the poor contact of ECM connector.	Go to step 6.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<b>6</b> <b>CHECK FUEL INJECTOR OPERATION.</b> 1) Connect all connectors. 2) Start the engine. 3) Check if the corresponding fuel injector emits operating sound.  NOTE: Use a sound scope to check the operating sound.	Does the fuel injector emit operating sound?	Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again.  NOTE: In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.	Repair the poor contact of fuel injector connector.

### **BX:DTC P0202 INJECTOR #2**

NOTE:

For the diagnostic procedure, refer to DTC P0201. <Ref. to EN(H6DO)(diag)-194, DTC P0201 INJECTOR #1, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

### **BY:DTC P0203 INJECTOR #3**

NOTE:

For the diagnostic procedure, refer to DTC P0201. <Ref. to EN(H6DO)(diag)-194, DTC P0201 INJECTOR #1, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

### **BZ:DTC P0204 INJECTOR #4**

NOTE:

For the diagnostic procedure, refer to DTC P0201. <Ref. to EN(H6DO)(diag)-194, DTC P0201 INJECTOR #1, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

### **CA:DTC P0205 INJECTOR #5**

NOTE:

For the diagnostic procedure, refer to DTC P0201. <Ref. to EN(H6DO)(diag)-194, DTC P0201 INJECTOR #1, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

### **CB:DTC P0206 INJECTOR #6**

NOTE:

For the diagnostic procedure, refer to DTC P0201. <Ref. to EN(H6DO)(diag)-194, DTC P0201 INJECTOR #1, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

## CC:DTC P0222 THROTTLE/PEDAL POSITION SENSOR/SWITCH "B" CIRCUIT LOW

### DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-112, DTC P0222 THROTTLE/PEDAL POSITION SENSOR/SWITCH "B" CIRCUIT LOW, Diagnostic Trouble Code (DTC) Detecting Criteria.>

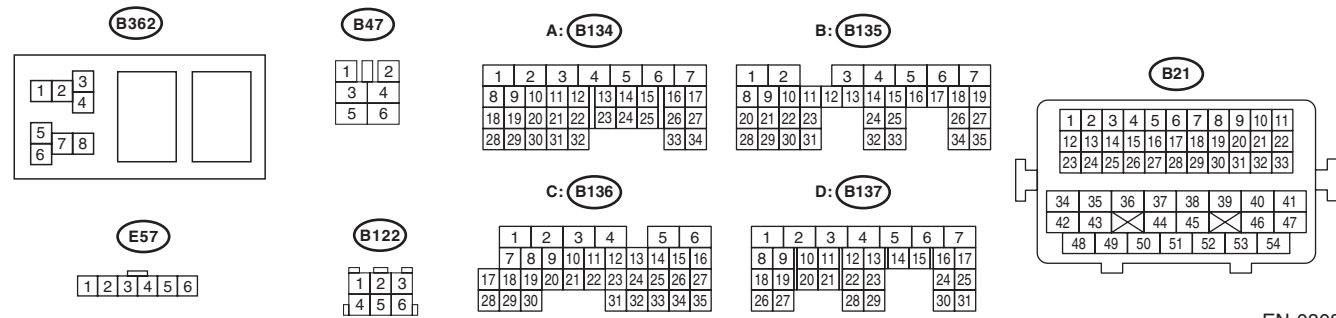
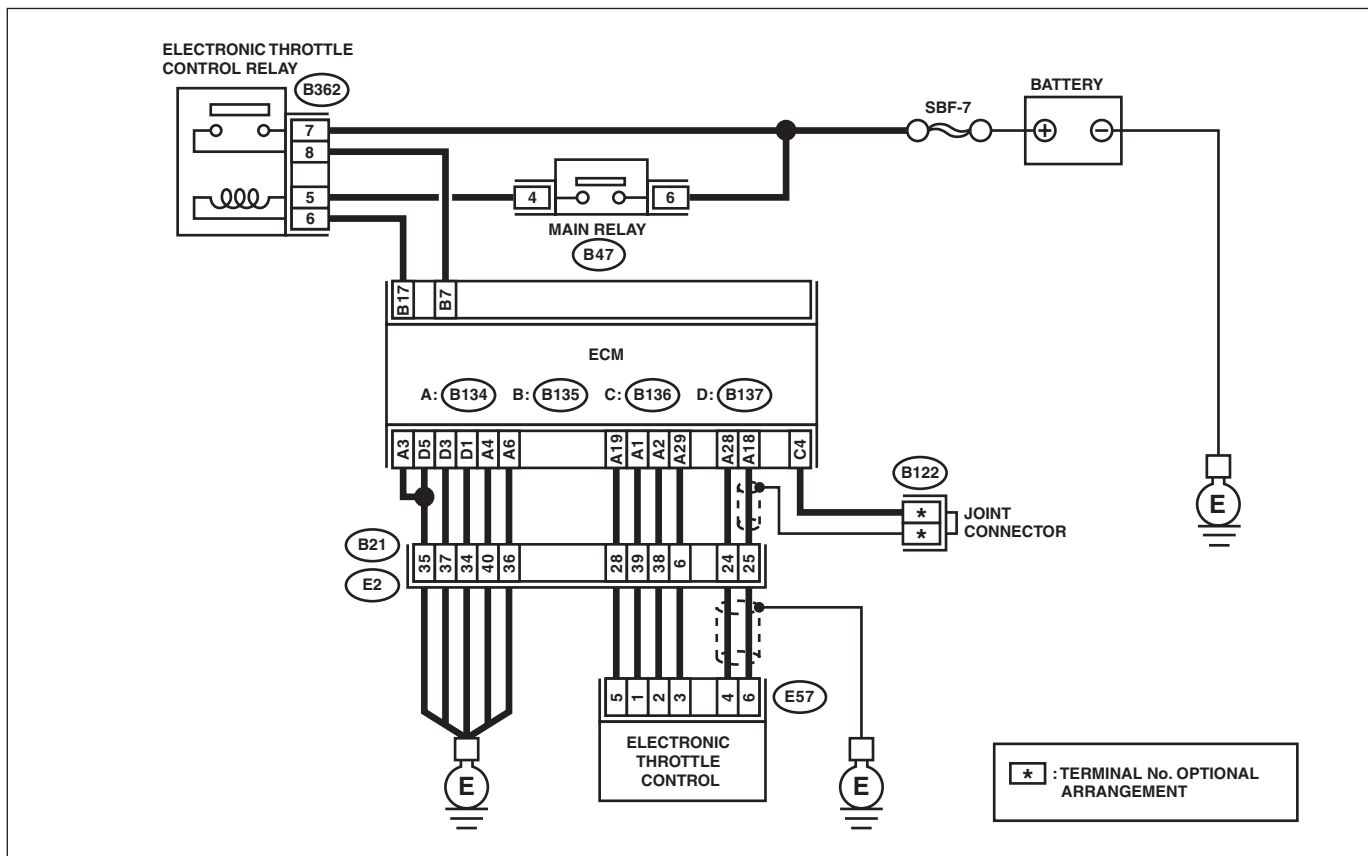
### TROUBLE SYMPTOM:

- Improper idling
- Poor driving performance
- Engine stalls.

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

### WIRING DIAGRAM:



EN-08081

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## ENGINE (DIAGNOSTICS)

	Step	Check	Yes	No
1	<p><b>CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.</b></p> <p>1) Turn the ignition switch to OFF.</p> <p>2) Disconnect the connectors from ECM and electronic throttle control.</p> <p>3) Measure the resistance between ECM and chassis ground.</p> <p><b>Connector &amp; terminal</b>  <b>(B134) No. 19 — Chassis ground:</b>  <b>(B134) No. 28 — Chassis ground:</b></p>	Is the resistance 1 MΩ or more?	Go to step 2.	Repair the short circuit to ground in harness between ECM and electronic throttle control connector.
2	<p><b>CHECK SHORT CIRCUIT INSIDE THE ECM.</b></p> <p>1) Connect the connector to ECM.</p> <p>2) Measure the resistance between electronic throttle control connector and engine ground.</p> <p><b>Connector &amp; terminal</b>  <b>(E57) No. 4 — Engine ground:</b></p>	Is the resistance 1 MΩ or more?	Replace the electronic throttle control. <Ref. to FU(H6DO)-19, Throttle Body.>	Repair the short circuit to ground in harness between ECM and electronic throttle control connector. Replace the ECM if defective. <Ref. to FU(H6DO)-52, Engine Control Module (ECM).>

## CD:DTC P0223 THROTTLE/PEDAL POSITION SENSOR/SWITCH "B" CIRCUIT HIGH

### DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-114, DTC P0223 THROTTLE/PEDAL POSITION SENSOR/SWITCH "B" CIRCUIT HIGH, Diagnostic Trouble Code (DTC) Detecting Criteria.>

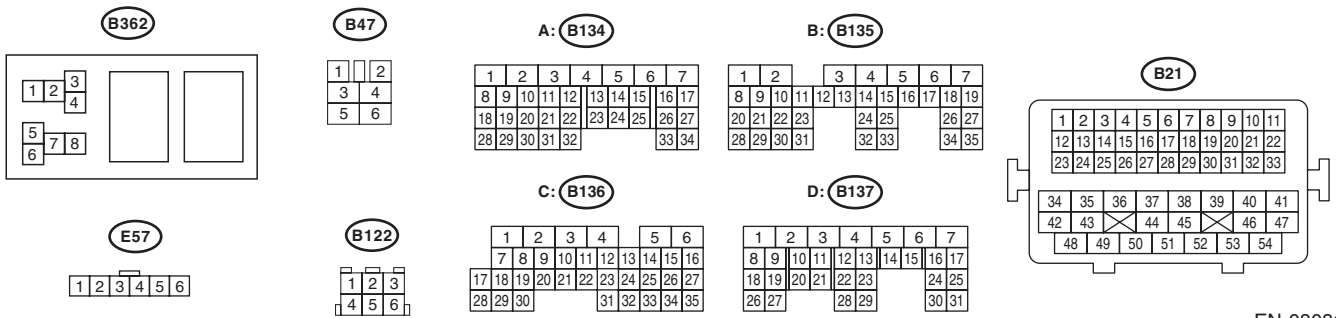
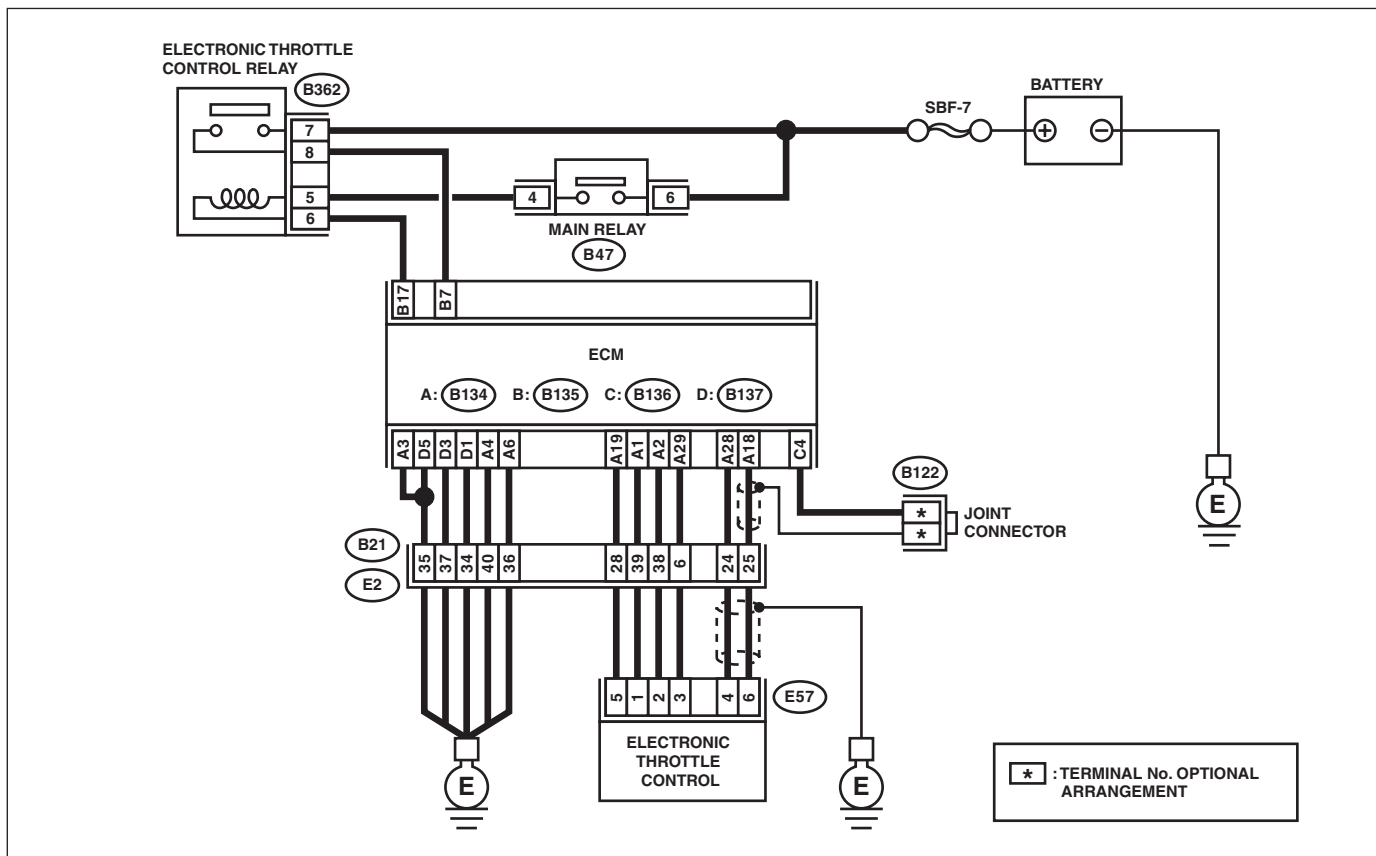
### TROUBLE SYMPTOM:

- Improper idling
- Poor driving performance
- Engine stalls.

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

### WIRING DIAGRAM:



EN-08081

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<p><b>1 CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.</b></p> <p>1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM and electronic throttle control. 3) Measure the resistance of harness between ECM and electronic throttle control connector.</p> <p><b>Connector &amp; terminal</b> <b>(B134) No. 28 — (E57) No. 4:</b> <b>(B134) No. 29 — (E57) No. 3:</b></p>	Is the resistance less than 1 $\Omega$ ?	Go to step 2.	Repair the harness and connector.  NOTE: In this case, repair the following item: • Open circuit in harness between ECM and electronic throttle control connector • Poor contact of coupling connector
<p><b>2 CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.</b></p> <p>1) Connect the connector to ECM. 2) Measure the resistance between electronic throttle control connector and engine ground.</p> <p><b>Connector &amp; terminal</b> <b>(E57) No. 3 — Engine ground:</b></p>	Is the resistance less than 5 $\Omega$ ?	Go to step 3.	Repair the harness and connector.  NOTE: In this case, repair the following item: • Open circuit of harness between ECM and engine ground • Poor contact of ECM connector • Poor contact of coupling connector
<p><b>3 CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.</b></p> <p>1) Turn the ignition switch to ON. 2) Measure the voltage between electronic throttle control connector and engine ground.</p> <p><b>Connector &amp; terminal</b> <b>(E57) No. 4 (+) — Engine ground (-):</b></p>	Is the voltage 5 V or more?	Repair the short circuit to power in harness between ECM and electronic throttle control connector.	Go to step 4.
<p><b>4 CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.</b></p> <p>1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM. 3) Measure the resistance between ECM connectors.</p> <p><b>Connector &amp; terminal</b> <b>(B134) No. 19 — (B134) No. 28:</b></p>	Is the resistance 1 M $\Omega$ or more?	Repair the poor contact of electronic throttle control connector. Replace the electronic throttle control if defective. <Ref. to FU(H6DO)-19, Throttle Body.>	Repair the short circuit to power in harness between ECM and electronic throttle control connector.



# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## CE:DTC P0230 FUEL PUMP PRIMARY CIRCUIT

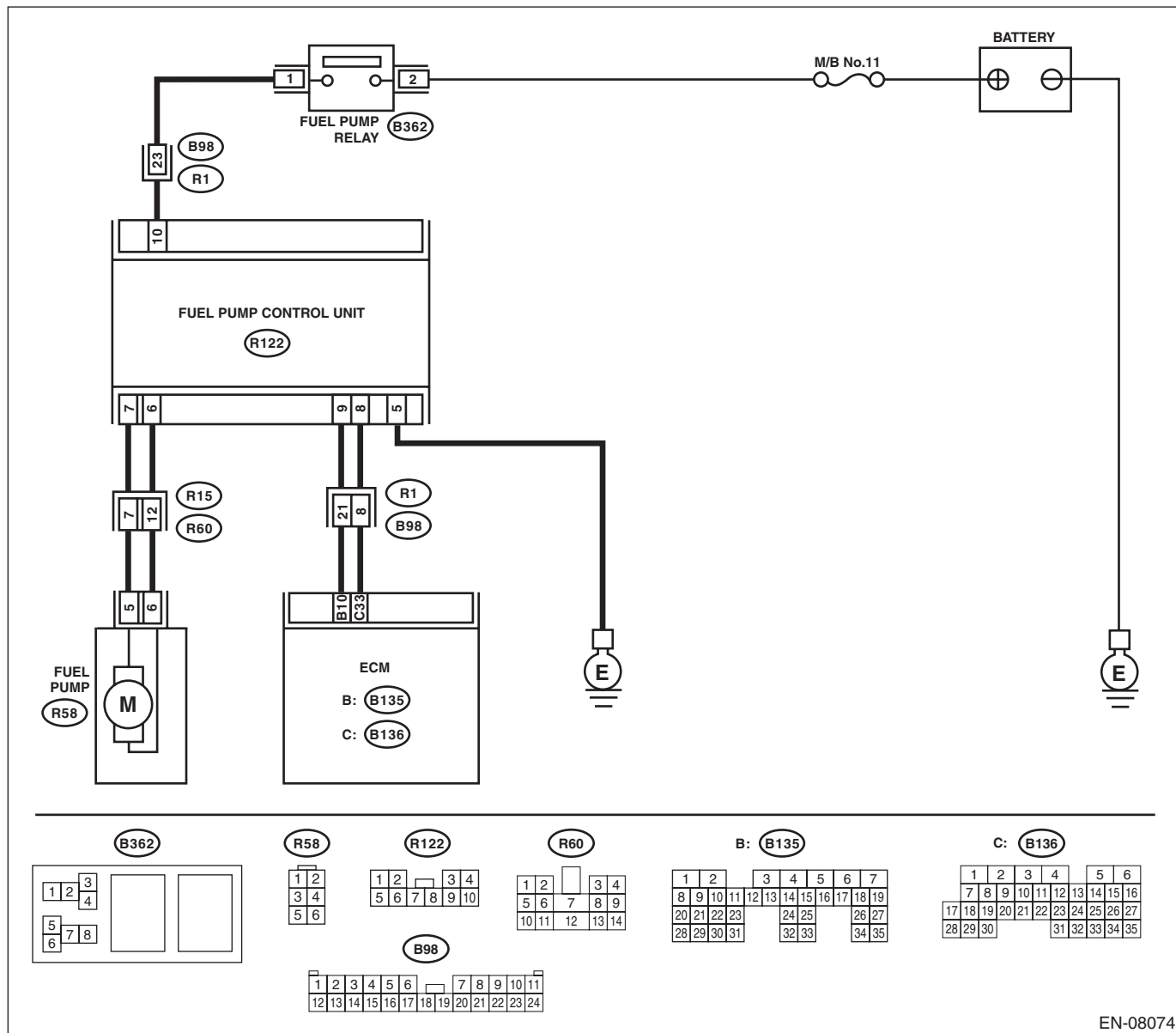
### DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-116, DTC P0230 FUEL PUMP PRIMARY CIRCUIT, Diagnostic Trouble Code (DTC) Detecting Criteria.>

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

### WIRING DIAGRAM:



EN-08074

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<p><b>1 CHECK POWER SUPPLY CIRCUIT TO FUEL PUMP CONTROL UNIT.</b></p> <p>1) Turn the ignition switch to OFF. 2) Disconnect the connector from fuel pump control unit. 3) Turn the ignition switch to ON. 4) Measure the voltage between fuel pump control unit and chassis ground.</p> <p><b>Connector &amp; terminal</b> <b>(R122) No. 10 (+) — Chassis ground (-):</b></p>	Is the voltage 10 V or more?	Go to step 2.	<p>Repair the power supply circuit.</p> <p>NOTE: In this case, repair the following item:</p> <ul style="list-style-type: none"> <li>• Open circuit or short circuit to ground in harness between fuel pump relay connector and fuel pump control unit connector</li> <li>• Poor contact of fuel pump relay connector</li> <li>• Poor contact of coupling connector</li> </ul>
<p><b>2 CHECK GROUND CIRCUIT OF FUEL PUMP CONTROL UNIT.</b></p> <p>1) Turn the ignition switch to OFF. 2) Measure the resistance of harness between fuel pump control unit and chassis ground.</p> <p><b>Connector &amp; terminal</b> <b>(R122) No. 5 — Chassis ground:</b></p>	Is the resistance less than 5 $\Omega$ ?	Go to step 3.	<p>Repair the open circuit in harness between fuel pump control unit connector and chassis ground.</p>
<p><b>3 CHECK HARNESS BETWEEN FUEL PUMP CONTROL UNIT AND FUEL PUMP CONNECTOR.</b></p> <p>1) Disconnect the connector from fuel pump. 2) Measure the resistance of harness between fuel pump control unit and fuel pump connector.</p> <p><b>Connector &amp; terminal</b> <b>(R122) No. 7 — (R58) No. 5:</b> <b>(R122) No. 6 — (R58) No. 6:</b></p>	Is the resistance less than 1 $\Omega$ ?	Go to step 4.	<p>Repair the harness and connector.</p> <p>NOTE: In this case, repair the following item:</p> <ul style="list-style-type: none"> <li>• Open circuit in harness between fuel pump control unit connector and fuel pump connector</li> <li>• Poor contact of coupling connector</li> </ul>
<p><b>4 CHECK HARNESS BETWEEN FUEL PUMP CONTROL UNIT AND FUEL PUMP CONNECTOR.</b></p> <p>Measure the resistance between fuel pump control unit and chassis ground.</p> <p><b>Connector &amp; terminal</b> <b>(R122) No. 7 — Chassis ground:</b> <b>(R122) No. 6 — Chassis ground:</b></p>	Is the resistance 1 M $\Omega$ or more?	Go to step 5.	<p>Repair the short circuit to ground in harness between fuel pump control unit connector and fuel pump connector.</p>
<p><b>5 CHECK HARNESS BETWEEN ECM AND FUEL PUMP CONTROL UNIT.</b></p> <p>1) Disconnect the connector from ECM. 2) Measure the resistance of the harness between the ECM and fuel pump control unit.</p> <p><b>Connector &amp; terminal</b> <b>(B136) No. 33 — (R122) No. 8:</b> <b>(B135) No. 10 — (R122) No. 9:</b></p>	Is the resistance less than 1 $\Omega$ ?	Go to step 6.	<p>Repair the harness and connector.</p> <p>NOTE: In this case, repair the following item:</p> <ul style="list-style-type: none"> <li>• Open circuit in harness between ECM and fuel pump control unit connector</li> <li>• Poor contact of coupling connector</li> </ul>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<b>6</b> <b>CHECK HARNESS BETWEEN ECM AND FUEL PUMP CONTROL UNIT.</b> Measure the resistance between fuel pump control unit and chassis ground. <b>Connector &amp; terminal</b> <b>(R122) No. 8 — Chassis ground:</b> <b>(R122) No. 9 — Chassis ground:</b>	Is the resistance 1 M $\Omega$ or more?	Go to step 7.	Repair the short circuit to ground in harness between ECM and fuel pump control unit connector.
<b>7</b> <b>CHECK FOR POOR CONTACT.</b> Check for poor contact of ECM and fuel pump control unit connector.	Is there poor contact of ECM or fuel pump control unit connector?	Repair the poor contact of ECM or fuel pump control unit connector.	Go to step 8.
<b>8</b> <b>CHECK EXPERIENCE OF RUNNING OUT OF FUEL.</b>	Has the vehicle experienced running out of fuel?	Finish the diagnosis. NOTE: DTC may be recorded as a result of fuel pump idling while running out of fuel.	Replace the fuel pump control unit. <Ref. to FU(H6DO)-58, Fuel Pump Control Unit.>

## Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

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### **CF:DTC P0301 CYLINDER 1 MISFIRE DETECTED**

NOTE:

For the diagnostic procedure, refer to DTC P0306. <Ref. to EN(H6DO)(diag)-205, DTC P0306 CYLINDER 6 MISFIRE DETECTED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

### **CG:DTC P0302 CYLINDER 2 MISFIRE DETECTED**

NOTE:

For the diagnostic procedure, refer to DTC P0306. <Ref. to EN(H6DO)(diag)-205, DTC P0306 CYLINDER 6 MISFIRE DETECTED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

### **CH:DTC P0303 CYLINDER 3 MISFIRE DETECTED**

NOTE:

For the diagnostic procedure, refer to DTC P0306. <Ref. to EN(H6DO)(diag)-205, DTC P0306 CYLINDER 6 MISFIRE DETECTED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

### **CI: DTC P0304 CYLINDER 4 MISFIRE DETECTED**

NOTE:

For the diagnostic procedure, refer to DTC P0306. <Ref. to EN(H6DO)(diag)-205, DTC P0306 CYLINDER 6 MISFIRE DETECTED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

### **CJ:DTC P0305 CYLINDER 5 MISFIRE DETECTED**

NOTE:

For the diagnostic procedure, refer to DTC P0306. <Ref. to EN(H6DO)(diag)-205, DTC P0306 CYLINDER 6 MISFIRE DETECTED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## CK:DTC P0306 CYLINDER 6 MISFIRE DETECTED

### DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- Immediately at fault recognition (A misfire which could damage catalyst occurs.)
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-125, DTC P0306 CYLINDER 6 MISFIRE DETECTED, Diagnostic Trouble Code (DTC) Detecting Criteria.>

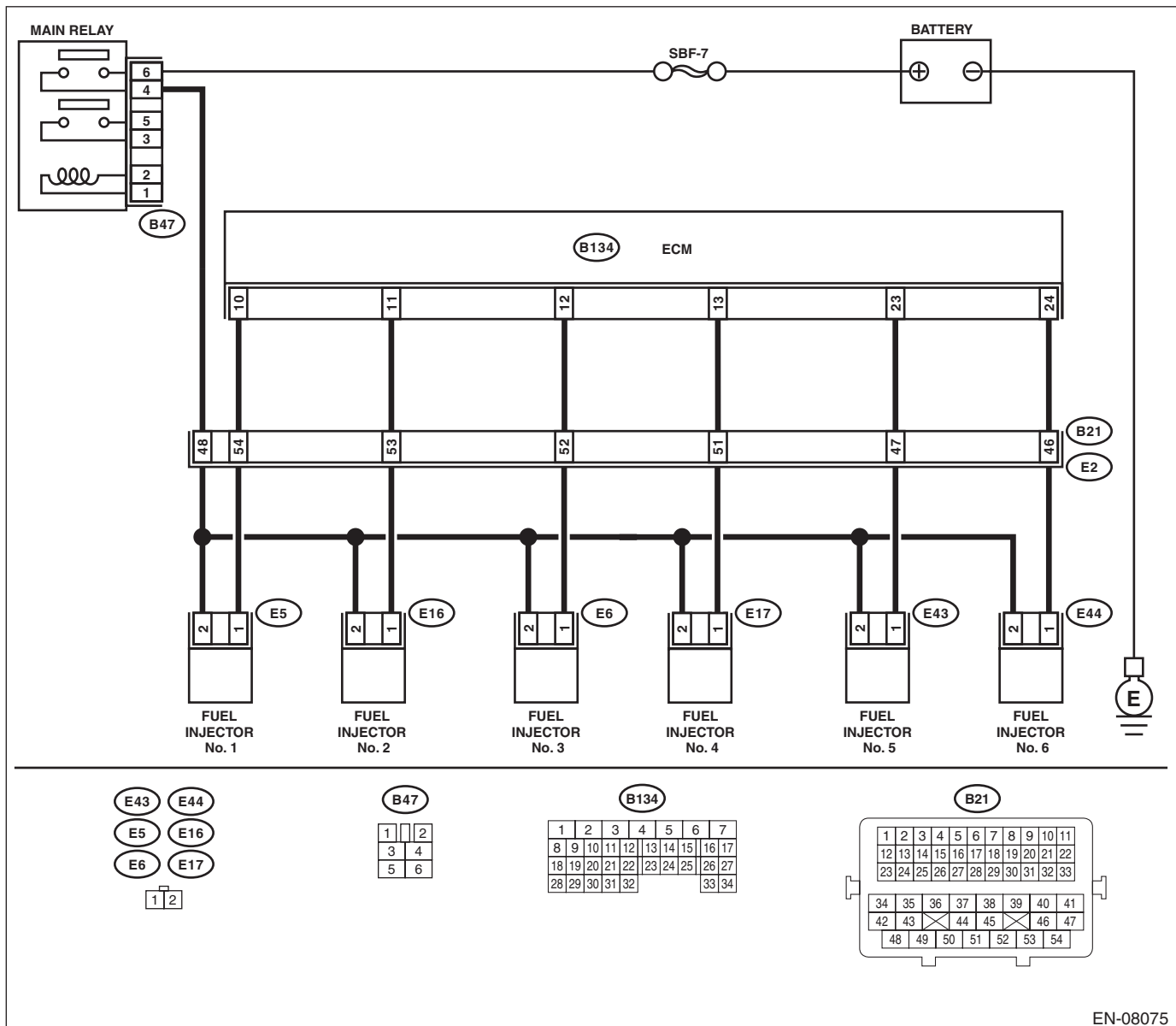
### TROUBLE SYMPTOM:

- Engine stalls.
- Improper idling
- Rough driving

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

### WIRING DIAGRAM:



EN-08075

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<p><b>1</b>      <b>CHECK OUTPUT SIGNAL OF ECM.</b>                      1) Turn the ignition switch to ON.                      2) Measure the voltage between ECM and chassis ground on faulty cylinders.</p> <p><b>Connector &amp; terminal</b>  <i>#1 (B134) No. 10 (+) — Chassis ground (-):</i>  <i>#2 (B134) No. 11 (+) — Chassis ground (-):</i>  <i>#3 (B134) No. 12 (+) — Chassis ground (-):</i>  <i>#4 (B134) No. 13 (+) — Chassis ground (-):</i>  <i>#5 (B134) No. 23 (+) — Chassis ground (-):</i>  <i>#6 (B134) No. 24 (+) — Chassis ground (-):</i></p>	Is the voltage 10 V or more?	Go to step 6.	Go to step 2.
<p><b>2</b>      <b>CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR.</b>                      1) Turn the ignition switch to OFF.                      2) Disconnect the connector from fuel injector on faulty cylinders.                      3) Measure the resistance between fuel injector connector and engine ground on faulty cylinders.</p> <p><b>Connector &amp; terminal</b>  <i>#1 (E5) No. 1 — Engine ground:</i>  <i>#2 (E16) No. 1 — Engine ground:</i>  <i>#3 (E6) No. 1 — Engine ground:</i>  <i>#4 (E17) No. 1 — Engine ground:</i>  <i>#5 (E43) No. 1 — Engine ground:</i>  <i>#6 (E44) No. 1 — Engine ground:</i></p>	Is the resistance 1 M $\Omega$ or more?	Go to step 3.	Repair the short circuit to ground in harness between ECM and fuel injector connector.
<p><b>3</b>      <b>CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR.</b>                      Measure the resistance of harness between ECM and fuel injector connector on faulty cylinders.</p> <p><b>Connector &amp; terminal</b>  <i>#1 (B134) No. 10 — (E5) No. 1:</i>  <i>#2 (B134) No. 11 — (E16) No. 1:</i>  <i>#3 (B134) No. 12 — (E6) No. 1:</i>  <i>#4 (B134) No. 13 — (E17) No. 1:</i>  <i>#5 (B134) No. 23 — (E43) No. 1:</i>  <i>#6 (B134) No. 24 — (E44) No. 1:</i></p>	Is the resistance less than 1 $\Omega$ ?	Go to step 4.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit in harness between ECM and fuel injector connector • Poor contact of coupling connector
<p><b>4</b>      <b>CHECK FUEL INJECTOR.</b>                      Measure the resistance between fuel injector terminals on faulty cylinder.</p> <p><b>Terminals</b>  <i>No. 1 — No. 2:</i></p>	Is the resistance 5 — 20 $\Omega$ ?	Go to step 5.	Replace the faulty fuel injector. <Ref. to FU(H6DO)-42, Fuel Injector.>
<p><b>5</b>      <b>CHECK POWER SUPPLY LINE.</b>                      1) Turn the ignition switch to ON.                      2) Measure the voltage between fuel injector connector of faulty cylinders and engine ground.</p> <p><b>Connector &amp; terminal</b>  <i>#1 (E5) No. 2 (+) — Engine ground (-):</i>  <i>#2 (E16) No. 2 (+) — Engine ground (-):</i>  <i>#3 (E6) No. 2 (+) — Engine ground (-):</i>  <i>#4 (E17) No. 2 (+) — Engine ground (-):</i>  <i>#5 (E43) No. 2 (+) — Engine ground (-):</i>  <i>#6 (E44) No. 2 (+) — Engine ground (-):</i></p>	Is the voltage 10 V or more?	Repair the poor contact of all connectors in fuel injector circuit.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit in harness between the main relay and fuel injector connector on faulty cylinders • Poor contact of coupling connector • Poor contact of main relay connector

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<b>6 CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connector from fuel injector on faulty cylinders. 3) Turn the ignition switch to ON. 4) Measure the voltage between ECM and chassis ground on faulty cylinders. <b>Connector &amp; terminal</b> #1 (B134) No. 10 (+) — Chassis ground (-): #2 (B134) No. 11 (+) — Chassis ground (-): #3 (B134) No. 12 (+) — Chassis ground (-): #4 (B134) No. 13 (+) — Chassis ground (-): #5 (B134) No. 23 (+) — Chassis ground (-): #6 (B134) No. 24 (+) — Chassis ground (-):	Is the voltage 10 V or more?	Repair the short circuit to power in harness between ECM and fuel injector connector.	Go to step 7.
<b>7 CHECK FUEL INJECTOR.</b> 1) Turn the ignition switch to OFF. 2) Measure the resistance between fuel injector terminals on faulty cylinder. <b>Terminals</b> No. 1 — No. 2:	Is the resistance 5 — 20 Ω?	Go to step 8.	Replace the faulty fuel injector. <Ref. to FU(H6DO)-42, Fuel Injector.>
<b>8 CHECK INSTALLATION OF CAMSHAFT POSITION SENSOR/CRANKSHAFT POSITION SENSOR.</b>	Is the camshaft position sensor or crankshaft position sensor loosely installed?	Tighten the camshaft position sensor or crankshaft position sensor.	Go to step 9.
<b>9 CHECK CRANK PLATE.</b>	Is the crank sprocket rusted or the teeth of crank plate broken?	Replace the crank plate. <Ref. to ME(H6DO)-95, Cylinder Block.>	Go to step 10.
<b>10 CHECK INSTALLATION CONDITION OF TIMING CHAIN.</b> Turn the crankshaft using ST, and align the alignment mark on crank sprocket with alignment mark on cylinder block. ST 18252AA000 CRANKSHAFT SOCKET	Is the timing chain dislocated from its proper position?	Correct the installation condition of timing chain. <Ref. to ME(H6DO)-53, Timing Chain Assembly.>	Go to step 11.
<b>11 CHECK FUEL LEVEL.</b>	Is the fuel meter indication lower than the “Lower” level?	Refill the fuel so that the fuel meter indication is higher than the “Lower” level, and proceed to the next step. Go to step 13.	Go to step 12.
<b>12 CHECK STATUS OF MALFUNCTION INDICATOR LIGHT.</b> 1) Clear the memory using the Subaru Select Monitor or general scan tool. <Ref. to EN(H6DO)(diag)-58, Clear Memory Mode.> 2) Start the engine, and drive the vehicle 10 minutes or more.	Does the malfunction indicator light illuminate or blink?	Go to step 14.	Go to step 13.

## Diagnostic Procedure with Diagnostic Trouble Code (DTC)

### ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<b>13</b>	<b>CHECK CAUSE OF MISFIRE.</b>	Was the cause of misfire identified when the engine is running?	Finish diagnostics operation, if the engine has no abnormality.
			Repair the poor contact of connector. NOTE: In this case, repair the following item: <ul style="list-style-type: none"> <li>• Poor contact of ignition coil connector</li> <li>• Poor contact of fuel injector connector on faulty cylinders</li> <li>• Poor contact of ECM connector</li> <li>• Poor contact of coupling connector</li> </ul>
<b>14</b>	<b>CHECK AIR INTAKE SYSTEM.</b>	Is there any fault in air intake system?	Repair the air intake system. NOTE: Check the following items. <ul style="list-style-type: none"> <li>• Are there air leaks or air suction caused by loose or dislocated nuts and bolts?</li> <li>• Are there cracks or any disconnection of hoses?</li> </ul>
<b>15</b>	<b>CHECK MISFIRE SYMPTOM.</b> 1) Turn the ignition switch to ON. 2) Check for DTC. <Ref. to EN(H6DO)(diag)-44, Read Diagnostic Trouble Code (DTC).>	Does the Subaru Select Monitor or general scan tool indicate only one DTC?	Go to step 18.
<b>16</b>	<b>CHECK DTC ON DISPLAY.</b>	Is DTC P0301, P0303 and P0305 displayed?	Go to step 16.
<b>17</b>	<b>CHECK DTC ON DISPLAY.</b>	Is DTC P0302, P0304 and P0306 displayed?	Go to step 17.
<b>18</b>	<b>ONLY ONE CYLINDER.</b>	Is there any fault in the cylinder?	Go to step 18. Go to step 16.
		Repair or replace faulty parts. NOTE: Check the following items. <ul style="list-style-type: none"> <li>• Spark plug</li> <li>• Ignition coil</li> <li>• Fuel injector</li> <li>• Compression ratio</li> </ul>	Check DTC P0171, P0172, P0174 or P0175 using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6DO)(diag)-84, List of Diagnostic Trouble Code (DTC).>



# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<b>19</b> <b>GROUP OF #1, #3 AND #5 CYLINDERS.</b>	Is there any fault in #1, #3 and #5 cylinders?	Repair or replace faulty parts. NOTE: Check the following items. <ul style="list-style-type: none"> <li>• Spark plug</li> <li>• Ignition coil</li> <li>• Fuel injector</li> <li>• Compression ratio</li> <li>• Skipping timing chain teeth</li> </ul>	Check DTC P0171, P0172, P0174 or P0175 using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6DO)(diag)-84, List of Diagnostic Trouble Code (DTC).>
<b>20</b> <b>GROUP OF #2, #4 AND #6 CYLINDERS.</b>	Is there any fault in #2, #4 and #6 cylinders?	Repair or replace faulty parts. NOTE: Check the following items. <ul style="list-style-type: none"> <li>• Spark plug</li> <li>• Ignition coil</li> <li>• Fuel injector</li> <li>• Compression ratio</li> <li>• Skipping timing chain teeth</li> </ul>	Check DTC P0171, P0172, P0174 or P0175 using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6DO)(diag)-84, List of Diagnostic Trouble Code (DTC).>
<b>21</b> <b>CYLINDER AT RANDOM.</b>	Is the engine idle rough?	Check DTC P0171, P0172, P0174 or P0175 using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6DO)(diag)-84, List of Diagnostic Trouble Code (DTC).>	Repair or replace faulty parts. NOTE: Check the following items. <ul style="list-style-type: none"> <li>• Spark plug</li> <li>• Ignition coil</li> <li>• Fuel injector</li> <li>• Compression ratio</li> </ul>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## CL:DTC P0327 KNOCK SENSOR 1 CIRCUIT LOW (BANK 1 OR SINGLE SENSOR)

### DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-126, DTC P0327 KNOCK SENSOR 1 CIRCUIT LOW (BANK 1 OR SINGLE SENSOR), Diagnostic Trouble Code (DTC) Detecting Criteria.>

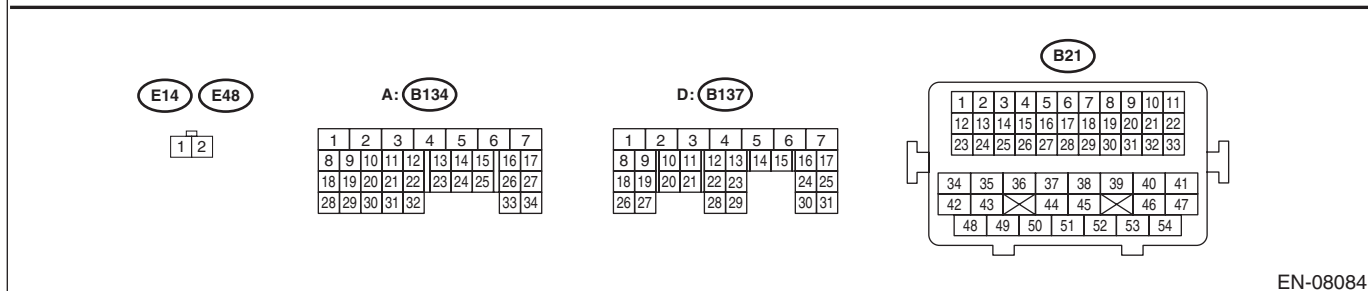
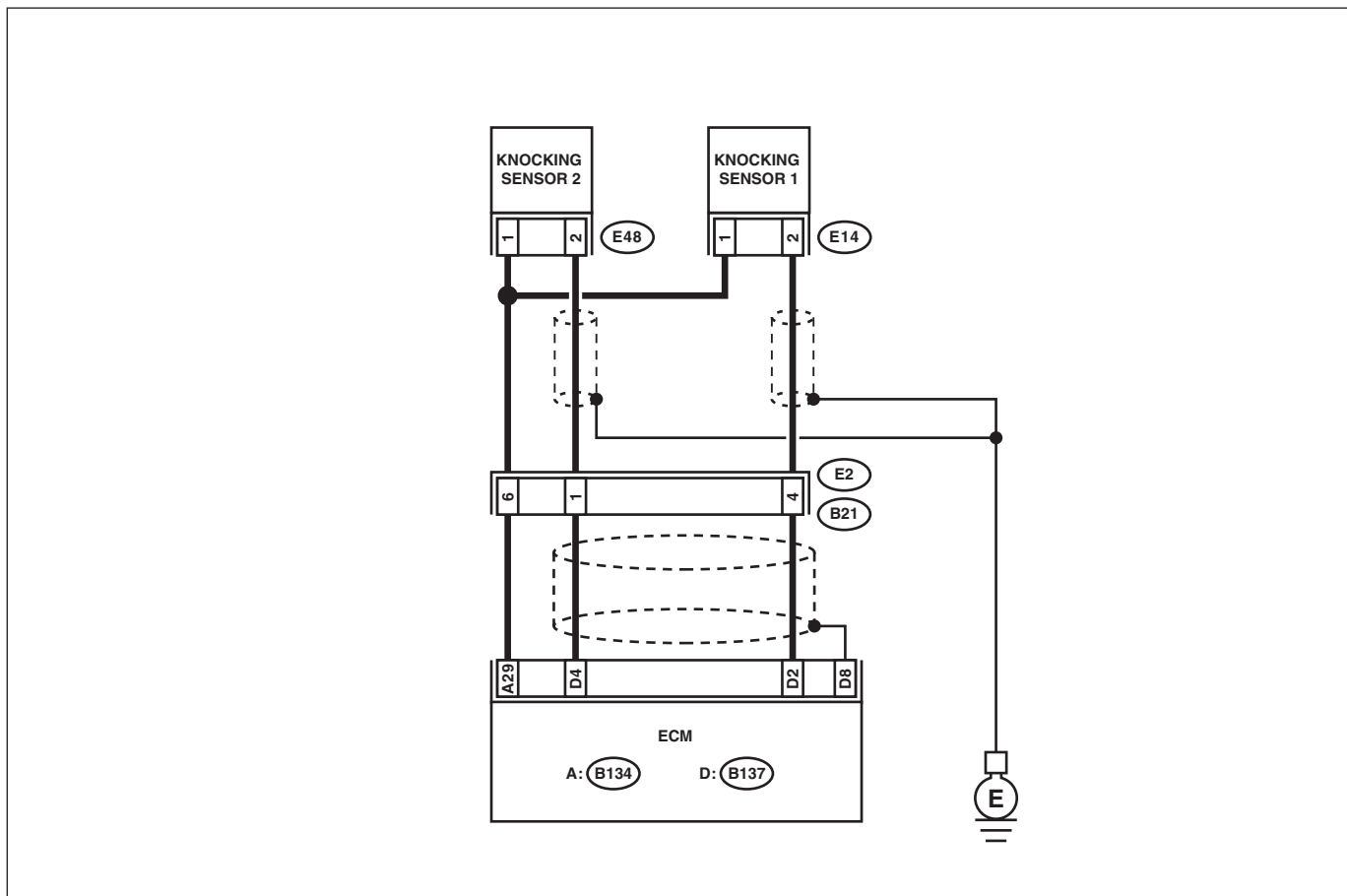
### TROUBLE SYMPTOM:

- Poor driving performance
- Knocking occurs.

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

### WIRING DIAGRAM:



EN-08084

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<b>1 CHECK HARNESS BETWEEN ECM AND KNOCK SENSOR CONNECTOR.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM. 3) Measure the resistance between ECM connectors. <i>Connector &amp; terminal</i> <i>(B137) No. 2 — (B134) No. 29:</i>	Is the resistance 600 kΩ or more?	Go to step 2.	Repair the poor contact of ECM connector.
<b>2 CHECK KNOCK SENSOR.</b> 1) Disconnect the connector from knock sensor. 2) Measure the resistance between knock sensor terminals. <i>Terminals</i> <i>No. 1 — No. 2:</i>	Is the resistance 600 kΩ or more?	Replace the knock sensor. <Ref. to FU(H6DO)-36, Knock Sensor.>	Repair the harness and connector. NOTE: In this case, repair the following item: <ul style="list-style-type: none"> <li>• Open circuit in harness between ECM and knock sensor connector</li> <li>• Poor contact of knock sensor connector</li> <li>• Poor contact of coupling connector</li> </ul>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## CM:DTC P0328 KNOCK SENSOR 1 CIRCUIT HIGH (BANK 1 OR SINGLE SENSOR)

### DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-128, DTC P0328 KNOCK SENSOR 1 CIRCUIT HIGH (BANK 1 OR SINGLE SENSOR), Diagnostic Trouble Code (DTC) Detecting Criteria.>

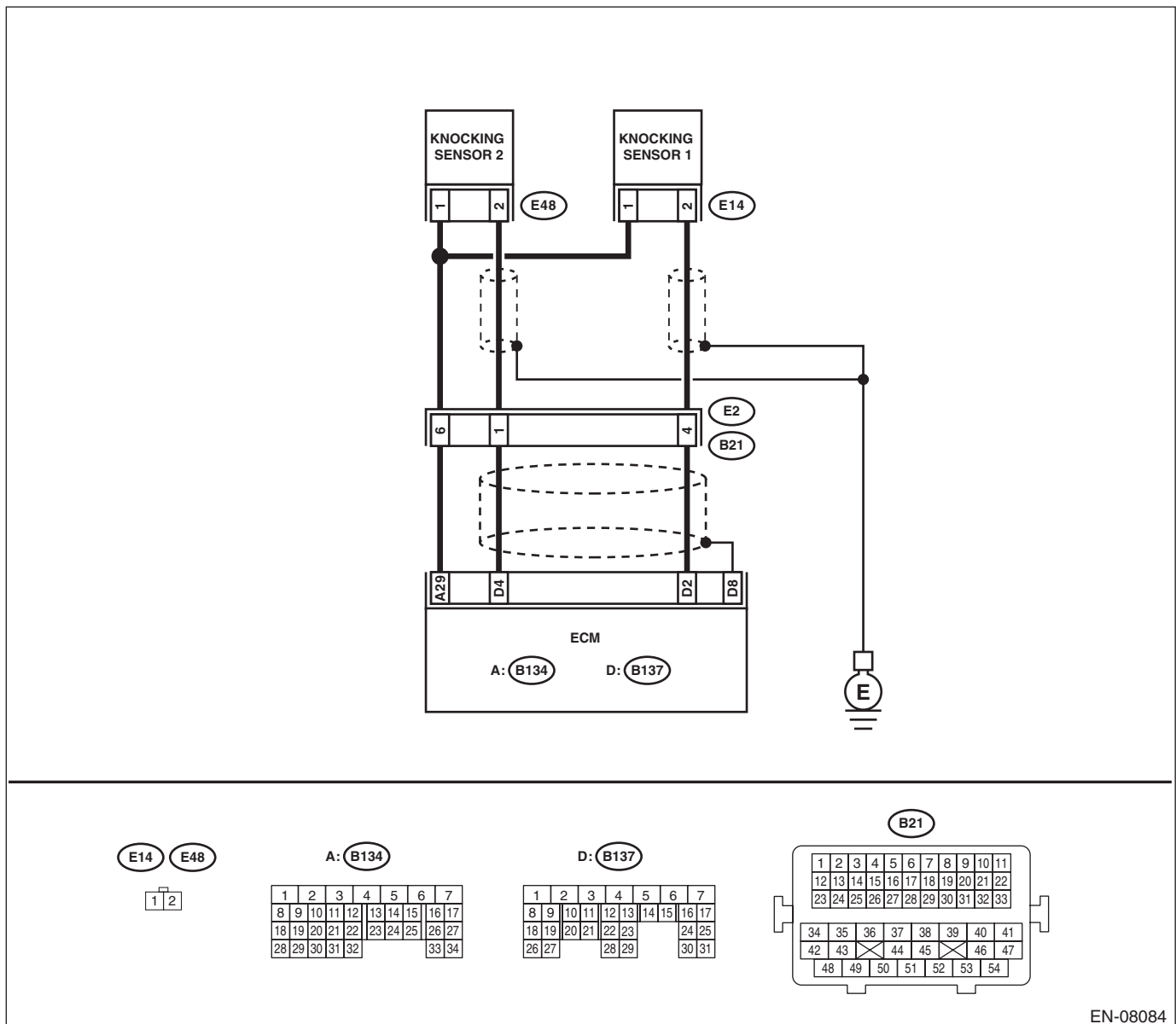
### TROUBLE SYMPTOM:

- Poor driving performance
- Knocking occurs.

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

### WIRING DIAGRAM:



EN-08084

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<p><b>1</b>     <b>CHECK HARNESS BETWEEN ECM AND KNOCK SENSOR CONNECTOR.</b>            1) Turn the ignition switch to OFF.            2) Disconnect the connectors from ECM.            3) Measure the resistance between ECM connectors.  <b>Connector &amp; terminal</b>  <b>(B137) No. 2 — (B134) No. 29:</b></p>	<p>Is the resistance less than 500 kΩ?</p>	<p>Go to step 2.</p>	<p>Go to step 3.</p>
<p><b>2</b>     <b>CHECK KNOCK SENSOR.</b>            1) Disconnect the connector from knock sensor.            2) Measure the resistance between knock sensor connectors.  <b>Terminals</b>  <b>No. 1 — No. 2:</b></p>	<p>Is the resistance less than 500 kΩ?</p>	<p>Replace the knock sensor. &lt;Ref. to FU(H6DO)-36, Knock Sensor.&gt;</p>	<p>Repair the short circuit to ground in harness between ECM and knock sensor connector.  <b>NOTE:</b>            The harness between both connectors are shielded. Remove the shield and repair the short circuit of harness.</p>
<p><b>3</b>     <b>CHECK INPUT SIGNAL OF ECM.</b>            1) Connect the connector to ECM.            2) Turn the ignition switch to ON.            3) Measure the voltage between ECM and chassis ground.  <b>Connector &amp; terminal</b>  <b>(B137) No. 2 (+) — Chassis ground (-):</b></p>	<p>Is the voltage 2 V or more?</p>	<p>Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again.  <b>NOTE:</b>            In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.</p>	<p>Repair the poor contact of ECM connector.</p>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## CN:DTC P0332 KNOCK SENSOR 2 CIRCUIT LOW (BANK 2)

### DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-129, DTC P0332 KNOCK SENSOR 2 CIRCUIT LOW (BANK 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>

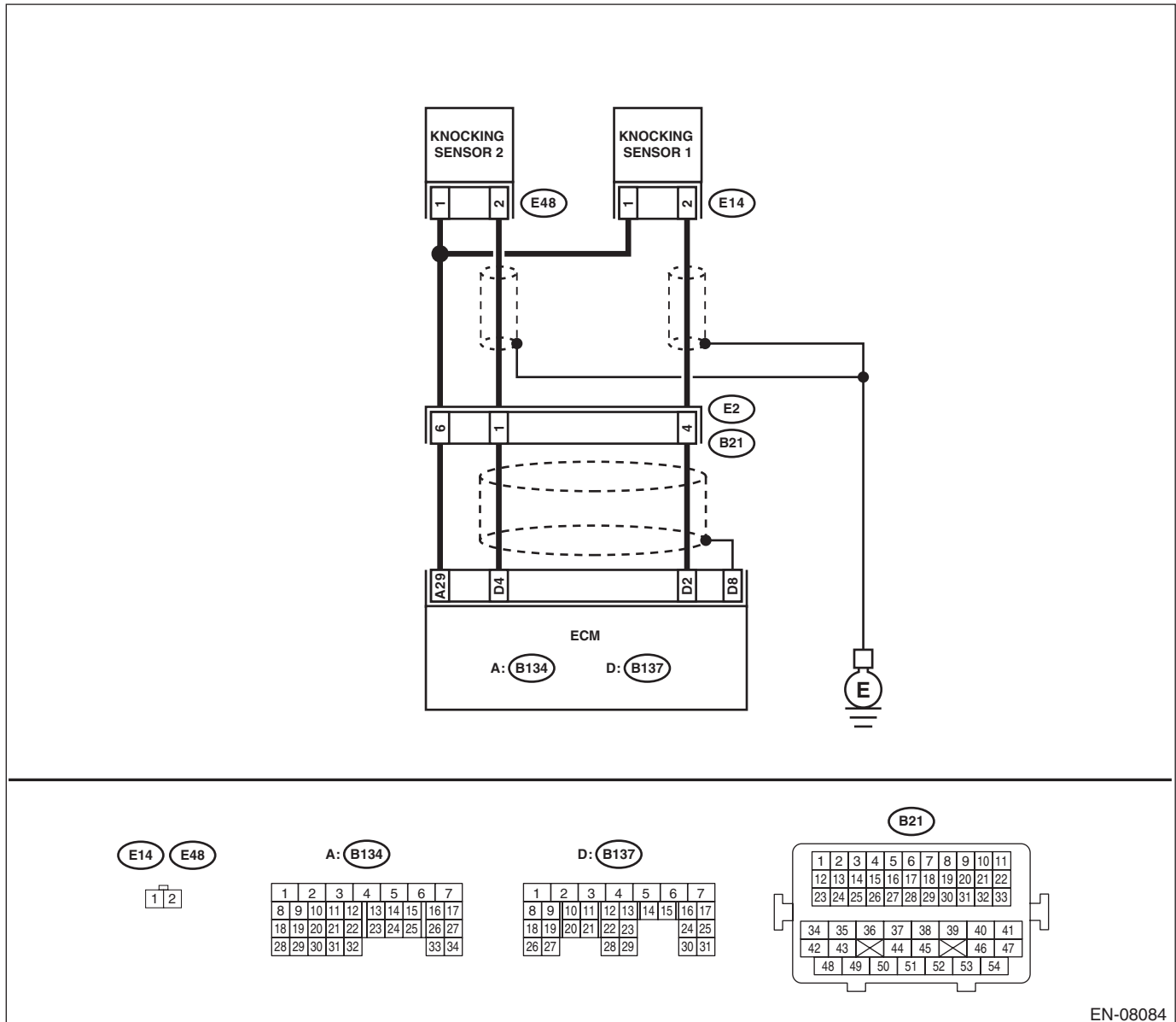
### TROUBLE SYMPTOM:

- Driving performance problem
- Knocking is occurred.

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

### WIRING DIAGRAM:



EN-08084

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<b>1 CHECK HARNESS BETWEEN ECM AND KNOCK SENSOR CONNECTOR.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM. 3) Measure the resistance between ECM connectors. <i>Connector &amp; terminal</i> <i>(B137) No. 4 — (B134) No. 29:</i>	Is the resistance 600 kΩ or more?	Go to step 2.	Repair the poor contact of ECM connector.
<b>2 CHECK KNOCK SENSOR.</b> 1) Disconnect the connector from knock sensor. 2) Measure the resistance between knock sensor terminals. <i>Terminals</i> <i>No. 1 — No. 2:</i>	Is the resistance 600 kΩ or more?	Replace the knock sensor. <Ref. to FU(H6DO)-36, Knock Sensor.>	Repair the harness and connector. NOTE: In this case, repair the following item: <ul style="list-style-type: none"> <li>• Open circuit in harness between ECM and knock sensor connector</li> <li>• Poor contact of knock sensor connector</li> <li>• Poor contact of coupling connector</li> </ul>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## CO:DTC P0333 KNOCK SENSOR 2 CIRCUIT HIGH (BANK 2)

### DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-129, DTC P0333 KNOCK SENSOR 2 CIRCUIT HIGH (BANK 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>

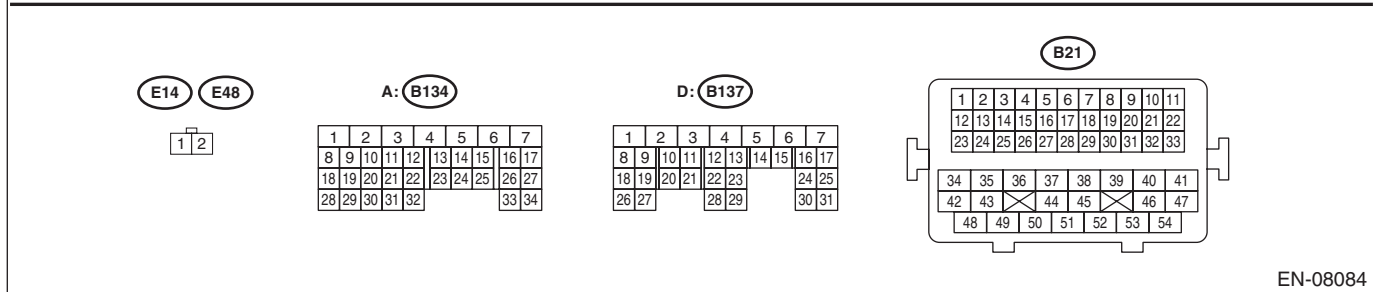
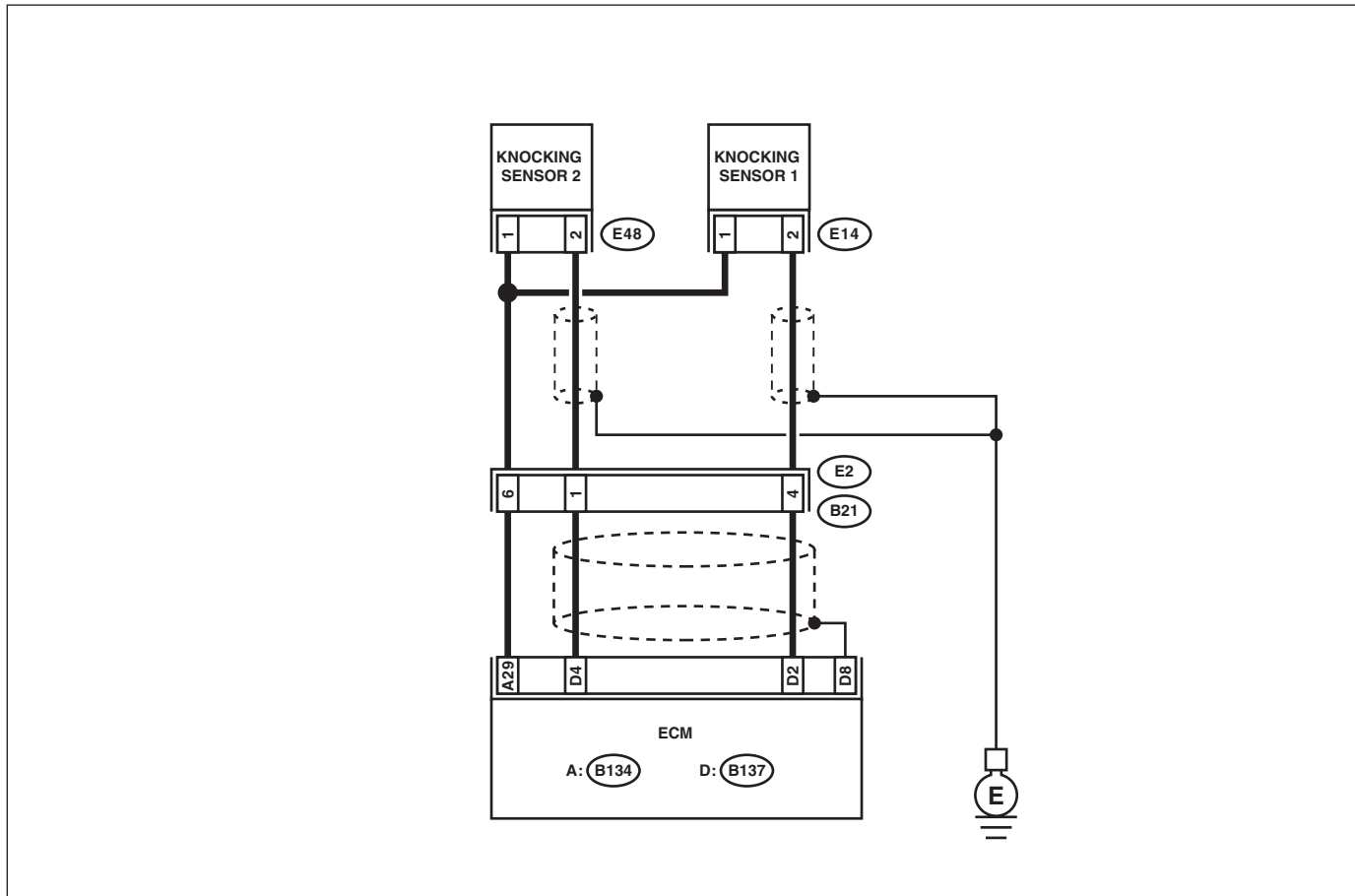
### TROUBLE SYMPTOM:

- Driving performance problem
- Knocking occurs.

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

### WIRING DIAGRAM:



EN-08084



# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<p><b>1 CHECK HARNESS BETWEEN ECM AND KNOCK SENSOR CONNECTOR.</b></p> <p>1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM. 3) Measure the resistance between ECM connectors.</p> <p><b>Connector &amp; terminal</b> <b>(B137) No. 4 — (B134) No. 29:</b></p>	<p>Is the resistance less than 500 kΩ?</p>	<p>Go to step 2.</p>	<p>Go to step 3.</p>
<p><b>2 CHECK KNOCK SENSOR.</b></p> <p>1) Disconnect the connector from knock sensor. 2) Measure the resistance between knock sensor connectors.</p> <p><b>Terminals</b> <b>No. 1 — No. 2:</b></p>	<p>Is the resistance less than 500 kΩ?</p>	<p>Replace the knock sensor. &lt;Ref. to FU(H6DO)-36, Knock Sensor.&gt;</p>	<p>Repair the short circuit to ground in harness between ECM and knock sensor connector.</p> <p><b>NOTE:</b> The harness between both connectors are shielded. Remove the shield and repair the short circuit of harness.</p>
<p><b>3 CHECK INPUT SIGNAL OF ECM.</b></p> <p>1) Connect the connector to ECM. 2) Turn the ignition switch to ON. 3) Measure the voltage between ECM and chassis ground.</p> <p><b>Connector &amp; terminal</b> <b>(B137) No. 4 (+) — Chassis ground (-):</b></p>	<p>Is the voltage 2 V or more?</p>	<p>Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again.</p> <p><b>NOTE:</b> In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.</p>	<p>Repair the poor contact of ECM connector.</p>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## CP:DTC P0335 CRANKSHAFT POSITION SENSOR "A" CIRCUIT

### DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-130, DTC P0335 CRANKSHAFT POSITION SENSOR "A" CIRCUIT, Diagnostic Trouble Code (DTC) Detecting Criteria.>

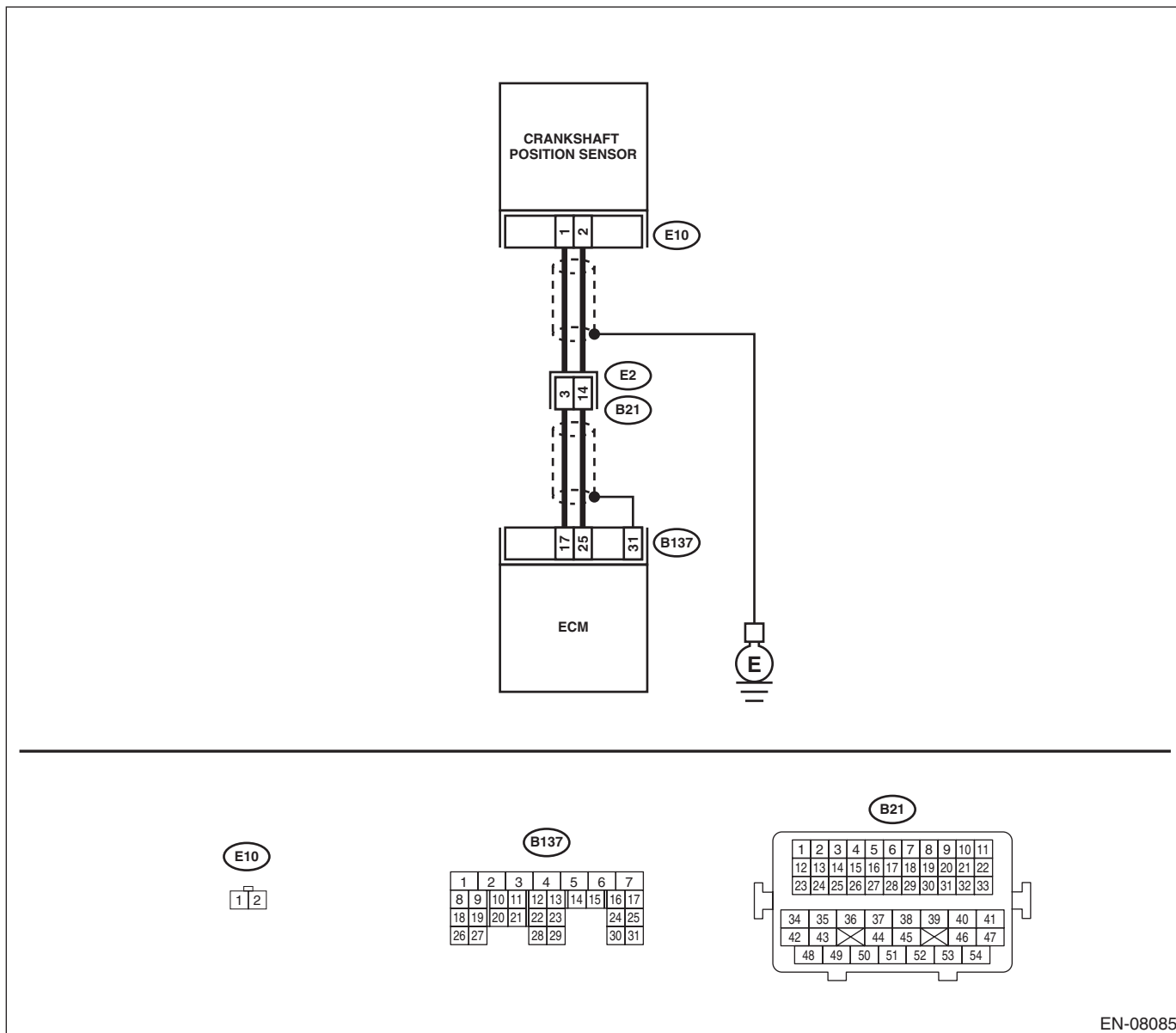
### TROUBLE SYMPTOM:

- Engine stalls.
- Failure of engine to start

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

### WIRING DIAGRAM:



EN-08085

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<b>1</b> <b>CHECK CONDITION OF CRANKSHAFT POSITION SENSOR.</b>	Is the crankshaft position sensor installation bolt tightened securely?	Go to step 2.	Tighten the crankshaft position sensor installation bolt securely.
<b>2</b> <b>CHECK CRANKSHAFT POSITION SENSOR.</b> 1) Turn the ignition switch to OFF. 2) Remove the crankshaft position sensor. 3) Measure the resistance between terminals of crankshaft position sensor connector. <b>Terminals</b> <b>No. 1 — No. 2:</b>	Is the resistance between 1 and 4 k $\Omega$ ?	Go to step 3.	Replace the crankshaft position sensor. <Ref. to FU(H6DO)-31, Crankshaft Position Sensor.>
<b>3</b> <b>CHECK HARNESS BETWEEN ECM AND CRANKSHAFT POSITION SENSOR CONNECTOR.</b> 1) Disconnect the connectors from ECM. 2) Measure the resistance of harness between ECM and crankshaft position sensor connector. <b>Connector &amp; terminal</b> <b>(B137) No. 17 — (E10) No. 1:</b> <b>(B137) No. 25 — (E10) No. 2:</b>	Is the resistance less than 1 $\Omega$ ?	Repair the poor contact of ECM and crankshaft position sensor connector.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit in harness between ECM and crankshaft position sensor connector • Poor contact of coupling connector

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## CQ:DTC P0336 CRANKSHAFT POSITION SENSOR “A” CIRCUIT RANGE/PERFORMANCE

### DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-132, DTC P0336 CRANKSHAFT POSITION SENSOR “A” CIRCUIT RANGE/PERFORMANCE, Diagnostic Trouble Code (DTC) Detecting Criteria.>

### TROUBLE SYMPTOM:

- Engine stalls.
- Failure of engine to start

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

	Step	Check	Yes	No
1	<b>CHECK CONDITION OF CRANKSHAFT POSITION SENSOR.</b> Turn the ignition switch to OFF.	Is the crankshaft position sensor installation bolt tightened securely?	Go to step 2.	Tighten the crankshaft position sensor installation bolt securely.
2	<b>CHECK CRANKSHAFT PLATE.</b>	Is there crack or damage in the crankshaft plate teeth?	Replace the crankshaft plate.	Go to step 3.
3	<b>CHECK INSTALLATION CONDITION OF TIMING CHAIN.</b> Turn the crankshaft, and align alignment mark on crank sprocket with alignment mark on cylinder block. ST 18252AA000      CRANKSHAFT SOCKET	Is the timing chain dislocated from its proper position?	Correct the installation condition of timing chain. <Ref. to ME(H6DO)-53, Timing Chain Assembly.>	Replace the crankshaft position sensor. <Ref. to FU(H6DO)-31, Crankshaft Position Sensor.>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## CR:DTC P0340 CAMSHAFT POSITION SENSOR "A" CIRCUIT (BANK 1 OR SINGLE SENSOR)

### DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-134, DTC P0340 CAMSHAFT POSITION SENSOR "A" CIRCUIT (BANK 1 OR SINGLE SENSOR), Diagnostic Trouble Code (DTC) Detecting Criteria.>

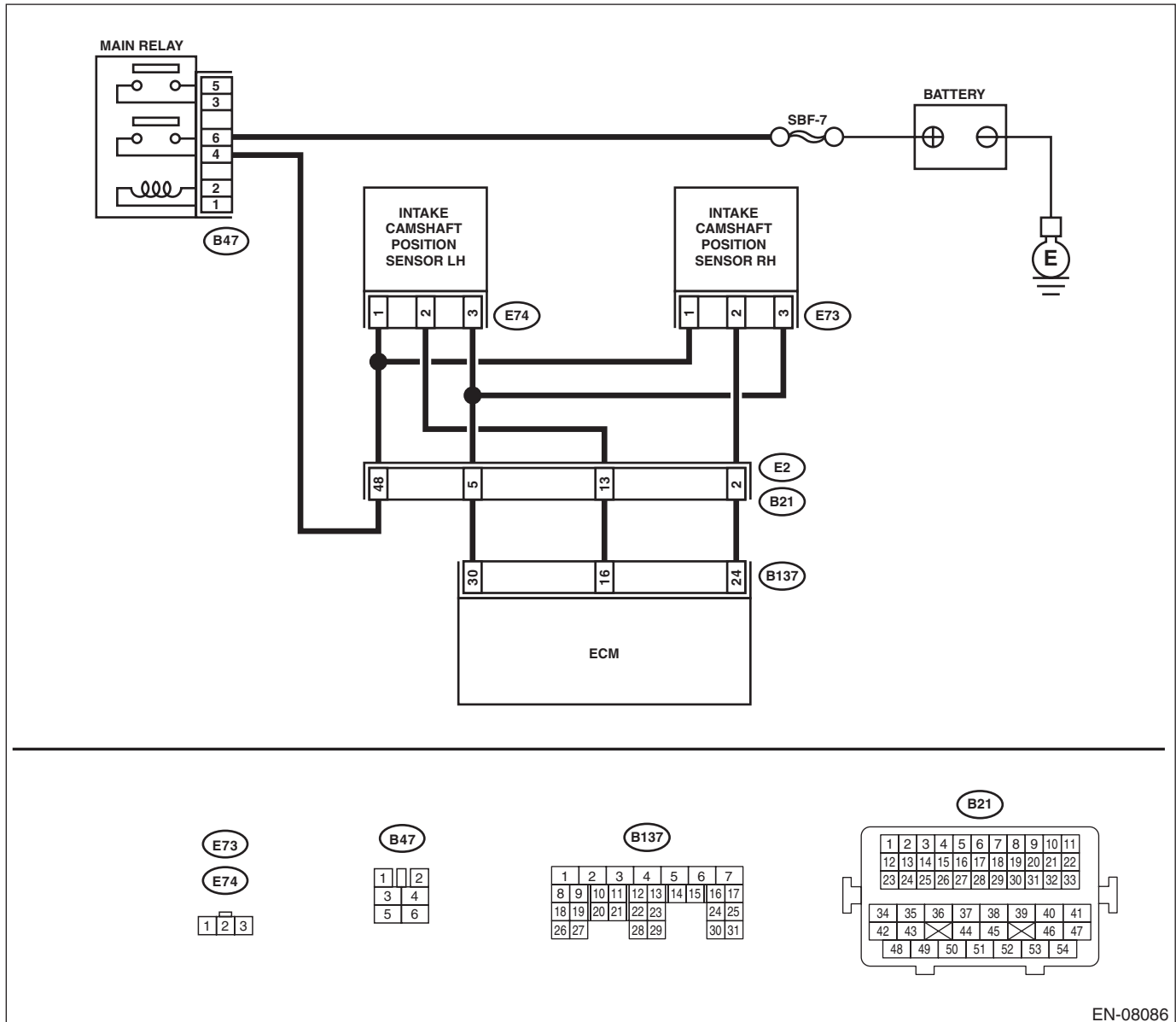
### TROUBLE SYMPTOM:

- Engine stalls.
- Failure of engine to start

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

### WIRING DIAGRAM:



EN-08086

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## ENGINE (DIAGNOSTICS)

	Step	Check	Yes	No
1	<p><b>CHECK POWER SUPPLY OF CAMSHAFT POSITION SENSOR.</b></p> <p>1) Turn the ignition switch to OFF.                      2) Disconnect the connector from camshaft position sensor.                      3) Turn the ignition switch to ON.                      4) Measure the voltage between camshaft position sensor connector and engine ground.</p> <p><b>Connector &amp; terminal</b>  <b>(E73) No. 1 (+) — Engine ground (-):</b></p>	Is the voltage 10 V or more?	Go to step 2.	Repair the harness and connector.  NOTE: In this case, repair the following item: • Open circuit or short circuit to ground in harness between main relay connector and camshaft position sensor connector • Poor contact of coupling connector
2	<p><b>CHECK HARNESS BETWEEN ECM AND CAMSHAFT POSITION SENSOR CONNECTOR.</b></p> <p>1) Turn the ignition switch to OFF.                      2) Disconnect the connectors from ECM.                      3) Measure the resistance between ECM and camshaft position sensor connector.</p> <p><b>Connector &amp; terminal</b>  <b>(B137) No. 24 — (E73) No. 2:</b>  <b>(B137) No. 30 — (E73) No. 3:</b></p>	Is the resistance less than 1 Ω?	Go to step 3.	Repair the harness and connector.  NOTE: In this case, repair the following item: • Open circuit in harness between ECM and camshaft position sensor connector • Poor contact of coupling connector
3	<p><b>CHECK HARNESS BETWEEN ECM AND CAMSHAFT POSITION SENSOR CONNECTOR.</b></p> <p>Measure the resistance between camshaft position sensor connector and engine ground.</p> <p><b>Connector &amp; terminal</b>  <b>(E73) No. 2 — Engine ground:</b></p>	Is the resistance 1 MΩ or more?	Go to step 4.	Repair short circuit to ground in harness between ECM and camshaft position sensor connector.
4	<p><b>CHECK HARNESS BETWEEN ECM AND CAMSHAFT POSITION SENSOR CONNECTOR.</b></p> <p>Measure the voltage between camshaft position sensor connector and engine ground.</p> <p><b>Connector &amp; terminal</b>  <b>(E73) No. 2 (+) — Engine ground (-):</b></p>	Is the voltage 5 V or more?	Repair the short circuit to power in the harness between ECM and camshaft position sensor connector.	Go to step 5.
5	<p><b>CHECK CONDITION OF CAMSHAFT POSITION SENSOR.</b></p>	Is the camshaft position sensor installation bolt tightened securely?	Go to step 6.	Tighten the camshaft position sensor installation bolt securely.
6	<p><b>CHECK CAMSHAFT POSITION SENSOR.</b></p> <p>Check the waveform of the camshaft position sensor. &lt;Ref. to EN(H6DO)(diag)-18, Engine Control Module (ECM) I/O Signal.&gt;</p>	Is there any abnormality in waveform?	Replace the camshaft position sensor. <Ref. to FU(H6DO)-33, Camshaft Position Sensor.>	Repair the following item. • Poor contact of ECM connector • Poor contact of camshaft position sensor connector • Poor contact of coupling connector

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## CS:DTC P0345 CAMSHAFT POSITION SENSOR "A" CIRCUIT (BANK 2)

### DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-135, DTC P0345 CAMSHAFT POSITION SENSOR "A" CIRCUIT (BANK 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>

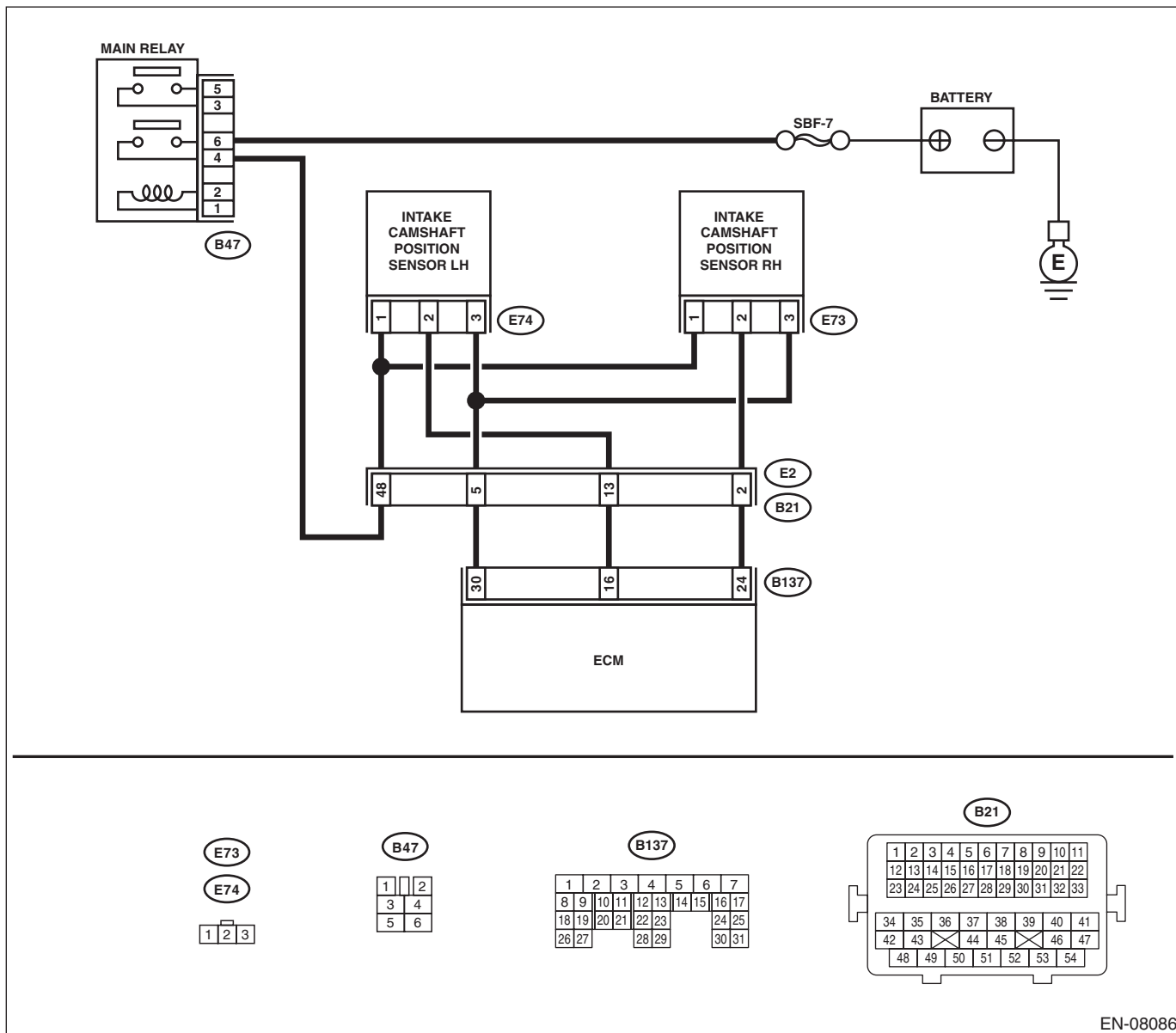
### TROUBLE SYMPTOM:

- Engine stalls.
- Failure of engine to start

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

### WIRING DIAGRAM:



EN-08086

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## ENGINE (DIAGNOSTICS)

	Step	Check	Yes	No
1	<p><b>CHECK POWER SUPPLY OF CAMSHAFT POSITION SENSOR.</b></p> <p>1) Turn the ignition switch to OFF.                      2) Disconnect the connector from camshaft position sensor.                      3) Turn the ignition switch to ON.                      4) Measure the voltage between camshaft position sensor connector and engine ground.</p> <p><b>Connector &amp; terminal</b>  <b>(E74) No. 1 (+) — Engine ground (-):</b></p>	Is the voltage 10 V or more?	Go to step 2.	Repair the harness and connector.  NOTE: In this case, repair the following item: • Open circuit or short circuit to ground in harness between main relay connector and camshaft position sensor connector • Poor contact of coupling connector
2	<p><b>CHECK HARNESS BETWEEN ECM AND CAMSHAFT POSITION SENSOR CONNECTOR.</b></p> <p>1) Turn the ignition switch to OFF.                      2) Disconnect the connectors from ECM.                      3) Measure the resistance between ECM and camshaft position sensor connector.</p> <p><b>Connector &amp; terminal</b>  <b>(B137) No. 16 — (E74) No. 2:</b>  <b>(B137) No. 30 — (E74) No. 3:</b></p>	Is the resistance less than 1 Ω?	Go to step 3.	Repair the harness and connector.  NOTE: In this case, repair the following item: • Open circuit in harness between ECM and camshaft position sensor connector • Poor contact of coupling connector
3	<p><b>CHECK HARNESS BETWEEN ECM AND CAMSHAFT POSITION SENSOR CONNECTOR.</b></p> <p>Measure the resistance between camshaft position sensor connector and engine ground.</p> <p><b>Connector &amp; terminal</b>  <b>(E74) No. 2 — Engine ground:</b></p>	Is the resistance 1 MΩ or more?	Go to step 4.	Repair short circuit to ground in harness between ECM and camshaft position sensor connector.
4	<p><b>CHECK HARNESS BETWEEN ECM AND CAMSHAFT POSITION SENSOR CONNECTOR.</b></p> <p>Measure the voltage between camshaft position sensor connector and engine ground.</p> <p><b>Connector &amp; terminal</b>  <b>(E74) No. 2 (+) — Engine ground (-):</b></p>	Is the voltage 5 V or more?	Repair the short circuit to power in the harness between ECM and camshaft position sensor connector.	Go to step 5.
5	<p><b>CHECK CONDITION OF CAMSHAFT POSITION SENSOR.</b></p>	Is the camshaft position sensor installation bolt tightened securely?	Go to step 6.	Tighten the camshaft position sensor installation bolt securely.
6	<p><b>CHECK CAMSHAFT POSITION SENSOR.</b></p> <p>Check the waveform of the camshaft position sensor. &lt;Ref. to EN(H6DO)(diag)-18, Engine Control Module (ECM) I/O Signal.&gt;</p>	Is there any abnormality in waveform?	Replace the camshaft position sensor. <Ref. to FU(H6DO)-33, Camshaft Position Sensor.>	Repair the following item. • Poor contact of ECM connector • Poor contact of camshaft position sensor connector • Poor contact of coupling connector



# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## CT:DTC P0351 IGNITION COIL A PRIMARY/SECONDARY CIRCUIT

### DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-136, DTC P0351 IGNITION COIL A PRIMARY/SECONDARY CIRCUIT, Diagnostic Trouble Code (DTC) Detecting Criteria.>

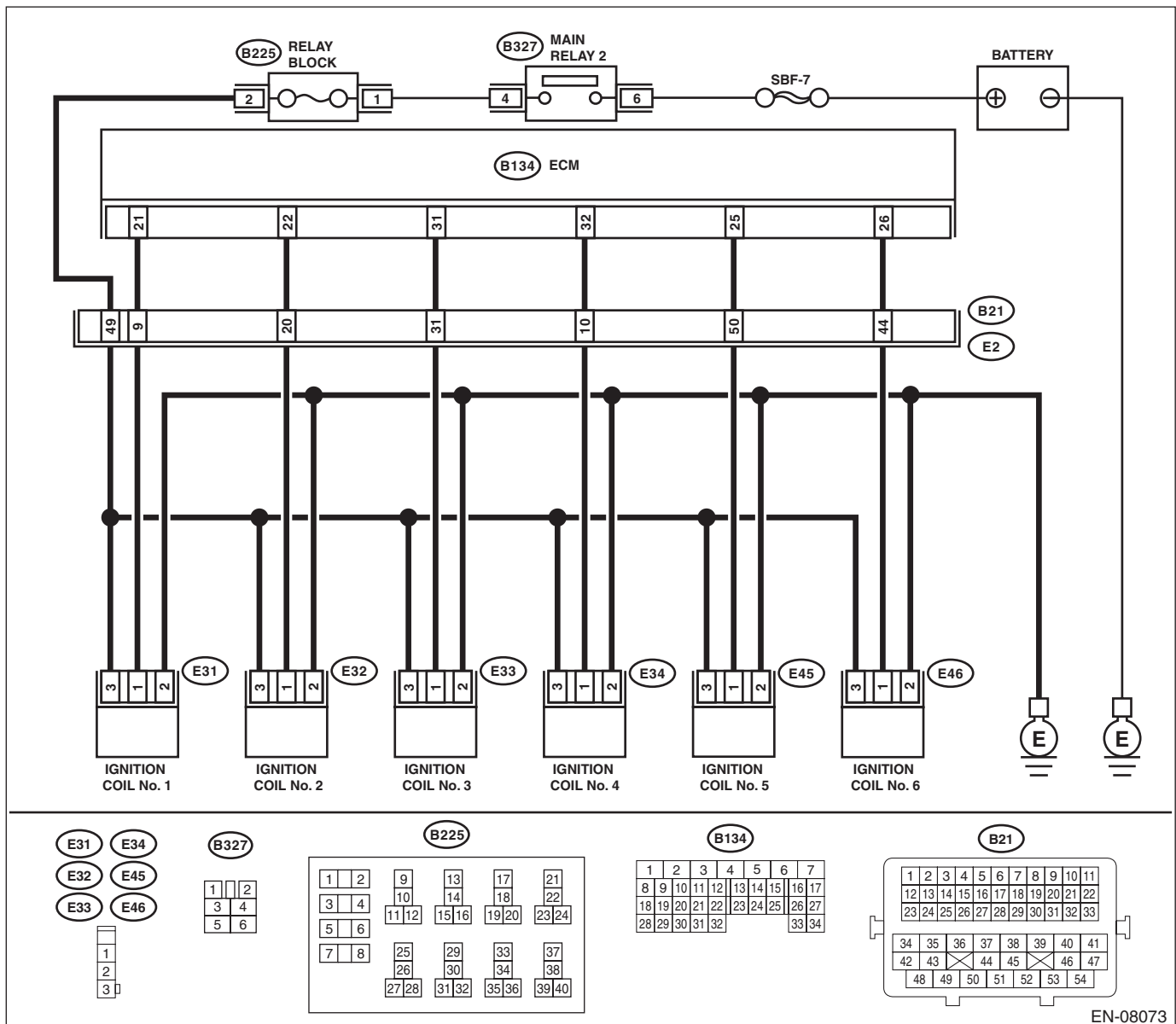
### TROUBLE SYMPTOM:

- Improper idling
- Poor driving performance

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

### WIRING DIAGRAM:



EN-08073

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<p><b>1 CHECK IGNITION COIL POWER SUPPLY CIRCUIT.</b></p> <p>1) Turn the ignition switch to OFF.                      2) Disconnect the connector from ignition coil.                      3) Turn the ignition switch to ON.                      4) Measure the voltage between ignition coil connector and engine ground.</p> <p><b>Connector &amp; terminal</b>  <b>DTC P0351; (E31) No. 3 (+) — Engine ground (-):</b>  <b>DTC P0352; (E32) No. 3 (+) — Engine ground (-):</b>  <b>DTC P0353; (E33) No. 3 (+) — Engine ground (-):</b>  <b>DTC P0354; (E34) No. 3 (+) — Engine ground (-):</b>  <b>DTC P0355; (E45) No. 3 (+) — Engine ground (-):</b>  <b>DTC P0356; (E46) No. 3 (+) — Engine ground (-):</b></p>	Is the voltage 10 V or more?	Go to step 2.	Repair the harness and connector.  NOTE: In this case, repair the following item: • Open circuit or short circuit to ground in harness of power supply circuit • Blown out of fuse • Poor contact of IG relay connector • Poor contact of coupling connector • Defective main relay 2
<p><b>2 CHECK HARNESS OF IGNITION COIL GROUND CIRCUIT.</b></p> <p>1) Turn the ignition switch to OFF.                      2) Measure the resistance of harness between ignition coil connector and engine ground.</p> <p><b>Connector &amp; terminal</b>  <b>DTC P0351; (E31) No. 2 — Engine ground:</b>  <b>DTC P0352; (E32) No. 2 — Engine ground:</b>  <b>DTC P0353; (E33) No. 2 — engine ground:</b>  <b>DTC P0354; (E34) No. 2 — Engine ground:</b>  <b>DTC P0355; (E45) No. 2 — Engine ground:</b>  <b>DTC P0356; (E46) No. 2 — Engine ground:</b></p>	Is the resistance less than 5 Ω?	Go to step 3.	Repair the open circuit in harness between ignition coil connector and engine grounding terminal.
<p><b>3 CHECK HARNESS BETWEEN ECM AND IGNITION COIL CONNECTOR.</b></p> <p>1) Disconnect the connector from ECM.                      2) Measure the resistance between ignition coil connector and engine ground.</p> <p><b>Connector &amp; terminal</b>  <b>DTC P0351; (E31) No. 1 — Engine ground:</b>  <b>DTC P0352; (E32) No. 1 — Engine ground:</b>  <b>DTC P0353; (E33) No. 1 — engine ground:</b>  <b>DTC P0354; (E34) No. 1 — Engine ground:</b>  <b>DTC P0355; (E45) No. 1 — Engine ground:</b>  <b>DTC P0356; (E46) No. 1 — Engine ground:</b></p>	Is the resistance 1 MΩ or more?	Go to step 4.	Repair the ground short circuit of harness between ECM connector and ignition coil connector.
<p><b>4 CHECK HARNESS BETWEEN ECM AND IGNITION COIL CONNECTOR.</b></p> <p>Measure the resistance of harness between ECM connector and ignition coil connector.</p> <p><b>Connector &amp; terminal</b>  <b>DTC P0351; (B134) No. 21 — (E31) No. 1:</b>  <b>DTC P0352; (B134) No. 22 — (E32) No. 1:</b>  <b>DTC P0353; (B134) No. 31 — (E33) No. 1:</b>  <b>DTC P0354; (B134) No. 32 — (E34) No. 1:</b>  <b>DTC P0355; (B134) No. 25 — (E45) No. 1:</b>  <b>DTC P0356; (B134) No. 26 — (E46) No. 1:</b></p>	Is the resistance less than 1 Ω?	Go to step 5.	Repair the harness and connector.  NOTE: In this case, repair the following item: • Open circuit of harness between ECM connector and the ignition coil connector • Poor contact of coupling connector
<p><b>5 CHECK FOR POOR CONTACT.</b></p> <p>Check for poor contact of ECM connector.</p>	Is there poor contact of ECM connector?	Repair the poor contact of ECM connector.	Go to step 6.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<b>6</b> <b>CHECK SPARK PLUG CONDITION.</b> 1) Remove the spark plug of the corresponding cylinder. <Ref. to IG(H6DO)-4, REMOVAL, Spark Plug.> 2) Check the spark plug condition. <Ref. to IG(H6DO)-5, INSPECTION, Spark Plug.>	Is the spark plug condition normal?	Replace the ignition coil. <Ref. to IG(H6DO)-7, Ignition Coil.>	Replace the spark plug. <Ref. to IG(H6DO)-4, Spark Plug.>

## **CU:DTC P0352 IGNITION COIL B PRIMARY/SECONDARY CIRCUIT**

NOTE:

For the diagnostic procedure, refer to DTC P0351. <Ref. to EN(H6DO)(diag)-225, DTC P0351 IGNITION COIL A PRIMARY/SECONDARY CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

## **CV:DTC P0353 IGNITION COIL C PRIMARY/SECONDARY CIRCUIT**

NOTE:

For the diagnostic procedure, refer to DTC P0351. <Ref. to EN(H6DO)(diag)-225, DTC P0351 IGNITION COIL A PRIMARY/SECONDARY CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

## **CW:DTC P0354 IGNITION COIL D PRIMARY/SECONDARY CIRCUIT**

NOTE:

For the diagnostic procedure, refer to DTC P0351. <Ref. to EN(H6DO)(diag)-225, DTC P0351 IGNITION COIL A PRIMARY/SECONDARY CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

## **CX:DTC P0355 IGNITION COIL E PRIMARY/SECONDARY CIRCUIT**

NOTE:

For the diagnostic procedure, refer to DTC P0351. <Ref. to EN(H6DO)(diag)-225, DTC P0351 IGNITION COIL A PRIMARY/SECONDARY CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

## **CY:DTC P0356 IGNITION COIL F PRIMARY/SECONDARY CIRCUIT**

NOTE:

For the diagnostic procedure, refer to DTC P0351. <Ref. to EN(H6DO)(diag)-225, DTC P0351 IGNITION COIL A PRIMARY/SECONDARY CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## CZ:DTC P0365 CAMSHAFT POSITION SENSOR "B" CIRCUIT (BANK 1)

### DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-138, DTC P0365 CAMSHAFT POSITION SENSOR "B" CIRCUIT (BANK 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

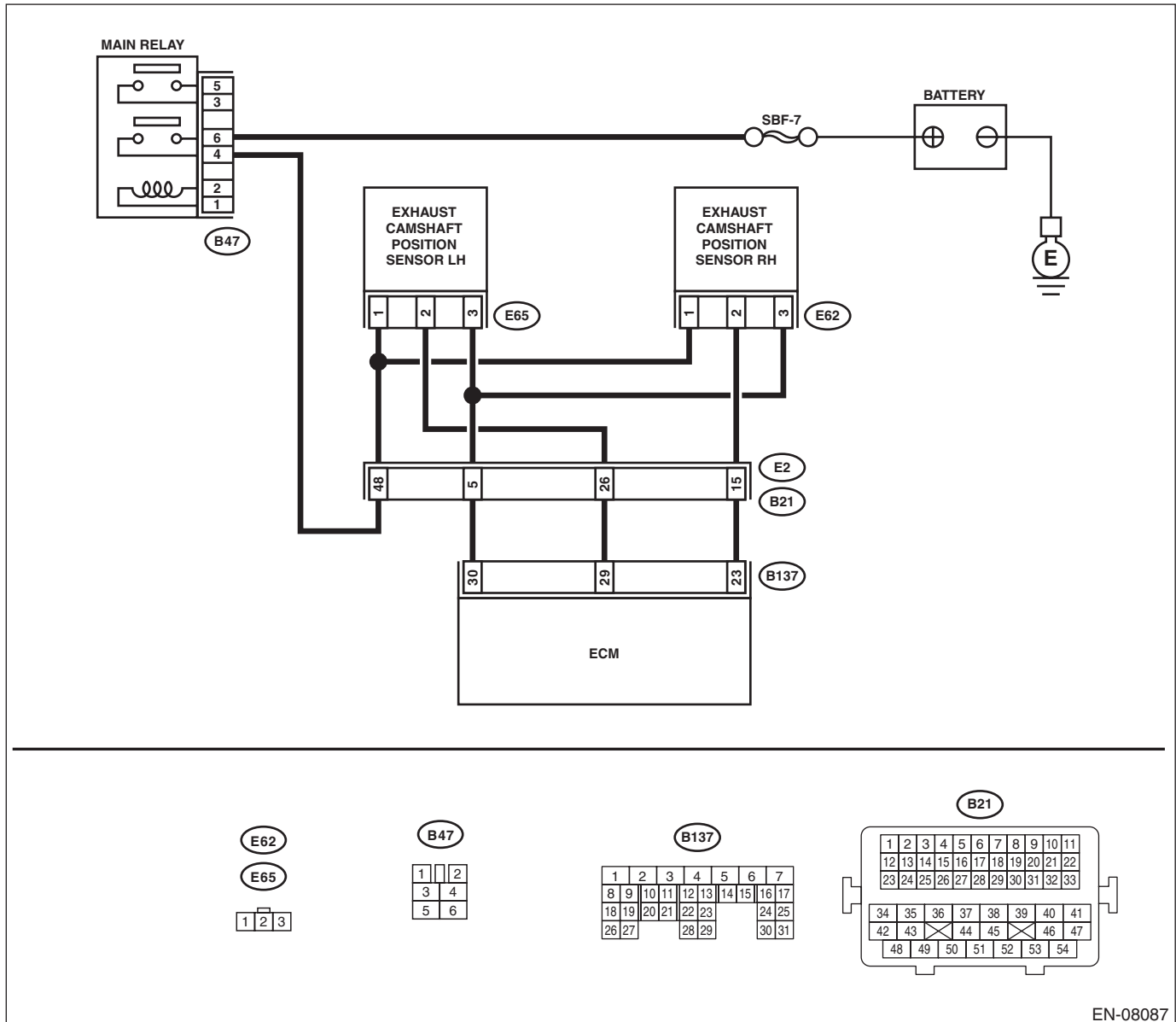
### TROUBLE SYMPTOM:

- Engine stalls.
- Failure of engine to start

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

### WIRING DIAGRAM:



EN-08087

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<b>1 CHECK POWER SUPPLY OF CAMSHAFT POSITION SENSOR.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connector from camshaft position sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between camshaft position sensor connector and engine ground. <b>Connector &amp; terminal</b> <b>(E62) No. 1 (+) — Engine ground (-):</b>	Is the voltage 10 V or more?	Go to step 2.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit or short circuit to ground in harness between main relay connector and camshaft position sensor connector • Poor contact of coupling connector
<b>2 CHECK HARNESS BETWEEN ECM AND CAMSHAFT POSITION SENSOR CONNECTOR.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM. 3) Measure the resistance between ECM and camshaft position sensor connector. <b>Connector &amp; terminal</b> <b>(B137) No. 23 — (E62) No. 2:</b> <b>(B137) No. 30 — (E62) No. 3:</b>	Is the resistance less than 1 Ω?	Go to step 3.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit in harness between ECM and camshaft position sensor connector • Poor contact of coupling connector
<b>3 CHECK HARNESS BETWEEN ECM AND CAMSHAFT POSITION SENSOR CONNECTOR.</b> Measure the resistance between camshaft position sensor connector and engine ground. <b>Connector &amp; terminal</b> <b>(E62) No. 2 — Engine ground:</b>	Is the resistance 1 MΩ or more?	Go to step 4.	Repair short circuit to ground in harness between ECM and camshaft position sensor connector.
<b>4 CHECK HARNESS BETWEEN ECM AND CAMSHAFT POSITION SENSOR CONNECTOR.</b> Measure the voltage between camshaft position sensor connector and engine ground. <b>Connector &amp; terminal</b> <b>(E62) No. 2 (+) — Engine ground (-):</b>	Is the voltage 5 V or more?	Repair the short circuit to power in the harness between ECM and camshaft position sensor connector.	Go to step 5.
<b>5 CHECK CONDITION OF CAMSHAFT POSITION SENSOR.</b>	Is the camshaft position sensor installation bolt tightened securely?	Go to step 6.	Tighten the camshaft position sensor installation bolt securely.
<b>6 CHECK CAMSHAFT POSITION SENSOR.</b> Check the waveform of the camshaft position sensor. <Ref. to EN(H6DO)(diag)-18, Engine Control Module (ECM) I/O Signal.>	Is there any abnormality in waveform?	Replace the camshaft position sensor. <Ref. to FU(H6DO)-33, Camshaft Position Sensor.>	Repair the following item. • Poor contact of ECM connector • Poor contact of camshaft position sensor connector • Poor contact of coupling connector

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## DA:DTC P0390 CAMSHAFT POSITION SENSOR "B" CIRCUIT (BANK 2)

### DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-139, DTC P0390 CAMSHAFT POSITION SENSOR "B" CIRCUIT (BANK 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>

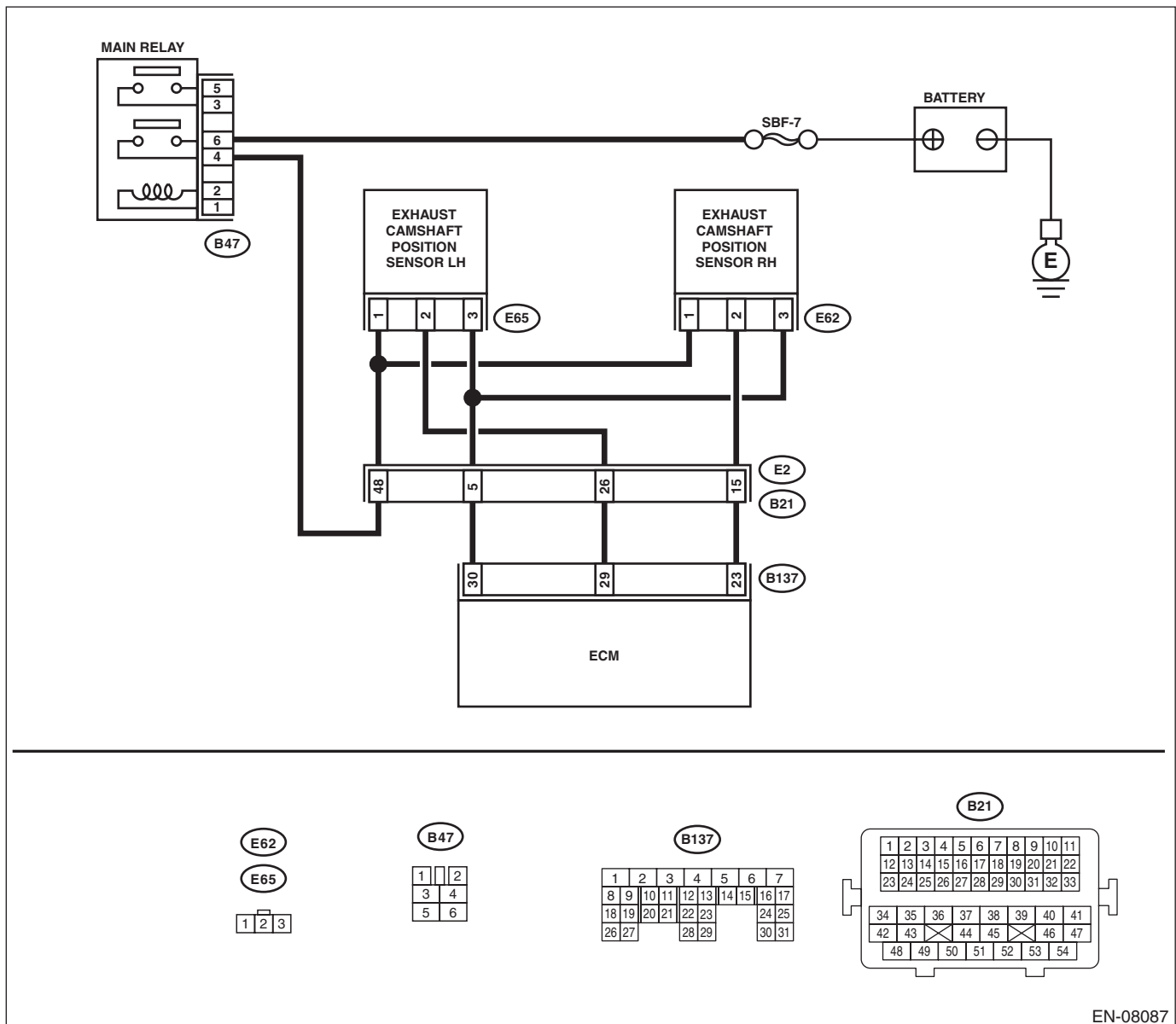
### TROUBLE SYMPTOM:

- Engine stalls.
- Failure of engine to start

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

### WIRING DIAGRAM:



EN-08087

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<p><b>1 CHECK POWER SUPPLY OF CAMSHAFT POSITION SENSOR.</b></p> <p>1) Turn the ignition switch to OFF.                      2) Disconnect the connector from camshaft position sensor.                      3) Turn the ignition switch to ON.                      4) Measure the voltage between camshaft position sensor connector and engine ground.</p> <p><b>Connector &amp; terminal</b>  <b>(E65) No. 1 (+) — Engine ground (-):</b></p>	Is the voltage 10 V or more?	Go to step 2.	Repair the harness and connector.  NOTE: In this case, repair the following item: • Open circuit or short circuit to ground in harness between main relay connector and camshaft position sensor connector • Poor contact of coupling connector
<p><b>2 CHECK HARNESS BETWEEN ECM AND CAMSHAFT POSITION SENSOR CONNECTOR.</b></p> <p>1) Turn the ignition switch to OFF.                      2) Disconnect the connectors from ECM.                      3) Measure the resistance between ECM and camshaft position sensor connector.</p> <p><b>Connector &amp; terminal</b>  <b>(B137) No. 29 — (E65) No. 2:</b>  <b>(B137) No. 30 — (E65) No. 3:</b></p>	Is the resistance less than 1 Ω?	Go to step 3.	Repair the harness and connector.  NOTE: In this case, repair the following item: • Open circuit in harness between ECM and camshaft position sensor connector • Poor contact of coupling connector
<p><b>3 CHECK HARNESS BETWEEN ECM AND CAMSHAFT POSITION SENSOR CONNECTOR.</b></p> <p>Measure the resistance between camshaft position sensor connector and engine ground.</p> <p><b>Connector &amp; terminal</b>  <b>(E65) No. 2 — Engine ground:</b></p>	Is the resistance 1 MΩ or more?	Go to step 4.	Repair short circuit to ground in harness between ECM and camshaft position sensor connector.
<p><b>4 CHECK HARNESS BETWEEN ECM AND CAMSHAFT POSITION SENSOR CONNECTOR.</b></p> <p>Measure the voltage between camshaft position sensor connector and engine ground.</p> <p><b>Connector &amp; terminal</b>  <b>(E65) No. 2 (+) — Engine ground (-):</b></p>	Is the voltage 5 V or more?	Repair the short circuit to power in the harness between ECM and camshaft position sensor connector.	Go to step 5.
<p><b>5 CHECK CONDITION OF CAMSHAFT POSITION SENSOR.</b></p>	Is the camshaft position sensor installation bolt tightened securely?	Go to step 6.	Tighten the camshaft position sensor installation bolt securely.
<p><b>6 CHECK CAMSHAFT POSITION SENSOR.</b></p> <p>Check the waveform of the camshaft position sensor. &lt;Ref. to EN(H6DO)(diag)-18, Engine Control Module (ECM) I/O Signal.&gt;</p>	Is there any abnormality in waveform?	Replace the camshaft position sensor. <Ref. to FU(H6DO)-33, Camshaft Position Sensor.>	Repair the following item. • Poor contact of ECM connector • Poor contact of camshaft position sensor connector • Poor contact of coupling connector

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## DB:DTC P0400 EXHAUST GAS RECIRCULATION FLOW

### DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-140, DTC P0400 EXHAUST GAS RECIRCULATION FLOW, Diagnostic Trouble Code (DTC) Detecting Criteria.>

### TROUBLE SYMPTOM:

- Movement performance problem when engine is low speed.
- Improper idling
- Movement performance problem

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

	Step	Check	Yes	No
1	<b>CHECK CURRENT DATA.</b> 1) Start the engine. 2) Read the value of «Mani. Absolute Pressure» using the Subaru Select Monitor or a general scan tool. <b>NOTE:</b> <ul style="list-style-type: none"><li>• Subaru Select Monitor</li></ul> For detailed operation procedures, refer to “READ CURRENT DATA FOR ENGINE”. <Ref. to EN(H6DO)(diag)-36, Subaru Select Monitor.> <ul style="list-style-type: none"><li>• General scan tool</li></ul> For detailed operation procedures, refer to the general scan tool operation manual.	Is the value of «Mani. Absolute Pressure» 53.3 kPa (400 mmHg, 15.75 inHg) or more?	Make sure that the EGR control valve, manifold absolute pressure sensor and throttle body are installed securely.	Go to step 2.
2	<b>CHECK EGR CONTROL VALVE.</b> Remove the EGR control valve.	Are there any holes, clogged lines or foreign matters in the EGR system?	Repair the EGR system.	Replace EGR control valve. <Ref. to FU(H6DO)-41, EGR Valve.>



# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## DC:DTC P0420 CATALYST SYSTEM EFFICIENCY BELOW THRESHOLD (BANK 1)

### DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-143, DTC P0420 CATALYST SYSTEM EFFICIENCY BELOW THRESHOLD (BANK 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

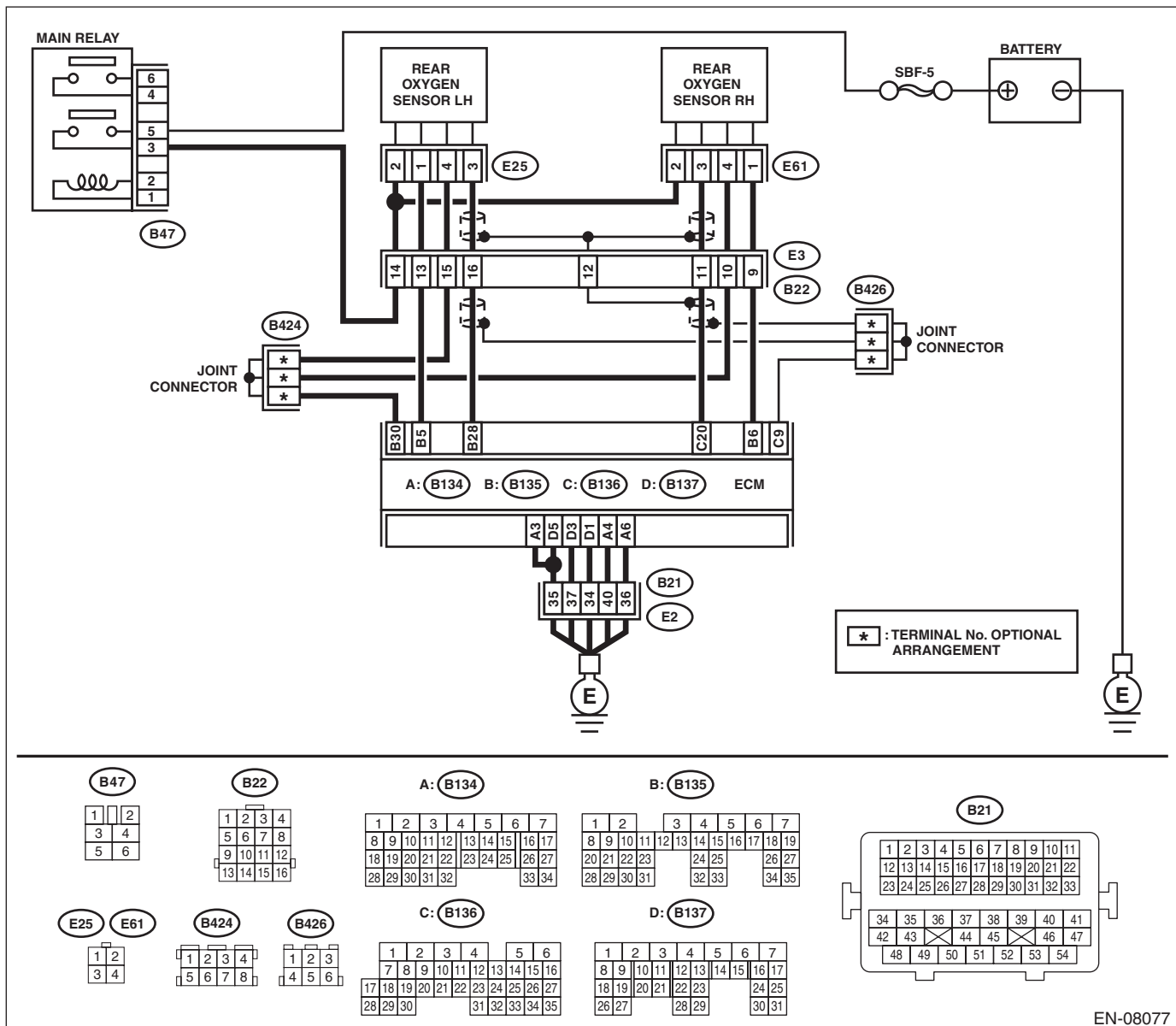
### TROUBLE SYMPTOM:

- Engine stalls.
- Idle mixture is out of specifications.

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

### WIRING DIAGRAM:



EN-08077

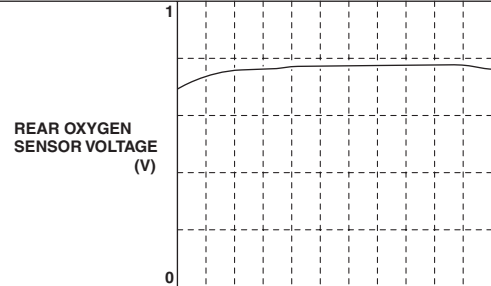
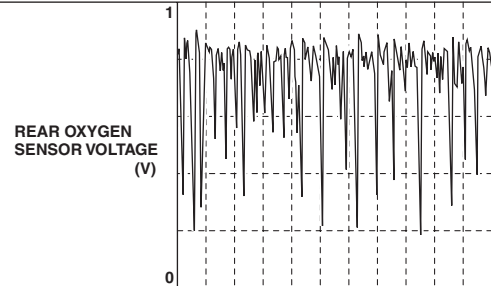
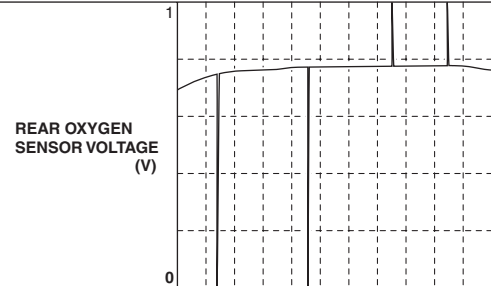
# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<p><b>1</b></p> <p><b>CHECK EXHAUST SYSTEM.</b>                      Check for gas leaks or air suction caused by loose or dislocated nuts and bolts, and open hole at exhaust pipes.</p> <p>NOTE:                      Check the following positions.</p> <ul style="list-style-type: none"> <li>• Between cylinder head and front exhaust pipe</li> <li>• Between front exhaust pipe and front catalytic converter</li> <li>• Between front catalytic converter and rear catalytic converter</li> <li>• Loose or improperly attached front oxygen (A/F) sensor or rear oxygen sensor</li> </ul>	<p>Is there any fault in exhaust system?</p>	<p>Repair or replace the exhaust system. &lt;Ref. to EX(H6DO)-2, General Description.&gt;</p>	<p>Go to step 2.</p>
<p><b>2</b></p> <p><b>CHECK WAVEFORM DATA ON THE SUBARU SELECT MONITOR (WHILE DRIVING).</b></p> <p>1) Drive at a constant speed between 80 — 112 km/h (50 — 70 MPH).</p> <p>2) After 5 minutes have elapsed in the condition of step 1), use the Subaru Select Monitor while still driving to read the waveform data.</p> <ul style="list-style-type: none"> <li>• At normal condition</li> </ul> <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> </div> <p style="text-align: right; margin-right: 50px;">EN-06666</p> <ul style="list-style-type: none"> <li>• At abnormal condition (numerous inversion)</li> </ul> <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> </div> <p style="text-align: right; margin-right: 50px;">EN-06667</p>	<p>Is a normal waveform displayed?</p>	<p>Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again.</p> <p>NOTE:                      In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.</p>	<p>Go to step 3.</p>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<p><b>3</b>      <b>CHECK WAVEFORM DATA ON THE SUBARU SELECT MONITOR (WHILE IDLING).</b></p> <p>1) Run the engine at idle. 2) In the condition of step 1), use the Subaru Select Monitor to read the waveform data.</p> <ul style="list-style-type: none"> <li>• At normal condition</li> </ul>  <p>10 sec/div      EN-06668</p> <ul style="list-style-type: none"> <li>• At abnormal condition 1 (numerous inversion)</li> </ul>  <p>10 sec/div      EN-06669</p> <ul style="list-style-type: none"> <li>• At abnormal condition 2 (noise input)</li> </ul>  <p>10 sec/div      EN-06670</p>	<p>Is a normal waveform displayed?</p>	<p>Go to step 4.</p>	<ul style="list-style-type: none"> <li>• The waveform is displayed at abnormal condition 1: Go to step 4.</li> <li>• The waveform is displayed at abnormal condition 2: Go to step 5.</li> </ul>
<p><b>4</b>      <b>CHECK CATALYTIC CONVERTER.</b></p>	<p>Is the catalytic converter damaged?</p>	<p>Replace the catalytic converter. &lt;Ref. to EC(H6DO)-3, Front Catalytic Converter.&gt;</p>	<p>Go to step 5.</p>
<p><b>5</b>      <b>CHECK REAR OXYGEN SENSOR CONNECTOR AND COUPLING CONNECTOR.</b></p>	<p>Has water entered the connector?</p>	<p>Completely remove any water inside.</p>	<p>Go to step 6.</p>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<b>6 CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM and rear oxygen sensor. 3) Measure the resistance of harness between ECM and rear oxygen sensor connector. <i><b>Connector &amp; terminal</b></i> <i><b>(B136) No. 20 — (E61) No. 3:</b></i> <i><b>(B135) No. 30 — (E61) No. 4:</b></i> <i><b>(B135) No. 28 — (E25) No. 3:</b></i> <i><b>(B135) No. 30 — (E25) No. 4:</b></i>	Is the resistance less than 1 $\Omega$ ?	Go to step 7.	Repair the harness and connector. NOTE: In this case, repair the following item: <ul style="list-style-type: none"> <li>• Open circuit in harness between ECM and rear oxygen sensor connector</li> <li>• Poor contact of coupling connector</li> </ul>
<b>7 CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.</b> 1) Connect the connector to ECM. 2) Turn the ignition switch to ON. 3) Measure the voltage between rear oxygen sensor connector and chassis ground. <i><b>Connector &amp; terminal</b></i> <i><b>(E61) No. 3 (+) — Chassis ground (-):</b></i> <i><b>(E25) No. 3 (+) — Chassis ground (-):</b></i>	Is the voltage 0.2 — 0.5 V?	Go to step 8.	Repair the harness and connector. NOTE: Repair the following locations. <ul style="list-style-type: none"> <li>• Open circuit in harness between ECM and rear oxygen sensor connector</li> <li>• Poor contact of ECM connector</li> <li>• Poor contact of coupling connector</li> </ul>
<b>8 CHECK REAR OXYGEN SENSOR SHIELD.</b> 1) Turn the ignition switch to OFF. 2) Expose the rear oxygen sensor connector body side harness sensor shield. 3) Measure the resistance between sensor shield and chassis ground.	Is the resistance less than 1 $\Omega$ ?	Replace the rear oxygen sensor. <Ref. to FU(H6DO)-50, Rear Oxygen Sensor.>	Repair the open circuit of rear oxygen sensor harness.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## DD:DTC P0442 EVAPORATIVE EMISSION CONTROL SYSTEM LEAK DETECTED (SMALL LEAK)

### DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-145, DTC P0442 EVAPORATIVE EMISSION CONTROL SYSTEM LEAK DETECTED (SMALL LEAK), Diagnostic Trouble Code (DTC) Detecting Criteria.>

### TROUBLE SYMPTOM:

- Fuel odor
- There is a hole of more than 1.0 mm (0.04 in) dia. in evaporation system or fuel tank.

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

	Step	Check	Yes	No
1	<b>CHECK FUEL FILLER CAP.</b> 1) Turn the ignition switch to OFF. 2) Check the fuel filler cap. NOTE: The DTC is stored in memory if fuel filler cap is or was loose or if the cap chain has caught while tightening.	Is the fuel filler cap tightened securely?	Go to step 2.	Tighten fuel filler cap securely.
2	<b>CHECK FUEL FILLER CAP.</b>	Is the fuel filler cap genuine?	Go to step 3.	Replace with a genuine fuel filler cap.
3	<b>CHECK FUEL FILLER PIPE GASKET.</b>	Is there any damage to the seal between fuel filler cap and fuel filler pipe?	Repair or replace the fuel filler cap and fuel filler pipe. <Ref. to FU(H6DO)-64, Fuel Filler Pipe.>	Go to step 4.
4	<b>CHECK DRAIN VALVE.</b> 1) Install the delivery (test) mode connector. 2) Turn the ignition switch to ON. 3) Operate the drain valve using the Subaru Select Monitor. NOTE: The drain valve can be operated using Subaru Select Monitor. For procedure, refer to "Compulsory Valve Operation Check Mode". <Ref. to EN(H6DO)(diag)-59, Compulsory Valve Operation Check Mode.>	Does the drain valve operate?	Go to step 5.	Replace the drain valve. <Ref. to EC(H6DO)-15, Drain Valve.>
5	<b>CHECK PURGE CONTROL SOLENOID VALVE.</b> Operate the purge control solenoid valve using the Subaru Select Monitor. 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(H6DO)(diag)-59, Compulsory Valve Operation Check Mode.>	Does the purge control solenoid valve operate?	Go to step 6.	Replace the purge control solenoid valve. <Ref. to EC(H6DO)-7, Purge Control Solenoid Valve.>
6	<b>CHECK EVAPORATIVE EMISSION CONTROL SYSTEM LINE.</b> 1) Turn the ignition switch to OFF. 2) Remove the delivery (test) mode connector.	Is there any hole of more than 1.0 mm (0.04 in) dia. on evaporation line?	Repair or replace the evaporation line. <Ref. to FU(H6DO)-75, Fuel Delivery and Evaporation Lines.>	Go to step 7.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## ENGINE (DIAGNOSTICS)

	Step	Check	Yes	No
7	<b>CHECK CANISTER.</b>	Is the canister damaged or is there a hole of more than 1.0 mm (0.04 in) dia. in it?	Repair or replace the canister. <Ref. to EC(H6DO)-6, Canister.>	Go to step 8.
8	<b>CHECK FUEL TANK.</b> Remove the fuel tank. <Ref. to FU(H6DO)-61, Fuel Tank.>	Is the fuel tank damaged or is there any hole of more than 1.0 mm (0.04 in) dia. in it?	Repair or replace the fuel tank. <Ref. to FU(H6DO)-61, Fuel Tank.>	Go to step 9.
9	<b>CHECK ANY OTHER MECHANICAL TROUBLE IN EVAPORATIVE EMISSION CONTROL SYSTEM.</b>	Is there any hole of more than 1.0 mm (0.04 in) dia., crack, clogging, or disconnection, bend, misconnection of hoses or pipes in evaporative emission control system?	Repair or replace the hoses or pipes.	Repair the poor contact of ECM connector.

## DE:DTC P0447 EVAPORATIVE EMISSION CONTROL SYSTEM VENT CONTROL CIRCUIT OPEN

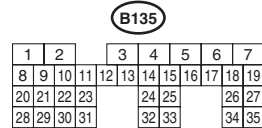
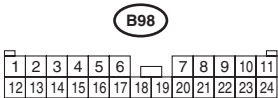
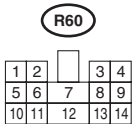
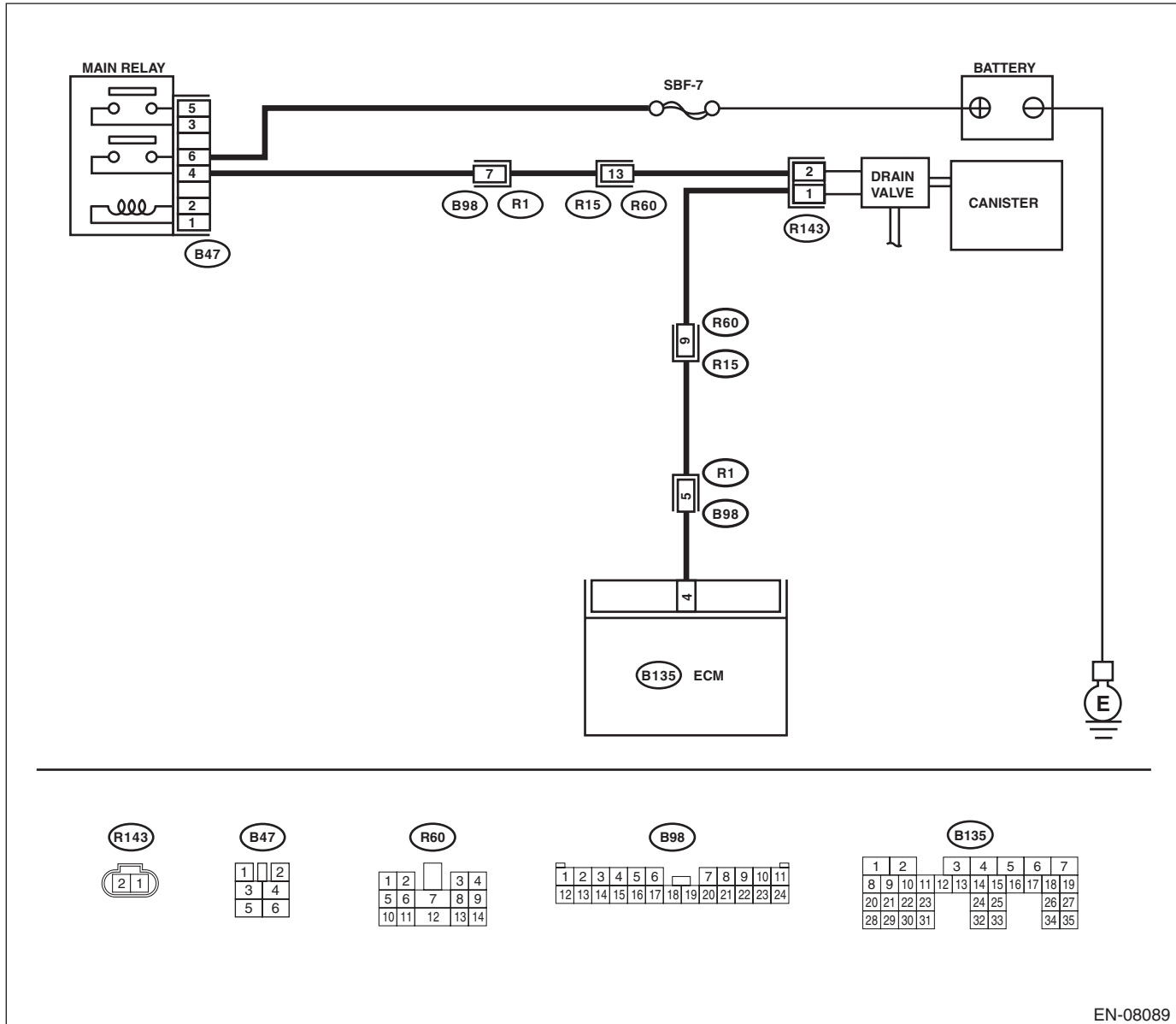
**DTC DETECTING CONDITION:**

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-161, DTC P0447 EVAPORATIVE EMISSION CONTROL SYSTEM VENT CONTROL CIRCUIT OPEN, Diagnostic Trouble Code (DTC) Detecting Criteria.>

**CAUTION:**

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

**WIRING DIAGRAM:**



# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<b>1 CHECK OUTPUT SIGNAL OF ECM.</b> 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM and chassis ground. <b>Connector &amp; terminal</b> <b>(B135) No. 4 (+) — Chassis ground (-):</b>	Is the voltage 10 V or more?	Go to step 2.	Go to step 3.
<b>2 CHECK FOR POOR CONTACT.</b> Check for poor contact of ECM connector.	Is there poor contact of ECM connector?	Repair the poor contact of ECM connector.	Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again.  NOTE: In this case, temporary open or short circuit of harness or temporary poor contact of connector may be the cause.
<b>3 CHECK POWER SUPPLY TO DRAIN VALVE.</b> Measure the voltage between drain valve and chassis ground. <b>Connector &amp; terminal</b> <b>(R143) No. 2 (+) — Chassis ground (-):</b>	Is the voltage 10 V or more?	Go to step 4.	Repair the power supply circuit.
<b>4 CHECK HARNESS BETWEEN ECM AND DRAIN VALVE CONNECTOR.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from the ECM and drain valve. 3) Measure the resistance between the drain valve connector and chassis ground. <b>Connector &amp; terminal</b> <b>(R143) No. 1 — Chassis ground:</b>	Is the resistance 1 M $\Omega$ or more?	Go to step 5.	Repair the ground short circuit of harness between ECM and drain valve connector.
<b>5 CHECK HARNESS BETWEEN ECM AND DRAIN VALVE CONNECTOR.</b> Measure the resistance of harness between ECM and drain valve connector. <b>Connector &amp; terminal</b> <b>(B135) No. 4 — (R143) No. 1:</b>	Is the resistance less than 1 $\Omega$ ?	Go to step 6.	Repair the harness and connector.  NOTE: In this case, repair the following item: <ul style="list-style-type: none"> <li>• Open circuit of harness between ECM and drain valve connector</li> <li>• Poor contact of coupling connector</li> </ul>
<b>6 CHECK DRAIN VALVE.</b> Measure the resistance between drain valve terminals. <b>Terminals</b> <b>No. 1 — No. 2:</b>	Is the resistance 10 — 100 $\Omega$ ?	Repair the poor contact of drain valve connector.	Replace the drain valve. <Ref. to EC(H6DO)-15, Drain Valve.>



## DF:DTC P0448 EVAPORATIVE EMISSION CONTROL SYSTEM VENT CONTROL CIRCUIT SHORTED

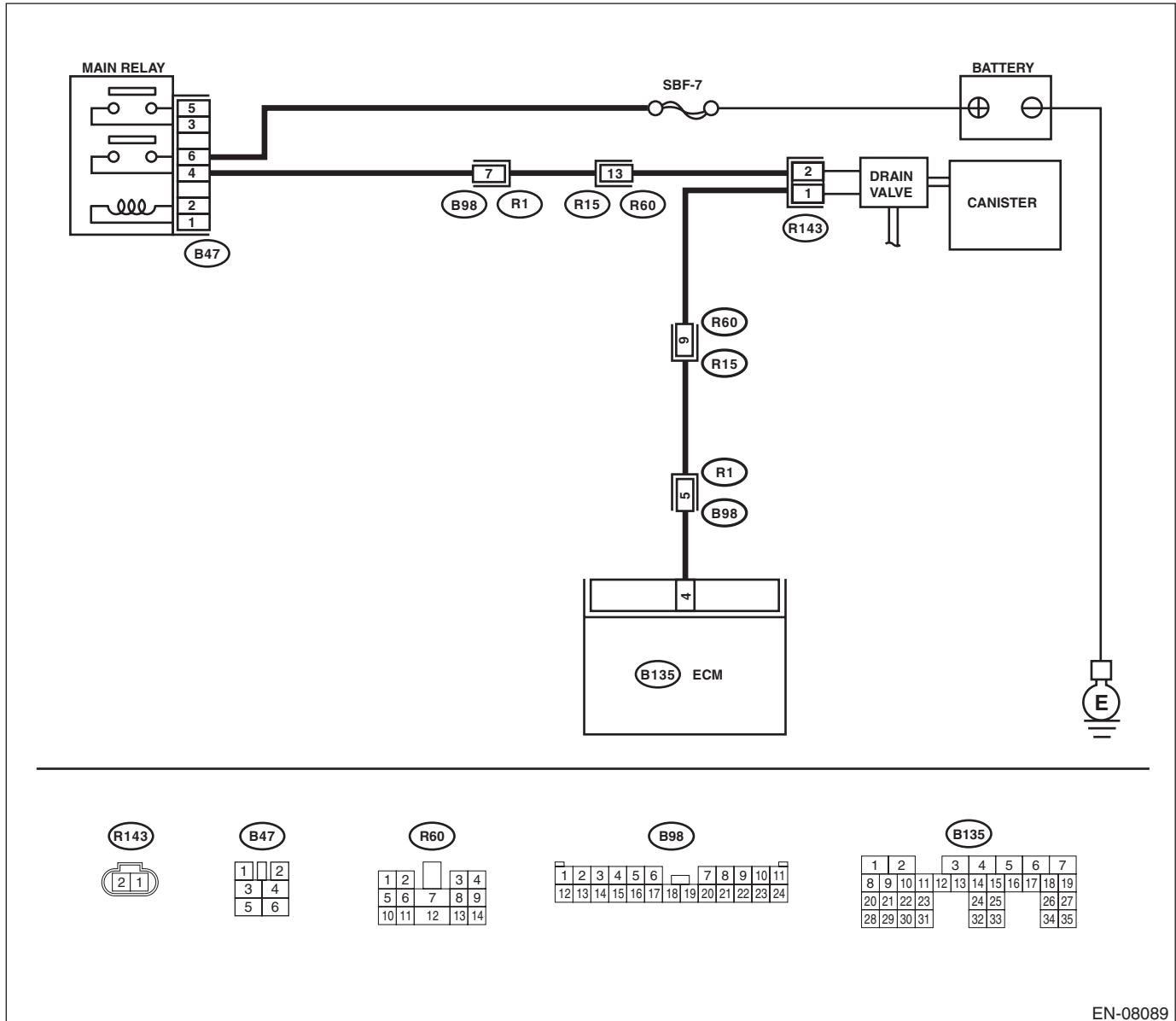
### DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-163, DTC P0448 EVAPORATIVE EMISSION CONTROL SYSTEM VENT CONTROL CIRCUIT SHORTED, Diagnostic Trouble Code (DTC) Detecting Criteria.>

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

### WIRING DIAGRAM:



# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<p><b>1</b>    <b>CHECK HARNESS BETWEEN ECM AND DRAIN VALVE.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from the ECM and drain valve. 3) Turn the ignition switch to ON. 4) Measure the voltage between ECM and chassis ground. <b>Connector &amp; terminal</b> <b>(B135) No. 4 (+) — Chassis ground (-):</b></p>	Is the voltage 10 V or more?	Repair the short circuit to power in the harness between ECM and drain valve connector.	Go to step 2.
<p><b>2</b>    <b>CHECK DRAIN VALVE.</b> 1) Turn the ignition switch to OFF. 2) Measure the resistance between drain valve terminals. <b>Terminals</b> <b>No. 1 — No. 2:</b></p>	Is the resistance less than 1 $\Omega$ ?	Replace the drain valve. <Ref. to EC(H6DO)-15, Drain Valve.>	Repair the poor contact of ECM connector.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## DG:DTC P0451 EVAPORATIVE EMISSION CONTROL SYSTEM PRESSURE SENSOR

### DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-165, DTC P0451 EVAPORATIVE EMISSION CONTROL SYSTEM PRESSURE SENSOR, Diagnostic Trouble Code (DTC) Detecting Criteria.>

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

	Step	Check	Yes	No
1	<b>CHECK FUEL FILLER CAP.</b> 1) Turn the ignition switch to OFF. 2) Open the fuel flap.	Is the fuel filler cap tightened securely?	Go to step 2.	Tighten fuel filler cap securely.
2	<b>CHECK PRESSURE VACUUM LINE.</b> NOTE: Check the following items. <ul style="list-style-type: none"><li>• Disconnection, leakage and clogging of the vacuum hoses and pipes between fuel tank pressure sensor and fuel tank</li><li>• Disconnection, leakage and clogging of air ventilation hoses and pipes between fuel filler pipe and fuel tank</li></ul>	Is there any fault in pressure/vacuum line?	Repair or replace the hoses and pipes.	Replace the fuel tank pressure sensor. <Ref. to EC(H6DO)-12, Fuel Tank Pressure Sensor.>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## DH:DTC P0452 EVAPORATIVE EMISSION CONTROL SYSTEM PRESSURE SENSOR LOW INPUT

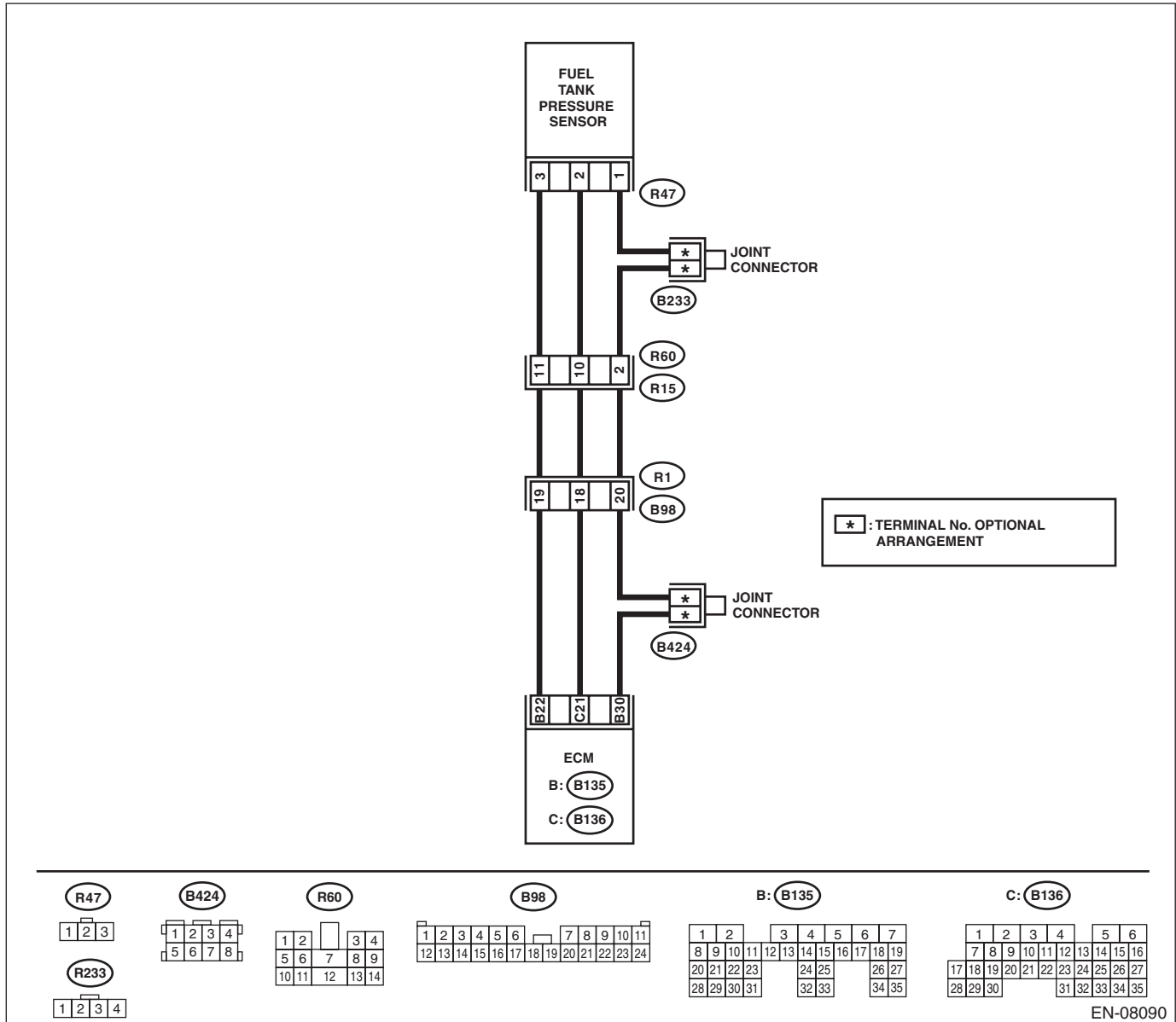
### DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-168, DTC P0452 EVAPORATIVE EMISSION CONTROL SYSTEM PRESSURE SENSOR LOW INPUT, Diagnostic Trouble Code (DTC) Detecting Criteria.>

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

### WIRING DIAGRAM:



EN-08090

Step	Check	Yes	No
1	<b>CHECK FOR ANY OTHER DTC ON DISPLAY.</b> Is DTC P0459 or P1443 displayed on the Subaru Select Monitor?	Replace the fuel tank. <Ref. to FU(H6DO)-61, Fuel Tank.>	Go to step 2.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<p><b>2 CHECK CURRENT DATA.</b></p> <p>1) Turn the ignition switch to ON.</p> <p>2) Using the Subaru Select Monitor or a general scan tool, read the value in «Fuel Tank Pressure».</p> <p>NOTE:</p> <ul style="list-style-type: none"> <li>• Subaru Select Monitor</li> </ul> <p>For detailed operation procedures, refer to “READ CURRENT DATA FOR ENGINE”. &lt;Ref. to EN(H6DO)(diag)-36, Subaru Select Monitor.&gt;</p> <ul style="list-style-type: none"> <li>• General scan tool</li> </ul> <p>For detailed operation procedures, refer to the general scan tool operation manual.</p>	<p>Is the value in «Fuel Tank Pressure» less than -7.45 kPa (-55.85 mmHg, -2.2003 inHg)?</p>	Go to step 3.	<p>Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again.</p> <p>NOTE:</p> <p>In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.</p>
<p><b>3 CHECK FUEL TANK PRESSURE SENSOR POWER SUPPLY.</b></p> <p>1) Turn the ignition switch to OFF.</p> <p>2) Disconnect the connector from the fuel tank pressure sensor.</p> <p>3) Turn the ignition switch to ON.</p> <p>4) Measure the voltage between the fuel tank pressure sensor connector and chassis ground.</p> <p><b>Connector &amp; terminal</b> <b>(R47) No. 3 (+) — Chassis ground (-):</b></p>	Is the voltage 4.5 V or more?	Go to step 4.	<p>Repair the harness and connector.</p> <p>NOTE:</p> <p>In this case, repair the following item:</p> <ul style="list-style-type: none"> <li>• Open circuit of harness between ECM and fuel tank pressure sensor connector</li> <li>• Poor contact of ECM connector</li> <li>• Poor contact of coupling connector</li> </ul>
<p><b>4 CHECK HARNESS BETWEEN ECM AND FUEL TANK PRESSURE SENSOR CONNECTOR.</b></p> <p>1) Turn the ignition switch to OFF.</p> <p>2) Disconnect the connector from ECM.</p> <p>3) Measure the resistance of harness between the ECM and fuel tank pressure sensor connector.</p> <p><b>Connector &amp; terminal</b> <b>(B136) No. 21 — (R47) No. 2:</b></p>	Is the resistance less than 1 Ω?	Go to step 5.	<p>Repair the harness and connector.</p> <p>NOTE:</p> <p>In this case, repair the following item:</p> <ul style="list-style-type: none"> <li>• Open circuit of harness between ECM and fuel tank pressure sensor connector</li> <li>• Poor contact of coupling connector</li> </ul>
<p><b>5 CHECK HARNESS BETWEEN ECM AND FUEL TANK PRESSURE SENSOR CONNECTOR.</b></p> <p>Measure the resistance between ECM and chassis ground.</p> <p><b>Connector &amp; terminal</b> <b>(B136) No. 21 — Chassis ground:</b></p>	Is the resistance 1 MΩ or more?	Go to step 6.	Repair the ground short circuit of harness between ECM and fuel tank pressure sensor connector.
<p><b>6 CHECK FOR POOR CONTACT.</b></p> <p>Check for poor contact between the ECM and fuel tank pressure sensor connector.</p>	Is there poor contact of the ECM or fuel tank pressure sensor connector?	Repair the poor contact of the ECM or fuel tank pressure sensor connector.	Replace the fuel tank pressure sensor. <Ref. to EC(H6DO)-12, Fuel Tank Pressure Sensor.>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## DI: DTC P0453 EVAPORATIVE EMISSION CONTROL SYSTEM PRESSURE SENSOR HIGH INPUT

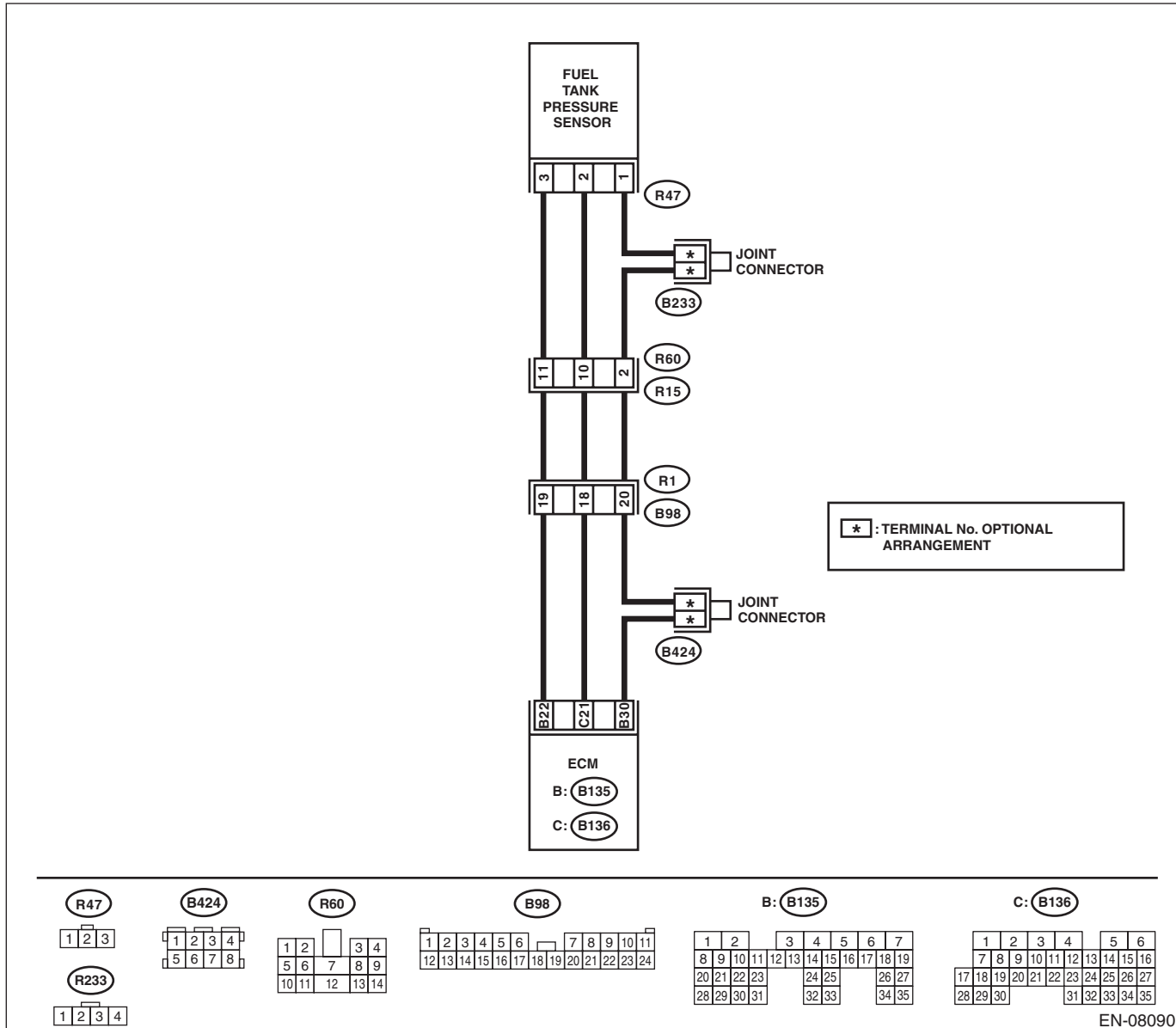
### DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-170, DTC P0453 EVAPORATIVE EMISSION CONTROL SYSTEM PRESSURE SENSOR HIGH INPUT, Diagnostic Trouble Code (DTC) Detecting Criteria.>

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

### WIRING DIAGRAM:



# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<p><b>1</b>      <b>CHECK CURRENT DATA.</b>                      1) Turn the ignition switch to ON.                      2) Using the Subaru Select Monitor or a general scan tool, read the value in «Fuel Tank Pressure».</p> <p>NOTE:                      • Subaru Select Monitor                      For detailed operation procedures, refer to “READ CURRENT DATA FOR ENGINE”. &lt;Ref. to EN(H6DO)(diag)-36, Subaru Select Monitor.&gt;                      • General scan tool                      For detailed operation procedures, refer to the general scan tool operation manual.</p>	<p>Is the value in «Fuel Tank Pressure» 7.98 kPa (59.85 mmHg, 2.357 inHg) or more?</p>	<p>Go to step 2.</p>	<p>Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again.</p> <p>NOTE:                      In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.</p>
<p><b>2</b>      <b>CHECK HARNESS BETWEEN ECM AND FUEL TANK PRESSURE SENSOR CONNECTOR.</b>                      1) Turn the ignition switch to OFF.                      2) Disconnect the connector from the fuel tank pressure sensor.                      3) Turn the ignition switch to ON.                      4) Using the Subaru Select Monitor or a general scan tool, read the value in «Fuel Tank Pressure».</p> <p>NOTE:                      • Subaru Select Monitor                      For detailed operation procedures, refer to “READ CURRENT DATA FOR ENGINE”. &lt;Ref. to EN(H6DO)(diag)-36, Subaru Select Monitor.&gt;                      • General scan tool                      For detailed operation procedures, refer to the general scan tool operation manual.</p>	<p>Is the value in «Fuel Tank Pressure» 7.98 kPa (59.85 mmHg, 2.357 inHg) or more?</p>	<p>Repair the short circuit to power in the harness between ECM and fuel tank pressure sensor connector.</p>	<p>Go to step 3.</p>
<p><b>3</b>      <b>CHECK HARNESS BETWEEN ECM AND FUEL TANK PRESSURE SENSOR CONNECTOR.</b>                      1) Turn the ignition switch to OFF.                      2) Measure the resistance of harness between fuel tank pressure sensor connector and engine ground.</p> <p><b>Connector &amp; terminal</b>  <b>(R47) No. 1 — Engine ground:</b></p>	<p>Is the resistance less than 5 Ω?</p>	<p>Go to step 4.</p>	<p>Repair the harness and connector.</p> <p>NOTE:                      In this case, repair the following item:                      • Open circuit of harness between ECM and fuel tank pressure sensor connector                      • Poor contact of ECM connector                      • Poor contact of coupling connector</p>
<p><b>4</b>      <b>CHECK FOR POOR CONTACT.</b>                      Check for poor contact of the fuel tank pressure sensor connector.</p>	<p>Is there poor contact of fuel tank pressure sensor connector?</p>	<p>Repair the poor contact of fuel tank pressure sensor connector.</p>	<p>Replace the fuel tank pressure sensor. &lt;Ref. to EC(H6DO)-12, Fuel Tank Pressure Sensor.&gt;</p>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## DJ:DTC P0456 EVAPORATIVE EMISSION CONTROL SYSTEM LEAK DETECTED (VERY SMALL LEAK)

### DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-171, DTC P0456 EVAPORATIVE EMISSION CONTROL SYSTEM LEAK DETECTED (VERY SMALL LEAK), Diagnostic Trouble Code (DTC) Detecting Criteria.>

### TROUBLE SYMPTOM:

- Fuel odor
- There is a hole of more than 0.5 mm (0.020 in) dia. in evaporation system or fuel tank.

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

	Step	Check	Yes	No
1	<b>CHECK FUEL FILLER CAP.</b> 1) Turn the ignition switch to OFF. 2) Check the fuel filler cap. NOTE: The DTC is stored in memory if fuel filler cap is or was loose or if the cap chain has caught while tightening.	Is the fuel filler cap tightened securely?	Go to step 2.	Tighten fuel filler cap securely.
2	<b>CHECK FUEL FILLER CAP.</b>	Is the fuel filler cap genuine?	Go to step 3.	Replace with a genuine fuel filler cap.
3	<b>CHECK FUEL FILLER PIPE GASKET.</b>	Is there any damage to the seal between fuel filler cap and fuel filler pipe?	Repair or replace the fuel filler cap and fuel filler pipe. <Ref. to FU(H6DO)-64, Fuel Filler Pipe.>	Go to step 4.
4	<b>CHECK DRAIN VALVE.</b> 1) Connect the delivery (test) mode connector. 2) Turn the ignition switch to ON. 3) Operate the drain valve using the Subaru Select Monitor. NOTE: Drain valve can be operated using the Subaru Select Monitor. For procedure, refer to "Compulsory Valve Operation Check Mode". <Ref. to EN(H6DO)(diag)-59, Compulsory Valve Operation Check Mode.>	Does the drain valve operate?	Go to step 5.	Replace the drain valve. <Ref. to EC(H6DO)-15, Drain Valve.>
5	<b>CHECK PURGE CONTROL SOLENOID VALVE.</b> Operate the purge control solenoid valve using the Subaru Select Monitor. 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(H6DO)(diag)-59, Compulsory Valve Operation Check Mode.>	Does the purge control solenoid valve operate?	Go to step 6.	Replace the purge control solenoid valve. <Ref. to EC(H6DO)-7, Purge Control Solenoid Valve.>
6	<b>CHECK EVAPORATIVE EMISSION CONTROL SYSTEM LINE.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the delivery (test) mode connector.	Is there any hole of more than 0.5 mm (0.020 in) dia. on evaporation line?	Repair or replace the evaporation line. <Ref. to FU(H6DO)-75, Fuel Delivery and Evaporation Lines.>	Go to step 7.



# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

Step	Check	Yes	No	
7	<b>CHECK CANISTER.</b>	Is the canister damaged or is there a hole of more than 0.5 mm (0.020 in) dia. in it?	Repair or replace the canister. <Ref. to EC(H6DO)-6, Canister.>	Go to step 8.
8	<b>CHECK FUEL TANK.</b> Remove the fuel tank. <Ref. to FU(H6DO)-61, Fuel Tank.>	Is the fuel tank damaged or is there any hole of more than 0.5 mm (0.020 in) dia. in it?	Repair or replace the fuel tank. <Ref. to FU(H6DO)-61, Fuel Tank.>	Go to step 9.
9	<b>CHECK ANY OTHER MECHANICAL TROUBLE IN EVAPORATIVE EMISSION CONTROL SYSTEM.</b>	Is there any hole of more than 0.5 mm (0.020 in) dia., crack, clogging, or disconnection, bend, misconnection of hoses or pipes in evaporative emission control system?	Repair or replace the hoses or pipes.	Repair the poor contact of ECM connector.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## DK:DTC P0457 EVAPORATIVE EMISSION CONTROL SYSTEM LEAK DETECTED (FUEL CAP LOOSE/OFF)

### DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-171, DTC P0457 EVAPORATIVE EMISSION CONTROL SYSTEM LEAK DETECTED (FUEL CAP LOOSE/OFF), Diagnostic Trouble Code (DTC) Detecting Criteria.>

### TROUBLE SYMPTOM:

- Fuel odor
- Fuel filler cap loose or lost

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

	Step	Check	Yes	No
1	<b>CHECK FUEL FILLER CAP.</b> 1) Turn the ignition switch to OFF. 2) Check the fuel filler cap. NOTE: The DTC is stored in memory if fuel filler cap is or was loose or if the cap chain has caught while tightening.	Is the fuel filler cap tightened securely?	Go to step 2.	Tighten fuel filler cap securely.
2	<b>CHECK FUEL FILLER CAP.</b>	Is the fuel filler cap genuine?	Go to step 3.	Replace with a genuine fuel filler cap.
3	<b>CHECK FUEL FILLER PIPE GASKET.</b>	Is there any damage to the seal between fuel filler cap and fuel filler pipe?	Repair or replace the fuel filler cap and fuel filler pipe. <Ref. to FU(H6DO)-64, Fuel Filler Pipe.>	Go to step 4.
4	<b>CHECK DRAIN VALVE.</b> 1) Connect the delivery (test) mode connector. 2) Turn the ignition switch to ON. 3) Operate the drain valve using the Subaru Select Monitor. NOTE: Drain valve can be operated using the Subaru Select Monitor. For procedure, refer to "Compulsory Valve Operation Check Mode". <Ref. to EN(H6DO)(diag)-59, Compulsory Valve Operation Check Mode.>	Does the drain valve operate?	Go to step 5.	Replace the drain valve. <Ref. to EC(H6DO)-15, Drain Valve.>
5	<b>CHECK PURGE CONTROL SOLENOID VALVE.</b> Operate the purge control solenoid valve using the Subaru Select Monitor. 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(H6DO)(diag)-59, Compulsory Valve Operation Check Mode.>	Does the purge control solenoid valve operate?	Go to step 6.	Replace the purge control solenoid valve. <Ref. to EC(H6DO)-7, Purge Control Solenoid Valve.>
6	<b>CHECK EVAPORATIVE EMISSION CONTROL SYSTEM LINE.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the delivery (test) mode connector.	Is there any disconnection, damage or clogging on the evaporation line?	Repair or replace the evaporation line. <Ref. to FU(H6DO)-75, Fuel Delivery and Evaporation Lines.>	Go to step 7.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

	Step	Check	Yes	No
7	<b>CHECK CANISTER.</b>	Is the canister damaged?	Repair or replace the canister. <Ref. to EC(H6DO)-6, Canister.>	Go to step 8.
8	<b>CHECK FUEL TANK.</b> Remove the fuel tank. <Ref. to FU(H6DO)-61, Fuel Tank.>	Is the fuel tank damaged?	Repair or replace the fuel tank. <Ref. to FU(H6DO)-61, Fuel Tank.>	Go to step 9.
9	<b>CHECK ANY OTHER MECHANICAL TROUBLE IN EVAPORATIVE EMISSION CONTROL SYSTEM.</b>	Are there holes, cracks, clogging, or disconnection, misconnection of hoses or pipes in evaporative emission control system?	Repair or replace the hoses or pipes.	Repair the poor contact of ECM connector.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## DL:DTC P0458 EVAPORATIVE EMISSION SYSTEM PURGE CONTROL VALVE CIRCUIT LOW

### DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-172, DTC P0458 EVAPORATIVE EMISSION SYSTEM PURGE CONTROL VALVE CIRCUIT LOW, Diagnostic Trouble Code (DTC) Detecting Criteria.>

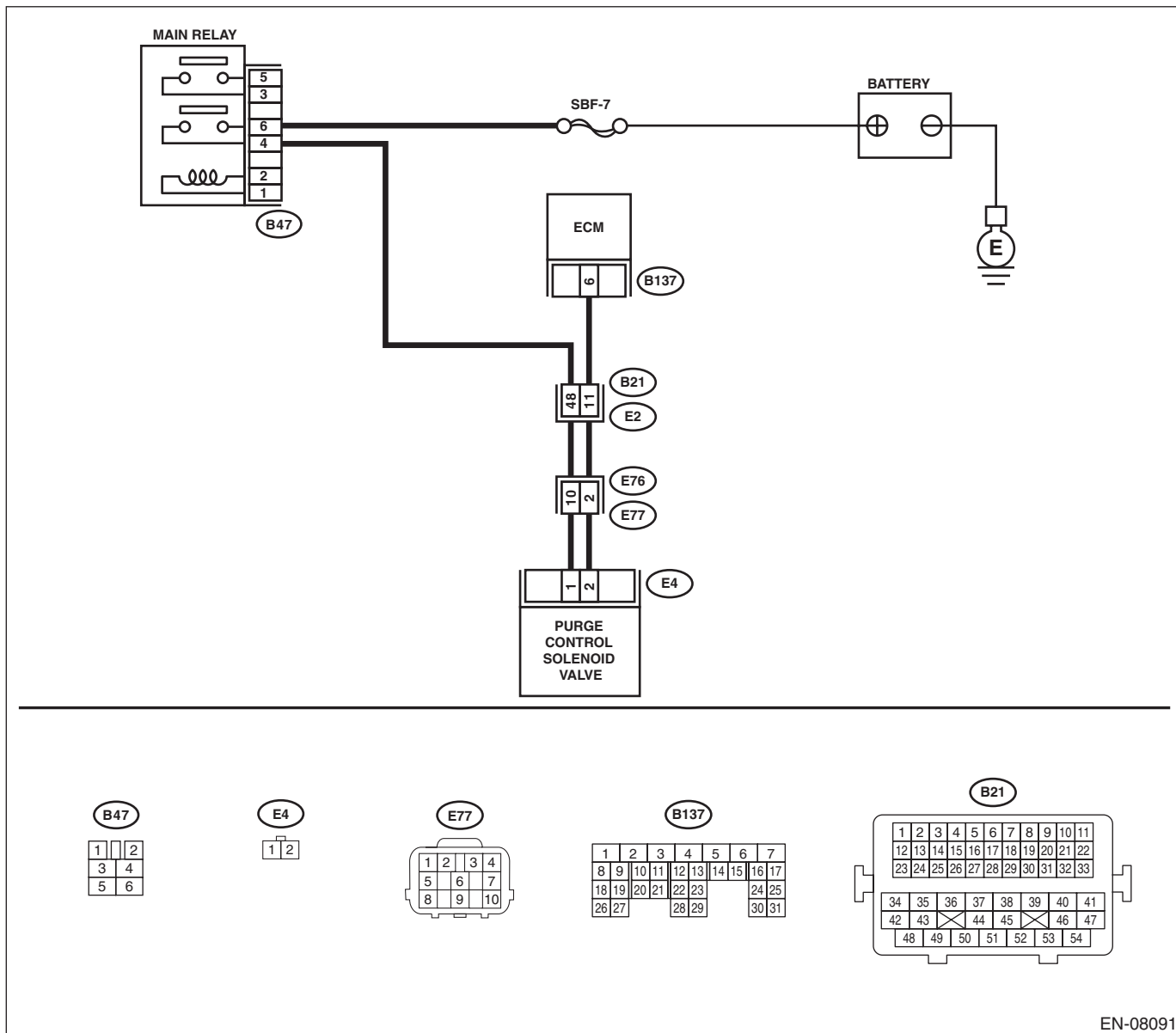
### TROUBLE SYMPTOM:

Improper idling

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

### WIRING DIAGRAM:



EN-08091

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

	Step	Check	Yes	No
1	<b>CHECK OUTPUT SIGNAL OF ECM.</b> 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM and chassis ground. <b>Connector &amp; terminal</b> <b>(B137) No. 6 (+) — Chassis ground (-):</b>	Is the voltage 10 V or more?	Go to step 2.	Go to step 3.
2	<b>CHECK FOR POOR CONTACT.</b> Check for poor contact of ECM connector.	Is there poor contact of ECM connector?	Repair the poor contact of ECM connector.	Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again. <b>NOTE:</b> In this case, temporary open or short circuit of harness or temporary poor contact of connector may be the cause.
3	<b>CHECK POWER SUPPLY TO PURGE CONTROL SOLENOID VALVE.</b> Measure the voltage between purge control solenoid valve and engine ground. <b>Connector &amp; terminal</b> <b>(E4) No. 1 (+) — Engine ground (-):</b>	Is the voltage 10 V or more?	Go to step 4.	Repair the power supply circuit.
4	<b>CHECK HARNESS BETWEEN ECM AND PURGE CONTROL SOLENOID VALVE CONNECTOR.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM and purge control solenoid valve. 3) Measure the resistance between the purge control solenoid valve connector and engine ground. <b>Connector &amp; terminal</b> <b>(E4) No. 2 — Engine ground:</b>	Is the resistance 1 M $\Omega$ or more?	Go to step 5.	Repair the ground short circuit of harness between ECM and purge control solenoid valve connector.
5	<b>CHECK HARNESS BETWEEN ECM AND PURGE CONTROL SOLENOID VALVE CONNECTOR.</b> Measure the resistance of harness between ECM and purge control solenoid valve. <b>Connector &amp; terminal</b> <b>(B137) No. 6 — (E4) No. 2:</b>	Is the resistance less than 1 $\Omega$ ?	Go to step 6.	Repair the harness and connector. <b>NOTE:</b> In this case, repair the following item: <ul style="list-style-type: none"> <li>• Open circuit in harness between ECM and purge control solenoid valve connector</li> <li>• Poor contact of coupling connector</li> </ul>
6	<b>CHECK PURGE CONTROL SOLENOID VALVE.</b> 1) Remove the purge control solenoid valve. 2) Measure the resistance between purge control solenoid valve terminals. <b>Terminals</b> <b>No. 1 — No. 2:</b>	Is the resistance 10 — 100 $\Omega$ ?	Repair the poor contact of purge control solenoid valve connector.	Replace the purge control solenoid valve. <Ref. to EC(H6DO)-7, Purge Control Solenoid Valve.>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## DM:DTC P0459 EVAPORATIVE EMISSION SYSTEM PURGE CONTROL VALVE CIRCUIT HIGH

### DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-174, DTC P0459 EVAPORATIVE EMISSION SYSTEM PURGE CONTROL VALVE CIRCUIT HIGH, Diagnostic Trouble Code (DTC) Detecting Criteria.>

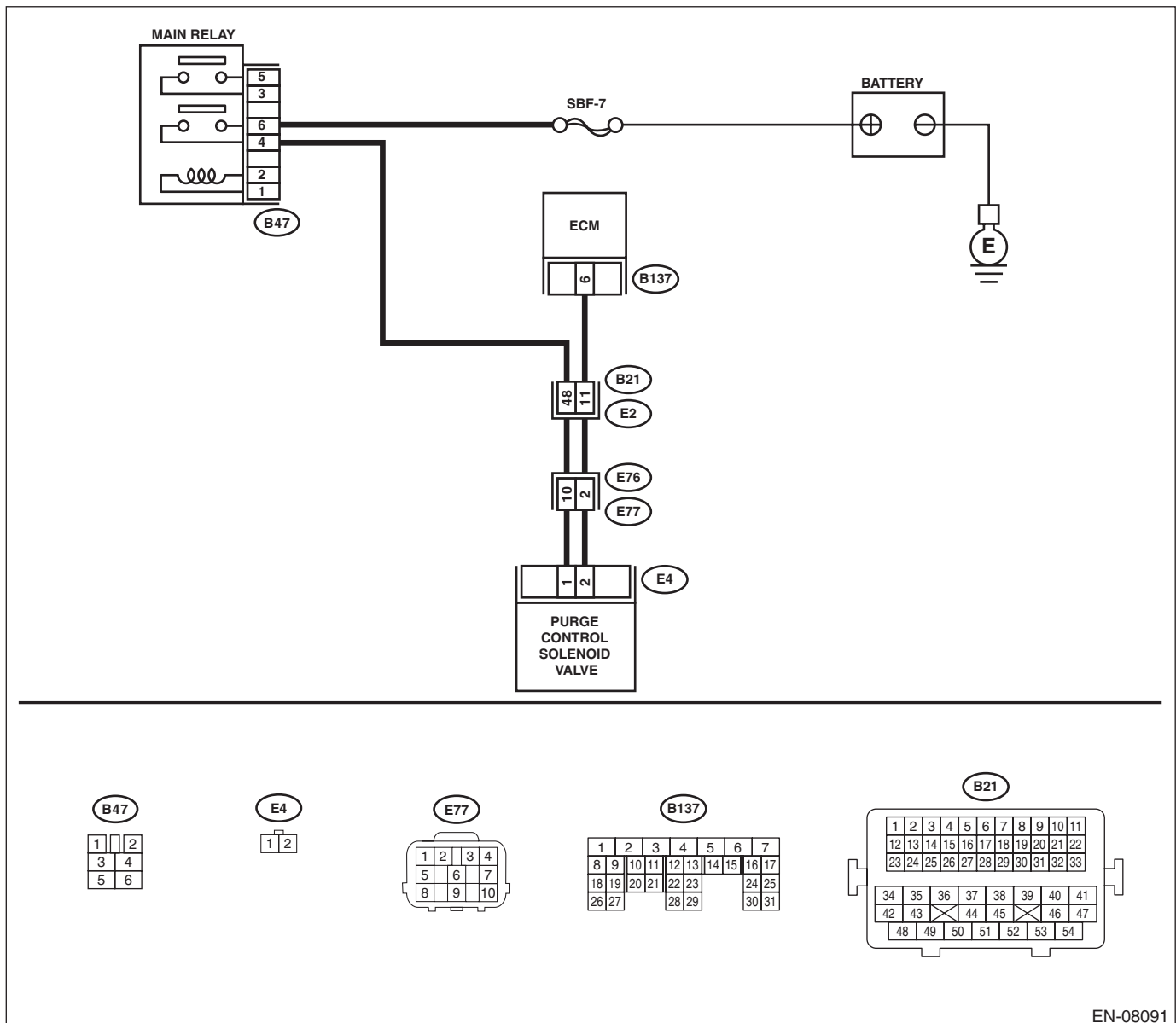
### TROUBLE SYMPTOM:

Improper idling

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

### WIRING DIAGRAM:



EN-08091

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

	Step	Check	Yes	No
1	<b>CHECK FOR ANY OTHER DTC ON DISPLAY.</b>	Is DTC P0452 displayed on the display?	Replace the fuel tank. <Ref. to FU(H6DO)-61, Fuel Tank.>	Go to step 2.
2	<b>CHECK HARNESS BETWEEN ECM AND PURGE CONTROL SOLENOID VALVE.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM and purge control solenoid valve. 3) Turn the ignition switch to ON. 4) Measure the voltage between ECM and chassis ground. <b>Connector &amp; terminal</b> <b>(B137) No. 6 (+) — Chassis ground (-):</b>	Is the voltage 10 V or more?	Repair the short circuit to power in the harness between ECM and purge control solenoid valve connector.	Go to step 3.
3	<b>CHECK PURGE CONTROL SOLENOID VALVE.</b> 1) Turn the ignition switch to OFF. 2) Measure the resistance between purge control solenoid valve terminals. <b>Terminals</b> <b>No. 1 — No. 2:</b>	Is the resistance less than 1 $\Omega$ ?	Replace the purge control solenoid valve. <Ref. to EC(H6DO)-7, Purge Control Solenoid Valve.>	Repair the poor contact of ECM connector.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## DN:DTC P0461 FUEL LEVEL SENSOR “A” CIRCUIT RANGE/PERFORMANCE

### DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-176, DTC P0461 FUEL LEVEL SENSOR “A” CIRCUIT RANGE/PERFORMANCE, Diagnostic Trouble Code (DTC) Detecting Criteria.>

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

Step	Check	Yes	No
1 CHECK FOR ANY OTHER DTC ON DISPLAY.	Is any other DTC displayed?	Check the appropriate DTC using the “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN(H6DO)(diag)-84, List of Diagnostic Trouble Code (DTC).>	Replace the fuel level sensor and fuel sub level sensor. <Ref. to FU(H6DO)-68, Fuel Level Sensor.> <Ref. to FU(H6DO)-69, Fuel Sub Level Sensor.>

## DO:DTC P0462 FUEL LEVEL SENSOR “A” CIRCUIT LOW

### NOTE:

For the diagnostic procedure, refer to DTC P0463. <Ref. to EN(H6DO)(diag)-257, DTC P0463 FUEL LEVEL SENSOR “A” CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>



# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## DP:DTC P0463 FUEL LEVEL SENSOR "A" CIRCUIT HIGH

### DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-180, DTC P0463 FUEL LEVEL SENSOR "A" CIRCUIT HIGH, Diagnostic Trouble Code (DTC) Detecting Criteria.>

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

Step	Check	Yes	No
1 <b>CHECK FOR ANY OTHER DTC ON DISPLAY.</b>	Is DTC P0462 or P0463 displayed on the Subaru Select Monitor?	Check the combination meter. <Ref. to IDI-4, INSPECTION, Combination Meter System.>	Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again.  NOTE: In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## DQ:DTC P0464 FUEL LEVEL SENSOR CIRCUIT INTERMITTENT

### DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-182, DTC P0464 FUEL LEVEL SENSOR CIRCUIT INTERMITTENT, Diagnostic Trouble Code (DTC) Detecting Criteria.>

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

Step	Check	Yes	No
1	<b>CHECK FOR ANY OTHER DTC ON DISPLAY.</b> Is DTC P0464 displayed on the display?	Check the combination meter. <Ref. to IDI-4, INSPECTION, Combination Meter System.>	Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again.  NOTE: In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## DR:DTC P0500 VEHICLE SPEED SENSOR "A"

### DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-185, DTC P0500 VEHICLE SPEED SENSOR "A", Diagnostic Trouble Code (DTC) Detecting Criteria.>

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

	Step	Check	Yes	No
1	<b>CHECK DTC OF VDC.</b> Check DTC of VDC.	Is DTC of VDC displayed?	Perform the diagnosis according to DTC. <Ref. to VDC(diag)-41, List of Diagnostic Trouble Code (DTC).>	Repair the poor contact of ECM connector.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## DS:DTC P0506 IDLE AIR CONTROL SYSTEM RPM LOWER THAN EXPECTED

### DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-186, DTC P0506 IDLE AIR CONTROL SYSTEM RPM LOWER THAN EXPECTED, Diagnostic Trouble Code (DTC) Detecting Criteria.>

### TROUBLE SYMPTOM:

- Hard to start the engine.
- Engine does not start.
- Improper idling
- Engine stalls.

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

Step	Check	Yes	No
1 <b>CHECK FOR ANY OTHER DTC ON DISPLAY.</b>	Is any other DTC displayed?	Check the appropriate DTC using the "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6DO)(diag)-84, List of Diagnostic Trouble Code (DTC).>	Go to step 2.
2 <b>CHECK AIR CLEANER ELEMENT.</b> 1) Turn the ignition switch to OFF. 2) Check the air cleaner element.	Is there excessive clogging on air cleaner element?	Replace the air cleaner element. <Ref. to IN(H6DO)-4, Air Cleaner Element.>	Go to step 3.
3 <b>CHECK ELECTRONIC THROTTLE CONTROL.</b> 1) Remove the electronic throttle control. 2) Check the electronic throttle control.	Are foreign matter found inside electronic throttle control?	Remove foreign matter from electronic throttle control.	Perform the diagnosis of DTC P2101. <Ref. to EN(H6DO)(diag)-336, DTC P2101 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT RANGE/PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## DT:DTC P0507 IDLE AIR CONTROL SYSTEM RPM HIGHER THAN EXPECTED

### DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-187, DTC P0507 IDLE AIR CONTROL SYSTEM RPM HIGHER THAN EXPECTED, Diagnostic Trouble Code (DTC) Detecting Criteria.>

### TROUBLE SYMPTOM:

Engine keeps running at higher speed than specified idle speed.

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

Step	Check	Yes	No
1 <b>CHECK FOR ANY OTHER DTC ON DISPLAY.</b>	Is any other DTC displayed?	Check the appropriate DTC using the "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6DO)(diag)-84, List of Diagnostic Trouble Code (DTC).>	Go to step 2.
2 <b>CHECK AIR INTAKE SYSTEM.</b> 1) Start and idle the engine. 2) Check the following items. <ul style="list-style-type: none"><li>• Loose installation of intake manifold and throttle body</li><li>• Cracks of intake manifold gasket and throttle body gasket</li><li>• Disconnection of vacuum hoses</li></ul>	Is there any fault in air intake system?	Repair air suction and leaks.	Go to step 3.
3 <b>CHECK ELECTRONIC THROTTLE CONTROL.</b> 1) Turn the ignition switch to OFF. 2) Remove the electronic throttle control. 3) Check the electronic throttle control.	Are foreign matter found inside electronic throttle control?	Remove foreign matter from electronic throttle control.	Perform the diagnosis of DTC P2101. <Ref. to EN(H6DO)(diag)-336, DTC P2101 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT RANGE/PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## DU:DTC P050A COLD START IDLE AIR CONTROL SYSTEM PERFORMANCE

### DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-188, DTC P050A COLD START IDLE AIR CONTROL SYSTEM PERFORMANCE, Diagnostic Trouble Code (DTC) Detecting Criteria.>

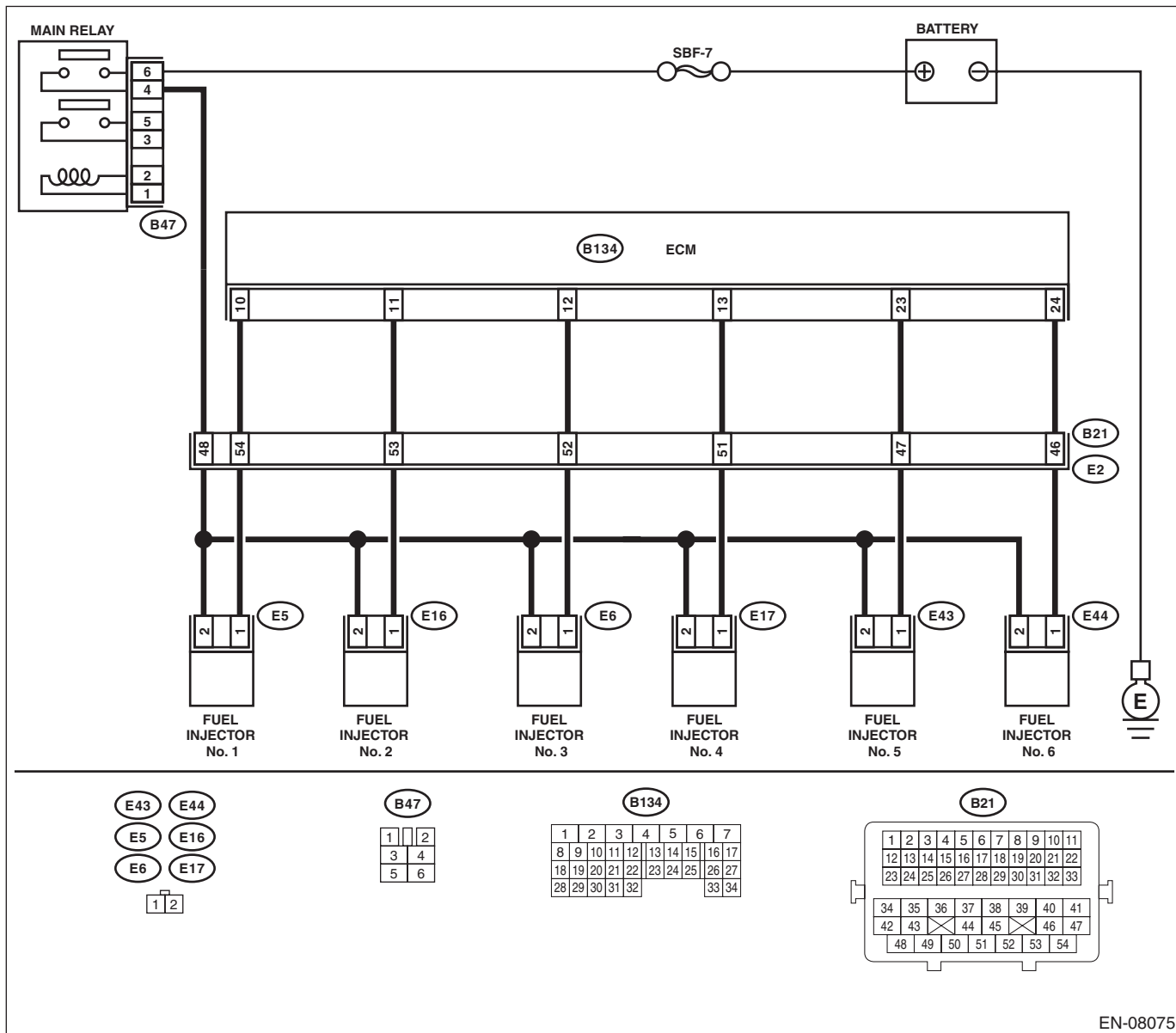
### TROUBLE SYMPTOM:

- Engine keeps running at higher speed than specified idle speed.
- Engine keeps running at a lower speed than the specified idle speed.
- Engine stalls.

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

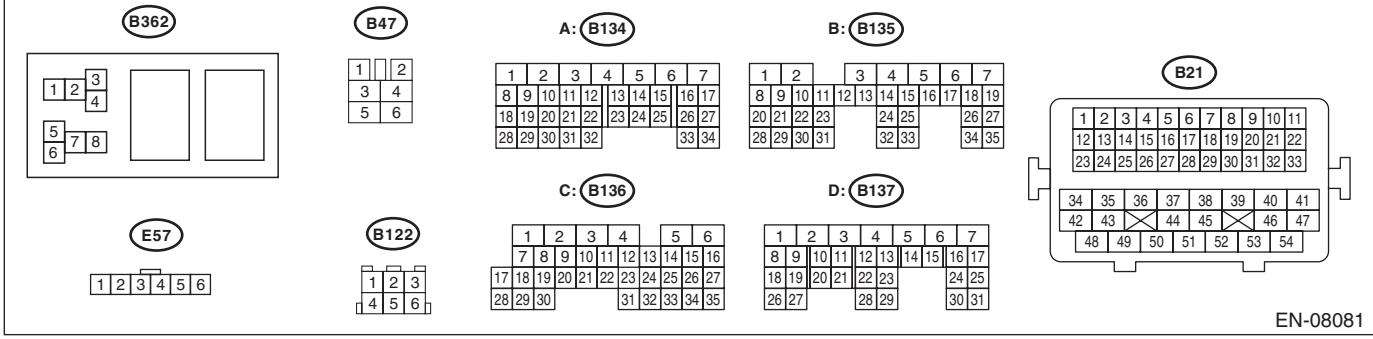
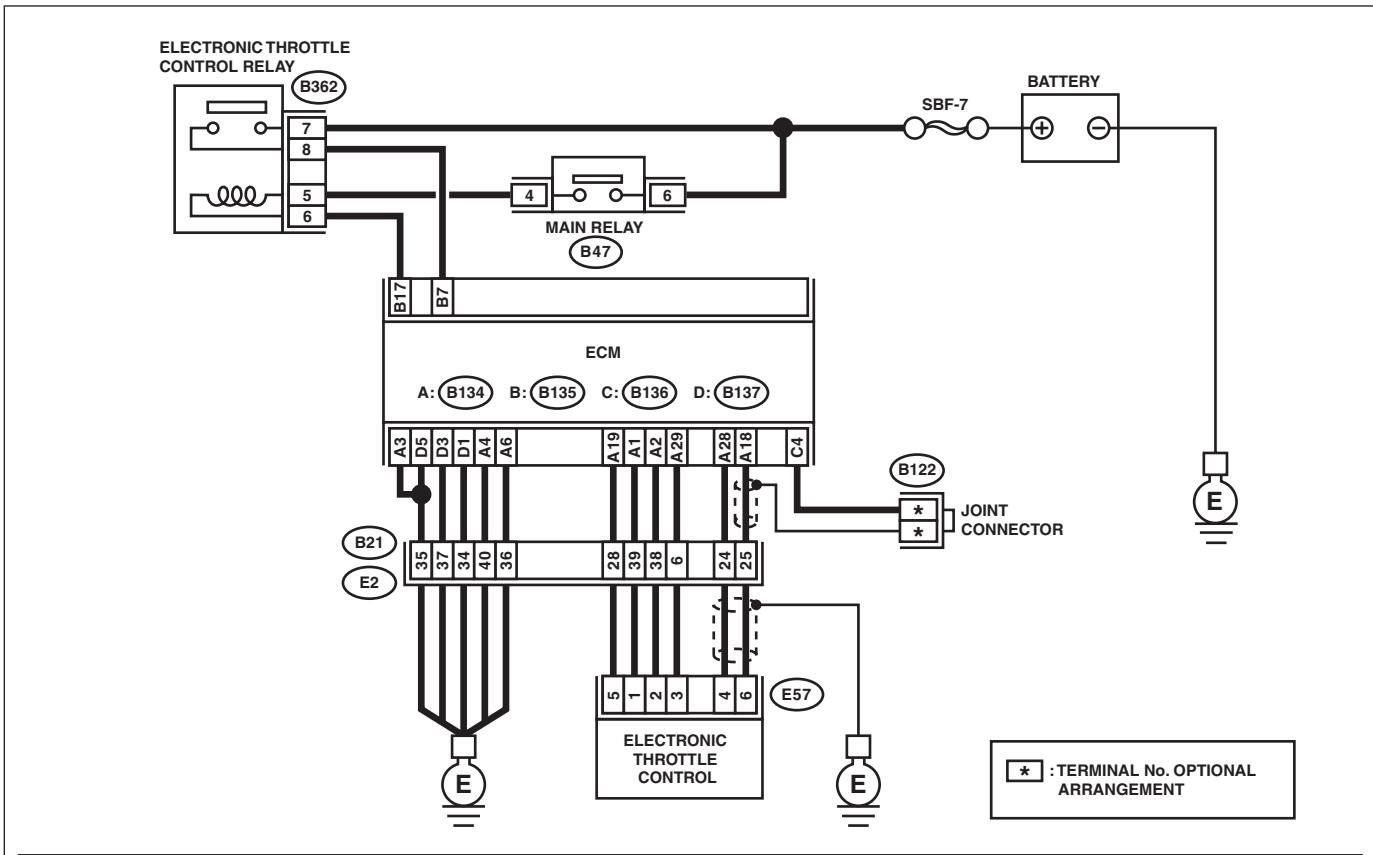
### WIRING DIAGRAM:



EN-08075

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)



EN-08081

Step	Check	Yes	No
1	<b>CHECK FOR ANY OTHER DTC ON DISPLAY.</b> Is any other DTC displayed?	Check the appropriate DTC using the "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6DO)(diag)-84, List of Diagnostic Trouble Code (DTC).>	Go to step 2.
2	<b>CHECK ENGINE OIL.</b> Is there a proper amount of engine oil?	Go to step 3.	Replace engine oil. <Ref. to LU(H6DO)-9, REPLACEMENT, Engine Oil.>
3	<b>CHECK EXHAUST SYSTEM.</b> Are there holes or loose bolts on exhaust system?	Repair the exhaust system.	Go to step 4.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<b>4</b> <b>CHECK AIR INTAKE SYSTEM.</b>	Are there holes, loose bolts or disconnection of hose on air intake system?	Repair the air intake system.	Go to step 5.
<b>5</b> <b>CHECK FUEL PRESSURE.</b> <b>WARNING:</b> Place “NO OPEN FLAMES” signs near the working area. <b>CAUTION:</b> Be careful not to spill fuel. Measure the fuel pressure. <Ref. to ME(H6DO)-30, INSPECTION, Fuel Pressure.> <b>CAUTION:</b> Release fuel pressure before removing the fuel pressure gauge.	Is the measured value 340 — 400 kPa (3.5 — 4.1 kgf/cm <sup>2</sup> , 49 — 58 psi)?	Go to step 6.	Repair the following item. Fuel pressure is too high: <ul style="list-style-type: none"> <li>• Clogged fuel line or bent hose</li> </ul> Fuel pressure is too low: <ul style="list-style-type: none"> <li>• Improper fuel pump discharge</li> <li>• Clogged fuel line</li> </ul>
<b>6</b> <b>CHECK ENGINE COOLANT TEMPERATURE SENSOR.</b> 1) Start the engine and warm up completely. 2) Read the value of «Coolant Temp.» using the Subaru Select Monitor or a general scan tool. <b>NOTE:</b> <ul style="list-style-type: none"> <li>• Subaru Select Monitor</li> </ul> For detailed operation procedures, refer to “READ CURRENT DATA FOR ENGINE”. <Ref. to EN(H6DO)(diag)-36, Subaru Select Monitor.> <ul style="list-style-type: none"> <li>• General scan tool</li> </ul> For detailed operation procedures, refer to the general scan tool operation manual.	Is the value of «Coolant Temp.» 75°C (167°F) or more?	Go to step 7.	Replace the engine coolant temperature sensor. <Ref. to FU(H6DO)-30, Engine Coolant Temperature Sensor.>
<b>7</b> <b>CHECK MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR.</b> 1) Start the engine and warm up engine until coolant temperature is higher than 75°C (167°F). 2) Place the select lever in “P” range or “N” range. 3) Turn the A/C switch to OFF. 4) Turn all the accessory switches to OFF. 5) Read the value of «Mass Air Flow» using the Subaru Select Monitor or a general scan tool. <b>NOTE:</b> <ul style="list-style-type: none"> <li>• Subaru Select Monitor</li> </ul> For detailed operation procedures, refer to “READ CURRENT DATA FOR ENGINE”. <Ref. to EN(H6DO)(diag)-36, Subaru Select Monitor.> <ul style="list-style-type: none"> <li>• General scan tool</li> </ul> For detailed operation procedures, refer to the general scan tool operation manual.	Is the value of «Mass Air Flow» 2.0 — 5.0 g/s (0.26 — 0.66 lb/m)?	Go to step 8.	Replace the mass air flow and intake air temperature sensor. <Ref. to FU(H6DO)-40, Mass Air Flow and Intake Air Temperature Sensor.>



# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<p><b>8</b></p> <p><b>CHECK MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR.</b></p> <ol style="list-style-type: none"> <li>1) Start the engine and warm up engine until coolant temperature is higher than 75°C (167°F).</li> <li>2) Place the select lever in “P” range or “N” range.</li> <li>3) Turn the A/C switch to OFF.</li> <li>4) Turn all the accessory switches to OFF.</li> <li>5) Open the front hood.</li> <li>6) Measure the ambient temperature.</li> <li>7) Read the value of «Intake Air Temp.» using the Subaru Select Monitor or a general scan tool.</li> </ol> <p>NOTE:</p> <ul style="list-style-type: none"> <li>• Subaru Select Monitor</li> </ul> <p>For detailed operation procedures, refer to “READ CURRENT DATA FOR ENGINE”. &lt;Ref. to EN(H6DO)(diag)-36, Subaru Select Monitor.&gt;</p> <ul style="list-style-type: none"> <li>• General scan tool</li> </ul> <p>For detailed operation procedures, refer to the general scan tool operation manual.</p>	<p>Subtract ambient temperature from «Intake Air Temp.». Is the obtained value -10 — 50°C (-18 — 90°F)?</p>	Go to step 9.	Check the mass air flow and intake air temperature sensor. <Ref. to FU(H6DO)-40, Mass Air Flow and Intake Air Temperature Sensor.>
<p><b>9</b></p> <p><b>CHECK OUTPUT SIGNAL OF ECM.</b></p> <ol style="list-style-type: none"> <li>1) Turn the ignition switch to ON.</li> <li>2) Measure the voltage between ECM and chassis ground on faulty cylinders.</li> </ol> <p><b>Connector &amp; terminal</b></p> <p><b>#1 (B134) No. 10 (+) — Chassis ground (-):</b>  <b>#2 (B134) No. 11 (+) — Chassis ground (-):</b>  <b>#3 (B134) No. 12 (+) — Chassis ground (-):</b>  <b>#4 (B134) No. 13 (+) — Chassis ground (-):</b>  <b>#5 (B134) No. 23 (+) — Chassis ground (-):</b>  <b>#6 (B134) No. 24 (+) — Chassis ground (-):</b></p>	Is the voltage 10 V or more?	Go to step 14.	Go to step 10.
<p><b>10</b></p> <p><b>CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR.</b></p> <ol style="list-style-type: none"> <li>1) Turn the ignition switch to OFF.</li> <li>2) Disconnect the connector from fuel injector on faulty cylinders.</li> <li>3) Measure the resistance between fuel injector connector and engine ground on faulty cylinders.</li> </ol> <p><b>Connector &amp; terminal</b></p> <p><b>#1 (E5) No. 1 — Engine ground:</b>  <b>#2 (E16) No. 1 — Engine ground:</b>  <b>#3 (E6) No. 1 — Engine ground:</b>  <b>#4 (E17) No. 1 — Engine ground:</b>  <b>#5 (E43) No. 1 — Engine ground:</b>  <b>#6 (E44) No. 1 — Engine ground:</b></p>	Is the resistance 1 MΩ or more?	Go to step 11.	Repair the ground short circuit of harness between ECM and fuel injector.
<p><b>11</b></p> <p><b>CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR.</b></p> <p>Measure the resistance of harness between ECM and fuel injector on faulty cylinders.</p> <p><b>Connector &amp; terminal</b></p> <p><b>#1 (B134) No. 10 — (E5) No. 1:</b>  <b>#2 (B134) No. 11 — (E16) No. 1:</b>  <b>#3 (B134) No. 12 — (E6) No. 1:</b>  <b>#4 (B134) No. 13 — (E17) No. 1:</b>  <b>#5 (B134) No. 23 — (E43) No. 1:</b>  <b>#6 (B134) No. 24 — (E44) No. 1:</b></p>	Is the resistance less than 1 Ω?	Go to step 12.	Repair the harness and connector. NOTE: In this case, repair the following item: <ul style="list-style-type: none"> <li>• Open circuit in harness between ECM and fuel injector connector</li> <li>• Poor contact of coupling connector</li> </ul>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<b>12 CHECK FUEL INJECTOR.</b> Measure the resistance between fuel injector terminals on faulty cylinder. <i>Terminals</i> <i>No. 1 — No. 2:</i>	Is the resistance 5 — 20 Ω?	Go to step 13.	Replace the faulty fuel injector. <Ref. to FU(H6DO)-42, Fuel Injector.>
<b>13 CHECK POWER SUPPLY LINE.</b> 1) Turn the ignition switch to ON. 2) Measure the voltage between fuel injector and engine ground on faulty cylinders. <i>Connector &amp; terminal</i> <i>#1 (E5) No. 2 (+) — Engine ground (-):</i> <i>#2 (E16) No. 2 (+) — Engine ground (-):</i> <i>#3 (E6) No. 2 (+) — Engine ground (-):</i> <i>#4 (E17) No. 2 (+) — Engine ground (-):</i> <i>#5 (E43) No. 2 (+) — Engine ground (-):</i> <i>#6 (E44) No. 2 (+) — Engine ground (-):</i>	Is the voltage 10 V or more?	Repair the poor contact of all connectors in fuel injector circuit.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit in harness between the main relay and fuel injector on faulty cylinders • Poor contact of coupling connector • Poor contact of main relay connector
<b>14 CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connector from fuel injector on faulty cylinders. 3) Turn the ignition switch to ON. 4) Measure the voltage between ECM and chassis ground on faulty cylinders. <i>Connector &amp; terminal</i> <i>#1 (B134) No. 10 (+) — Chassis ground (-):</i> <i>#2 (B134) No. 11 (+) — Chassis ground (-):</i> <i>#3 (B134) No. 12 (+) — Chassis ground (-):</i> <i>#4 (B134) No. 13 (+) — Chassis ground (-):</i> <i>#5 (B134) No. 23 (+) — Chassis ground (-):</i> <i>#6 (B134) No. 24 (+) — Chassis ground (-):</i>	Is the voltage 10 V or more?	Repair the short circuit to power in the harness between the ECM and fuel injector.	Go to step 15.
<b>15 CHECK FUEL INJECTOR.</b> 1) Turn the ignition switch to OFF. 2) Measure the resistance between fuel injector terminals on faulty cylinder. <i>Terminals</i> <i>No. 1 — No. 2:</i>	Is the resistance 5 — 20 Ω?	Go to step 16.	Replace the faulty fuel injector. <Ref. to FU(H6DO)-42, Fuel Injector.>
<b>16 CHECK INSTALLATION OF CAMSHAFT POSITION SENSOR/CRANKSHAFT POSITION SENSOR.</b>	Is the camshaft position sensor or crankshaft position sensor loosely installed?	Tighten the camshaft position sensor or crankshaft position sensor.	Go to step 17.
<b>17 CHECK CRANK PLATE.</b>	Is the crank sprocket rusted or the teeth of crank plate broken?	Replace the crank plate. <Ref. to ME(H6DO)-95, Cylinder Block.>	Go to step 18.
<b>18 CHECK INSTALLATION CONDITION OF TIMING CHAIN.</b> Turn the crankshaft using ST, and align the alignment mark on crank sprocket with alignment mark on cylinder block. ST 18252AA000 CRANKSHAFT SOCKET	Is the timing chain dislocated from its proper position?	Correct the installation condition of timing chain. <Ref. to ME(H6DO)-53, Timing Chain Assembly.>	Go to step 19.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<b>19 CHECK ELECTRONIC THROTTLE CONTROL RELAY.</b> 1) Turn the ignition switch to OFF. 2) Remove the electronic throttle control relay. 3) Connect the battery to terminals No. 5 and No. 6 of electronic throttle control relay. 4) Measure the resistance between electronic throttle control relay terminals. <i>Terminals</i> <i>No. 7 — No. 8:</i>	Is the resistance less than 1 $\Omega$ ?	Go to step 20.	Replace the electronic throttle control relay. <Ref. to EN(H6DO)(diag)-9, Electrical Component Location.>
<b>20 CHECK POWER SUPPLY OF ELECTRONIC THROTTLE CONTROL RELAY.</b> Measure the voltage between electronic throttle control relay connector and chassis ground. <i>Connector &amp; terminal</i> <i>(B362) No. 7 (+) — Chassis ground (-):</i>	Is the voltage 10 V or more?	Go to step 21.	Repair the open or ground short circuit of power supply circuit.
<b>21 CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL RELAY.</b> 1) Disconnect the connector from ECM. 2) Turn the ignition switch to ON. 3) Measure the voltage between electronic throttle control relay connector and chassis ground. <i>Connector &amp; terminal</i> <i>(B362) No. 6 (+) — Chassis ground (-):</i>	Is the voltage 10 V or more?	Repair the short circuit to power in harness between ECM and electronic throttle control relay.	Go to step 22.
<b>22 CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL RELAY.</b> 1) Turn the ignition switch to OFF. 2) Measure the resistance between electronic throttle control relay connector and chassis ground. <i>Connector &amp; terminal</i> <i>(B362) No. 6 — Chassis ground:</i> <i>(B362) No. 8 — Chassis ground:</i>	Is the resistance 1 M $\Omega$ or more?	Go to step 23.	Repair the ground short circuit of harness between ECM and electronic throttle control relay.
<b>23 CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL RELAY.</b> Measure the resistance between ECM and electronic throttle control relay connector. <i>Connector &amp; terminal</i> <i>(B135) No. 17 — (B362) No. 6:</i> <i>(B135) No. 7 — (B362) No. 8:</i>	Is the resistance less than 1 $\Omega$ ?	Go to step 24.	Repair the open circuit of harness between ECM and electronic throttle control relay.
<b>24 CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM and electronic throttle control. 3) Measure the resistance between ECM and chassis ground. <i>Connector &amp; terminal</i> <i>(B134) No. 19 — Chassis ground:</i> <i>(B134) No. 18 — Chassis ground:</i> <i>(B134) No. 18 — (B136) No. 4:</i> <i>(B134) No. 28 — Chassis ground:</i>	Is the resistance 1 M $\Omega$ or more?	Go to step 25.	Repair the short circuit to ground in harness between ECM and electronic throttle control connector.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<b>25 CHECK SHORT CIRCUIT INSIDE THE ECM.</b> 1) Connect the connector to ECM. 2) Measure the resistance between electronic throttle control connector and engine ground. <b>Connector &amp; terminal</b> <i>(E57) No. 6 — Engine ground:</i> <i>(E57) No. 4 — Engine ground:</i>	Is the resistance 1 M $\Omega$ or more?	Go to step 26.	Repair the short circuit to ground in harness between ECM and electronic throttle control connector. Replace the ECM if defective. <Ref. to FU(H6DO)-52, Engine Control Module (ECM).>
<b>26 CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.</b> 1) Disconnect the connector from ECM. 2) Measure the resistance of harness between ECM and electronic throttle control connector. <b>Connector &amp; terminal</b> <i>(B134) No. 18 — (E57) No. 6:</i> <i>(B134) No. 28 — (E57) No. 4:</i> <i>(B134) No. 29 — (E57) No. 3:</i>	Is the resistance less than 1 $\Omega$ ?	Go to step 27.	Repair the harness and connector.  NOTE: In this case, repair the following item: <ul style="list-style-type: none"> <li>• Open circuit in harness between ECM and electronic throttle control connector</li> <li>• Poor contact of coupling connector</li> </ul>
<b>27 CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.</b> 1) Connect the connector to ECM. 2) Measure the resistance between electronic throttle control connector and engine ground. <b>Connector &amp; terminal</b> <i>(E57) No. 3 — Engine ground:</i>	Is the resistance less than 5 $\Omega$ ?	Go to step 28.	Repair the harness and connector.  NOTE: In this case, repair the following item: <ul style="list-style-type: none"> <li>• Open circuit of harness between ECM and engine ground</li> <li>• Poor contact of ECM connector</li> <li>• Poor contact of coupling connector</li> </ul>
<b>28 CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.</b> 1) Turn the ignition switch to ON. 2) Measure the voltage between electronic throttle control connector and engine ground. <b>Connector &amp; terminal</b> <i>(E57) No. 6 (+) — Engine ground (-):</i> <i>(E57) No. 4 (+) — Engine ground (-):</i>	Is the voltage 5 V or more?	Repair the short circuit to power in harness between ECM and electronic throttle control connector.	Go to step 29.
<b>29 CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance between ECM connectors. <b>Connector &amp; terminal</b> <i>(B134) No. 19 — (B134) No. 18:</i> <i>(B134) No. 19 — (B134) No. 28:</i>	Is the resistance 1 M $\Omega$ or more?	Go to step 30.	Repair the short circuit to power in harness between ECM and electronic throttle control connector.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<b>30 CHECK SENSOR OUTPUT.</b> 1) Connect all connectors. 2) Turn the ignition switch to ON. 3) Read the value of «Main-Throttle Sensor» using Subaru Select Monitor. NOTE: For detailed operation procedures, refer to “READ CURRENT DATA FOR ENGINE”. <Ref. to EN(H6DO)(diag)-36, Subaru Select Monitor.>	Is the value of «Main-Throttle Sensor» 0.81 — 0.87 V?	Go to step 31.	Repair the poor contact of electronic throttle control connector. Replace the electronic throttle control if defective. <Ref. to FU(H6DO)-19, Throttle Body.>
<b>31 CHECK SENSOR OUTPUT.</b> Read the value of «Sub-Throttle Sensor» using Subaru Select Monitor. NOTE: For detailed operation procedures, refer to “READ CURRENT DATA FOR ENGINE”. <Ref. to EN(H6DO)(diag)-36, Subaru Select Monitor.>	Is the value of «Sub-Throttle Sensor» 1.64 — 1.70 V?	Go to step 32.	Repair the poor contact of electronic throttle control connector. Replace the electronic throttle control if defective. <Ref. to FU(H6DO)-19, Throttle Body.>
<b>32 CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL MOTOR.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM and electronic throttle control. 3) Measure the resistance between ECM and electronic throttle control connector. <i>Connector &amp; terminal</i> (B134) No. 1 — (E57) No. 1: (B134) No. 2 — (E57) No. 2:	Is the resistance less than 1 Ω?	Go to step 33.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit in harness between ECM and electronic throttle control • Poor contact of coupling connector
<b>33 CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL MOTOR.</b> 1) Connect the connector to ECM. 2) Turn the ignition switch to ON. 3) Measure the voltage between electronic throttle control connector and engine ground. <i>Connector &amp; terminal</i> (E57) No. 2 (+) — Engine ground (-): (E57) No. 1 (+) — Engine ground (-):	Is the voltage 5 V or more?	Repair the short circuit to power in the harness between ECM and electronic throttle control.	Go to step 34.
<b>34 CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL MOTOR.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance between electronic throttle control connector and engine ground. <i>Connector &amp; terminal</i> (E57) No. 2 — Engine ground: (E57) No. 1 — Engine ground:	Is the resistance 1 MΩ or more?	Go to step 35.	Repair the short circuit to ground in harness between ECM and electronic throttle control.
<b>35 CHECK ELECTRONIC THROTTLE CONTROL MOTOR HARNESS.</b> Measure the resistance between electronic throttle control connectors. <i>Connector &amp; terminal</i> (E57) No. 2 — (E57) No. 1:	Is the resistance 1 MΩ or more?	Go to step 36.	Repair the short circuit of harness between ECM and electronic throttle control.

## Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<b>36</b> <b>CHECK ELECTRONIC THROTTLE CONTROL GROUND CIRCUIT.</b> Measure the resistance between ECM and chassis ground. <i><b>Connector &amp; terminal</b></i> <i>(B134) No. 3 — Chassis ground:</i> <i>(B134) No. 4 — Chassis ground:</i> <i>(B134) No. 6 — Chassis ground:</i> <i>(B137) No. 1 — Chassis ground:</i> <i>(B137) No. 3 — Chassis ground:</i> <i>(B137) No. 5 — Chassis ground:</i>	Is the resistance less than 5 $\Omega$ ?	Go to step <b>37</b> .	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit of harness between ECM and engine ground • Poor contact of coupling connector
<b>37</b> <b>CHECK ELECTRONIC THROTTLE CONTROL.</b> Measure the resistance between electronic throttle control terminals. <i><b>Terminals</b></i> <i><b>No. 2 — No. 1:</b></i>	Is the resistance 50 $\Omega$ or less?	Go to step <b>38</b> .	Replace the electronic throttle control. <Ref. to FU(H6DO)-19, Throttle Body.>
<b>38</b> <b>CHECK ELECTRONIC THROTTLE CONTROL.</b> Move the throttle valve to the fully open and fully closed positions with fingers. Check that the valve returns to the specified position when releasing fingers.	Does the valve return to the specified position? Standard value: 3 mm (0.12 in) from fully closed position	Repair the poor contact of ECM connector.	Replace the electronic throttle control. <Ref. to FU(H6DO)-19, Throttle Body.>

### DV:DTC P050B COLD START IGNITION TIMING PERFORMANCE

NOTE:

For the diagnostic procedure, refer to DTC P050A. <Ref. to EN(H6DO)(diag)-262, DTC P050A COLD START IDLE AIR CONTROL SYSTEM PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

## DW:DTC P0512 STARTER REQUEST CIRCUIT

### DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-192, DTC P0512 STARTER REQUEST CIRCUIT, Diagnostic Trouble Code (DTC) Detecting Criteria.>

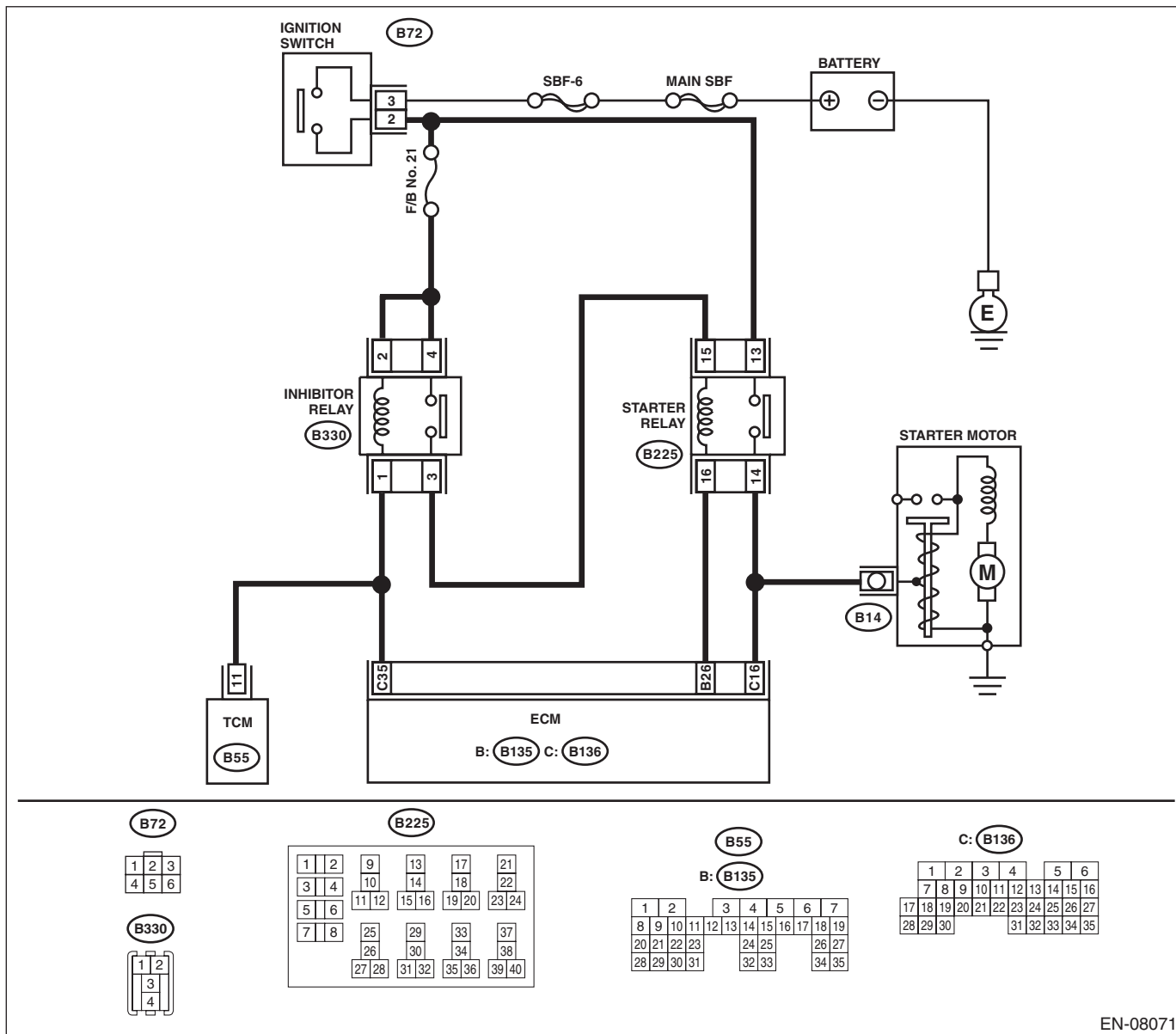
### TROUBLE SYMPTOM:

Failure of engine to start

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

### WIRING DIAGRAM:



EN-08071

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<b>1</b> <b>CHECK FOR ANY OTHER DTC ON DISPLAY.</b>	Is any other DTC displayed?	Check the appropriate DTC using the "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6DO)(diag)-84, List of Diagnostic Trouble Code (DTC).>	Go to step 2.
<b>2</b> <b>CHECK HARNESS BETWEEN ECM AND STARTER RELAY CONNECTOR.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM. 3) Turn the ignition switch to ON. 4) Measure the voltage between ECM and chassis ground. <b>Connector &amp; terminal</b> <b>(B136) No. 16 (+) — Chassis ground (-):</b>	Is the voltage 10 V or more?	Repair the short circuit to power supply in harness between ECM and starter relay connector.	Repair the poor contact of ECM connector.



# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## **DX:DTC P0604 INTERNAL CONTROL MODULE RANDOM ACCESS MEMORY (RAM) ERROR**

### **DTC DETECTING CONDITION:**

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-194, DTC P0604 INTERNAL CONTROL MODULE RANDOM ACCESS MEMORY (RAM) ERROR, Diagnostic Trouble Code (DTC) Detecting Criteria.>

### **TROUBLE SYMPTOM:**

- Engine does not start.
- Engine stalls.

### **CAUTION:**

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

Step	Check	Yes	No
1 <b>CHECK FOR ANY OTHER DTC ON DISPLAY.</b>	Is any other DTC displayed?	Check the appropriate DTC using the "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6DO)(diag)-84, List of Diagnostic Trouble Code (DTC).>	Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again. <b>NOTE:</b> In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.

## **DY:DTC P0605 INTERNAL CONTROL MODULE READ ONLY MEMORY (ROM) ERROR**

### **NOTE:**

For the diagnostic procedure, refer to DTC P0607. <Ref. to EN(H6DO)(diag)-274, DTC P0607 THROTTLE CONTROL SYSTEM CIRCUIT RANGE/PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## DZ:DTC P0607 THROTTLE CONTROL SYSTEM CIRCUIT RANGE/PERFORMANCE

### DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-196, DTC P0607 THROTTLE CONTROL SYSTEM CIRCUIT RANGE/PERFORMANCE, Diagnostic Trouble Code (DTC) Detecting Criteria.>

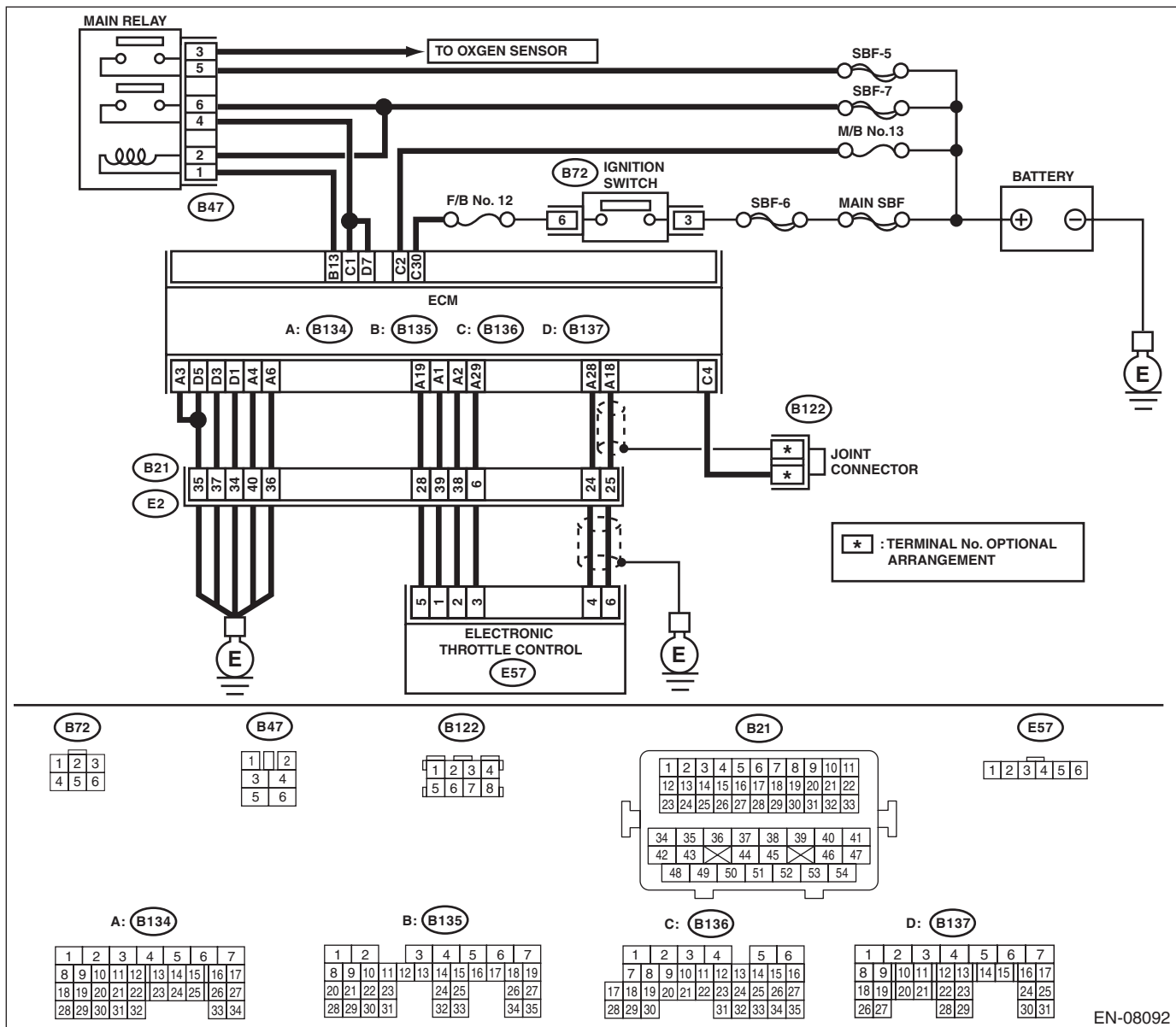
### TROUBLE SYMPTOM:

- Improper idling
- Poor driving performance

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

### WIRING DIAGRAM:



EN-08092

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<b>1 CHECK INPUT VOLTAGE OF ECM.</b> 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM and chassis ground. <i>Connector &amp; terminal</i> (B136) No. 1 (+) — Chassis ground (-): (B137) No. 7 (+) — Chassis ground (-):	Is the voltage 10 — 13 V?	Go to step 2.	Repair the open or ground short circuit of power supply circuit.
<b>2 CHECK INPUT VOLTAGE OF ECM.</b> 1) Start the engine. 2) Measure the voltage between ECM and chassis ground. <i>Connector &amp; terminal</i> (B136) No. 1 (+) — Chassis ground (-): (B137) No. 7 (+) — Chassis ground (-):	Is the voltage 13 — 15 V?	Go to step 3.	Repair the open or ground short circuit of power supply circuit.
<b>3 CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM and electronic throttle control. 3) Measure the resistance of harness between ECM and electronic throttle control connector. <i>Connector &amp; terminal</i> (B134) No. 19 — (E57) No. 5: (B134) No. 29 — (E57) No. 3:	Is the resistance less than 1 Ω?	Go to step 4.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit in harness between ECM and electronic throttle control connector • Poor contact of coupling connector
<b>4 CHECK ECM GROUND HARNESS.</b> 1) Connect all connectors. 2) Turn the ignition switch to ON. 3) Measure the voltage between ECM and chassis ground. <i>Connector &amp; terminal</i> (B134) No. 3 (+) — Chassis ground (-): (B134) No. 4 (+) — Chassis ground (-): (B134) No. 6 (+) — Chassis ground (-): (B137) No. 1 (+) — Chassis ground (-): (B137) No. 3 (+) — Chassis ground (-): (B137) No. 5 (+) — Chassis ground (-):	Is the voltage less than 1 V?	Repair the poor contact of ECM connector.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit in ground circuit • Further tightening of the engine ground terminal • Poor contact of coupling connector

## EA:DTC P0638 THROTTLE ACTUATOR CONTROL RANGE/PERFORMANCE (BANK 1)

NOTE:

For the diagnostic procedure, refer to DTC P2101. <Ref. to EN(H6DO)(diag)-336, DTC P2101 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT RANGE/PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

## EB:DTC P0700 TRANSMISSION CONTROL SYSTEM (MIL REQUEST)

NOTE:

For the diagnostic procedure, refer to AT section. <Ref. to 5AT(diag)-2, Basic Diagnostic Procedure.>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## EC:DTC P1152 O2 SENSOR CIRCUIT RANGE/PERFORMANCE (LOW) (BANK1 SENSOR1)

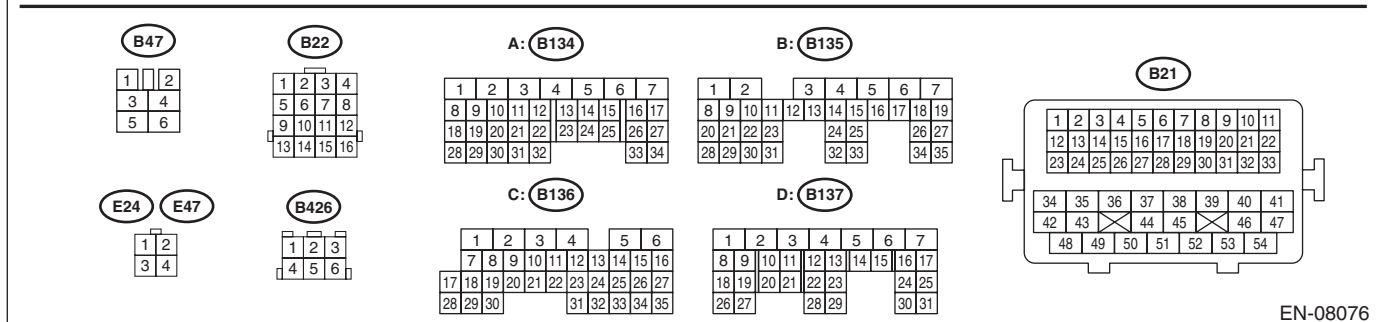
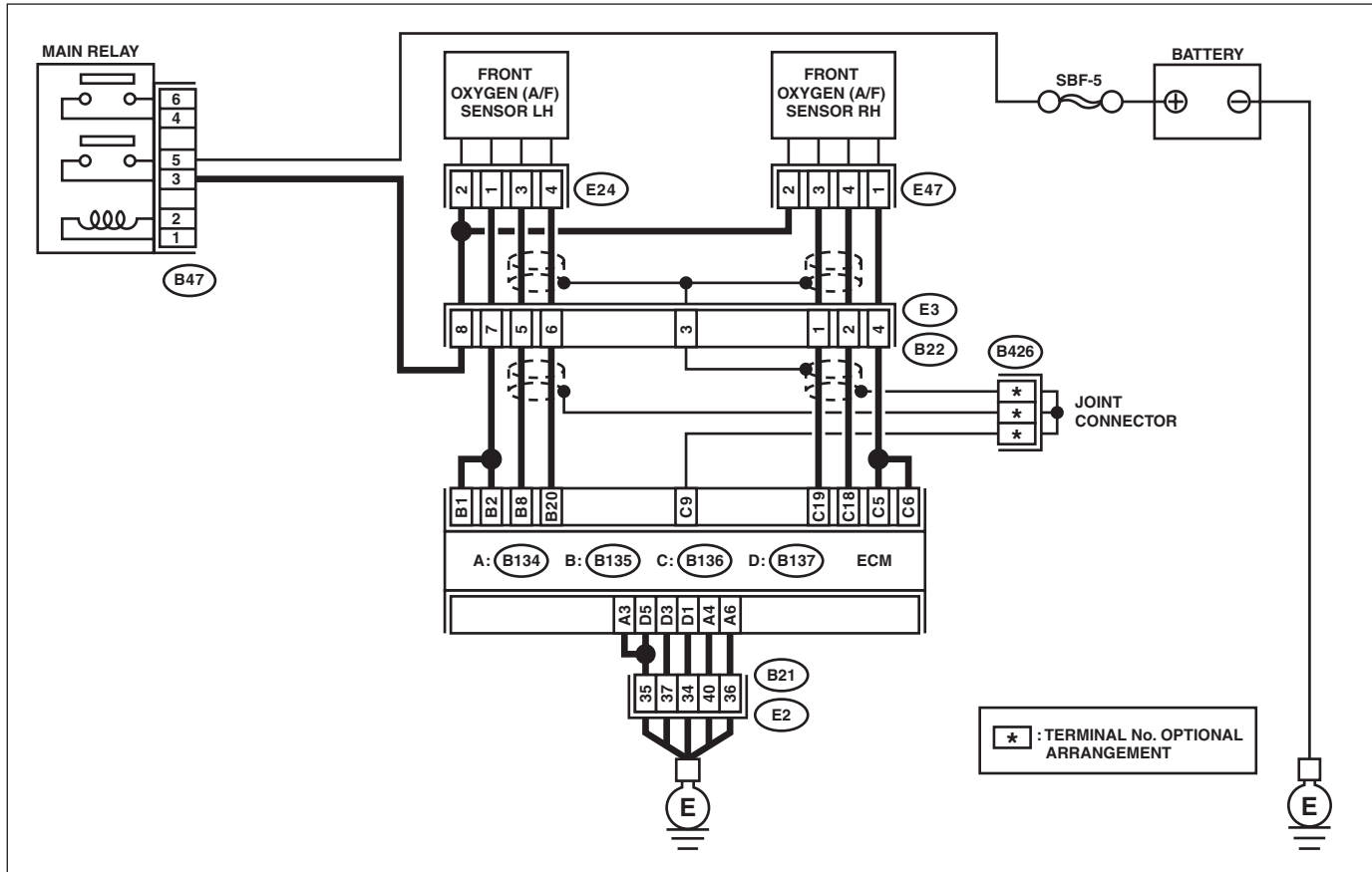
### DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-201, DTC P1152 O2 SENSOR CIRCUIT RANGE/PERFORMANCE (LOW) (BANK1 SENSOR1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

### WIRING DIAGRAM:



EN-08076

Step	Check	Yes	No	
1	CHECK FRONT OXYGEN (A/F) SENSOR CONNECTOR AND COUPLING CONNECTOR.	Has water entered the connector?	Completely remove any water inside.	Go to step 2.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<p><b>2</b></p> <p><b>CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.</b></p> <p>1) Turn the ignition switch to OFF.                      2) Disconnect the connectors from ECM and front oxygen (A/F) sensor.                      3) Measure the resistance of harness between ECM and front oxygen (A/F) sensor connector.</p> <p><b>Connector &amp; terminal</b>  <b>(B136) No. 19 — (E47) No. 3:</b>  <b>(B136) No. 18 — (E47) No. 4:</b></p>	<p>Is the resistance less than 1 Ω?</p>	<p>Go to step 3.</p>	<p>Repair the harness and connector.</p> <p>NOTE:                      In this case, repair the following item:</p> <ul style="list-style-type: none"> <li>• Open circuit in harness between ECM and front oxygen (A/F) sensor connector</li> <li>• Poor contact of coupling connector</li> </ul>
<p><b>3</b></p> <p><b>CHECK FOR POOR CONTACT.</b>                      Check for poor contact of the front oxygen (A/F) sensor connector.</p>	<p>Is there poor contact of front oxygen (A/F) sensor connector?</p>	<p>Repair the poor contact of front oxygen (A/F) sensor connector.</p>	<p>Replace the front oxygen (A/F) sensor. &lt;Ref. to FU(H6DO)-48, Front Oxygen (A/F) Sensor.&gt;</p>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## ED:DTC P1153 O2 SENSOR CIRCUIT RANGE/PERFORMANCE (HIGH) (BANK1 SENSOR1)

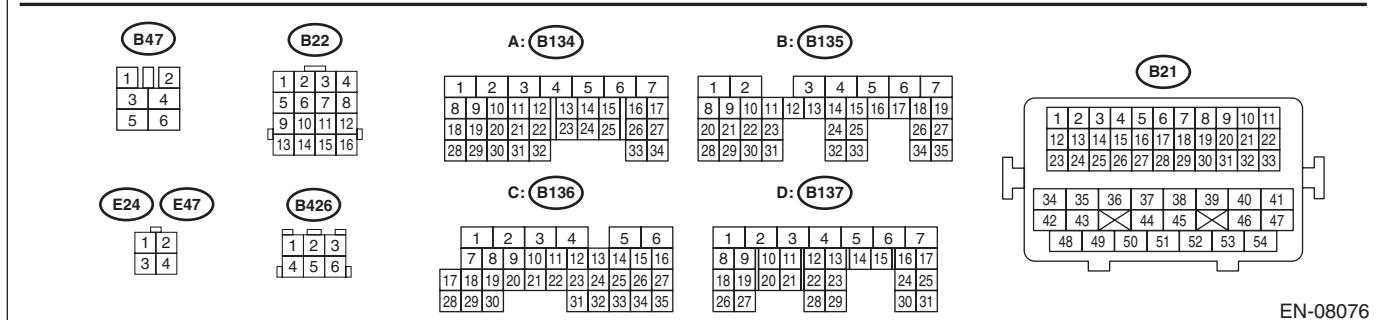
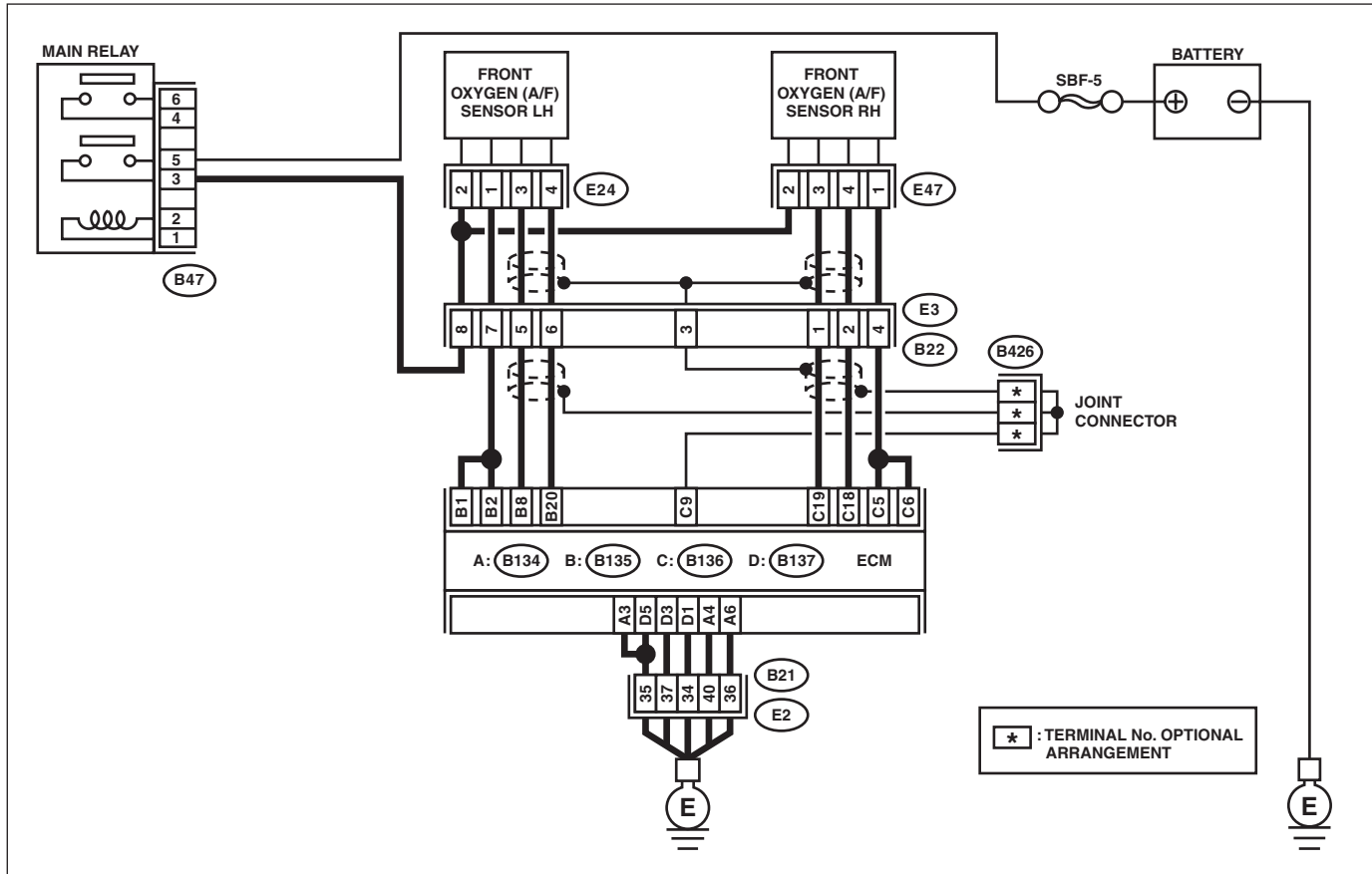
### DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-203, DTC P1153 O2 SENSOR CIRCUIT RANGE/PERFORMANCE (HIGH) (BANK1 SENSOR1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

### WIRING DIAGRAM:



EN-08076

Step	Check	Yes	No	
1	CHECK FRONT OXYGEN (A/F) SENSOR CONNECTOR AND COUPLING CONNECTOR.	Has water entered the connector?	Completely remove any water inside.	Go to step 2.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<b>2</b> <b>CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance between ECM and chassis ground. <i>Connector &amp; terminal</i> <i>(B136) No. 19 — Chassis ground:</i> <i>(B136) No. 18 — Chassis ground:</i>	Is the resistance 1 M $\Omega$ or more?	Go to step 3.	Repair the ground short circuit of harness between ECM and front oxygen (A/F) sensor connector.
<b>3</b> <b>CHECK OUTPUT SIGNAL FOR ECM.</b> 1) Connect the connector to ECM. 2) Turn the ignition switch to ON. 3) Measure the voltage between ECM and chassis ground. <i>Connector &amp; terminal</i> <i>(B136) No. 19 (+) — Chassis ground (-):</i>	Is the voltage 4.5 V or more?	Go to step 5.	Go to step 4.
<b>4</b> <b>CHECK OUTPUT SIGNAL FOR ECM.</b> Measure the voltage between ECM and chassis ground. <i>Connector &amp; terminal</i> <i>(B136) No. 18 (+) — Chassis ground (-):</i>	Is the voltage 4.95 V or more?	Go to step 5.	Replace the front oxygen (A/F) sensor. <Ref. to FU(H6DO)-48, Front Oxygen (A/F) Sensor.>
<b>5</b> <b>CHECK OUTPUT SIGNAL FOR ECM.</b> Measure the voltage between ECM and chassis ground. <i>Connector &amp; terminal</i> <i>(B136) No. 19 (+) — Chassis ground (-):</i> <i>(B136) No. 18 (+) — Chassis ground (-):</i>	Is the voltage 8 V or more?	Repair the short circuit to power in the harness between ECM and front oxygen (A/F) sensor connector. After repair, replace the ECM. <Ref. to FU(H6DO)-52, Engine Control Module (ECM).>	Repair the poor contact of ECM connector.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## EE:DTC P1154 O2 SENSOR CIRCUIT RANGE/PERFORMANCE (LOW) (BANK 2 SENSOR 1)

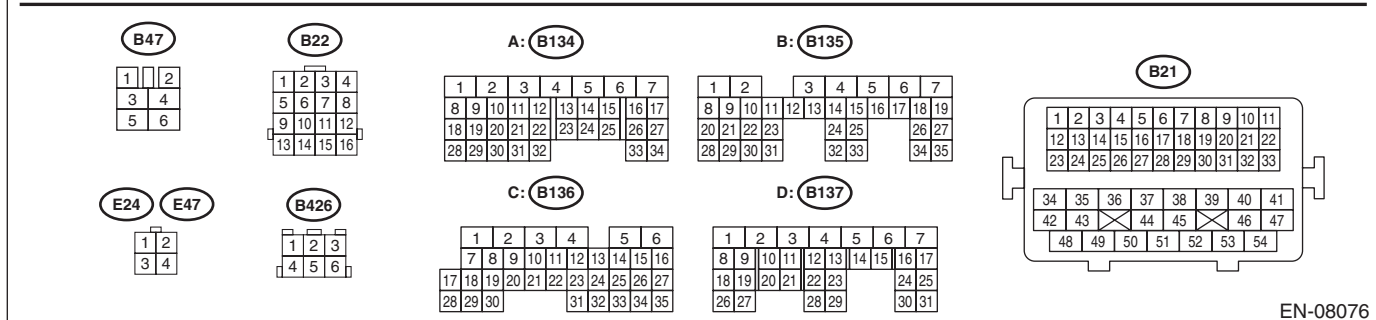
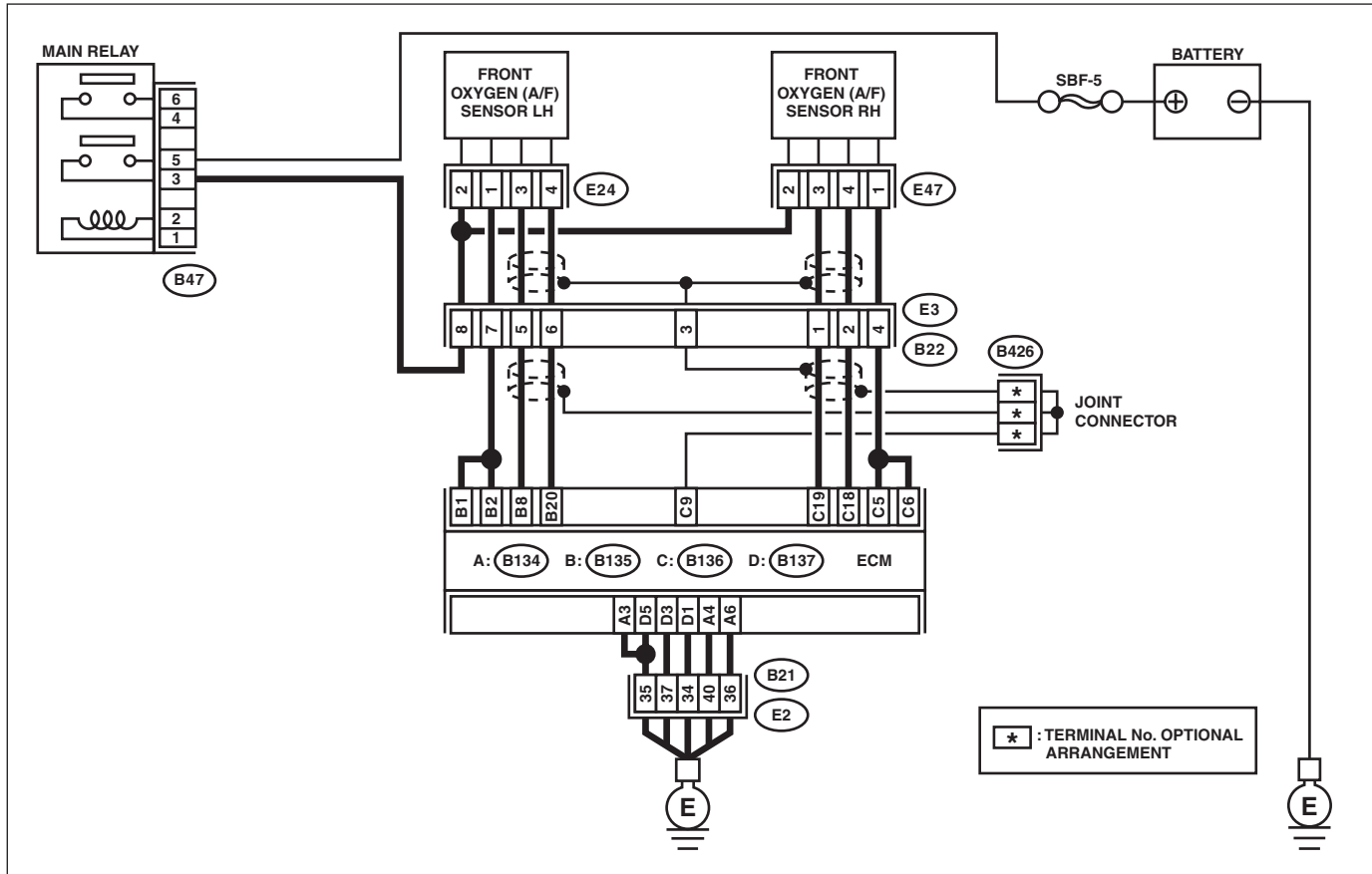
### DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-205, DTC P1154 O2 SENSOR CIRCUIT RANGE/PERFORMANCE (LOW) (BANK 2 SENSOR 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

### WIRING DIAGRAM:



EN-08076

Step	Check	Yes	No
1	CHECK FRONT OXYGEN (A/F) SENSOR CONNECTOR AND COUPLING CONNECTOR.	Has water entered the connector?	Completely remove any water inside.
			Go to step 2.



# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<p><b>2</b>      <b>CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.</b></p> <p>1) Turn the ignition switch to OFF.                  2) Disconnect the connectors from ECM and front oxygen (A/F) sensor.                  3) Measure the resistance of harness between ECM and front oxygen (A/F) sensor connector.</p> <p><b>Connector &amp; terminal</b>  <b>(B135) No. 8 — (E24) No. 3:</b>  <b>(B135) No. 20 — (E24) No. 4:</b></p>	<p>Is the resistance less than 1 Ω?</p>	<p>Go to step 3.</p>	<p>Repair the harness and connector.</p> <p>NOTE:                  In this case, repair the following item:</p> <ul style="list-style-type: none"> <li>• Open circuit in harness between ECM and front oxygen (A/F) sensor connector</li> <li>• Poor contact of coupling connector</li> </ul>
<p><b>3</b>      <b>CHECK FOR POOR CONTACT.</b>                  Check for poor contact of the front oxygen (A/F) sensor connector.</p>	<p>Is there poor contact of front oxygen (A/F) sensor connector?</p>	<p>Repair the poor contact of front oxygen (A/F) sensor connector.</p>	<p>Replace the front oxygen (A/F) sensor. &lt;Ref. to FU(H6DO)-48, Front Oxygen (A/F) Sensor.&gt;</p>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## EF:DTC P1155 O2 SENSOR CIRCUIT RANGE/PERFORMANCE (HIGH) (BANK 2 SENSOR 1)

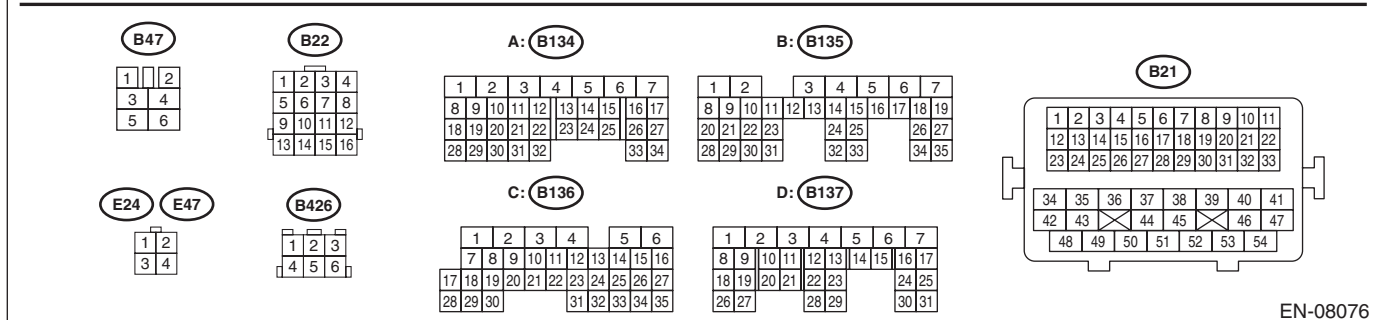
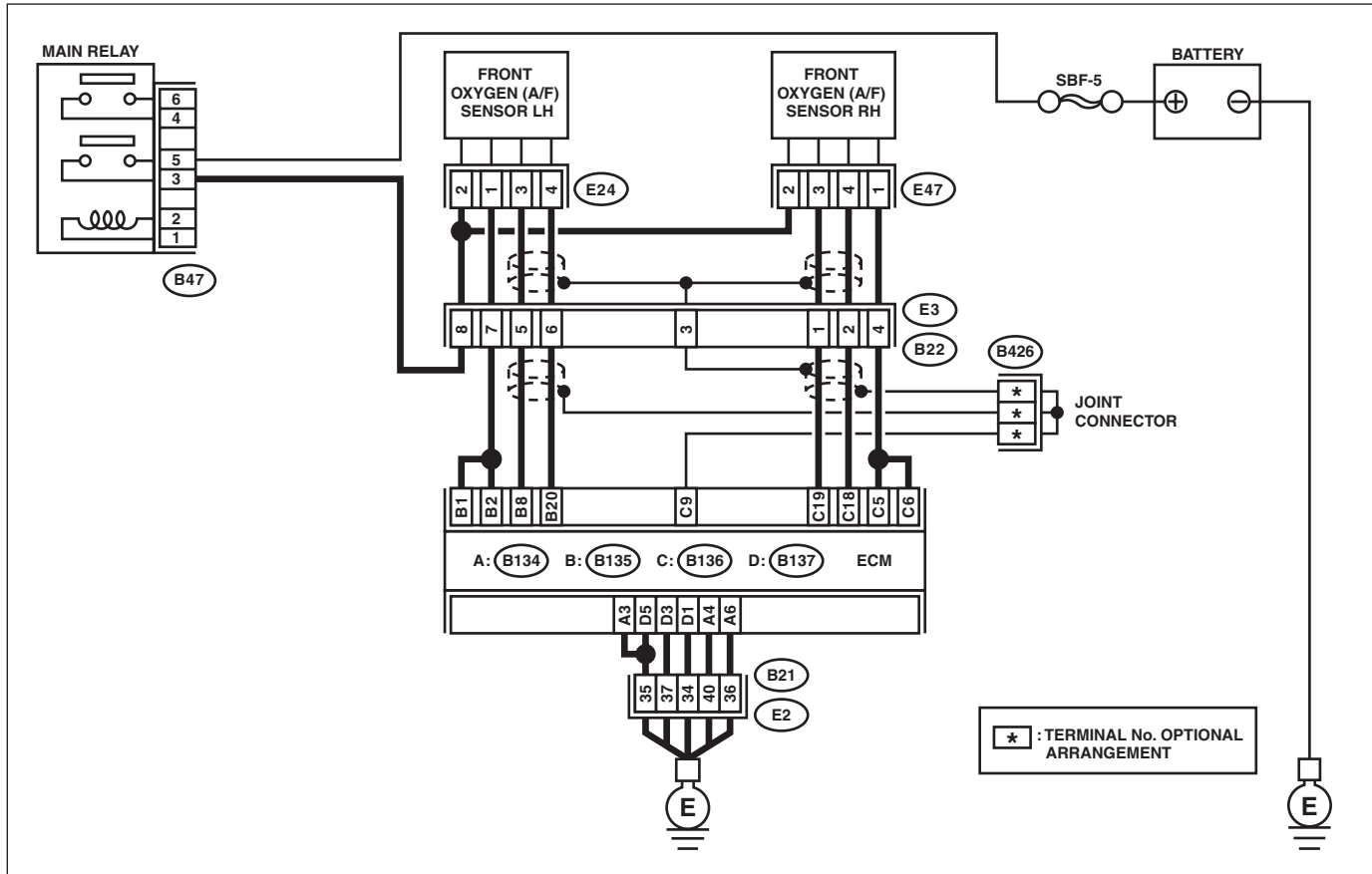
### DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-205, DTC P1155 O2 SENSOR CIRCUIT RANGE/PERFORMANCE (HIGH) (BANK 2 SENSOR 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

### WIRING DIAGRAM:



EN-08076

Step	Check	Yes	No	
1	CHECK FRONT OXYGEN (A/F) SENSOR CONNECTOR AND COUPLING CONNECTOR.	Has water entered the connector?	Completely remove any water inside.	Go to step 2.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<b>2</b> <b>CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance between ECM and chassis ground. <i>Connector &amp; terminal</i> <i>(B135) No. 8 — Chassis ground:</i> <i>(B135) No. 20 — Chassis ground:</i>	Is the resistance 1 MΩ or more?	Go to step 3.	Repair the ground short circuit of harness between ECM and front oxygen (A/F) sensor connector.
<b>3</b> <b>CHECK OUTPUT SIGNAL FOR ECM.</b> 1) Connect the connector to ECM. 2) Turn the ignition switch to ON. 3) Measure the voltage between ECM and chassis ground. <i>Connector &amp; terminal</i> <i>(B135) No. 8 (+) — Chassis ground (-):</i>	Is the voltage 4.5 V or more?	Go to step 5.	Go to step 4.
<b>4</b> <b>CHECK OUTPUT SIGNAL FOR ECM.</b> Measure the voltage between ECM and chassis ground. <i>Connector &amp; terminal</i> <i>(B135) No. 20 (+) — Chassis ground (-):</i>	Is the voltage 4.95 V or more?	Go to step 5.	Replace the front oxygen (A/F) sensor. <Ref. to FU(H6DO)-48, Front Oxygen (A/F) Sensor.>
<b>5</b> <b>CHECK OUTPUT SIGNAL FOR ECM.</b> Measure the voltage between ECM and chassis ground. <i>Connector &amp; terminal</i> <i>(B135) No. 8 (+) — Chassis ground (-):</i> <i>(B135) No. 20 (+) — Chassis ground (-):</i>	Is the voltage 8 V or more?	Repair the short circuit to power in the harness between ECM and front oxygen (A/F) sensor connector. After repair, replace the ECM. <Ref. to FU(H6DO)-52, Engine Control Module (ECM).>	Repair the poor contact of ECM connector.

## EG:DTC P1160 RETURN SPRING FAILURE

### NOTE:

For the diagnostic procedure, refer to DTC P2101. <Ref. to EN(H6DO)(diag)-336, DTC P2101 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT RANGE/PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## EH:DTC P1443 VENT CONTROL SOLENOID VALVE FUNCTION PROBLEM

### DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-208, DTC P1443 VENT CONTROL SOLENOID VALVE FUNCTION PROBLEM, Diagnostic Trouble Code (DTC) Detecting Criteria.>

### TROUBLE SYMPTOM:

Improper fuel supply

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

Step	Check	Yes	No
1 <b>CHECK FOR ANY OTHER DTC ON DISPLAY.</b>	Is any other DTC displayed?	<ul style="list-style-type: none"> <li>• If P0452 is displayed: Replace the fuel tank. &lt;Ref. to FU(H6DO)-61, Fuel Tank.&gt;</li> <li>• If any DTC except for P0452 is displayed: Check the appropriate DTC using the "List of Diagnostic Trouble Code (DTC)". &lt;Ref. to EN(H6DO)(diag)-84, List of Diagnostic Trouble Code (DTC).&gt;</li> </ul>	Go to step 2.
2 <b>CHECK DRAIN HOSE.</b> Check the drain hose for clogging.	Is there clogging in the drain hose?	Replace the drain hose.	Go to step 3.
3 <b>CHECK DRAIN VALVE OPERATION.</b> 1) Turn the ignition switch to OFF. 2) Install the delivery (test) mode connector. 3) Turn the ignition switch to ON. 4) Operate the drain valve.  NOTE: Drain valve can be operated using the Subaru Select Monitor. For procedure, refer to "Compulsory Valve Operation Check Mode". <Ref. to EN(H6DO)(diag)-59, Compulsory Valve Operation Check Mode.>	Does the drain valve operate?	Repair the poor contact of ECM connector.	Replace the drain valve. <Ref. to EC(H6DO)-15, Drain Valve.>

## **EI: DTC P1492 EGR SOLENOID VALVE SIGNAL #1 CIRCUIT MALFUNCTION (LOW INPUT)**

**NOTE:**

For the diagnostic procedure, refer to DTC P1498. <Ref. to EN(H6DO)(diag)-286, DTC P1498 EGR SOLENOID VALVE SIGNAL #4 CIRCUIT MALFUNCTION (LOW INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

## **EJ: DTC P1493 EGR SOLENOID VALVE SIGNAL #1 CIRCUIT MALFUNCTION (HIGH INPUT)**

**NOTE:**

For the diagnostic procedure, refer to DTC P1499. <Ref. to EN(H6DO)(diag)-289, DTC P1499 EGR SOLENOID VALVE SIGNAL #4 CIRCUIT MALFUNCTION (HIGH INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

## **EK: DTC P1494 EGR SOLENOID VALVE SIGNAL #2 CIRCUIT MALFUNCTION (LOW INPUT)**

**NOTE:**

For the diagnostic procedure, refer to DTC P1498. <Ref. to EN(H6DO)(diag)-286, DTC P1498 EGR SOLENOID VALVE SIGNAL #4 CIRCUIT MALFUNCTION (LOW INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

## **EL: DTC P1495 EGR SOLENOID VALVE SIGNAL #2 CIRCUIT MALFUNCTION (HIGH INPUT)**

**NOTE:**

For the diagnostic procedure, refer to DTC P1499. <Ref. to EN(H6DO)(diag)-289, DTC P1499 EGR SOLENOID VALVE SIGNAL #4 CIRCUIT MALFUNCTION (HIGH INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

## **EM: DTC P1496 EGR SOLENOID VALVE SIGNAL #3 CIRCUIT MALFUNCTION (LOW INPUT)**

**NOTE:**

For the diagnostic procedure, refer to DTC P1498. <Ref. to EN(H6DO)(diag)-286, DTC P1498 EGR SOLENOID VALVE SIGNAL #4 CIRCUIT MALFUNCTION (LOW INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

## **EN: DTC P1497 EGR SOLENOID VALVE SIGNAL #3 CIRCUIT MALFUNCTION (HIGH INPUT)**

**NOTE:**

For the diagnostic procedure, refer to DTC P1499. <Ref. to EN(H6DO)(diag)-289, DTC P1499 EGR SOLENOID VALVE SIGNAL #4 CIRCUIT MALFUNCTION (HIGH INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

## Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

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### **EO:DTC P1498 EGR SOLENOID VALVE SIGNAL #4 CIRCUIT MALFUNCTION (LOW INPUT)**

#### **DTC DETECTING CONDITION:**

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-210, DTC P1492 EGR SOLENOID VALVE SIGNAL #1 CIRCUIT MALFUNCTION (LOW INPUT), Diagnostic Trouble Code (DTC) Detecting Criteria.> <Ref. to GD(H6DO)-214, DTC P1494 EGR SOLENOID VALVE SIGNAL #2 CIRCUIT MALFUNCTION (LOW INPUT), Diagnostic Trouble Code (DTC) Detecting Criteria.> <Ref. to GD(H6DO)-214, DTC P1496 EGR SOLENOID VALVE SIGNAL #3 CIRCUIT MALFUNCTION (LOW INPUT), Diagnostic Trouble Code (DTC) Detecting Criteria.> <Ref. to GD(H6DO)-214, DTC P1498 EGR SOLENOID VALVE SIGNAL #4 CIRCUIT MALFUNCTION (LOW INPUT), Diagnostic Trouble Code (DTC) Detecting Criteria.>

#### **TROUBLE SYMPTOM:**

- Improper idling
- Poor driving performance
- Engine breathing

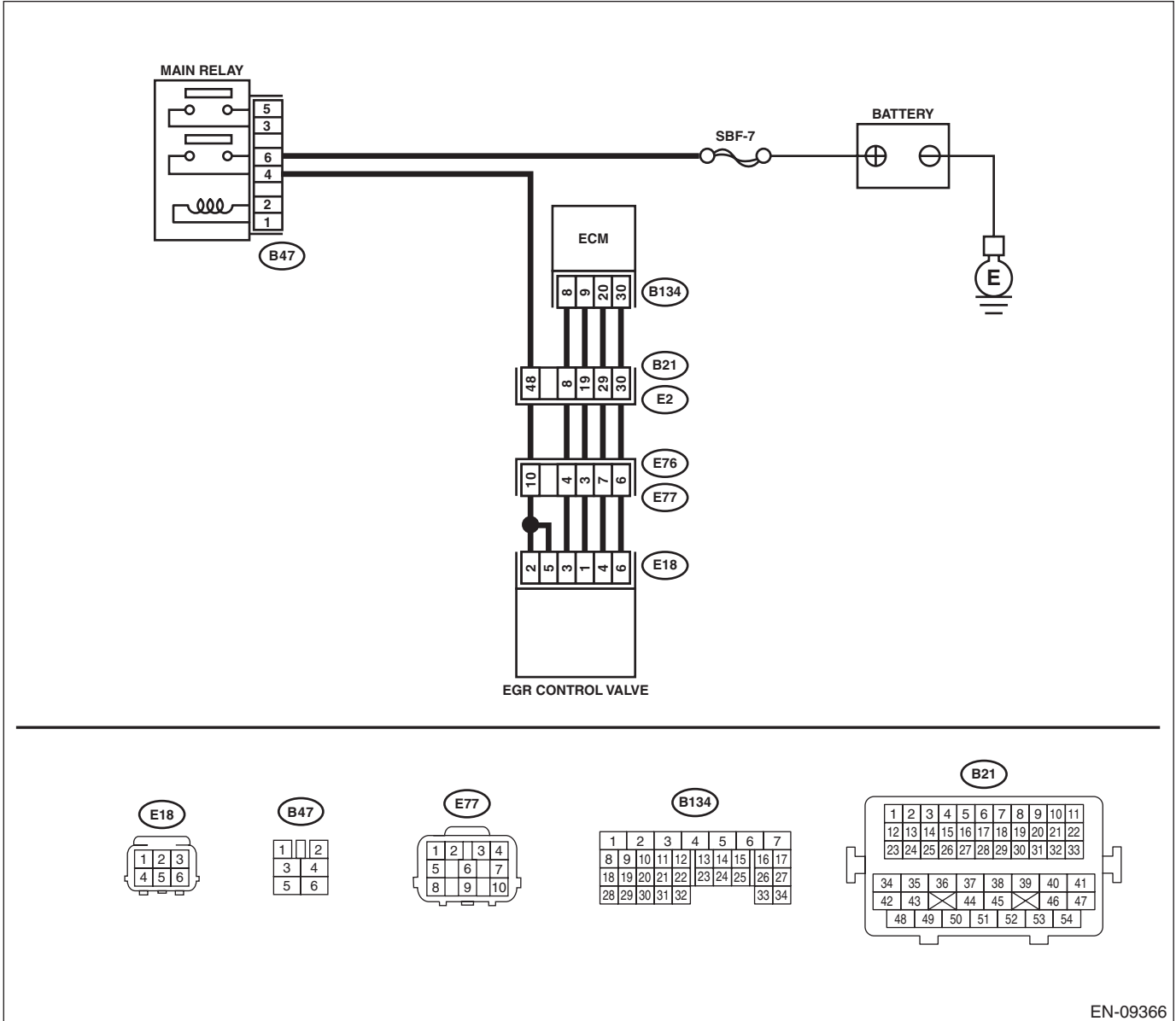
#### **CAUTION:**

**After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.**

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## WIRING DIAGRAM:



EN-09366

Step	Check	Yes	No
<p><b>1</b></p> <p><b>CHECK POWER SUPPLY TO EGR CONTROL VALVE.</b></p> <ol style="list-style-type: none"> <li>1) Turn the ignition switch to OFF.</li> <li>2) Disconnect the connector from the EGR control valve.</li> <li>3) Turn the ignition switch to ON.</li> <li>4) Measure the voltage between EGR control valve connector and engine ground.</li> </ol> <p><b>Connector &amp; terminal</b></p> <p><b>(E18) No. 2 (+) — Engine ground (-):</b></p> <p><b>(E18) No. 5 (+) — Engine ground (-):</b></p>	<p>Is the voltage 10 V or more?</p>	<p>Go to step 2.</p>	<p>Repair the harness and connector.</p> <p><b>NOTE:</b></p> <p>In this case, repair the following item:</p> <ul style="list-style-type: none"> <li>• Open circuit in harness between EGR control valve connector and main relay connector</li> <li>• Poor contact of coupling connector</li> </ul>

## Diagnostic Procedure with Diagnostic Trouble Code (DTC)

### ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<b>2 CHECK HARNESS BETWEEN ECM AND EGR CONTROL VALVE CONNECTOR.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance of harness between ECM and EGR control valve connectors. <b>Connector &amp; terminal</b> <i>DTC P1492; (B134) No. 8 — (E18) No. 3:</i> <i>DTC P1494; (B134) No. 9 — (E18) No. 1:</i> <i>DTC P1496; (B134) No. 20 — (E18) No. 4:</i> <i>DTC P1498; (B134) No. 30 — (E18) No. 6:</i>	Is the resistance less than 1 Ω?	Go to step 3.	Repair the harness and connector.  NOTE: In this case, repair the following item: • Open circuit of harness between ECM and EGR control valve connector • Poor contact of coupling connector
<b>3 CHECK HARNESS BETWEEN ECM AND EGR CONTROL VALVE CONNECTOR.</b> 1) Disconnect the connector from ECM. 2) Measure the resistance between ECM and chassis ground. <b>Connector &amp; terminal</b> <i>DTC P1492; (B134) No. 8 — Chassis ground:</i> <i>DTC P1494; (B134) No. 9 — Chassis ground:</i> <i>DTC P1496; (B134) No. 20 — Chassis ground:</i> <i>DTC P1498; (B134) No. 30 — Chassis ground:</i>	Is the resistance 1 MΩ or more?	Go to step 4.	Repair the ground short in harness between ECM and EGR control valve connector.
<b>4 CHECK FOR POOR CONTACT.</b> Check poor contact of ECM and EGR control valve connectors.	Is there poor contact in ECM or EGR control valve connector?	Repair the poor contact of ECM or EGR control valve connector.	Replace EGR control valve. <Ref. to FU(H6DO)-41, EGR Valve.>



## **EP:DTC P1499 EGR SOLENOID VALVE SIGNAL #4 CIRCUIT MALFUNCTION (HIGH INPUT)**

### **DTC DETECTING CONDITION:**

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-212, DTC P1493 EGR SOLENOID VALVE SIGNAL #1 CIRCUIT MALFUNCTION (HIGH INPUT), Diagnostic Trouble Code (DTC) Detecting Criteria.> <Ref. to GD(H6DO)-214, DTC P1495 EGR SOLENOID VALVE SIGNAL #2 CIRCUIT MALFUNCTION (HIGH INPUT), Diagnostic Trouble Code (DTC) Detecting Criteria.> <Ref. to GD(H6DO)-214, DTC P1497 EGR SOLENOID VALVE SIGNAL #3 CIRCUIT MALFUNCTION (HIGH INPUT), Diagnostic Trouble Code (DTC) Detecting Criteria.> <Ref. to GD(H6DO)-214, DTC P1499 EGR SOLENOID VALVE SIGNAL #4 CIRCUIT MALFUNCTION (HIGH INPUT), Diagnostic Trouble Code (DTC) Detecting Criteria.>

### **TROUBLE SYMPTOM:**

- Improper idling
- Poor driving performance
- Engine breathing

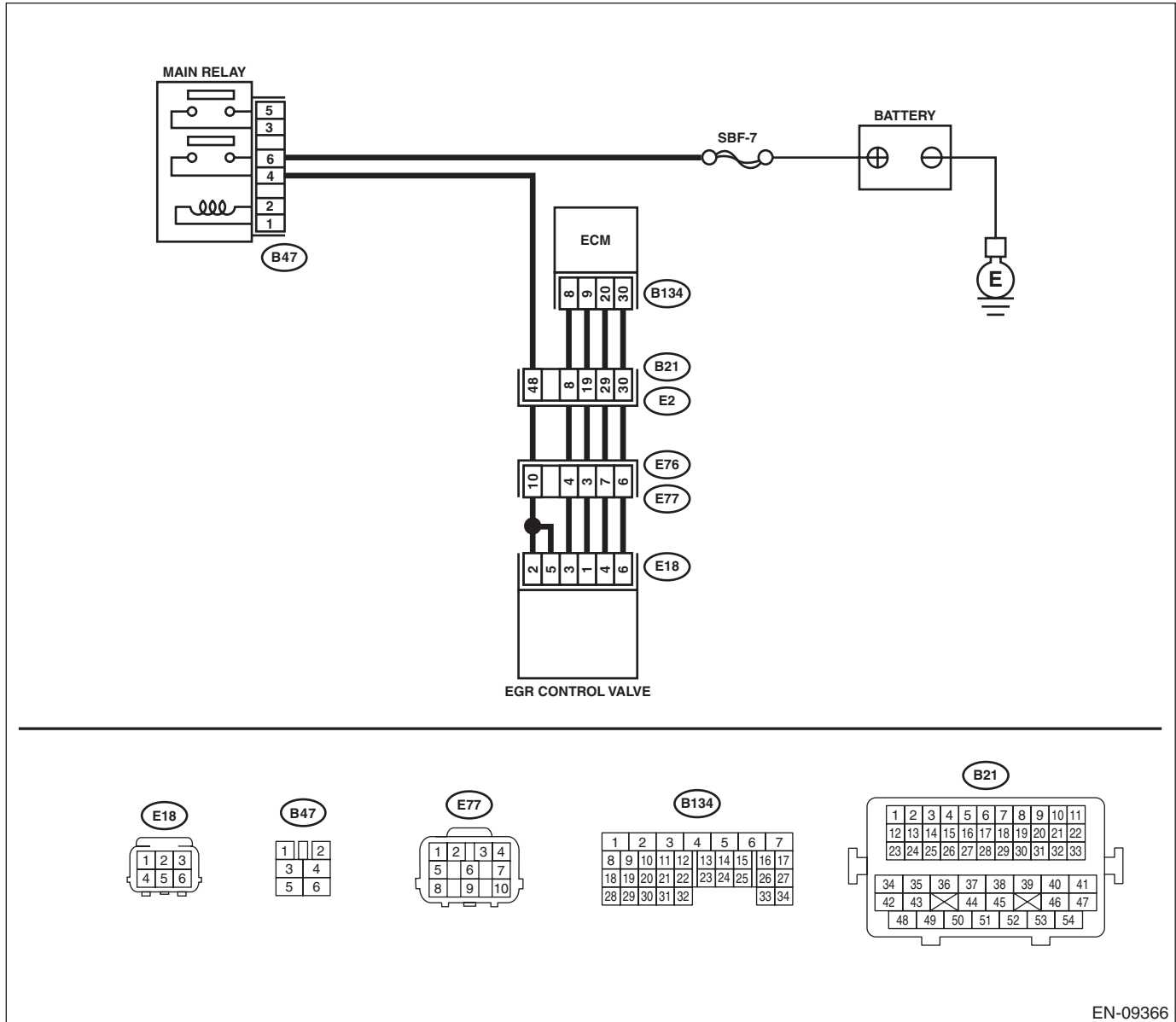
### **CAUTION:**

**After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.**

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## WIRING DIAGRAM:



EN-09366

Step	Check	Yes	No
<p><b>1</b></p> <p><b>CHECK HARNESS BETWEEN ECM AND EGR CONTROL VALVE CONNECTOR.</b></p> <p>1) Turn the ignition switch to OFF.                      2) Disconnect the connector from ECM and EGR control valve.                      3) Turn the ignition switch to ON.                      4) Measure the voltage between ECM and chassis ground.</p> <p><b>Connector &amp; terminal</b>                      DTC P1493; (B134) No. 8 (+) — Chassis ground (-):                      DTC P1495; (B134) No. 9 (+) — Chassis ground (-):                      DTC P1497; (B134) No. 20 (+) — Chassis ground (-):                      DTC P1499; (B134) No. 30 (+) — Chassis ground (-):</p>	<p>Is the voltage 10 V or more?</p>	<p>Repair the short circuit to power in the harness between the ECM and EGR control valve connector.</p>	<p>Go to step 2.</p>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<b>2</b> <b>CHECK EGR CONTROL VALVE.</b> Measure the resistance between EGR control valve terminals. <b>Terminals</b> <b>DTC P1493; No. 2 — No. 3:</b> <b>DTC P1495; No. 2 — No. 1:</b> <b>DTC P1497; No. 5 — No. 4:</b> <b>DTC P1499; No. 5 — No. 6:</b>	Is the resistance 20 Ω or more?	Repair the poor contact of ECM connector.	Replace EGR control valve. <Ref. to FU(H6DO)-41, EGR Valve.>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## EQ:DTC P1518 STARTER SWITCH CIRCUIT LOW INPUT

### DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-215, DTC P1518 STARTER SWITCH CIRCUIT LOW INPUT, Diagnostic Trouble Code (DTC) Detecting Criteria.>

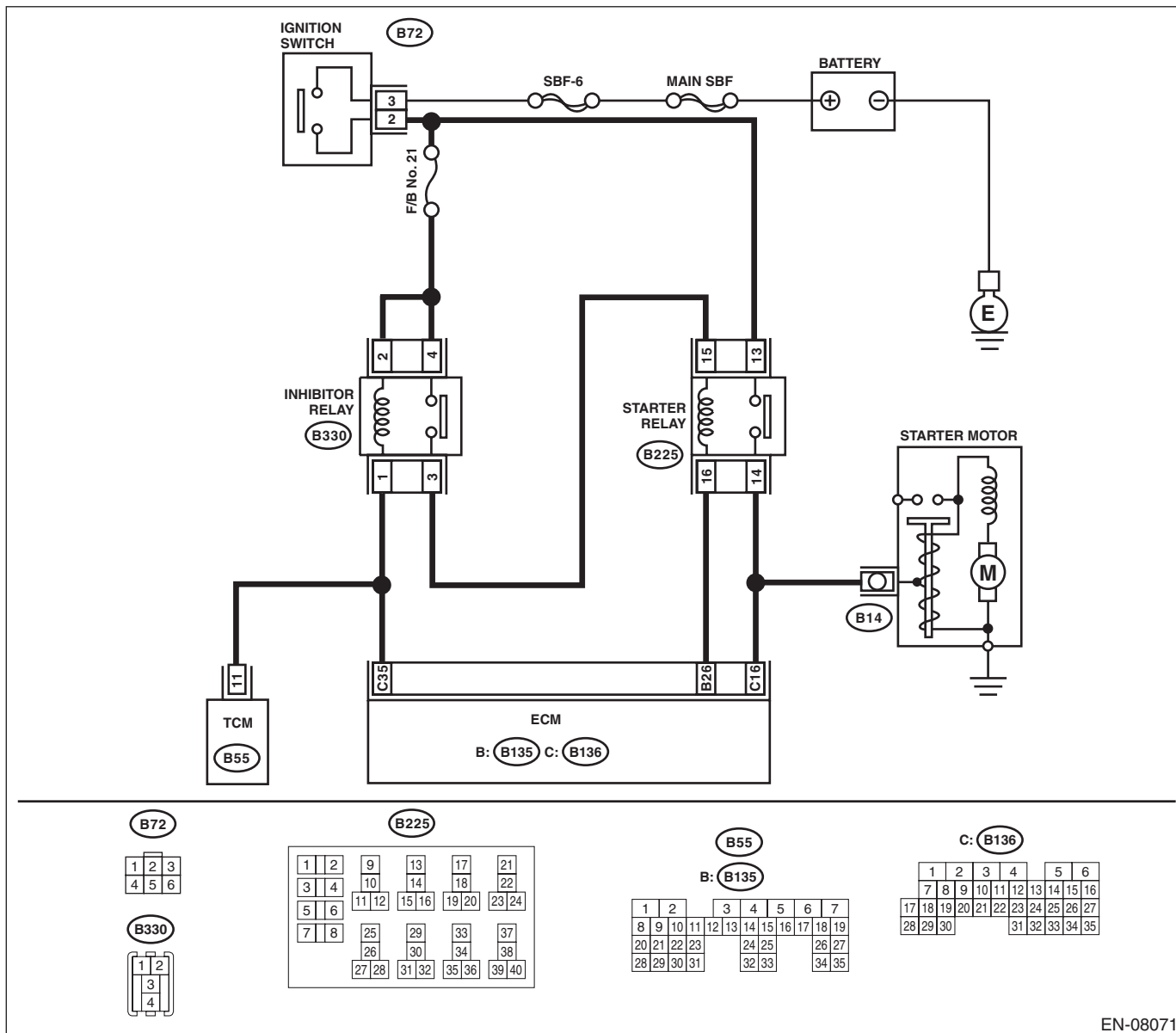
### TROUBLE SYMPTOM:

Failure of engine to start

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

### WIRING DIAGRAM:



EN-08071

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

	Step	Check	Yes	No
1	<b>CHECK FOR ANY OTHER DTC ON DISPLAY.</b>	Is any other DTC displayed?	Check DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6DO)(diag)-84, List of Diagnostic Trouble Code (DTC).>	Go to step 2.
2	<b>CHECK HARNESS BETWEEN ECM AND STARTER RELAY CONNECTOR.</b> 1) Turn the ignition switch to OFF. 2) Remove the starter relay. 3) Disconnect the connectors from ECM and starter motor. 4) Measure the resistance of harness between ECM and starter relay connector. <b>Connector &amp; terminal</b> <b>(B136) No. 16 — (B225) No. 14:</b>	Is the resistance less than 1 Ω?	Go to step 3.	Repair the open circuit of harness between ECM and starter relay connector.
3	<b>CHECK HARNESS BETWEEN ECM AND STARTER RELAY CONNECTOR.</b> Measure the resistance between ECM and chassis ground. <b>Connector &amp; terminal</b> <b>(B136) No. 16 — Chassis ground:</b>	Is the resistance 1 MΩ or more?	Repair the poor contact of ECM connector.	Repair the short circuit to ground in harness between ECM and starter relay connector.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## ER:DTC P1560 BACK-UP VOLTAGE CIRCUIT MALFUNCTION

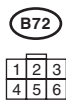
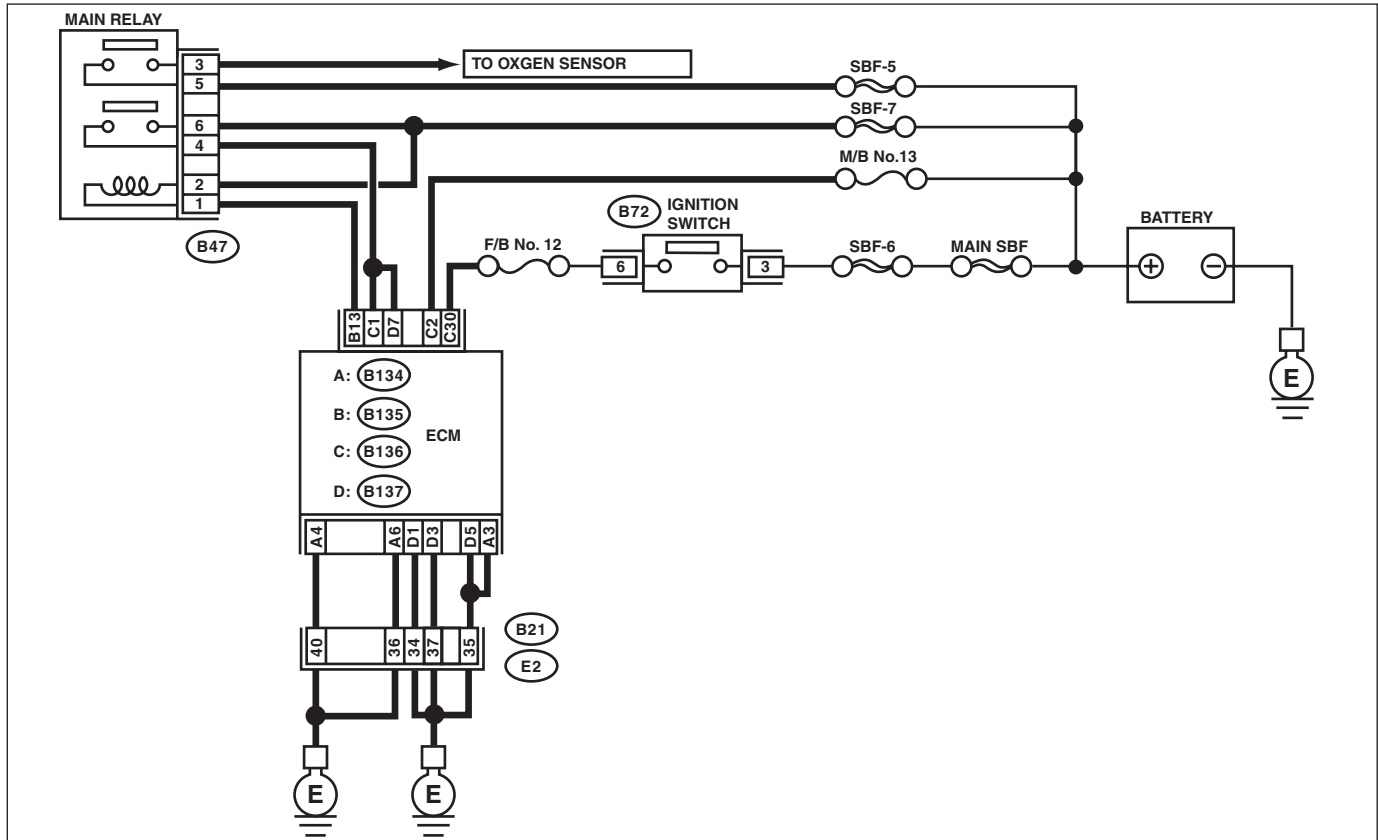
### DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-216, DTC P1560 BACK-UP VOLTAGE CIRCUIT MALFUNCTION, Diagnostic Trouble Code (DTC) Detecting Criteria.>

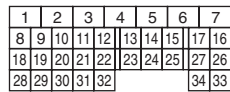
### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

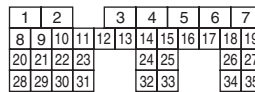
### WIRING DIAGRAM:



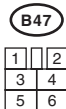
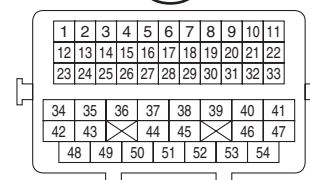
A: B134



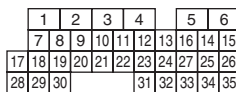
B: B135



B21



C: B136



D: B137



EN-08072

Step	Check	Yes	No
<b>1</b> <b>CHECK INPUT SIGNAL OF ECM.</b> 1) Turn the ignition switch to OFF. 2) Measure the voltage between ECM and chassis ground. <i>Connector &amp; terminal</i> <i>(B136) No. 2 (+) — Chassis ground (-):</i>	Is the voltage 10 V or more?	Repair the poor contact of ECM connector.	Go to step 2.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<b>2</b> <b>CHECK HARNESS BETWEEN ECM AND MAIN FUSE BOX CONNECTOR.</b> 1) Disconnect the connectors from ECM. 2) Measure the resistance between ECM and chassis ground. <b>Connector &amp; terminal</b> <b>(B136) No. 2 — Chassis ground:</b>	Is the resistance 1 MΩ or more?	Go to step 3.	Repair the ground short circuit of harness between ECM and battery terminal.
<b>3</b> <b>CHECK M/B FUSE NO. 13.</b>	Is the fuse blown out?	Replace the fuse.	Repair the harness and connector. NOTE: In this case, repair the following item: <ul style="list-style-type: none"><li>• Open circuit in harness between ECM and battery</li><li>• Poor contact of ECM connector</li><li>• Poor contact of battery terminal</li></ul>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## ES:DTC P2088 INTAKE CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT LOW (BANK 1)

### DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-218, DTC P2088 INTAKE CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT LOW (BANK 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

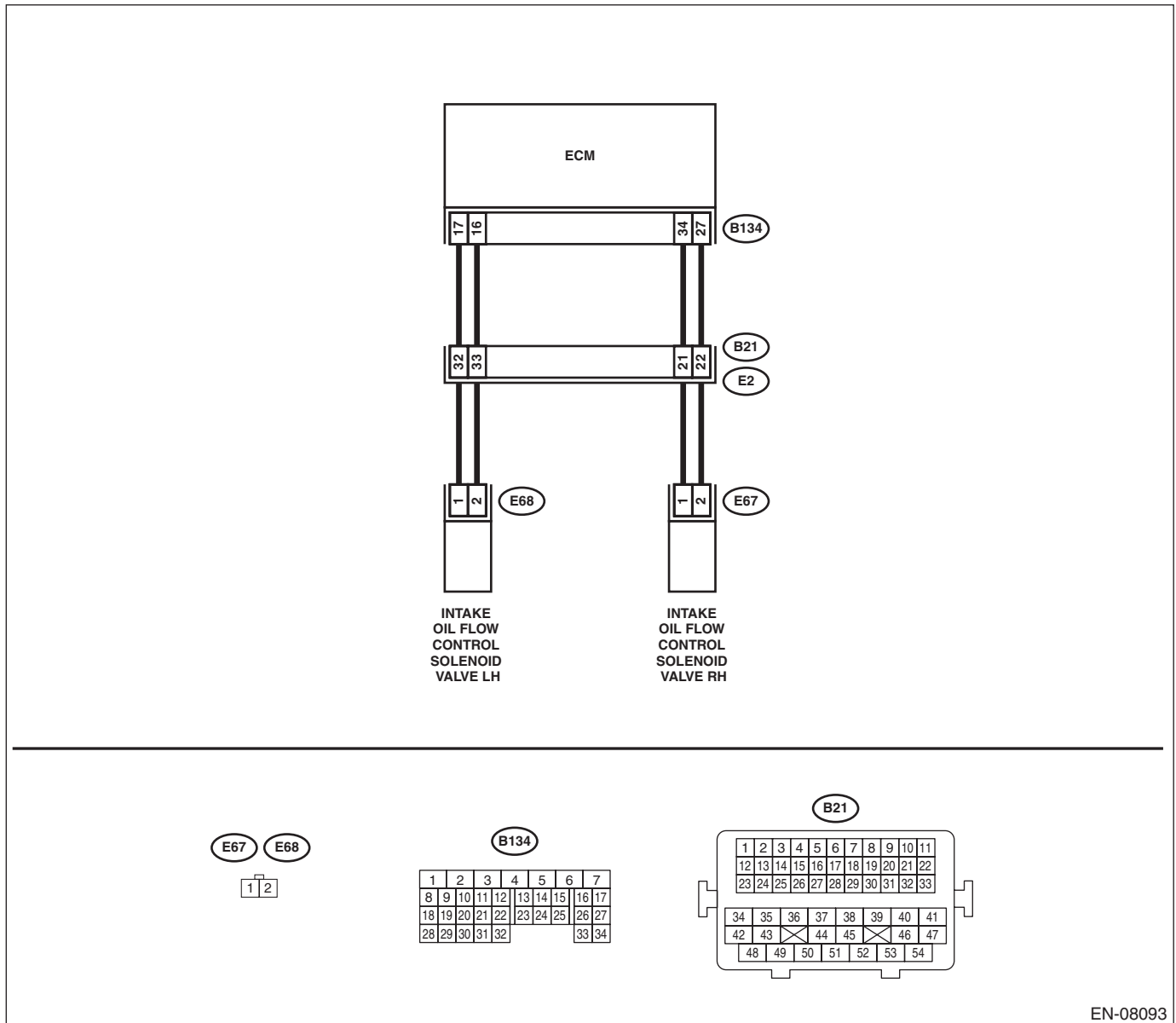
### TROUBLE SYMPTOM:

Improper idling

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

### WIRING DIAGRAM:



EN-08093



# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<p><b>1</b>    <b>CHECK HARNESS BETWEEN ECM AND OIL FLOW CONTROL SOLENOID VALVE RH CONNECTOR.</b>            1) Turn the ignition switch to OFF.            2) Disconnect the connectors from ECM and oil flow control solenoid valve RH.            3) Measure the resistance of harness between ECM and oil flow control solenoid valve RH connector.  <b>Connector &amp; terminal</b>  <b>(B134) No. 34 — (E67) No. 1:</b>  <b>(B134) No. 27 — (E67) No. 2:</b></p>	<p>Is the resistance less than 1 Ω?</p>	<p>Go to step 2.</p>	<p>Repair the harness and connector.  <b>NOTE:</b>            In this case, repair the following item:            • Open circuit in harness between ECM and oil flow control solenoid valve RH connector            • Poor contact of coupling connector</p>
<p><b>2</b>    <b>CHECK HARNESS BETWEEN ECM AND OIL FLOW CONTROL SOLENOID VALVE RH CONNECTOR.</b>            Measure the resistance between ECM and chassis ground.  <b>Connector &amp; terminal</b>  <b>(B134) No. 34 — Chassis ground:</b>  <b>(B134) No. 27 — Chassis ground:</b></p>	<p>Is the resistance 1 MΩ or more?</p>	<p>Go to step 3.</p>	<p>Repair the short circuit to ground in harness between ECM and oil flow control solenoid valve RH connector.</p>
<p><b>3</b>    <b>CHECK OIL FLOW CONTROL SOLENOID VALVE.</b>            Measure the resistance between oil flow control solenoid valve terminals.  <b>Terminals</b>  <b>No. 1 — No. 2:</b></p>	<p>Is the resistance 6 — 12 Ω?</p>	<p>Repair the poor contact of ECM and oil flow control solenoid valve RH connector RH.</p>	<p>Replace the oil flow control solenoid valve RH.            &lt;Ref. to FU(H6DO)-45, Oil Flow Control Solenoid Valve.&gt;</p>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## ET:DTC P2089 INTAKE CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT HIGH (BANK 1)

### DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-219, DTC P2089 INTAKE CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT HIGH (BANK 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

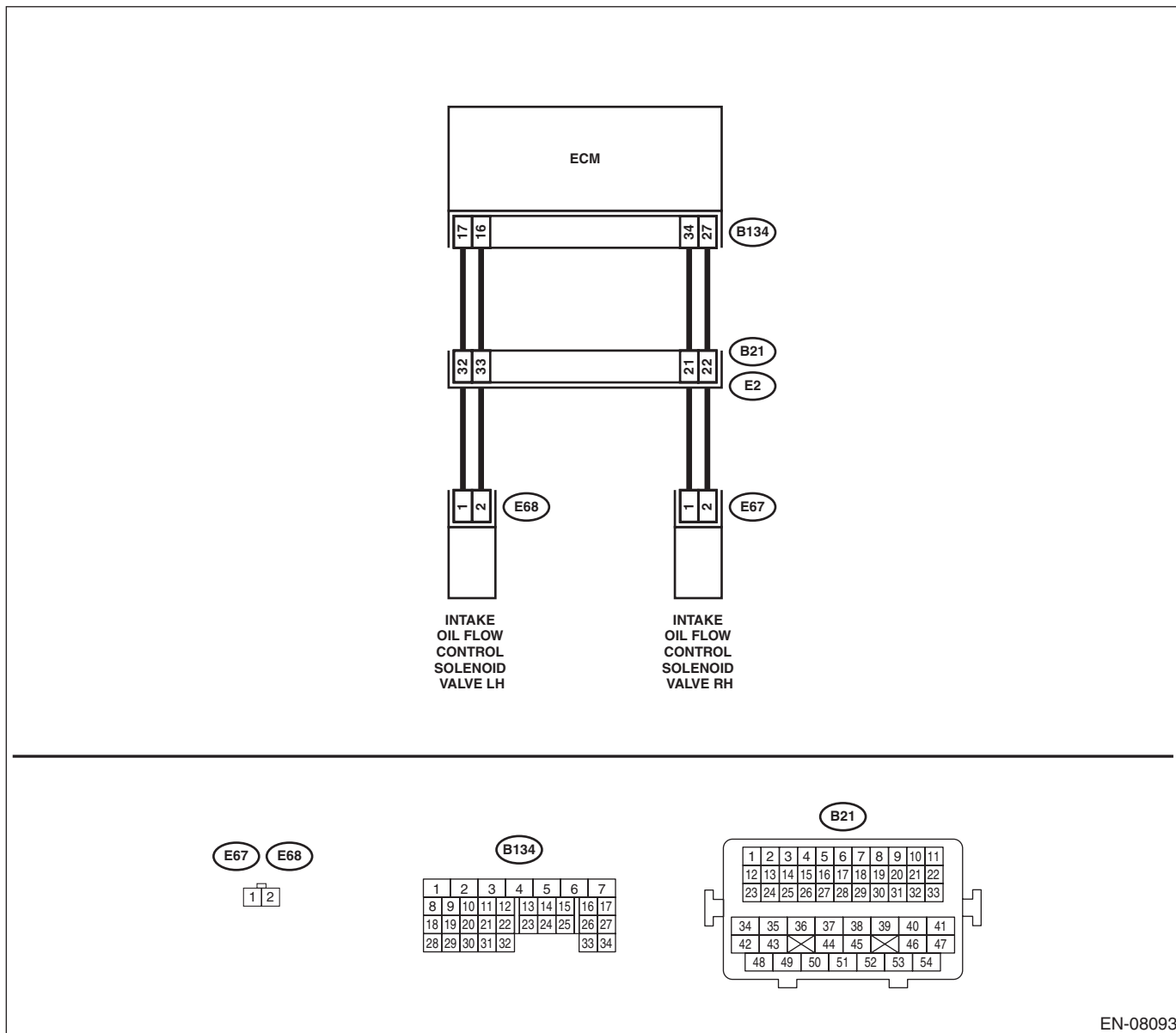
### TROUBLE SYMPTOM:

Improper idling

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

### WIRING DIAGRAM:



EN-08093

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<p><b>1</b></p> <p><b>CHECK HARNESS BETWEEN ECM AND OIL FLOW CONTROL SOLENOID VALVE RH CONNECTOR.</b></p> <p>1) Turn the ignition switch to OFF.                      2) Disconnect the connectors from ECM and oil flow control solenoid valve RH.                      3) Measure the voltage between ECM and chassis ground.</p> <p><b>Connector &amp; terminal</b>                      (B134) No. 34 (+) — Chassis ground (-):                      (B134) No. 27 (+) — Chassis ground (-):</p>	Is the voltage less than 1 V?	Go to step 2.	Repair the short circuit to power supply in harness between ECM and oil flow control solenoid valve RH connector.
<p><b>2</b></p> <p><b>CHECK HARNESS BETWEEN ECM AND OIL FLOW CONTROL SOLENOID VALVE RH CONNECTOR.</b></p> <p>Measure the resistance of harness between ECM and oil flow control solenoid valve RH connector.</p> <p><b>Connector &amp; terminal</b>                      (B134) No. 34 — (E67) No. 1:                      (B134) No. 27 — (E67) No. 2:</p>	Is the resistance less than 1 Ω?	Go to step 3.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit in harness between ECM and oil flow control solenoid valve RH connector • Poor contact of coupling connector
<p><b>3</b></p> <p><b>CHECK OIL FLOW CONTROL SOLENOID VALVE.</b></p> <p>Measure the resistance between oil flow control solenoid valve terminals.</p> <p><b>Terminals</b>                      No. 1 — No. 2:</p>	Is the resistance 6 — 12 Ω?	Repair the poor contact of ECM and oil flow control solenoid valve RH connector RH.	Replace the oil flow control solenoid valve RH. <Ref. to FU(H6DO)-45, Oil Flow Control Solenoid Valve.>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## EU:DTC P2090 EXHAUST CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT LOW (BANK 1)

### DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-220, DTC P2090 EXHAUST CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT LOW (BANK 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

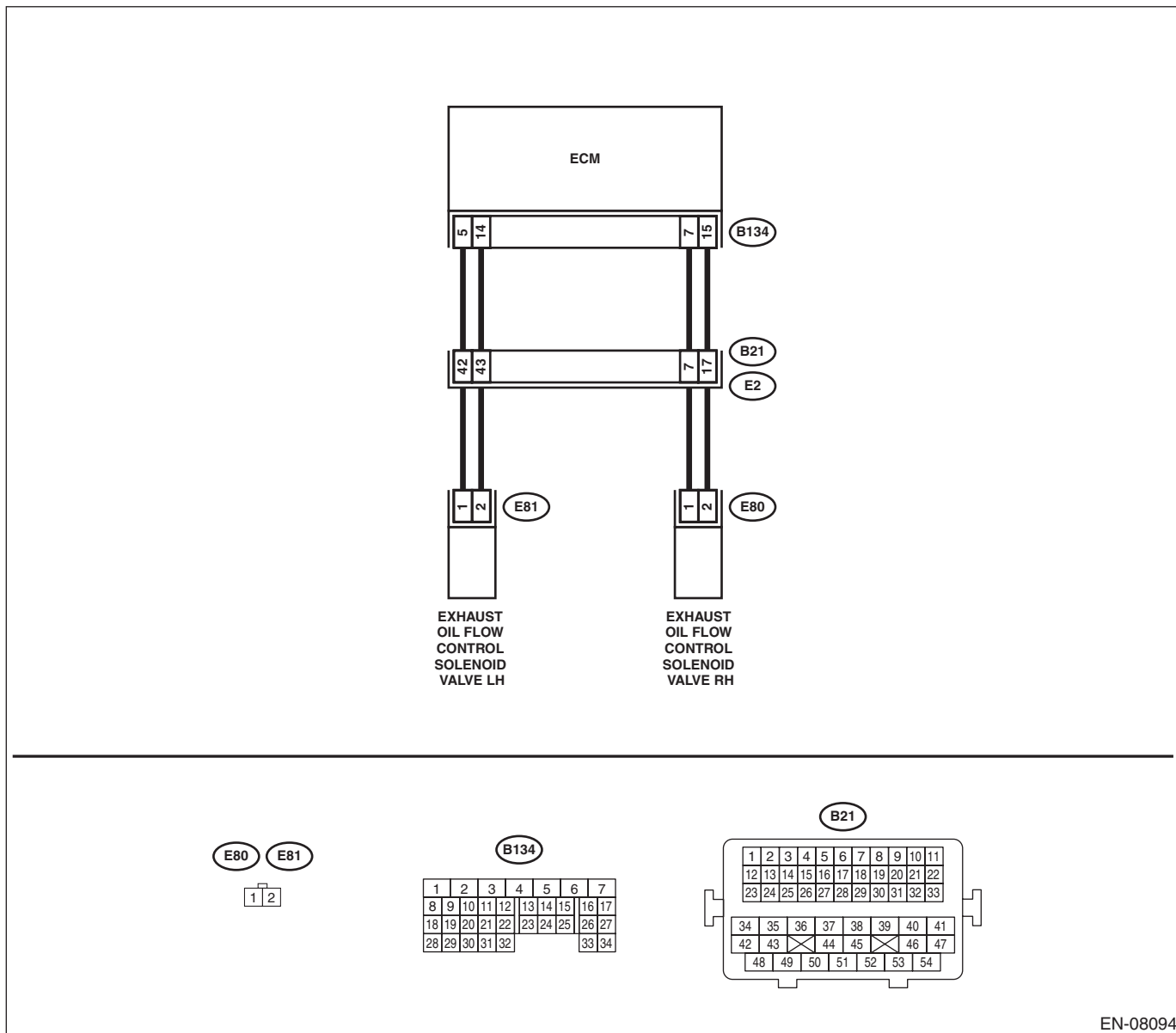
### TROUBLE SYMPTOM:

Improper idling

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

### WIRING DIAGRAM:



EN-08094

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<p><b>1</b>     <b>CHECK HARNESS BETWEEN ECM AND OIL FLOW CONTROL SOLENOID VALVE RH CONNECTOR.</b></p> <p>1) Turn the ignition switch to OFF.                      2) Disconnect the connectors from ECM and oil flow control solenoid valve RH.                      3) Measure the resistance of harness between ECM and oil flow control solenoid valve RH connector.</p> <p><b>Connector &amp; terminal</b>  <b>(B134) No. 7 — (E80) No. 1:</b>  <b>(B134) No. 15 — (E80) No. 2:</b></p>	Is the resistance less than 1 Ω?	Go to step 2.	Repair the harness and connector.  NOTE: In this case, repair the following item: • Open circuit in harness between ECM and oil flow control solenoid valve RH connector • Poor contact of coupling connector
<p><b>2</b>     <b>CHECK HARNESS BETWEEN ECM AND OIL FLOW CONTROL SOLENOID VALVE RH CONNECTOR.</b></p> <p>Measure the resistance between ECM and chassis ground.</p> <p><b>Connector &amp; terminal</b>  <b>(B134) No. 7 — Chassis ground:</b>  <b>(B134) No. 15 — Chassis ground:</b></p>	Is the resistance 1 MΩ or more?	Go to step 3.	Repair the short circuit to ground in harness between ECM and oil flow control solenoid valve RH connector.
<p><b>3</b>     <b>CHECK OIL FLOW CONTROL SOLENOID VALVE.</b></p> <p>Measure the resistance between oil flow control solenoid valve terminals.</p> <p><b>Terminals</b>  <b>No. 1 — No. 2:</b></p>	Is the resistance 6 — 12 Ω?	Repair the poor contact of ECM and oil flow control solenoid valve RH connector RH.	Replace the oil flow control solenoid valve RH. <Ref. to FU(H6DO)-45, Oil Flow Control Solenoid Valve.>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## EV:DTC P2091 EXHAUST CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT HIGH (BANK 1)

### DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-221, DTC P2091 EXHAUST CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT HIGH (BANK 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

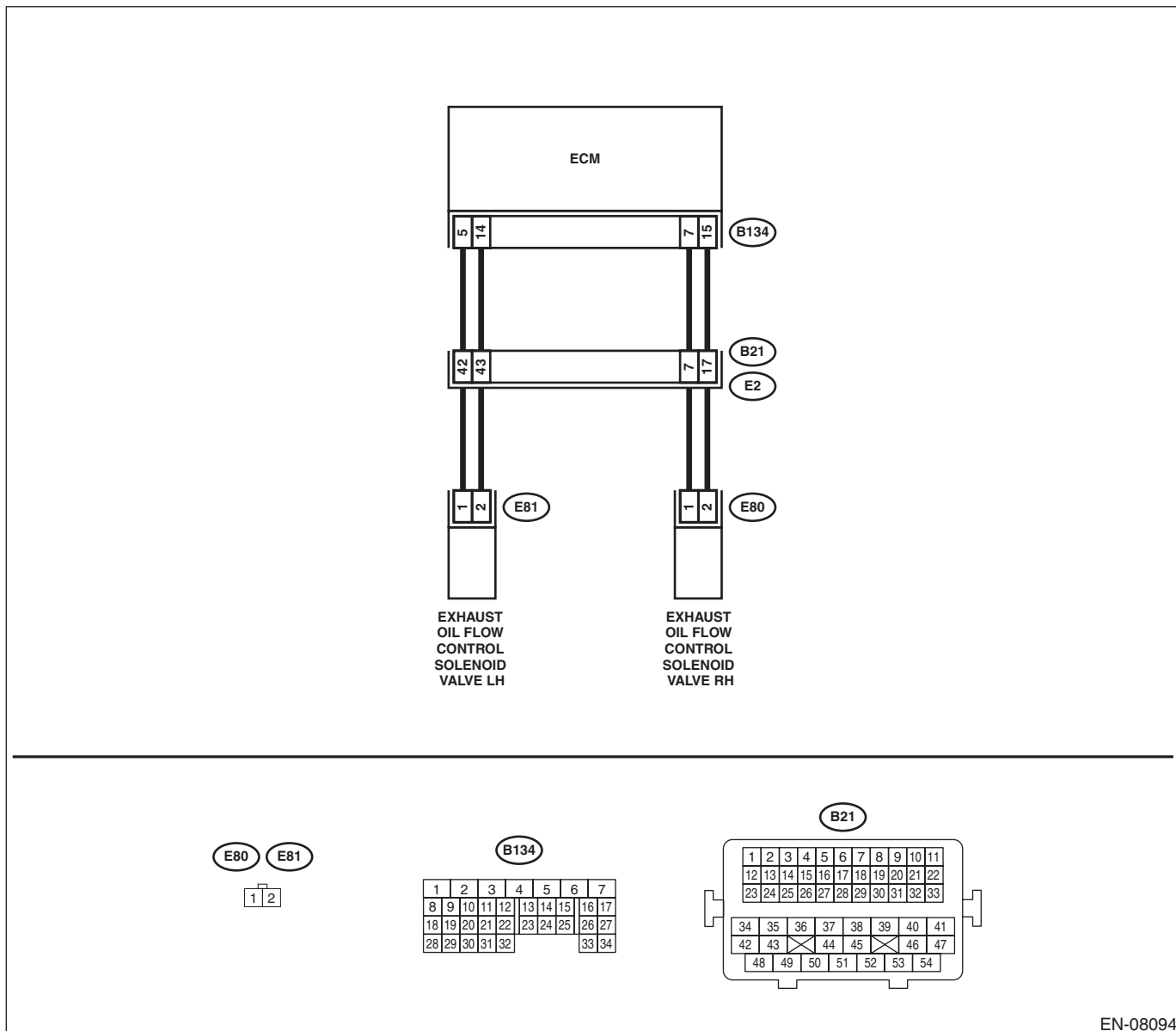
### TROUBLE SYMPTOM:

Improper idling

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

### WIRING DIAGRAM:



EN-08094

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<p><b>1</b>     <b>CHECK HARNESS BETWEEN ECM AND OIL FLOW CONTROL SOLENOID VALVE RH CONNECTOR.</b>            1) Turn the ignition switch to OFF.            2) Disconnect the connectors from ECM and oil flow control solenoid valve RH.            3) Measure the voltage between ECM and chassis ground.  <b>Connector &amp; terminal</b>  <b>(B134) No. 7 (+) — Chassis ground (-):</b>  <b>(B134) No. 15 (+) — Chassis ground (-):</b></p>	<p>Is the voltage less than 1 V?</p>	<p>Go to step 2.</p>	<p>Repair the short circuit to power supply in harness between ECM and oil flow control solenoid valve RH connector.</p>
<p><b>2</b>     <b>CHECK HARNESS BETWEEN ECM AND OIL FLOW CONTROL SOLENOID VALVE RH CONNECTOR.</b>            Measure the resistance of harness between ECM and oil flow control solenoid valve RH connector.  <b>Connector &amp; terminal</b>  <b>(B134) No. 7 — (E80) No. 1:</b>  <b>(B134) No. 15 — (E80) No. 2:</b></p>	<p>Is the resistance less than 1 Ω?</p>	<p>Go to step 3.</p>	<p>Repair the harness and connector.  <b>NOTE:</b>            In this case, repair the following item:            • Open circuit in harness between ECM and oil flow control solenoid valve RH connector            • Poor contact of coupling connector</p>
<p><b>3</b>     <b>CHECK OIL FLOW CONTROL SOLENOID VALVE.</b>            Measure the resistance between oil flow control solenoid valve terminals.  <b>Terminals</b>  <b>No. 1 — No. 2:</b></p>	<p>Is the resistance 6 — 12 Ω?</p>	<p>Repair the poor contact of ECM and oil flow control solenoid valve RH connector RH.</p>	<p>Replace the oil flow control solenoid valve RH.            &lt;Ref. to FU(H6DO)-45, Oil Flow Control Solenoid Valve.&gt;</p>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## EW:DTC P2092 INTAKE CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT LOW (BANK 2)

### DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-222, DTC P2092 INTAKE CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT LOW (BANK 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>

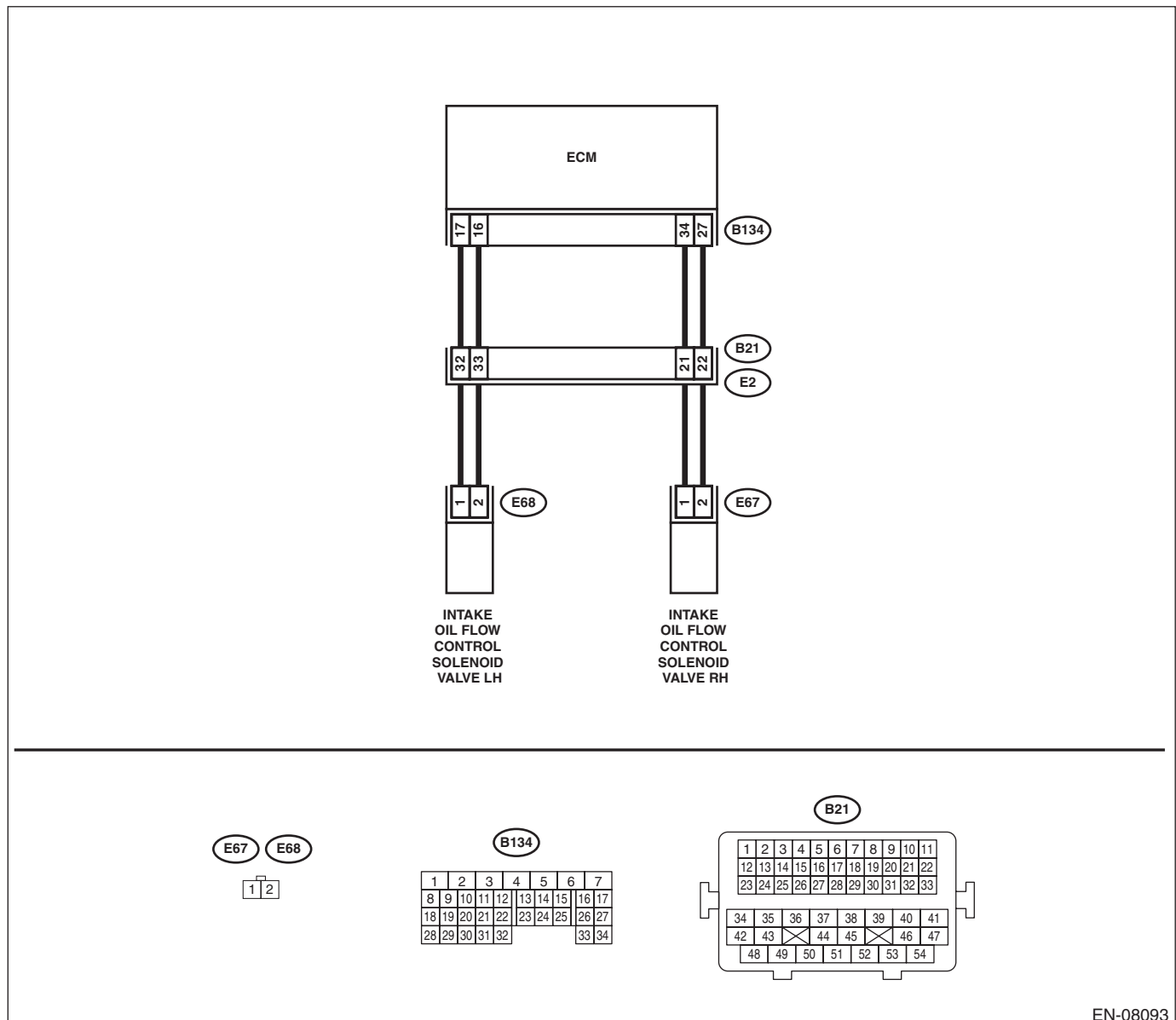
### TROUBLE SYMPTOM:

Improper idling

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

### WIRING DIAGRAM:



EN-08093



# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

	Step	Check	Yes	No
1	<p><b>CHECK HARNESS BETWEEN ECM AND OIL FLOW CONTROL SOLENOID VALVE LH CONNECTOR.</b></p> <p>1) Turn the ignition switch to OFF.                      2) Disconnect the connectors from ECM and oil flow control solenoid valve LH.                      3) Measure the resistance of harness between ECM and oil flow control solenoid valve LH connector.</p> <p><b>Connector &amp; terminal</b>                      (B134) No. 17 — (E68) No. 1:                      (B134) No. 16 — (E68) No. 2:</p>	Is the resistance less than 1 Ω?	Go to step 2.	<p>Repair the harness and connector.</p> <p>NOTE:                      In this case, repair the following item:</p> <ul style="list-style-type: none"> <li>• Open circuit in harness between ECM and oil flow control solenoid valve RH connector</li> <li>• Poor contact of coupling connector</li> </ul>
2	<p><b>CHECK HARNESS BETWEEN ECM AND OIL FLOW CONTROL SOLENOID VALVE LH CONNECTOR.</b></p> <p>Measure the resistance between ECM and chassis ground.</p> <p><b>Connector &amp; terminal</b>                      (B134) No. 17 — Chassis ground:                      (B134) No. 16 — Chassis ground:</p>	Is the resistance 1 MΩ or more?	Go to step 3.	Repair the short circuit to ground in harness between ECM and oil flow control solenoid valve LH connector.
3	<p><b>CHECK OIL FLOW CONTROL SOLENOID VALVE.</b></p> <p>Measure the resistance between oil flow control solenoid valve terminals.</p> <p><b>Terminals</b>                      No. 1 — No. 2:</p>	Is the resistance 6 — 12 Ω?	Repair the poor contact of ECM and oil flow control solenoid valve LH connector.	Replace the oil flow control solenoid valve LH. <Ref. to FU(H6DO)-45, Oil Flow Control Solenoid Valve.>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## EX:DTC P2093 INTAKE CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT HIGH (BANK 2)

### DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-222, DTC P2093 INTAKE CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT HIGH (BANK 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>

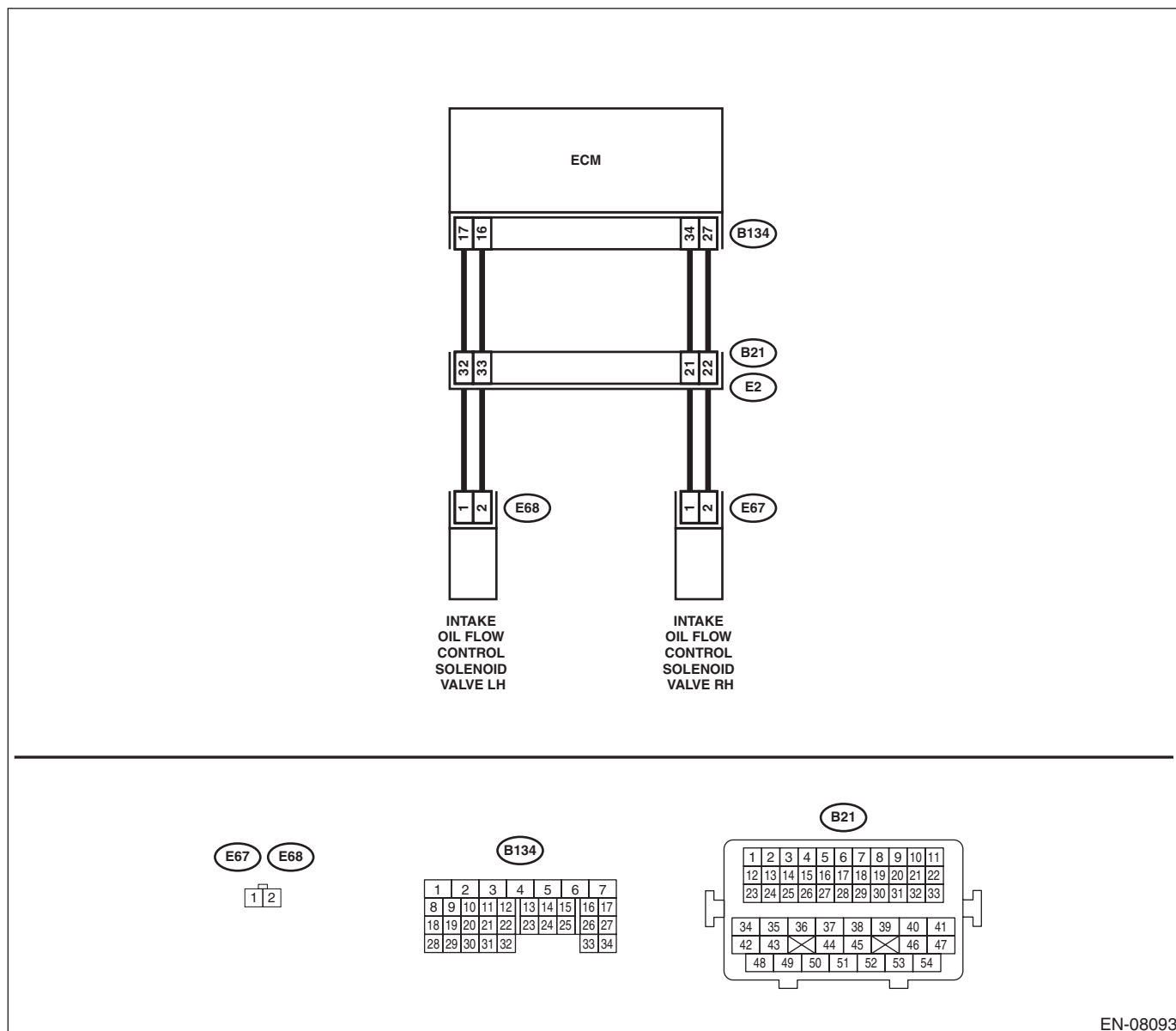
### TROUBLE SYMPTOM:

Improper idling

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

### WIRING DIAGRAM:



EN-08093

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<p><b>1</b>     <b>CHECK HARNESS BETWEEN ECM AND OIL FLOW CONTROL SOLENOID VALVE LH CONNECTOR.</b>            1) Turn the ignition switch to OFF.            2) Disconnect the connectors from ECM and oil flow control solenoid valve LH.            3) Measure the voltage between ECM and chassis ground.  <b>Connector &amp; terminal</b>  <b>(B134) No. 17 (+) — Chassis ground (-):</b>  <b>(B134) No. 16 (+) — Chassis ground (-):</b></p>	<p>Is the voltage less than 1 V?</p>	<p>Go to step 2.</p>	<p>Repair the short circuit to power supply in harness between ECM and oil flow control solenoid valve LH connector.</p>
<p><b>2</b>     <b>CHECK HARNESS BETWEEN ECM AND OIL FLOW CONTROL SOLENOID VALVE LH CONNECTOR.</b>            Measure the resistance of harness between ECM and oil flow control solenoid valve LH connector.  <b>Connector &amp; terminal</b>  <b>(B134) No. 17 — (E68) No. 1:</b>  <b>(B134) No. 16 — (E68) No. 2:</b></p>	<p>Is the resistance less than 1 Ω?</p>	<p>Go to step 3.</p>	<p>Repair the harness and connector.            NOTE:            In this case, repair the following item:            • Open circuit in harness between ECM and oil flow control solenoid valve RH connector            • Poor contact of coupling connector</p>
<p><b>3</b>     <b>CHECK OIL FLOW CONTROL SOLENOID VALVE.</b>            Measure the resistance between oil flow control solenoid valve terminals.  <b>Terminals</b>  <b>No. 1 — No. 2:</b></p>	<p>Is the resistance 6 — 12 Ω?</p>	<p>Repair the poor contact of ECM and oil flow control solenoid valve LH connector.</p>	<p>Replace the oil flow control solenoid valve LH.            &lt;Ref. to FU(H6DO)-45, Oil Flow Control Solenoid Valve.&gt;</p>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## EY:DTC P2094 EXHAUST CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT LOW (BANK 2)

### DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-222, DTC P2094 EXHAUST CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT LOW (BANK 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>

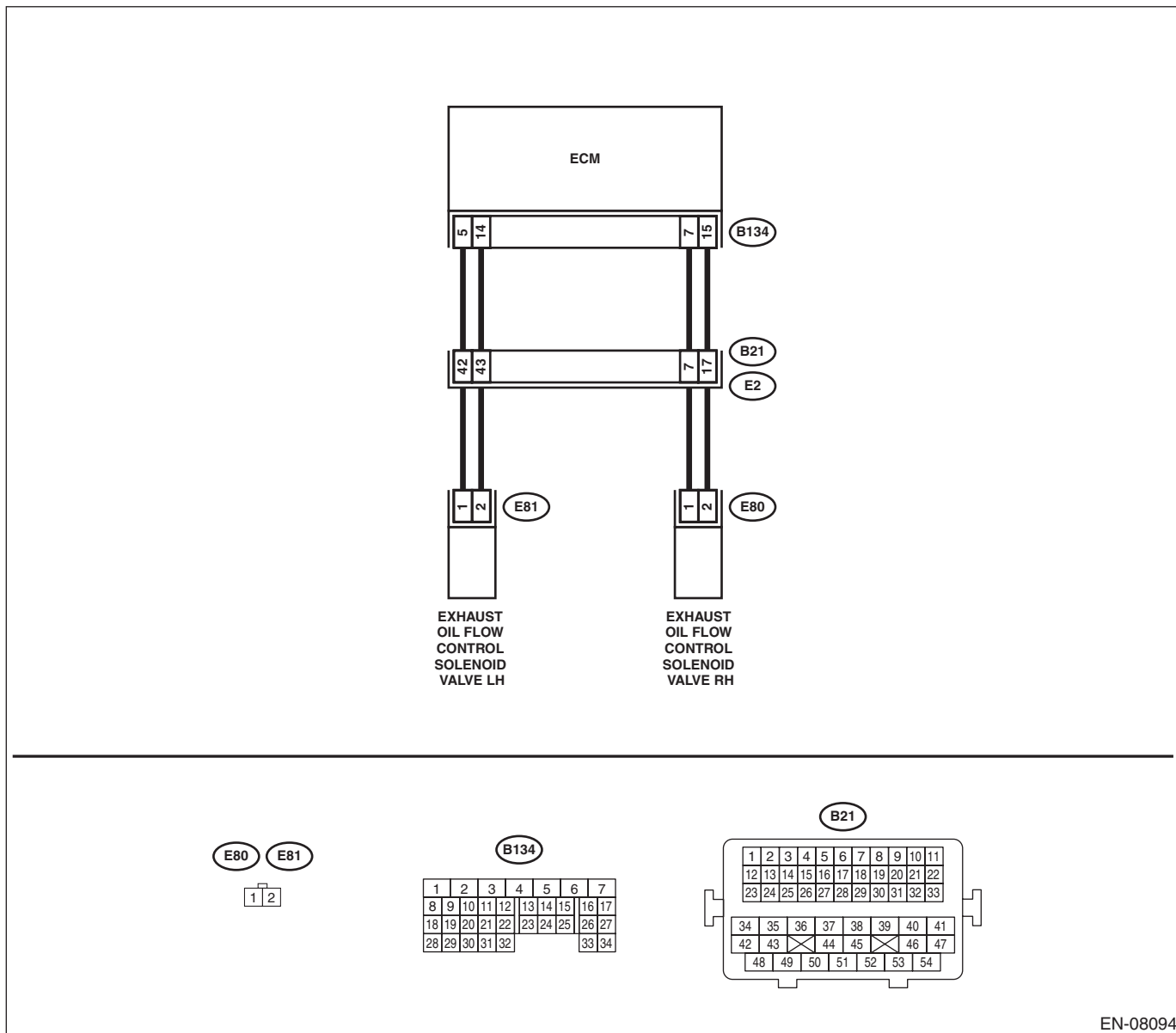
### TROUBLE SYMPTOM:

Improper idling

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

### WIRING DIAGRAM:



EN-08094

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

	Step	Check	Yes	No
1	<p><b>CHECK HARNESS BETWEEN ECM AND OIL FLOW CONTROL SOLENOID VALVE LH CONNECTOR.</b></p> <p>1) Turn the ignition switch to OFF.                      2) Disconnect the connectors from ECM and oil flow control solenoid valve LH.                      3) Measure the resistance of harness between ECM and oil flow control solenoid valve LH connector.</p> <p><b>Connector &amp; terminal</b>  <b>(B134) No. 5 — (E81) No. 1:</b>  <b>(B134) No. 14 — (E81) No. 2:</b></p>	Is the resistance less than 1 Ω?	Go to step 2.	Repair the harness and connector.  NOTE: In this case, repair the following item: • Open circuit in harness between ECM and oil flow control solenoid valve RH connector • Poor contact of coupling connector
2	<p><b>CHECK HARNESS BETWEEN ECM AND OIL FLOW CONTROL SOLENOID VALVE LH CONNECTOR.</b></p> <p>Measure the resistance between ECM and chassis ground.</p> <p><b>Connector &amp; terminal</b>  <b>(B134) No. 5 — Chassis ground:</b>  <b>(B134) No. 14 — Chassis ground:</b></p>	Is the resistance 1 MΩ or more?	Go to step 3.	Repair the short circuit to ground in harness between ECM and oil flow control solenoid valve LH connector.
3	<p><b>CHECK OIL FLOW CONTROL SOLENOID VALVE.</b></p> <p>Measure the resistance between oil flow control solenoid valve terminals.</p> <p><b>Terminals</b>  <b>No. 1 — No. 2:</b></p>	Is the resistance 6 — 12 Ω?	Repair the poor contact of ECM and oil flow control solenoid valve LH connector.	Replace the oil flow control solenoid valve LH. <Ref. to FU(H6DO)-45, Oil Flow Control Solenoid Valve.>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## EZ:DTC P2095 EXHAUST CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT HIGH (BANK 2)

### DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-222, DTC P2095 EXHAUST CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT HIGH (BANK 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>

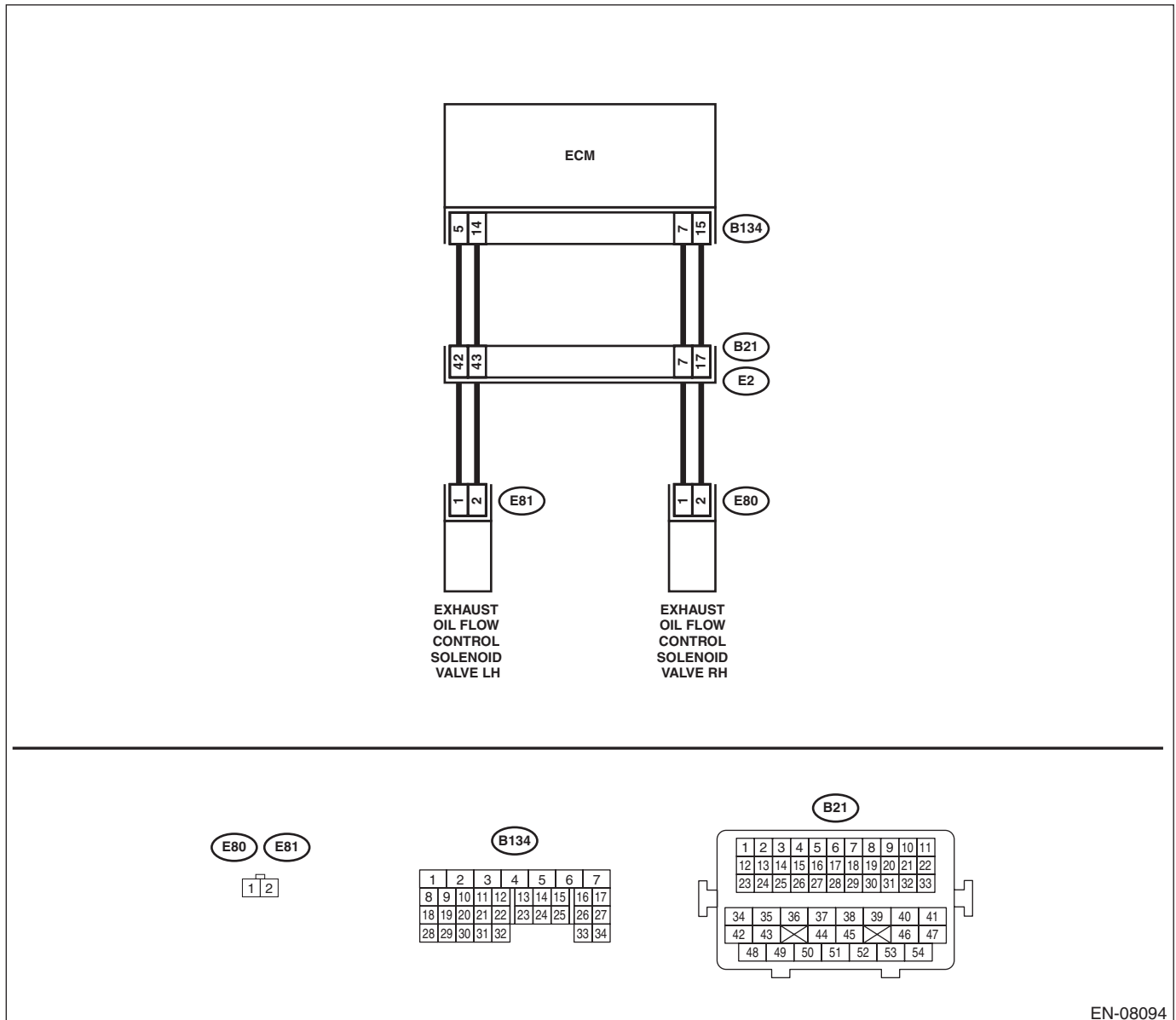
### TROUBLE SYMPTOM:

Improper idling

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

### WIRING DIAGRAM:



EN-08094

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<p><b>1</b>     <b>CHECK HARNESS BETWEEN ECM AND OIL FLOW CONTROL SOLENOID VALVE LH CONNECTOR.</b>            1) Turn the ignition switch to OFF.            2) Disconnect the connectors from ECM and oil flow control solenoid valve LH.            3) Measure the voltage between ECM and chassis ground.  <b>Connector &amp; terminal</b>  <b>(B134) No. 5 (+) — Chassis ground (-):</b>  <b>(B134) No. 14 (+) — Chassis ground (-):</b></p>	<p>Is the voltage less than 1 V?</p>	<p>Go to step 2.</p>	<p>Repair the short circuit to power supply in harness between ECM and oil flow control solenoid valve LH connector.</p>
<p><b>2</b>     <b>CHECK HARNESS BETWEEN ECM AND OIL FLOW CONTROL SOLENOID VALVE LH CONNECTOR.</b>            Measure the resistance of harness between ECM and oil flow control solenoid valve LH connector.  <b>Connector &amp; terminal</b>  <b>(B134) No. 5 — (E81) No. 1:</b>  <b>(B134) No. 14 — (E81) No. 2:</b></p>	<p>Is the resistance less than 1 Ω?</p>	<p>Go to step 3.</p>	<p>Repair the harness and connector.            NOTE:            In this case, repair the following item:            • Open circuit in harness between ECM and oil flow control solenoid valve RH connector            • Poor contact of coupling connector</p>
<p><b>3</b>     <b>CHECK OIL FLOW CONTROL SOLENOID VALVE.</b>            Measure the resistance between oil flow control solenoid valve terminals.  <b>Terminals</b>  <b>No. 1 — No. 2:</b></p>	<p>Is the resistance 6 — 12 Ω?</p>	<p>Repair the poor contact of ECM and oil flow control solenoid valve LH connector.</p>	<p>Replace the oil flow control solenoid valve LH.            &lt;Ref. to FU(H6DO)-45, Oil Flow Control Solenoid Valve.&gt;</p>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## FA:DTC P2096 POST CATALYST FUEL TRIM SYSTEM TOO LEAN (BANK 1)

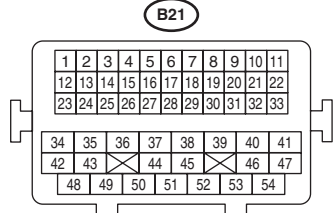
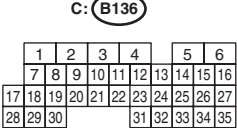
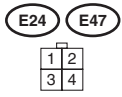
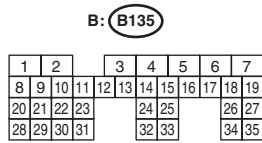
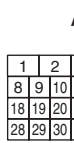
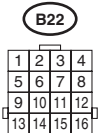
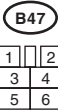
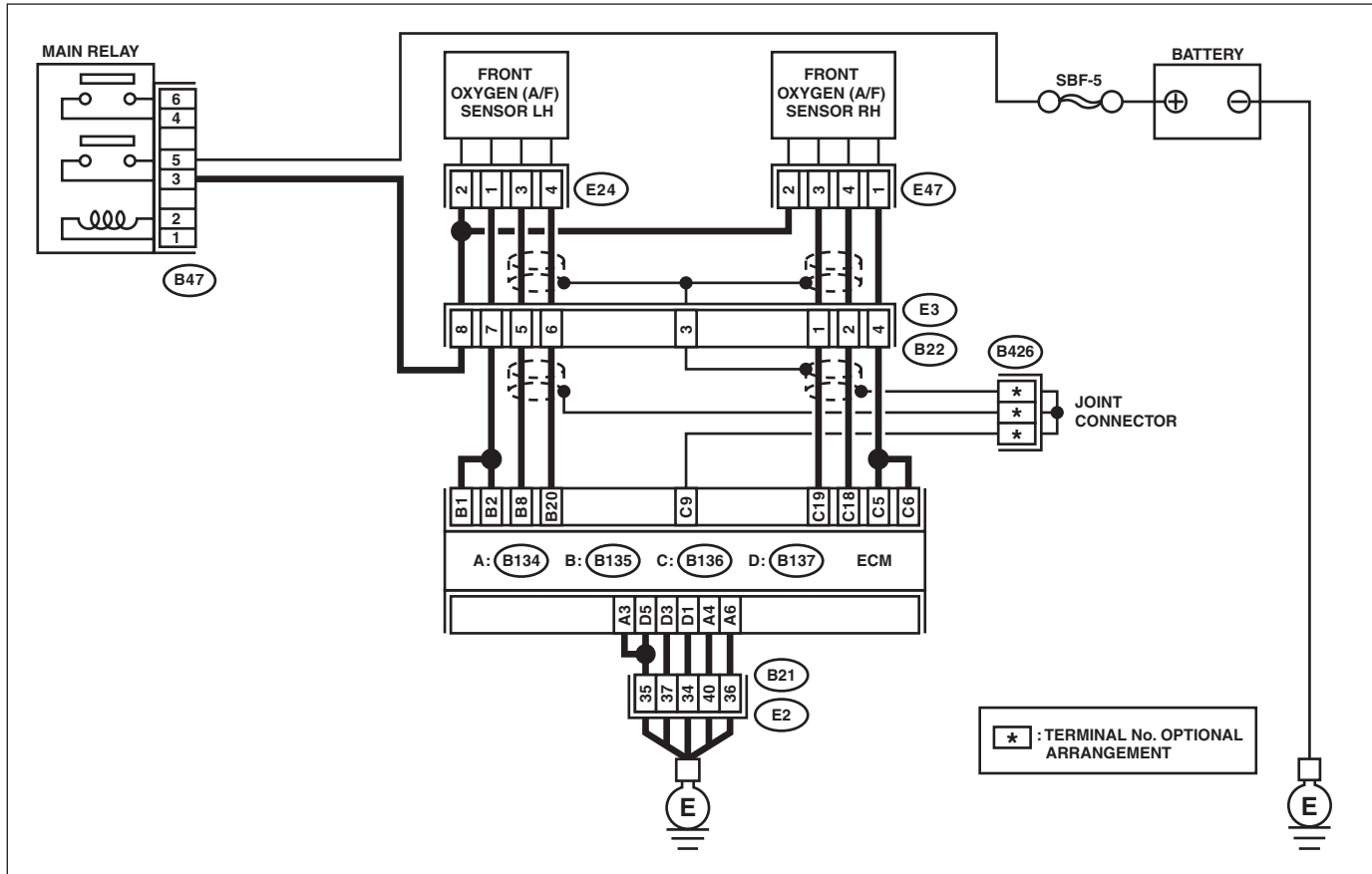
### DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-223, DTC P2096 POST CATALYST FUEL TRIM SYSTEM TOO LEAN (BANK 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

### WIRING DIAGRAM:

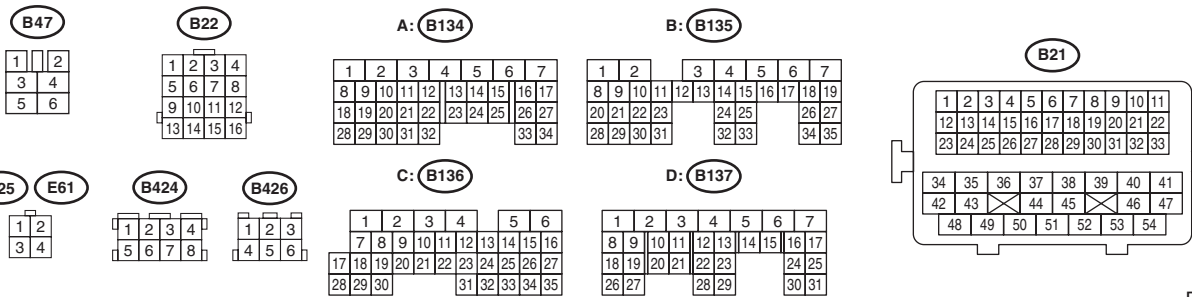
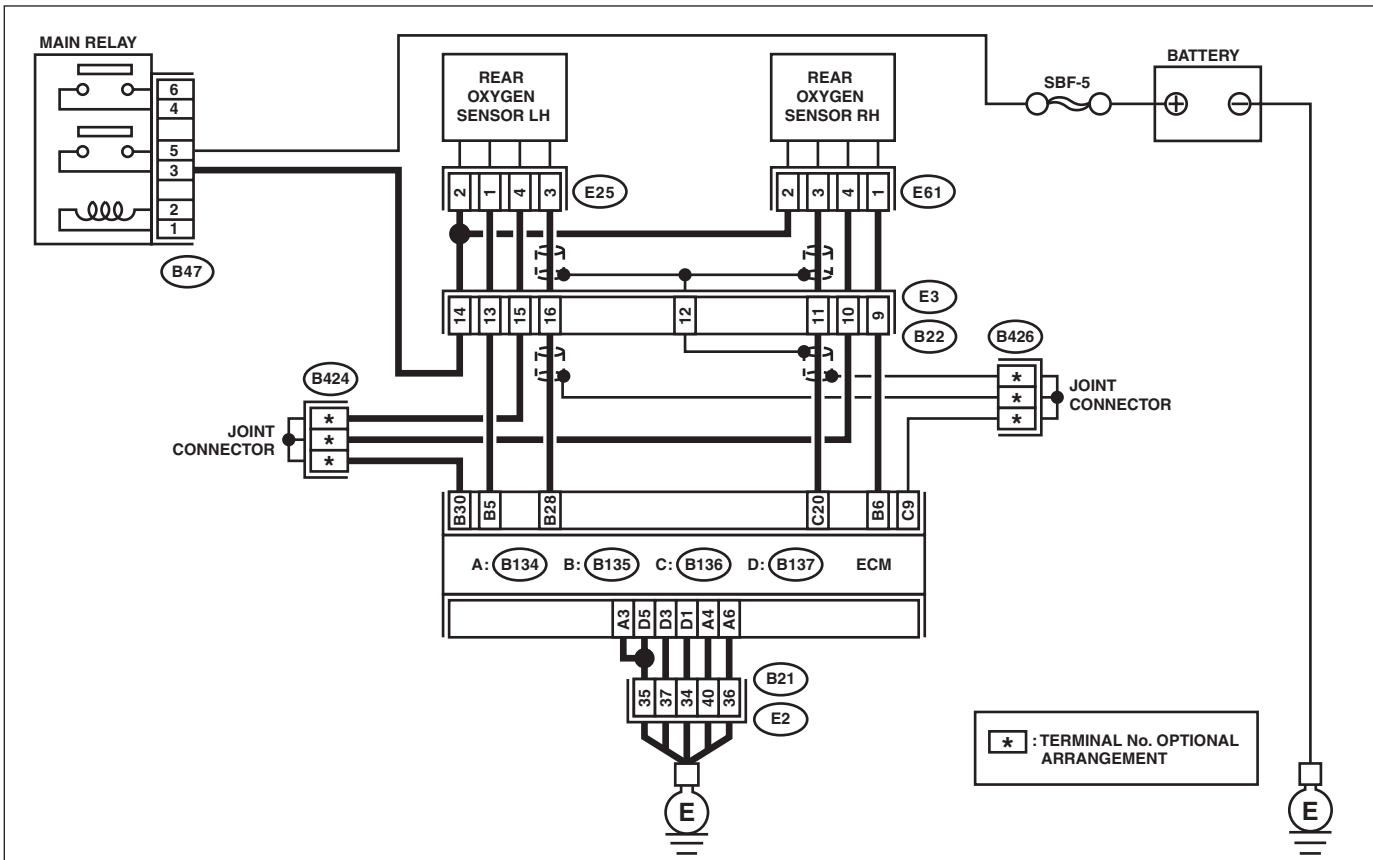


EN-08076



# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)



EN-08077

Step	Check	Yes	No
1	<b>CHECK FOR ANY OTHER DTC ON DISPLAY.</b> Is any other DTC displayed?	Check DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6DO)(diag)-84, List of Diagnostic Trouble Code (DTC).>	Go to step 2.
2	<b>CHECK FRONT OXYGEN (A/F) SENSOR CONNECTOR AND COUPLING CONNECTOR.</b> Has water entered the connector?	Completely remove any water inside.	Go to step 3.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<b>3 CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM and front oxygen (A/F) sensor. 3) Measure the resistance of harness between ECM and front oxygen (A/F) sensor connector. <i><b>Connector &amp; terminal</b></i> <i><b>(B136) No. 19 — (E47) No. 3:</b></i> <i><b>(B136) No. 18 — (E47) No. 4:</b></i>	Is the resistance less than 1 Ω?	Go to step 4.	Repair the harness and connector.  NOTE: In this case, repair the following item: • Open circuit in harness between ECM and front oxygen (A/F) sensor connector • Poor contact of coupling connector
<b>4 CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.</b> Measure the resistance between ECM and chassis ground. <i><b>Connector &amp; terminal</b></i> <i><b>(B136) No. 19 — Chassis ground:</b></i> <i><b>(B136) No. 18 — Chassis ground:</b></i>	Is the resistance 1 MΩ or more?	Go to step 5.	Repair the ground short circuit of harness between ECM and front oxygen (A/F) sensor connector.
<b>5 CHECK OUTPUT SIGNAL FOR ECM.</b> 1) Connect the connector to ECM. 2) Turn the ignition switch to ON. 3) Measure the voltage between front oxygen (A/F) sensor connector and chassis ground. <i><b>Connector &amp; terminal</b></i> <i><b>(E47) No. 3 (+) — Chassis ground (-):</b></i>	Is the voltage 4.5 V or more?	Go to step 7.	Go to step 6.
<b>6 CHECK OUTPUT SIGNAL FOR ECM.</b> Measure the voltage between front oxygen (A/F) sensor connector and chassis ground. <i><b>Connector &amp; terminal</b></i> <i><b>(E47) No. 4 (+) — Chassis ground (-):</b></i>	Is the voltage 4.95 V or more?	Go to step 7.	Go to step 8.
<b>7 CHECK OUTPUT SIGNAL FOR ECM.</b> Measure the voltage between front oxygen (A/F) sensor connector and chassis ground. <i><b>Connector &amp; terminal</b></i> <i><b>(E47) No. 3 (+) — Chassis ground (-):</b></i> <i><b>(E47) No. 4 (+) — Chassis ground (-):</b></i>	Is the voltage 8 V or more?	Repair the short circuit to power in the harness between ECM and front oxygen (A/F) sensor connector. After repair, replace the ECM. <Ref. to FU(H6DO)-52, Engine Control Module (ECM).>	Repair the poor contact of ECM connector.
<b>8 CHECK EXHAUST SYSTEM.</b>	Are there holes or loose bolts on exhaust system?	Repair the exhaust system.	Go to step 9.
<b>9 CHECK AIR INTAKE SYSTEM.</b>	Are there holes, loose bolts or disconnection of hose on air intake system?	Repair the air intake system.	Go to step 10.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<p><b>10</b></p> <p><b>CHECK FUEL PRESSURE.</b></p> <p><b>WARNING:</b> Place “NO OPEN FLAMES” signs near the working area.</p> <p><b>CAUTION:</b> Be careful not to spill fuel.</p> <p>1) Connect the front oxygen (A/F) sensor connector.</p> <p>2) Measure the fuel pressure. &lt;Ref. to ME(H6DO)-30, INSPECTION, Fuel Pressure.&gt;</p> <p><b>CAUTION:</b> Release fuel pressure before removing the fuel pressure gauge.</p>	<p>Is the measured value 340 — 400 kPa (3.5 — 4.1 kgf/cm<sup>2</sup>, 49 — 58 psi)?</p>	<p>Go to step 11.</p>	<p>Repair the following item.</p> <p>Fuel pressure is too high:</p> <ul style="list-style-type: none"> <li>• Clogged fuel line or bent hose</li> </ul> <p>Fuel pressure is too low:</p> <ul style="list-style-type: none"> <li>• Improper fuel pump discharge</li> <li>• Clogged fuel line</li> </ul>
<p><b>11</b></p> <p><b>CHECK ENGINE COOLANT TEMPERATURE SENSOR.</b></p> <p>1) Start the engine and warm up completely.</p> <p>2) Read the value of «Coolant Temp.» using the Subaru Select Monitor or a general scan tool.</p> <p>NOTE:</p> <ul style="list-style-type: none"> <li>• Subaru Select Monitor</li> </ul> <p>For detailed operation procedures, refer to “READ CURRENT DATA FOR ENGINE”. &lt;Ref. to EN(H6DO)(diag)-36, Subaru Select Monitor.&gt;</p> <ul style="list-style-type: none"> <li>• General scan tool</li> </ul> <p>For detailed operation procedures, refer to the general scan tool operation manual.</p>	<p>Is the value of «Coolant Temp.» 75°C (167°F) or more?</p>	<p>Go to step 12.</p>	<p>Replace the engine coolant temperature sensor. &lt;Ref. to FU(H6DO)-30, Engine Coolant Temperature Sensor.&gt;</p>
<p><b>12</b></p> <p><b>CHECK MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR.</b></p> <p>1) Start the engine and warm up engine until coolant temperature is higher than 75°C (167°F).</p> <p>2) Place the select lever in “P” range or “N” range.</p> <p>3) Turn the A/C switch to OFF.</p> <p>4) Turn all the accessory switches to OFF.</p> <p>5) Read the value of «Mass Air Flow» using the Subaru Select Monitor or a general scan tool.</p> <p>NOTE:</p> <ul style="list-style-type: none"> <li>• Subaru Select Monitor</li> </ul> <p>For detailed operation procedures, refer to “READ CURRENT DATA FOR ENGINE”. &lt;Ref. to EN(H6DO)(diag)-36, Subaru Select Monitor.&gt;</p> <ul style="list-style-type: none"> <li>• General scan tool</li> </ul> <p>For detailed operation procedures, refer to the general scan tool operation manual.</p>	<p>Is the value of «Mass Air Flow» 2.0 — 5.0 g/s (0.26 — 0.66 lb/m)?</p>	<p>Go to step 13.</p>	<p>Replace the mass air flow and intake air temperature sensor. &lt;Ref. to FU(H6DO)-40, Mass Air Flow and Intake Air Temperature Sensor.&gt;</p>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<p><b>13 CHECK MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR.</b></p> <p>1) Start the engine and warm up engine until coolant temperature is higher than 75°C (167°F).</p> <p>2) Place the select lever in “P” range or “N” range.</p> <p>3) Turn the A/C switch to OFF.</p> <p>4) Turn all the accessory switches to OFF.</p> <p>5) Open the front hood.</p> <p>6) Measure the ambient temperature.</p> <p>7) Read the value of «Intake Air Temp.» using the Subaru Select Monitor or a general scan tool.</p> <p>NOTE:</p> <ul style="list-style-type: none"> <li>• Subaru Select Monitor</li> </ul> <p>For detailed operation procedures, refer to “READ CURRENT DATA FOR ENGINE”. &lt;Ref. to EN(H6DO)(diag)-36, Subaru Select Monitor.&gt;</p> <ul style="list-style-type: none"> <li>• General scan tool</li> </ul> <p>For detailed operation procedures, refer to the general scan tool operation manual.</p>	<p>Subtract ambient temperature from «Intake Air Temp.». Is the obtained value -10 — 50°C (-18 — 90°F)?</p>	Go to step 14.	Check the mass air flow and intake air temperature sensor. <Ref. to FU(H6DO)-40, Mass Air Flow and Intake Air Temperature Sensor.>
<p><b>14 CHECK REAR OXYGEN SENSOR DATA.</b></p> <p>1) Warm up the engine until engine coolant temperature is higher than 75°C (167°F), and keep the engine speed at 3,000 rpm. (2 minutes maximum)</p> <p>2) Read the value of «Front O2 Sensor #1» using the Subaru Select Monitor or a general scan tool.</p> <p>NOTE:</p> <ul style="list-style-type: none"> <li>• Subaru Select Monitor</li> </ul> <p>For detailed operation procedures, refer to “READ CURRENT DATA FOR ENGINE”. &lt;Ref. to EN(H6DO)(diag)-36, Subaru Select Monitor.&gt;</p> <ul style="list-style-type: none"> <li>• General scan tool</li> </ul> <p>For detailed operation procedures, refer to the general scan tool operation manual.</p>	<p>Is the value of «Front O2 Sensor #1» 0.490 V or more?</p>	Go to step 15.	Go to step 16.
<p><b>15 CHECK REAR OXYGEN SENSOR DATA.</b></p> <p>1) Warm up the engine until engine coolant temperature is higher than 75°C (167°F), and rapidly reduce the engine speed from 3,000 rpm.</p> <p>2) Read the value of «Front O2 Sensor #1» using the Subaru Select Monitor or a general scan tool.</p> <p>NOTE:</p> <ul style="list-style-type: none"> <li>• Subaru Select Monitor</li> </ul> <p>For detailed operation procedures, refer to “READ CURRENT DATA FOR ENGINE”. &lt;Ref. to EN(H6DO)(diag)-36, Subaru Select Monitor.&gt;</p> <ul style="list-style-type: none"> <li>• General scan tool</li> </ul> <p>For detailed operation procedures, refer to the general scan tool operation manual.</p>	<p>Is the value of «Front O2 Sensor #1» 0.250 V or less?</p>	Go to step 17.	Go to step 16.
<p><b>16 CHECK REAR OXYGEN SENSOR CONNECTOR AND COUPLING CONNECTOR.</b></p>	<p>Has water entered the connector?</p>	Completely remove any water inside.	Go to step 18.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<p><b>17</b>     <b>CHECK FRONT OXYGEN (A/F) SENSOR USING REAR OXYGEN SENSOR SIGNAL.</b>                      1) Warm up the engine until engine coolant temperature is higher than 75°C (167°F), then keep the engine idling for 5 minutes or more.                      2) Read the value of «Front O2 Sensor #1» using the Subaru Select Monitor or a general scan tool.</p> <p>NOTE:                      • Subaru Select Monitor                      For detailed operation procedures, refer to “READ CURRENT DATA FOR ENGINE”. &lt;Ref. to EN(H6DO)(diag)-36, Subaru Select Monitor.&gt;                      • General scan tool                      For detailed operation procedures, refer to the general scan tool operation manual.</p>	<p>Is the value in «Front O2 Sensor #1» kept at 0.250 V or less for 5 minutes or more?</p>	<p>Replace the front oxygen (A/F) sensor. &lt;Ref. to FU(H6DO)-48, Front Oxygen (A/F) Sensor.&gt;</p>	<p>Go to step 18.</p>
<p><b>18</b>     <b>CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.</b>                      1) Turn the ignition switch to OFF.                      2) Disconnect the connector from ECM and rear oxygen sensor.                      3) Measure the resistance of harness between ECM and rear oxygen sensor connector.</p> <p><b>Connector &amp; terminal</b>  <i>(B136) No. 20 — (E61) No. 3:</i>  <i>(B135) No. 30 — (E61) No. 4:</i></p>	<p>Is the resistance less than 1 Ω?</p>	<p>Go to step 19.</p>	<p>Repair the harness and connector.</p> <p>NOTE:                      In this case, repair the following item:                      • Open circuit in harness between ECM and rear oxygen sensor connector                      • Poor contact of coupling connector</p>
<p><b>19</b>     <b>CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.</b>                      1) Connect the connector to ECM.                      2) Turn the ignition switch to ON.                      3) Measure the voltage between rear oxygen sensor connector and chassis ground.</p> <p><b>Connector &amp; terminal</b>  <i>(E61) No. 3 (+) — Chassis ground (-):</i></p>	<p>Is the voltage 0.2 — 0.5 V?</p>	<p>Replace the rear oxygen sensor.                      &lt;Ref. to FU(H6DO)-50, Rear Oxygen Sensor.&gt;</p>	<p>Repair the harness and connector.</p> <p>NOTE:                      In this case, repair the following item:                      • Open circuit in harness between ECM and rear oxygen sensor connector                      • Poor contact of ECM connector                      • Poor contact of coupling connector</p>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## FB:DTC P2097 POST CATALYST FUEL TRIM SYSTEM TOO RICH (BANK 1)

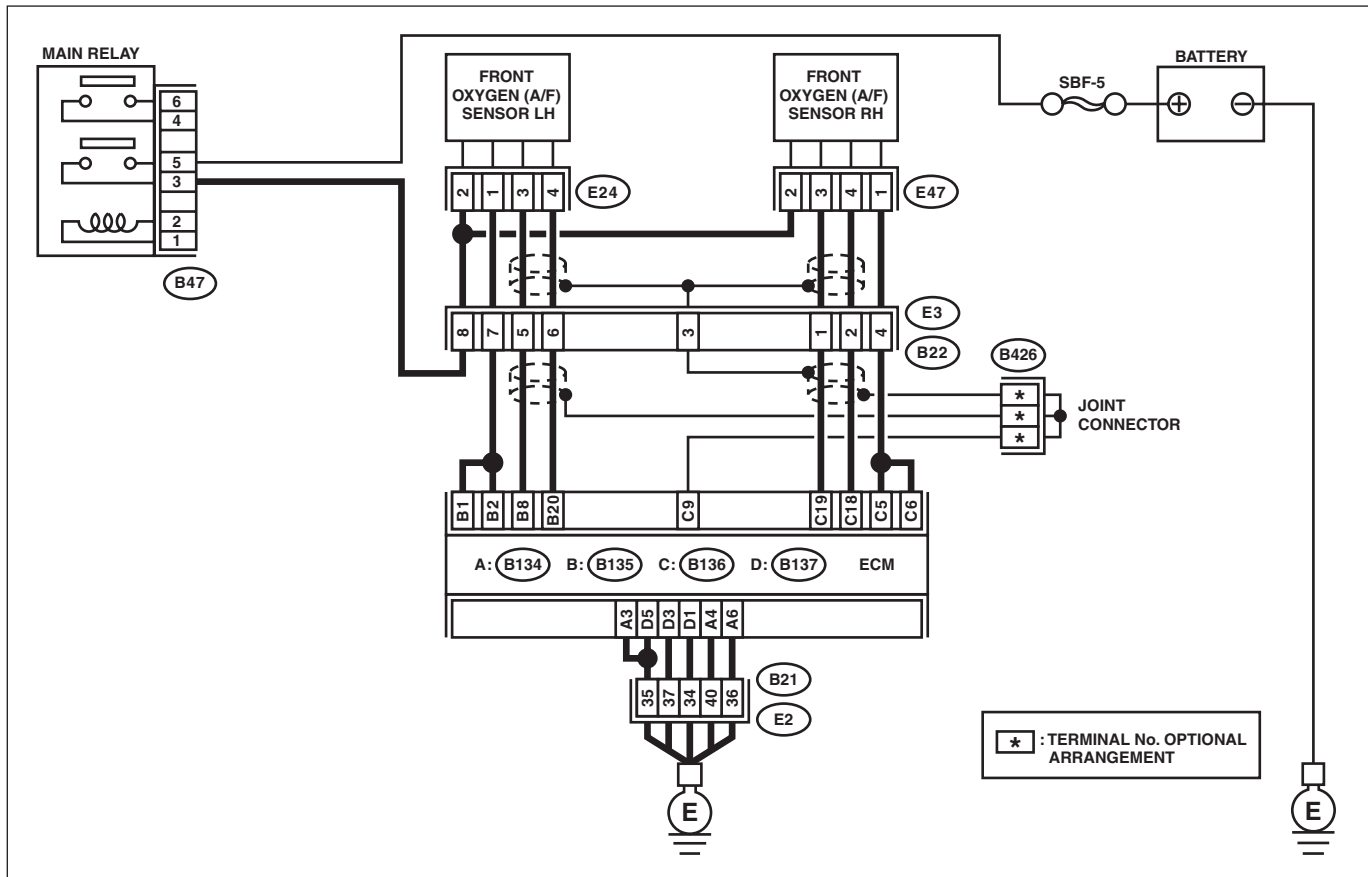
### DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-225, DTC P2097 POST CATALYST FUEL TRIM SYSTEM TOO RICH (BANK 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

### WIRING DIAGRAM:



B47



B22



A: B134



B: B135



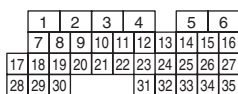
E24 E47



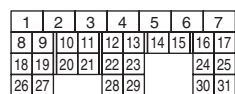
B426



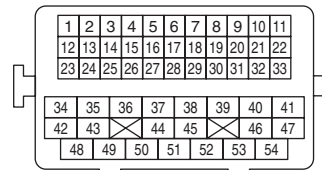
C: B136



D: B137



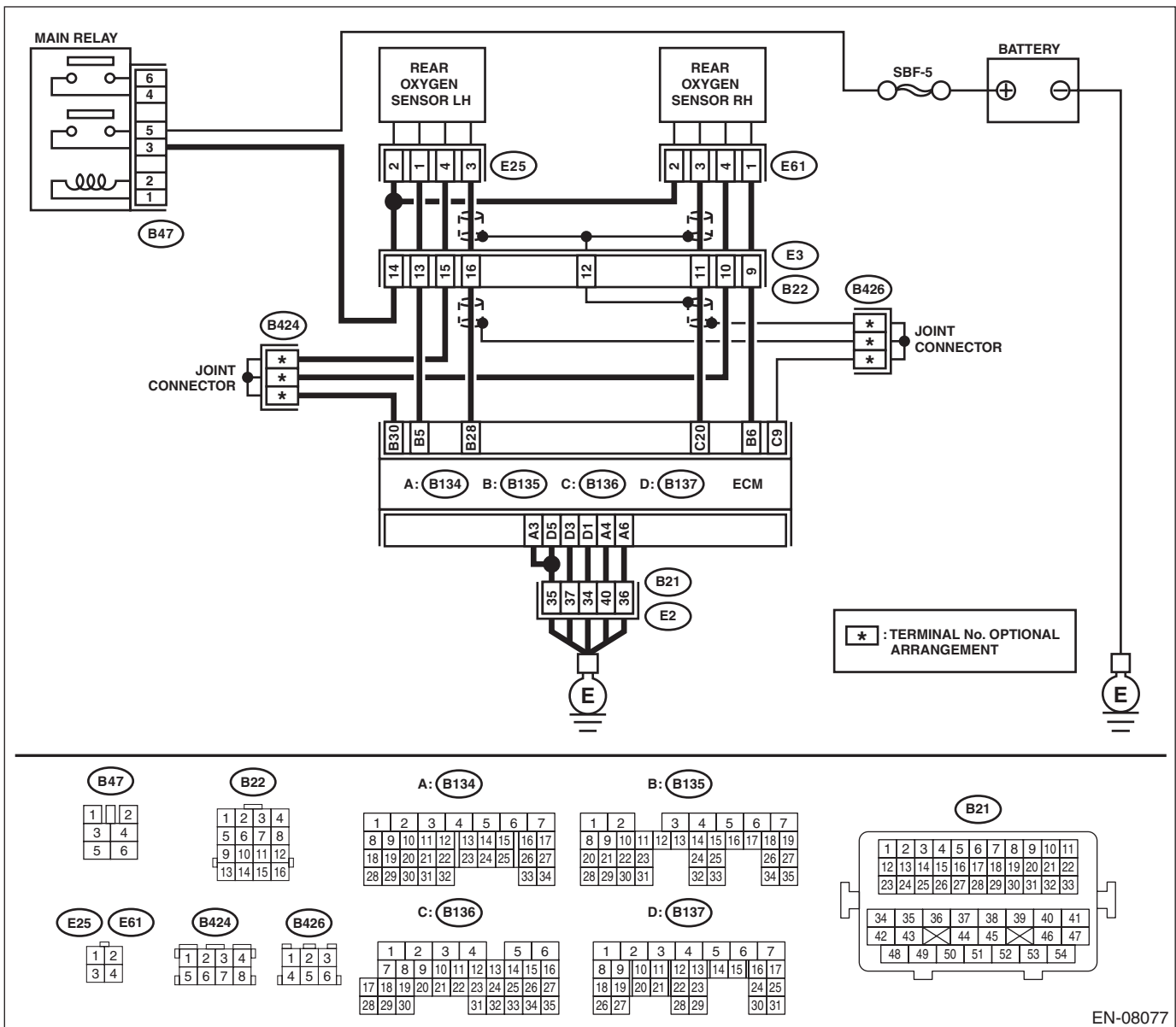
B21



EN-08076

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)



Step	Check	Yes	No
1	<b>CHECK FOR ANY OTHER DTC ON DISPLAY.</b> Is any other DTC displayed?	Check DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6DO)(diag)-84, List of Diagnostic Trouble Code (DTC).>	Go to step 2.
2	<b>CHECK FRONT OXYGEN (A/F) SENSOR CONNECTOR AND COUPLING CONNECTOR.</b> Has water entered the connector?	Completely remove any water inside.	Go to step 3.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<b>3 CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM and front oxygen (A/F) sensor. 3) Measure the resistance of harness between ECM and front oxygen (A/F) sensor connector. <i><b>Connector &amp; terminal</b></i> <i><b>(B136) No. 19 — (E47) No. 3:</b></i> <i><b>(B136) No. 18 — (E47) No. 4:</b></i>	Is the resistance less than 1 Ω?	Go to step 4.	Repair the harness and connector.  NOTE: In this case, repair the following item: <ul style="list-style-type: none"> <li>• Open circuit in harness between ECM and front oxygen (A/F) sensor connector</li> <li>• Poor contact of coupling connector</li> </ul>
<b>4 CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.</b> Measure the resistance between ECM and chassis ground. <i><b>Connector &amp; terminal</b></i> <i><b>(B136) No. 19 — Chassis ground:</b></i> <i><b>(B136) No. 18 — Chassis ground:</b></i>	Is the resistance 1 MΩ or more?	Go to step 5.	Repair the ground short circuit of harness between ECM and front oxygen (A/F) sensor connector.
<b>5 CHECK OUTPUT SIGNAL FOR ECM.</b> 1) Connect the connector to ECM. 2) Turn the ignition switch to ON. 3) Measure the voltage between front oxygen (A/F) sensor connector and chassis ground. <i><b>Connector &amp; terminal</b></i> <i><b>(E47) No. 3 (+) — Chassis ground (-):</b></i>	Is the voltage 4.5 V or more?	Go to step 7.	Go to step 6.
<b>6 CHECK OUTPUT SIGNAL FOR ECM.</b> Measure the voltage between front oxygen (A/F) sensor connector and chassis ground. <i><b>Connector &amp; terminal</b></i> <i><b>(E47) No. 4 (+) — Chassis ground (-):</b></i>	Is the voltage 4.95 V or more?	Go to step 7.	Go to step 8.
<b>7 CHECK OUTPUT SIGNAL FOR ECM.</b> Measure the voltage between front oxygen (A/F) sensor connector and chassis ground. <i><b>Connector &amp; terminal</b></i> <i><b>(E47) No. 3 (+) — Chassis ground (-):</b></i> <i><b>(E47) No. 4 (+) — Chassis ground (-):</b></i>	Is the voltage 8 V or more?	Repair the short circuit to power in the harness between ECM and front oxygen (A/F) sensor connector. After repair, replace the ECM. <Ref. to FU(H6DO)-52, Engine Control Module (ECM).>	Repair the poor contact of ECM connector.
<b>8 CHECK EXHAUST SYSTEM.</b>	Are there holes or loose bolts on exhaust system?	Repair the exhaust system.	Go to step 9.
<b>9 CHECK AIR INTAKE SYSTEM.</b>	Are there holes, loose bolts or disconnection of hose on air intake system?	Repair the air intake system.	Go to step 10.



# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<p><b>10</b></p> <p><b>CHECK FUEL PRESSURE.</b></p> <p><b>WARNING:</b> Place “NO OPEN FLAMES” signs near the working area.</p> <p><b>CAUTION:</b> Be careful not to spill fuel.</p> <p>1) Connect the front oxygen (A/F) sensor connector.</p> <p>2) Measure the fuel pressure. &lt;Ref. to ME(H6DO)-30, INSPECTION, Fuel Pressure.&gt;</p> <p><b>CAUTION:</b> Release fuel pressure before removing the fuel pressure gauge.</p>	<p>Is the measured value 340 — 400 kPa (3.5 — 4.1 kgf/cm<sup>2</sup>, 49 — 58 psi)?</p>	<p>Go to step 11.</p>	<p>Repair the following item.</p> <p>Fuel pressure is too high:</p> <ul style="list-style-type: none"> <li>• Clogged fuel line or bent hose</li> </ul> <p>Fuel pressure is too low:</p> <ul style="list-style-type: none"> <li>• Improper fuel pump discharge</li> <li>• Clogged fuel line</li> </ul>
<p><b>11</b></p> <p><b>CHECK ENGINE COOLANT TEMPERATURE SENSOR.</b></p> <p>1) Start the engine and warm up completely.</p> <p>2) Read the value of «Coolant Temp.» using the Subaru Select Monitor or a general scan tool.</p> <p>NOTE:</p> <ul style="list-style-type: none"> <li>• Subaru Select Monitor</li> </ul> <p>For detailed operation procedures, refer to “READ CURRENT DATA FOR ENGINE”. &lt;Ref. to EN(H6DO)(diag)-36, Subaru Select Monitor.&gt;</p> <ul style="list-style-type: none"> <li>• General scan tool</li> </ul> <p>For detailed operation procedures, refer to the general scan tool operation manual.</p>	<p>Is the value of «Coolant Temp.» 75°C (167°F) or more?</p>	<p>Go to step 12.</p>	<p>Replace the engine coolant temperature sensor. &lt;Ref. to FU(H6DO)-30, Engine Coolant Temperature Sensor.&gt;</p>
<p><b>12</b></p> <p><b>CHECK MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR.</b></p> <p>1) Start the engine and warm up engine until coolant temperature is higher than 75°C (167°F).</p> <p>2) Place the select lever in “P” range or “N” range.</p> <p>3) Turn the A/C switch to OFF.</p> <p>4) Turn all the accessory switches to OFF.</p> <p>5) Read the value of «Mass Air Flow» using the Subaru Select Monitor or a general scan tool.</p> <p>NOTE:</p> <ul style="list-style-type: none"> <li>• Subaru Select Monitor</li> </ul> <p>For detailed operation procedures, refer to “READ CURRENT DATA FOR ENGINE”. &lt;Ref. to EN(H6DO)(diag)-36, Subaru Select Monitor.&gt;</p> <ul style="list-style-type: none"> <li>• General scan tool</li> </ul> <p>For detailed operation procedures, refer to the general scan tool operation manual.</p>	<p>Is the value of «Mass Air Flow» 2.0 — 5.0 g/s (0.26 — 0.66 lb/m)?</p>	<p>Go to step 13.</p>	<p>Replace the mass air flow and intake air temperature sensor. &lt;Ref. to FU(H6DO)-40, Mass Air Flow and Intake Air Temperature Sensor.&gt;</p>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<p><b>13 CHECK MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR.</b></p> <p>1) Start the engine and warm up engine until coolant temperature is higher than 75°C (167°F).</p> <p>2) Place the select lever in “P” range or “N” range.</p> <p>3) Turn the A/C switch to OFF.</p> <p>4) Turn all the accessory switches to OFF.</p> <p>5) Open the front hood.</p> <p>6) Measure the ambient temperature.</p> <p>7) Read the value of «Intake Air Temp.» using the Subaru Select Monitor or a general scan tool.</p> <p>NOTE:</p> <ul style="list-style-type: none"> <li>• Subaru Select Monitor</li> </ul> <p>For detailed operation procedures, refer to “READ CURRENT DATA FOR ENGINE”. &lt;Ref. to EN(H6DO)(diag)-36, Subaru Select Monitor.&gt;</p> <ul style="list-style-type: none"> <li>• General scan tool</li> </ul> <p>For detailed operation procedures, refer to the general scan tool operation manual.</p>	<p>Subtract ambient temperature from «Intake Air Temp.». Is the obtained value -10 — 50°C (-18 — 90°F)?</p>	Go to step 14.	Check the mass air flow and intake air temperature sensor. <Ref. to FU(H6DO)-40, Mass Air Flow and Intake Air Temperature Sensor.>
<p><b>14 CHECK REAR OXYGEN SENSOR DATA.</b></p> <p>1) Warm up the engine until engine coolant temperature is higher than 75°C (167°F), and keep the engine speed at 3,000 rpm. (2 minutes maximum)</p> <p>2) Read the value of «Front O2 Sensor #1» using the Subaru Select Monitor or a general scan tool.</p> <p>NOTE:</p> <ul style="list-style-type: none"> <li>• Subaru Select Monitor</li> </ul> <p>For detailed operation procedures, refer to “READ CURRENT DATA FOR ENGINE”. &lt;Ref. to EN(H6DO)(diag)-36, Subaru Select Monitor.&gt;</p> <ul style="list-style-type: none"> <li>• General scan tool</li> </ul> <p>For detailed operation procedures, refer to the general scan tool operation manual.</p>	<p>Is the value of «Front O2 Sensor #1» 0.490 V or more?</p>	Go to step 15.	Go to step 16.
<p><b>15 CHECK REAR OXYGEN SENSOR DATA.</b></p> <p>1) Warm up the engine until engine coolant temperature is higher than 75°C (167°F), and rapidly reduce the engine speed from 3,000 rpm.</p> <p>2) Read the value of «Front O2 Sensor #1» using the Subaru Select Monitor or a general scan tool.</p> <p>NOTE:</p> <ul style="list-style-type: none"> <li>• Subaru Select Monitor</li> </ul> <p>For detailed operation procedures, refer to “READ CURRENT DATA FOR ENGINE”. &lt;Ref. to EN(H6DO)(diag)-36, Subaru Select Monitor.&gt;</p> <ul style="list-style-type: none"> <li>• General scan tool</li> </ul> <p>For detailed operation procedures, refer to the general scan tool operation manual.</p>	<p>Is the value of «Front O2 Sensor #1» 0.250 V or less?</p>	Go to step 17.	Go to step 16.
<p><b>16 CHECK REAR OXYGEN SENSOR CONNECTOR AND COUPLING CONNECTOR.</b></p>	<p>Has water entered the connector?</p>	Completely remove any water inside.	Go to step 18.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<p><b>17 CHECK FRONT OXYGEN (A/F) SENSOR USING REAR OXYGEN SENSOR SIGNAL.</b></p> <p>1) Warm up the engine until engine coolant temperature is higher than 75°C (167°F), then keep the engine idling for 5 minutes or more.</p> <p>2) Read the value of «Front O2 Sensor #1» using the Subaru Select Monitor or a general scan tool.</p> <p>NOTE:</p> <ul style="list-style-type: none"> <li>• Subaru Select Monitor</li> </ul> <p>For detailed operation procedures, refer to “READ CURRENT DATA FOR ENGINE”. &lt;Ref. to EN(H6DO)(diag)-36, Subaru Select Monitor.&gt;</p> <ul style="list-style-type: none"> <li>• General scan tool</li> </ul> <p>For detailed operation procedures, refer to the general scan tool operation manual.</p>	<p>Is the value in «Front O2 Sensor #1» kept at 0.8 V or more for 5 minutes or more?</p>	<p>Replace the front oxygen (A/F) sensor. &lt;Ref. to FU(H6DO)-48, Front Oxygen (A/F) Sensor.&gt;</p>	<p>Go to step 18.</p>
<p><b>18 CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.</b></p> <p>1) Turn the ignition switch to OFF.</p> <p>2) Disconnect the connector from ECM and rear oxygen sensor.</p> <p>3) Measure the resistance of harness between ECM and rear oxygen sensor connector.</p> <p><b>Connector &amp; terminal</b></p> <p><b>(B136) No. 20 — (E61) No. 3:</b></p> <p><b>(B135) No. 30 — (E61) No. 4:</b></p>	<p>Is the resistance less than 1 Ω?</p>	<p>Go to step 19.</p>	<p>Repair the harness and connector.</p> <p>NOTE:</p> <p>In this case, repair the following item:</p> <ul style="list-style-type: none"> <li>• Open circuit in harness between ECM and rear oxygen sensor connector</li> <li>• Poor contact of coupling connector</li> </ul>
<p><b>19 CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.</b></p> <p>1) Connect the connector to ECM.</p> <p>2) Turn the ignition switch to ON.</p> <p>3) Measure the voltage between rear oxygen sensor connector and chassis ground.</p> <p><b>Connector &amp; terminal</b></p> <p><b>(E61) No. 3 (+) — Chassis ground (-):</b></p>	<p>Is the voltage 0.2 — 0.5 V?</p>	<p>Replace the rear oxygen sensor. &lt;Ref. to FU(H6DO)-50, Rear Oxygen Sensor.&gt;</p>	<p>Repair the harness and connector.</p> <p>NOTE:</p> <p>In this case, repair the following item:</p> <ul style="list-style-type: none"> <li>• Open circuit in harness between ECM and rear oxygen sensor connector</li> <li>• Poor contact of ECM connector</li> <li>• Poor contact of coupling connector</li> </ul>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## FC:DTC P2098 POST CATALYST FUEL TRIM SYSTEM TOO LEAN BANK 2

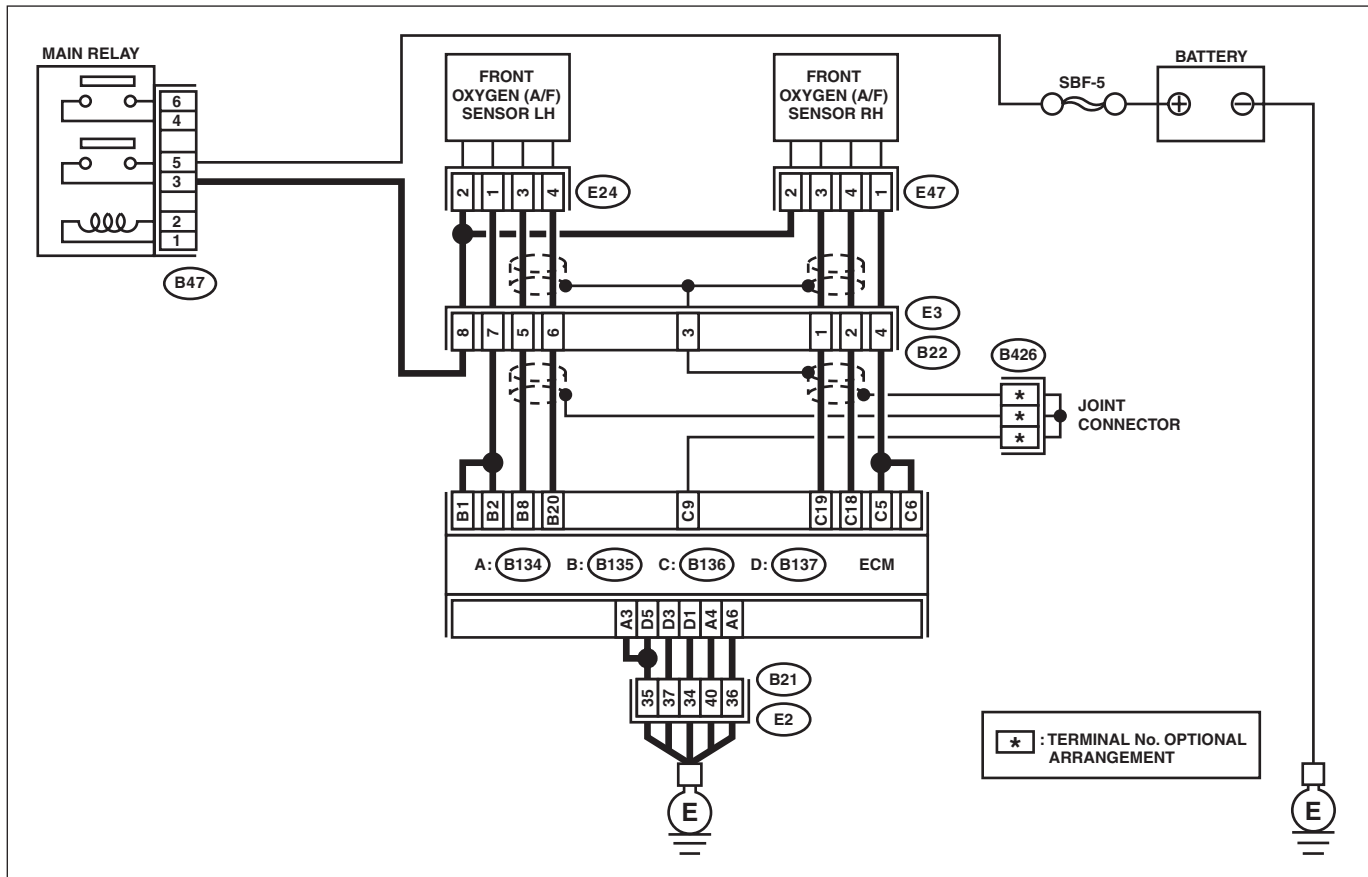
### DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-226, DTC P2098 POST CATALYST FUEL TRIM SYSTEM TOO LEAN BANK 2, Diagnostic Trouble Code (DTC) Detecting Criteria.>

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

### WIRING DIAGRAM:



B47



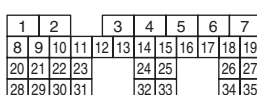
B22



A: B134



B: B135



E24 E47



B426



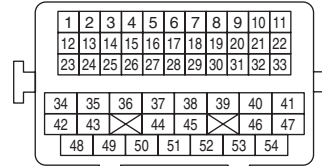
C: B136



D: B137



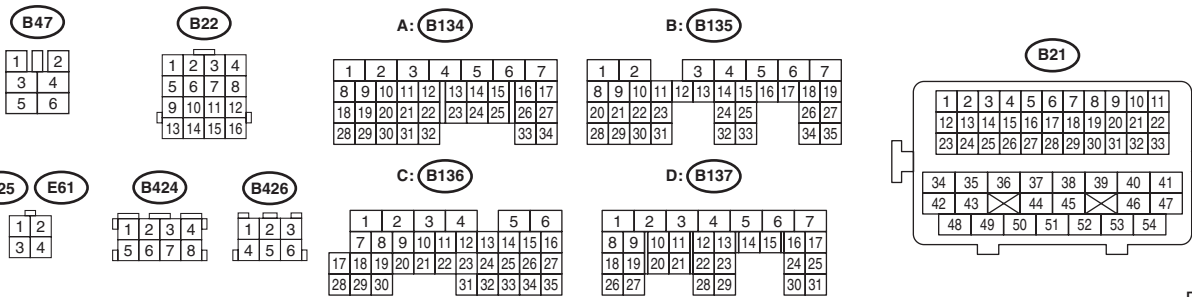
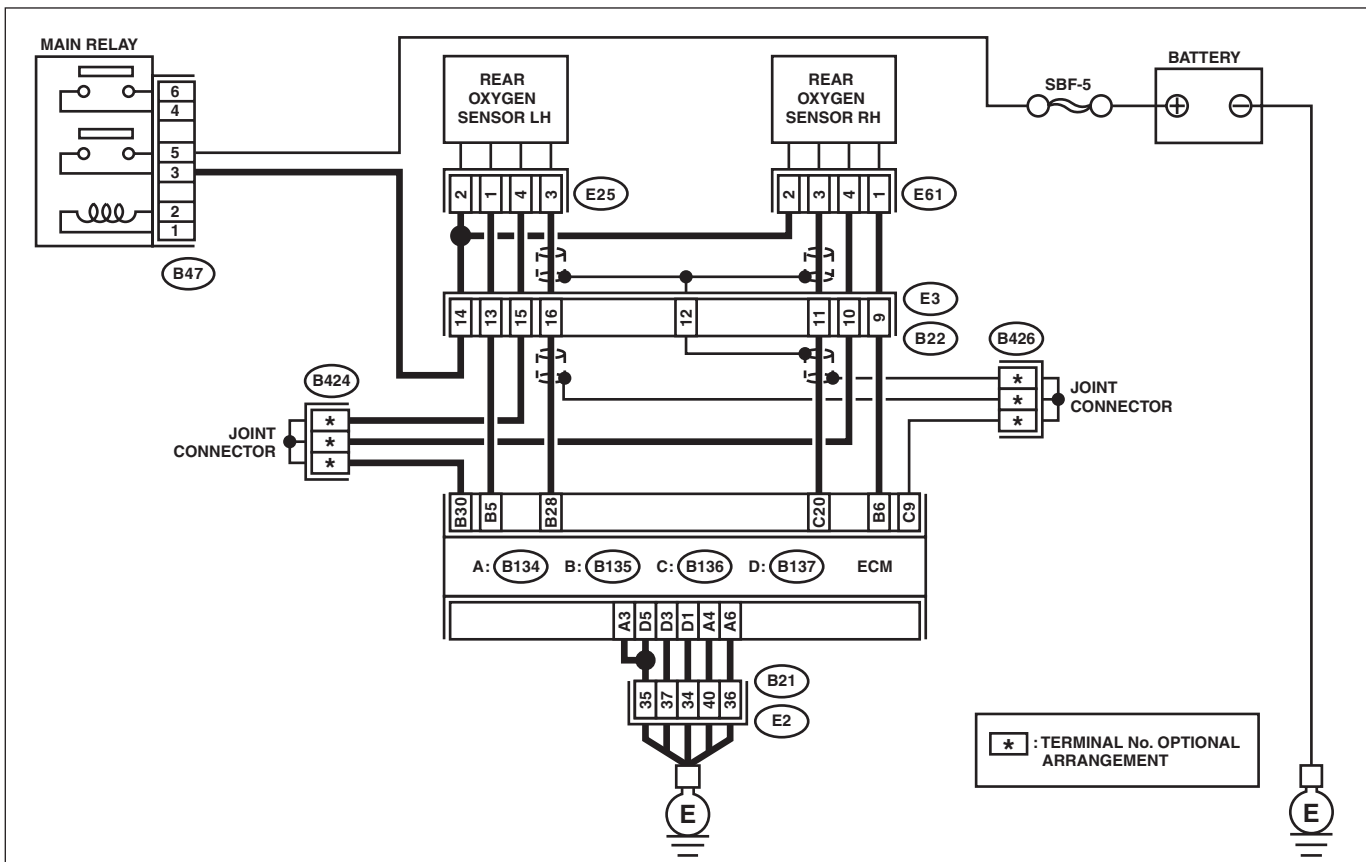
B21



EN-08076

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)



EN-08077

Step	Check	Yes	No
1	<b>CHECK FOR ANY OTHER DTC ON DISPLAY.</b> Is any other DTC displayed?	Check DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6DO)(diag)-84, List of Diagnostic Trouble Code (DTC).>	Go to step 2.
2	<b>CHECK FRONT OXYGEN (A/F) SENSOR CONNECTOR AND COUPLING CONNECTOR.</b> Has water entered the connector?	Completely remove any water inside.	Go to step 3.

## Diagnostic Procedure with Diagnostic Trouble Code (DTC)

### ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<b>3 CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM and front oxygen (A/F) sensor. 3) Measure the resistance of harness between ECM and front oxygen (A/F) sensor connector. <i><b>Connector &amp; terminal</b></i> <i><b>(B135) No. 8 — (E24) No. 3:</b></i> <i><b>(B135) No. 20 — (E24) No. 4:</b></i>	Is the resistance less than 1 Ω?	Go to step 4.	Repair the harness and connector.  NOTE: In this case, repair the following item: <ul style="list-style-type: none"> <li>• Open circuit in harness between ECM and front oxygen (A/F) sensor connector</li> <li>• Poor contact of coupling connector</li> </ul>
<b>4 CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.</b> Measure the resistance between ECM and chassis ground. <i><b>Connector &amp; terminal</b></i> <i><b>(B135) No. 8 — Chassis ground:</b></i> <i><b>(B135) No. 20 — Chassis ground:</b></i>	Is the resistance 1 MΩ or more?	Go to step 5.	Repair the ground short circuit of harness between ECM and front oxygen (A/F) sensor connector.
<b>5 CHECK OUTPUT SIGNAL FOR ECM.</b> 1) Connect the connector to ECM. 2) Turn the ignition switch to ON. 3) Measure the voltage between front oxygen (A/F) sensor connector and chassis ground. <i><b>Connector &amp; terminal</b></i> <i><b>(E24) No. 3 (+) — Chassis ground (-):</b></i>	Is the voltage 4.5 V or more?	Go to step 7.	Go to step 6.
<b>6 CHECK OUTPUT SIGNAL FOR ECM.</b> Measure the voltage between front oxygen (A/F) sensor connector and chassis ground. <i><b>Connector &amp; terminal</b></i> <i><b>(E24) No. 4 (+) — Chassis ground (-):</b></i>	Is the voltage 4.95 V or more?	Go to step 7.	Go to step 8.
<b>7 CHECK OUTPUT SIGNAL FOR ECM.</b> Measure the voltage between front oxygen (A/F) sensor connector and chassis ground. <i><b>Connector &amp; terminal</b></i> <i><b>(E24) No. 3 (+) — Chassis ground (-):</b></i> <i><b>(E24) No. 4 (+) — Chassis ground (-):</b></i>	Is the voltage 8 V or more?	Repair the short circuit to power in the harness between ECM and front oxygen (A/F) sensor connector. After repair, replace the ECM. <Ref. to FU(H6DO)-52, Engine Control Module (ECM).>	Repair the poor contact of ECM connector.
<b>8 CHECK EXHAUST SYSTEM.</b>	Are there holes or loose bolts on exhaust system?	Repair the exhaust system.	Go to step 9.
<b>9 CHECK AIR INTAKE SYSTEM.</b>	Are there holes, loose bolts or disconnection of hose on air intake system?	Repair the air intake system.	Go to step 10.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<p><b>10</b>     <b>CHECK FUEL PRESSURE.</b>  <b>WARNING:</b>  Place “NO OPEN FLAMES” signs near the working area.  <b>CAUTION:</b>  <b>Be careful not to spill fuel.</b>  1) Connect the front oxygen (A/F) sensor connector.  2) Measure the fuel pressure. &lt;Ref. to ME(H6DO)-30, INSPECTION, Fuel Pressure.&gt;  <b>CAUTION:</b>  <b>Release fuel pressure before removing the fuel pressure gauge.</b></p>	<p>Is the measured value 340 — 400 kPa (3.5 — 4.1 kgf/cm<sup>2</sup>, 49 — 58 psi)?</p>	<p>Go to step 11.</p>	<p>Repair the following item.  Fuel pressure is too high:  • Clogged fuel line or bent hose  Fuel pressure is too low:  • Improper fuel pump discharge  • Clogged fuel line</p>
<p><b>11</b>     <b>CHECK ENGINE COOLANT TEMPERATURE SENSOR.</b>  1) Start the engine and warm up completely.  2) Read the value of «Coolant Temp.» using the Subaru Select Monitor or a general scan tool.  NOTE:  • Subaru Select Monitor  For detailed operation procedures, refer to “READ CURRENT DATA FOR ENGINE”. &lt;Ref. to EN(H6DO)(diag)-36, Subaru Select Monitor.&gt;  • General scan tool  For detailed operation procedures, refer to the general scan tool operation manual.</p>	<p>Is the value of «Coolant Temp.» 75°C (167°F) or more?</p>	<p>Go to step 12.</p>	<p>Replace the engine coolant temperature sensor. &lt;Ref. to FU(H6DO)-30, Engine Coolant Temperature Sensor.&gt;</p>
<p><b>12</b>     <b>CHECK MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR.</b>  1) Start the engine and warm up engine until coolant temperature is higher than 75°C (167°F).  2) Place the select lever in “P” range or “N” range.  3) Turn the A/C switch to OFF.  4) Turn all the accessory switches to OFF.  5) Read the value of «Mass Air Flow» using the Subaru Select Monitor or a general scan tool.  NOTE:  • Subaru Select Monitor  For detailed operation procedures, refer to “READ CURRENT DATA FOR ENGINE”. &lt;Ref. to EN(H6DO)(diag)-36, Subaru Select Monitor.&gt;  • General scan tool  For detailed operation procedures, refer to the general scan tool operation manual.</p>	<p>Is the value of «Mass Air Flow» 2.0 — 5.0 g/s (0.26 — 0.66 lb/m)?</p>	<p>Go to step 13.</p>	<p>Replace the mass air flow and intake air temperature sensor. &lt;Ref. to FU(H6DO)-40, Mass Air Flow and Intake Air Temperature Sensor.&gt;</p>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<p><b>13 CHECK MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR.</b></p> <p>1) Start the engine and warm up engine until coolant temperature is higher than 75°C (167°F).</p> <p>2) Place the select lever in “P” range or “N” range.</p> <p>3) Turn the A/C switch to OFF.</p> <p>4) Turn all the accessory switches to OFF.</p> <p>5) Open the front hood.</p> <p>6) Measure the ambient temperature.</p> <p>7) Read the value of «Intake Air Temp.» using the Subaru Select Monitor or a general scan tool.</p> <p>NOTE:</p> <ul style="list-style-type: none"> <li>• Subaru Select Monitor</li> </ul> <p>For detailed operation procedures, refer to “READ CURRENT DATA FOR ENGINE”. &lt;Ref. to EN(H6DO)(diag)-36, Subaru Select Monitor.&gt;</p> <ul style="list-style-type: none"> <li>• General scan tool</li> </ul> <p>For detailed operation procedures, refer to the general scan tool operation manual.</p>	<p>Subtract ambient temperature from «Intake Air Temp.». Is the obtained value -10 — 50°C (-18 — 90°F)?</p>	Go to step 14.	Check the mass air flow and intake air temperature sensor. <Ref. to FU(H6DO)-40, Mass Air Flow and Intake Air Temperature Sensor.>
<p><b>14 CHECK REAR OXYGEN SENSOR DATA.</b></p> <p>1) Warm up the engine until engine coolant temperature is higher than 75°C (167°F), and keep the engine speed at 3,000 rpm. (2 minutes maximum)</p> <p>2) Read the value of «Front O2 Sensor #2» using the Subaru Select Monitor or a general scan tool.</p> <p>NOTE:</p> <ul style="list-style-type: none"> <li>• Subaru Select Monitor</li> </ul> <p>For detailed operation procedures, refer to “READ CURRENT DATA FOR ENGINE”. &lt;Ref. to EN(H6DO)(diag)-36, Subaru Select Monitor.&gt;</p> <ul style="list-style-type: none"> <li>• General scan tool</li> </ul> <p>For detailed operation procedures, refer to the general scan tool operation manual.</p>	<p>Is the value of «Front O2 Sensor #2» 0.490 V or more?</p>	Go to step 15.	Go to step 16.
<p><b>15 CHECK REAR OXYGEN SENSOR DATA.</b></p> <p>1) Warm up the engine until engine coolant temperature is higher than 75°C (167°F), and rapidly reduce the engine speed from 3,000 rpm.</p> <p>2) Read the value of «Front O2 Sensor #2» using the Subaru Select Monitor or a general scan tool.</p> <p>NOTE:</p> <ul style="list-style-type: none"> <li>• Subaru Select Monitor</li> </ul> <p>For detailed operation procedures, refer to “READ CURRENT DATA FOR ENGINE”. &lt;Ref. to EN(H6DO)(diag)-36, Subaru Select Monitor.&gt;</p> <ul style="list-style-type: none"> <li>• General scan tool</li> </ul> <p>For detailed operation procedures, refer to the general scan tool operation manual.</p>	<p>Is the value of «Front O2 Sensor #2» 0.250 V or less?</p>	Go to step 17.	Go to step 16.
<p><b>16 CHECK REAR OXYGEN SENSOR CONNECTOR AND COUPLING CONNECTOR.</b></p>	<p>Has water entered the connector?</p>	Completely remove any water inside.	Go to step 18.



# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<p><b>17 CHECK FRONT OXYGEN (A/F) SENSOR USING REAR OXYGEN SENSOR SIGNAL.</b></p> <p>1) Warm up the engine until engine coolant temperature is higher than 75°C (167°F), then keep the engine idling for 5 minutes or more.</p> <p>2) Read the value of «Front O2 Sensor #2» using the Subaru Select Monitor or a general scan tool.</p> <p>NOTE:</p> <ul style="list-style-type: none"> <li>• Subaru Select Monitor</li> </ul> <p>For detailed operation procedures, refer to “READ CURRENT DATA FOR ENGINE”. &lt;Ref. to EN(H6DO)(diag)-36, Subaru Select Monitor.&gt;</p> <ul style="list-style-type: none"> <li>• General scan tool</li> </ul> <p>For detailed operation procedures, refer to the general scan tool operation manual.</p>	<p>Is the value in «Front O2 Sensor #2» kept at 0.250 V or less for 5 minutes or more?</p>	<p>Replace the front oxygen (A/F) sensor. &lt;Ref. to FU(H6DO)-48, Front Oxygen (A/F) Sensor.&gt;</p>	<p>Go to step 18.</p>
<p><b>18 CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.</b></p> <p>1) Turn the ignition switch to OFF.</p> <p>2) Disconnect the connector from ECM and rear oxygen sensor.</p> <p>3) Measure the resistance of harness between ECM and rear oxygen sensor connector.</p> <p><b>Connector &amp; terminal</b></p> <p><b>(B135) No. 28 — (E25) No. 3:</b></p> <p><b>(B135) No. 30 — (E25) No. 4:</b></p>	<p>Is the resistance less than 1 Ω?</p>	<p>Go to step 19.</p>	<p>Repair the harness and connector.</p> <p>NOTE:</p> <p>In this case, repair the following item:</p> <ul style="list-style-type: none"> <li>• Open circuit in harness between ECM and rear oxygen sensor connector</li> <li>• Poor contact of coupling connector</li> </ul>
<p><b>19 CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.</b></p> <p>1) Connect the connector to ECM.</p> <p>2) Turn the ignition switch to ON.</p> <p>3) Measure the voltage between rear oxygen sensor connector and chassis ground.</p> <p><b>Connector &amp; terminal</b></p> <p><b>(E25) No. 3 (+) — Chassis ground (-):</b></p>	<p>Is the voltage 0.2 — 0.5 V?</p>	<p>Replace the rear oxygen sensor. &lt;Ref. to FU(H6DO)-50, Rear Oxygen Sensor.&gt;</p>	<p>Repair the harness and connector.</p> <p>NOTE:</p> <p>In this case, repair the following item:</p> <ul style="list-style-type: none"> <li>• Open circuit in harness between ECM and rear oxygen sensor connector</li> <li>• Poor contact of ECM connector</li> <li>• Poor contact of coupling connector</li> </ul>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## FD:DTC P2099 POST CATALYST FUEL TRIM SYSTEM TOO RICH BANK 2

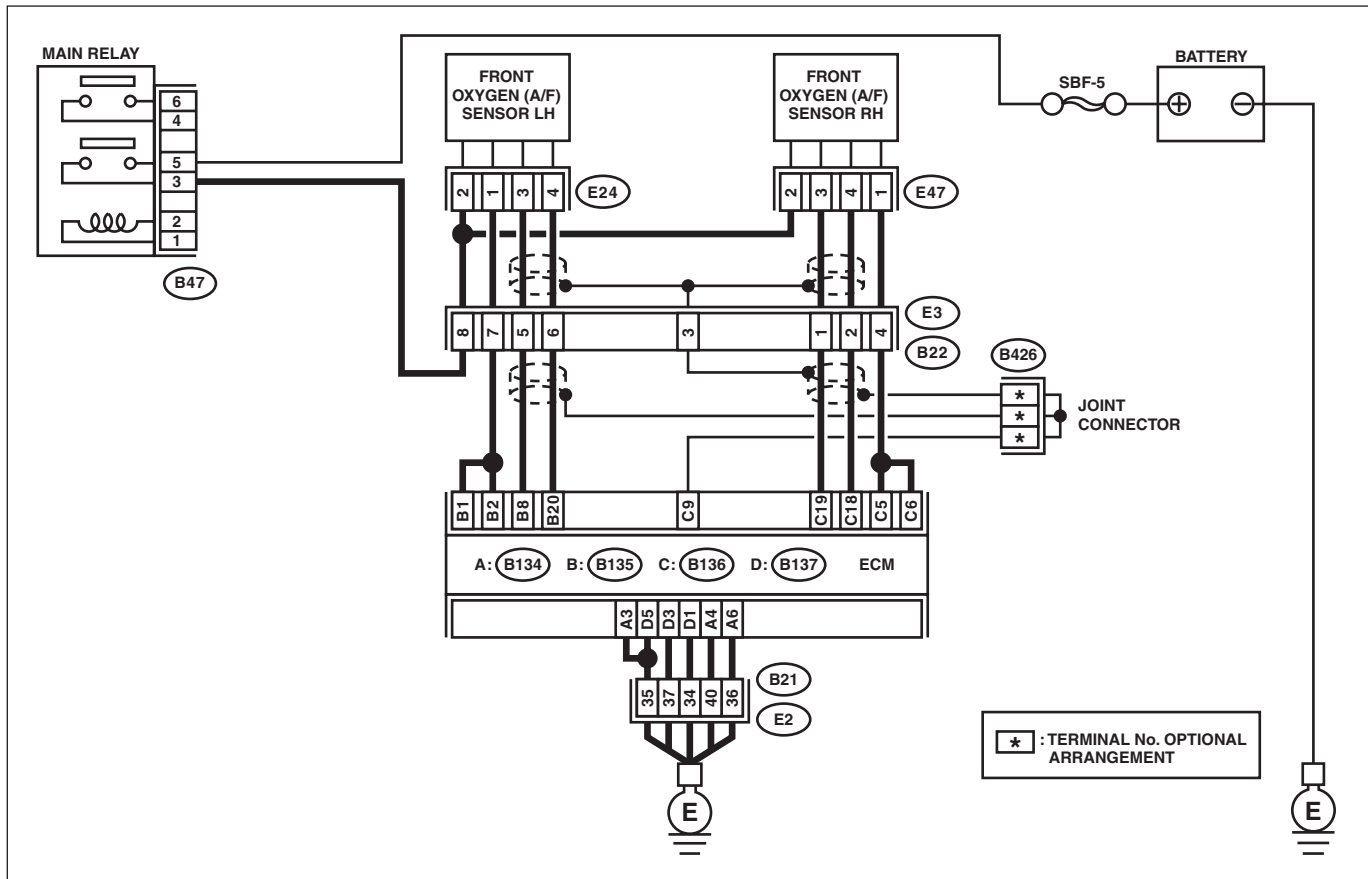
### DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-226, DTC P2099 POST CATALYST FUEL TRIM SYSTEM TOO RICH BANK 2, Diagnostic Trouble Code (DTC) Detecting Criteria.>

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

### WIRING DIAGRAM:



B47



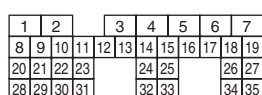
B22



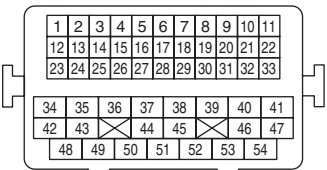
A: B134



B: B135



B21



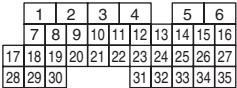
E24 E47



B426



C: B136



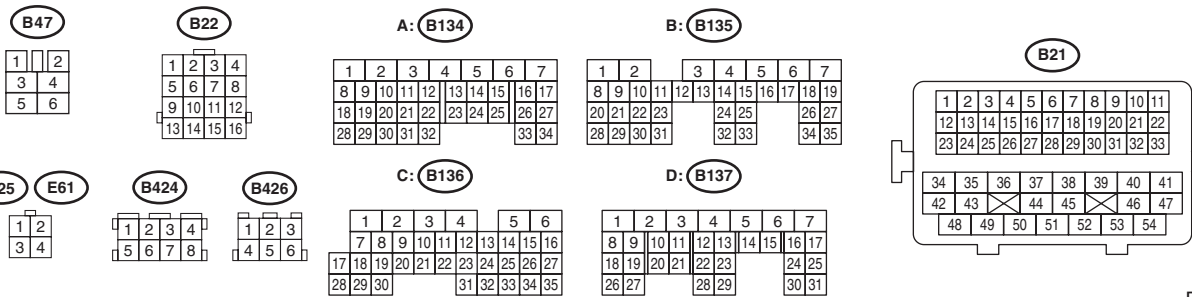
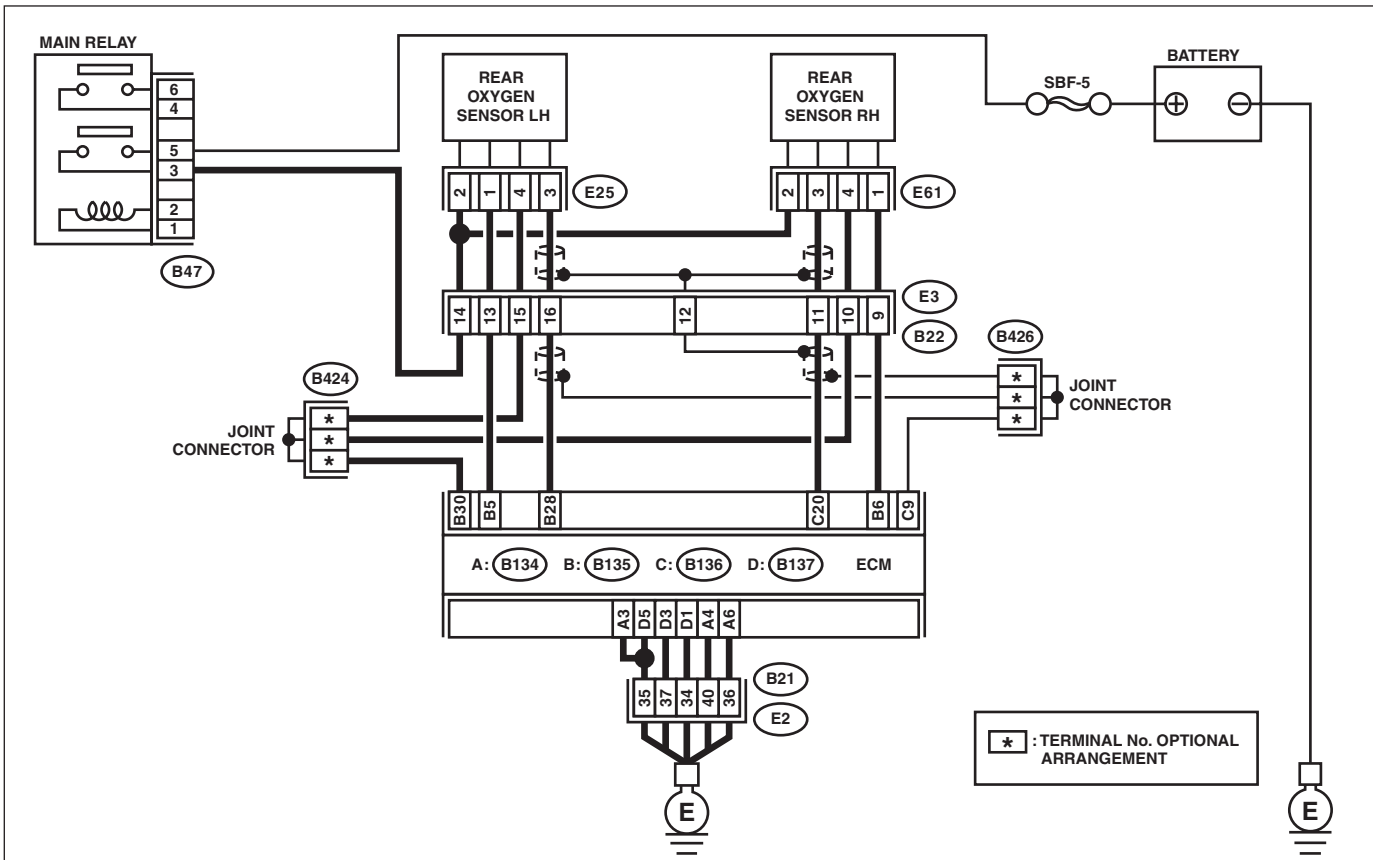
D: B137



EN-08076

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)



EN-08077

Step	Check	Yes	No
1	<b>CHECK FOR ANY OTHER DTC ON DISPLAY.</b> Is any other DTC displayed?	Check DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6DO)(diag)-84, List of Diagnostic Trouble Code (DTC).>	Go to step 2.
2	<b>CHECK FRONT OXYGEN (A/F) SENSOR CONNECTOR AND COUPLING CONNECTOR.</b> Has water entered the connector?	Completely remove any water inside.	Go to step 3.

## Diagnostic Procedure with Diagnostic Trouble Code (DTC)

### ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<b>3 CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM and front oxygen (A/F) sensor. 3) Measure the resistance of harness between ECM and front oxygen (A/F) sensor connector. <i><b>Connector &amp; terminal</b></i> <i><b>(B135) No. 8 — (E24) No. 3:</b></i> <i><b>(B135) No. 20 — (E24) No. 4:</b></i>	Is the resistance less than 1 Ω?	Go to step 4.	Repair the harness and connector.  NOTE: In this case, repair the following item: • Open circuit in harness between ECM and front oxygen (A/F) sensor connector • Poor contact of coupling connector
<b>4 CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.</b> Measure the resistance between ECM and chassis ground. <i><b>Connector &amp; terminal</b></i> <i><b>(B135) No. 8 — Chassis ground:</b></i> <i><b>(B135) No. 20 — Chassis ground:</b></i>	Is the resistance 1 MΩ or more?	Go to step 5.	Repair the ground short circuit of harness between ECM and front oxygen (A/F) sensor connector.
<b>5 CHECK OUTPUT SIGNAL FOR ECM.</b> 1) Connect the connector to ECM. 2) Turn the ignition switch to ON. 3) Measure the voltage between front oxygen (A/F) sensor connector and chassis ground. <i><b>Connector &amp; terminal</b></i> <i><b>(E24) No. 3 (+) — Chassis ground (-):</b></i>	Is the voltage 4.5 V or more?	Go to step 7.	Go to step 6.
<b>6 CHECK OUTPUT SIGNAL FOR ECM.</b> Measure the voltage between front oxygen (A/F) sensor connector and chassis ground. <i><b>Connector &amp; terminal</b></i> <i><b>(E24) No. 4 (+) — Chassis ground (-):</b></i>	Is the voltage 4.95 V or more?	Go to step 7.	Go to step 8.
<b>7 CHECK OUTPUT SIGNAL FOR ECM.</b> Measure the voltage between front oxygen (A/F) sensor connector and chassis ground. <i><b>Connector &amp; terminal</b></i> <i><b>(E24) No. 3 (+) — Chassis ground (-):</b></i> <i><b>(E24) No. 4 (+) — Chassis ground (-):</b></i>	Is the voltage 8 V or more?	Repair the short circuit to power in the harness between ECM and front oxygen (A/F) sensor connector. After repair, replace the ECM. <Ref. to FU(H6DO)-52, Engine Control Module (ECM).>	Repair the poor contact of ECM connector.
<b>8 CHECK EXHAUST SYSTEM.</b>	Are there holes or loose bolts on exhaust system?	Repair the exhaust system.	Go to step 9.
<b>9 CHECK AIR INTAKE SYSTEM.</b>	Are there holes, loose bolts or disconnection of hose on air intake system?	Repair the air intake system.	Go to step 10.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<p><b>10</b></p> <p><b>CHECK FUEL PRESSURE.</b></p> <p><b>WARNING:</b> Place “NO OPEN FLAMES” signs near the working area.</p> <p><b>CAUTION:</b> Be careful not to spill fuel.</p> <p>1) Connect the front oxygen (A/F) sensor connector.</p> <p>2) Measure the fuel pressure. &lt;Ref. to ME(H6DO)-30, INSPECTION, Fuel Pressure.&gt;</p> <p><b>CAUTION:</b> Release fuel pressure before removing the fuel pressure gauge.</p>	<p>Is the measured value 340 — 400 kPa (3.5 — 4.1 kgf/cm<sup>2</sup>, 49 — 58 psi)?</p>	<p>Go to step 11.</p>	<p>Repair the following item.</p> <p>Fuel pressure is too high:</p> <ul style="list-style-type: none"> <li>• Clogged fuel line or bent hose</li> </ul> <p>Fuel pressure is too low:</p> <ul style="list-style-type: none"> <li>• Improper fuel pump discharge</li> <li>• Clogged fuel line</li> </ul>
<p><b>11</b></p> <p><b>CHECK ENGINE COOLANT TEMPERATURE SENSOR.</b></p> <p>1) Start the engine and warm up completely.</p> <p>2) Read the value of «Coolant Temp.» using the Subaru Select Monitor or a general scan tool.</p> <p>NOTE:</p> <ul style="list-style-type: none"> <li>• Subaru Select Monitor</li> </ul> <p>For detailed operation procedures, refer to “READ CURRENT DATA FOR ENGINE”. &lt;Ref. to EN(H6DO)(diag)-36, Subaru Select Monitor.&gt;</p> <ul style="list-style-type: none"> <li>• General scan tool</li> </ul> <p>For detailed operation procedures, refer to the general scan tool operation manual.</p>	<p>Is the value of «Coolant Temp.» 75°C (167°F) or more?</p>	<p>Go to step 12.</p>	<p>Replace the engine coolant temperature sensor. &lt;Ref. to FU(H6DO)-30, Engine Coolant Temperature Sensor.&gt;</p>
<p><b>12</b></p> <p><b>CHECK MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR.</b></p> <p>1) Start the engine and warm up engine until coolant temperature is higher than 75°C (167°F).</p> <p>2) Place the select lever in “P” range or “N” range.</p> <p>3) Turn the A/C switch to OFF.</p> <p>4) Turn all the accessory switches to OFF.</p> <p>5) Read the value of «Mass Air Flow» using the Subaru Select Monitor or a general scan tool.</p> <p>NOTE:</p> <ul style="list-style-type: none"> <li>• Subaru Select Monitor</li> </ul> <p>For detailed operation procedures, refer to “READ CURRENT DATA FOR ENGINE”. &lt;Ref. to EN(H6DO)(diag)-36, Subaru Select Monitor.&gt;</p> <ul style="list-style-type: none"> <li>• General scan tool</li> </ul> <p>For detailed operation procedures, refer to the general scan tool operation manual.</p>	<p>Is the value of «Mass Air Flow» 2.0 — 5.0 g/s (0.26 — 0.66 lb/m)?</p>	<p>Go to step 13.</p>	<p>Replace the mass air flow and intake air temperature sensor. &lt;Ref. to FU(H6DO)-40, Mass Air Flow and Intake Air Temperature Sensor.&gt;</p>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<p><b>13 CHECK MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR.</b></p> <p>1) Start the engine and warm up engine until coolant temperature is higher than 75°C (167°F).</p> <p>2) Place the select lever in “P” range or “N” range.</p> <p>3) Turn the A/C switch to OFF.</p> <p>4) Turn all the accessory switches to OFF.</p> <p>5) Open the front hood.</p> <p>6) Measure the ambient temperature.</p> <p>7) Read the value of «Intake Air Temp.» using the Subaru Select Monitor or a general scan tool.</p> <p>NOTE:</p> <ul style="list-style-type: none"> <li>• Subaru Select Monitor</li> </ul> <p>For detailed operation procedures, refer to “READ CURRENT DATA FOR ENGINE”. &lt;Ref. to EN(H6DO)(diag)-36, Subaru Select Monitor.&gt;</p> <ul style="list-style-type: none"> <li>• General scan tool</li> </ul> <p>For detailed operation procedures, refer to the general scan tool operation manual.</p>	<p>Subtract ambient temperature from «Intake Air Temp.». Is the obtained value -10 — 50°C (-18 — 90°F)?</p>	Go to step 14.	Check the mass air flow and intake air temperature sensor. <Ref. to FU(H6DO)-40, Mass Air Flow and Intake Air Temperature Sensor.>
<p><b>14 CHECK REAR OXYGEN SENSOR DATA.</b></p> <p>1) Warm up the engine until engine coolant temperature is higher than 75°C (167°F), and keep the engine speed at 3,000 rpm. (2 minutes maximum)</p> <p>2) Read the value of «Front O2 Sensor #2» using the Subaru Select Monitor or a general scan tool.</p> <p>NOTE:</p> <ul style="list-style-type: none"> <li>• Subaru Select Monitor</li> </ul> <p>For detailed operation procedures, refer to “READ CURRENT DATA FOR ENGINE”. &lt;Ref. to EN(H6DO)(diag)-36, Subaru Select Monitor.&gt;</p> <ul style="list-style-type: none"> <li>• General scan tool</li> </ul> <p>For detailed operation procedures, refer to the general scan tool operation manual.</p>	<p>Is the value of «Front O2 Sensor #2» 0.490 V or more?</p>	Go to step 15.	Go to step 16.
<p><b>15 CHECK REAR OXYGEN SENSOR DATA.</b></p> <p>1) Warm up the engine until engine coolant temperature is higher than 75°C (167°F), and rapidly reduce the engine speed from 3,000 rpm.</p> <p>2) Read the value of «Front O2 Sensor #2» using the Subaru Select Monitor or a general scan tool.</p> <p>NOTE:</p> <ul style="list-style-type: none"> <li>• Subaru Select Monitor</li> </ul> <p>For detailed operation procedures, refer to “READ CURRENT DATA FOR ENGINE”. &lt;Ref. to EN(H6DO)(diag)-36, Subaru Select Monitor.&gt;</p> <ul style="list-style-type: none"> <li>• General scan tool</li> </ul> <p>For detailed operation procedures, refer to the general scan tool operation manual.</p>	<p>Is the value of «Front O2 Sensor #2» 0.250 V or less?</p>	Go to step 17.	Go to step 16.
<p><b>16 CHECK REAR OXYGEN SENSOR CONNECTOR AND COUPLING CONNECTOR.</b></p>	<p>Has water entered the connector?</p>	Completely remove any water inside.	Go to step 18.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<p><b>17</b>      <b>CHECK FRONT OXYGEN (A/F) SENSOR USING REAR OXYGEN SENSOR SIGNAL.</b>                      1) Warm up the engine until engine coolant temperature is higher than 75°C (167°F), then keep the engine idling for 5 minutes or more.                      2) Read the value of «Front O2 Sensor #2» using the Subaru Select Monitor or a general scan tool.                      NOTE:                      • Subaru Select Monitor                      For detailed operation procedures, refer to “READ CURRENT DATA FOR ENGINE”. &lt;Ref. to EN(H6DO)(diag)-36, Subaru Select Monitor.&gt;                      • General scan tool                      For detailed operation procedures, refer to the general scan tool operation manual.</p>	<p>Is the value in «Front O2 Sensor #2» kept at 0.8 V or more for 5 minutes or more?</p>	<p>Replace the front oxygen (A/F) sensor. &lt;Ref. to FU(H6DO)-48, Front Oxygen (A/F) Sensor.&gt;</p>	<p>Go to step 18.</p>
<p><b>18</b>      <b>CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.</b>                      1) Turn the ignition switch to OFF.                      2) Disconnect the connector from ECM and rear oxygen sensor.                      3) Measure the resistance of harness between ECM and rear oxygen sensor connector.  <i><b>Connector &amp; terminal</b></i>  <i><b>(B135) No. 28 — (E25) No. 3:</b></i>  <i><b>(B135) No. 30 — (E25) No. 4:</b></i></p>	<p>Is the resistance less than 1 Ω?</p>	<p>Go to step 19.</p>	<p>Repair the harness and connector.                      NOTE:                      In this case, repair the following item:                      • Open circuit in harness between ECM and rear oxygen sensor connector                      • Poor contact of coupling connector</p>
<p><b>19</b>      <b>CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.</b>                      1) Connect the connector to ECM.                      2) Turn the ignition switch to ON.                      3) Measure the voltage between rear oxygen sensor connector and chassis ground.  <i><b>Connector &amp; terminal</b></i>  <i><b>(E25) No. 3 (+) — Chassis ground (-):</b></i></p>	<p>Is the voltage 0.2 — 0.5 V?</p>	<p>Replace the rear oxygen sensor.                      &lt;Ref. to FU(H6DO)-50, Rear Oxygen Sensor.&gt;</p>	<p>Repair the harness and connector.                      NOTE:                      In this case, repair the following item:                      • Open circuit in harness between ECM and rear oxygen sensor connector                      • Poor contact of ECM connector                      • Poor contact of coupling connector</p>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## FE:DTC P2101 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT RANGE/ PERFORMANCE

### DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-227, DTC P2101 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT RANGE/PERFORMANCE, Diagnostic Trouble Code (DTC) Detecting Criteria.>

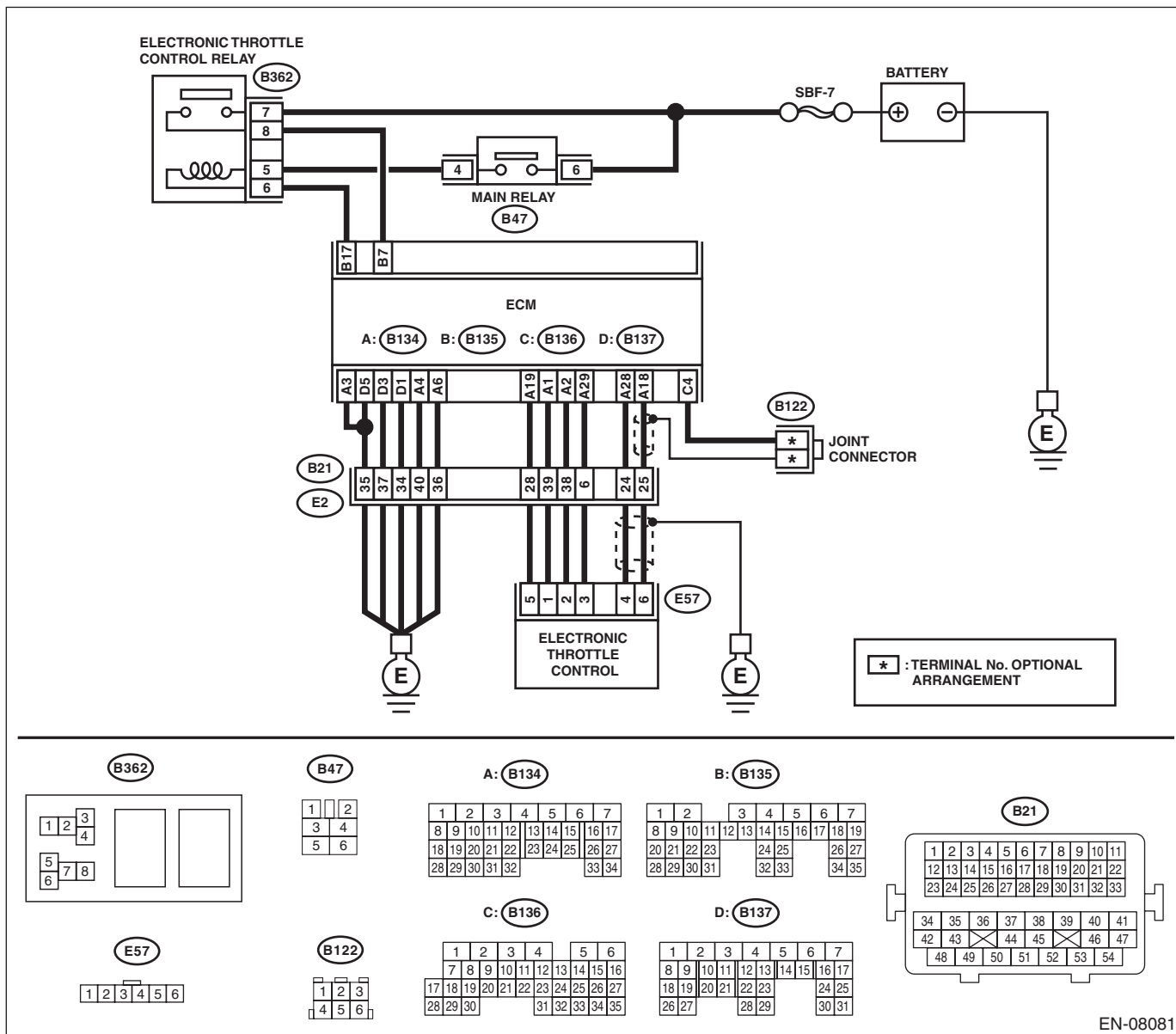
### TROUBLE SYMPTOM:

- Improper idling
- Poor driving performance
- Engine stalls.

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

### WIRING DIAGRAM:



EN-08081



# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<b>1</b> <b>CHECK ELECTRONIC THROTTLE CONTROL RELAY.</b> 1) Turn the ignition switch to OFF. 2) Remove the electronic throttle control relay. 3) Connect the battery to terminals No. 5 and No. 6 of electronic throttle control relay. 4) Measure the resistance between electronic throttle control relay terminals. <b>Terminals</b> <b>No. 7 — No. 8:</b>	Is the resistance less than 1 $\Omega$ ?	Go to step 2.	Replace the electronic throttle control relay. <Ref. to EN(H6DO)(diag)-9, Electrical Component Location.>
<b>2</b> <b>CHECK POWER SUPPLY OF ELECTRONIC THROTTLE CONTROL RELAY.</b> Measure the voltage between electronic throttle control relay connector and chassis ground. <b>Connector &amp; terminal</b> <b>(B362) No. 7 (+) — Chassis ground (-):</b>	Is the voltage 10 V or more?	Go to step 3.	Repair the open or ground short circuit of power supply circuit.
<b>3</b> <b>CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL RELAY.</b> 1) Disconnect the connector from ECM. 2) Turn the ignition switch to ON. 3) Measure the voltage between electronic throttle control relay connector and chassis ground. <b>Connector &amp; terminal</b> <b>(B362) No. 6 (+) — Chassis ground (-):</b>	Is the voltage 10 V or more?	Repair the short circuit to power in harness between ECM and electronic throttle control relay.	Go to step 4.
<b>4</b> <b>CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL RELAY.</b> 1) Turn the ignition switch to OFF. 2) Measure the resistance between electronic throttle control relay connector and chassis ground. <b>Connector &amp; terminal</b> <b>(B362) No. 8 — Chassis ground:</b> <b>(B362) No. 6 — Chassis ground:</b>	Is the resistance 1 M $\Omega$ or more?	Go to step 5.	Repair the ground short circuit of harness between ECM and electronic throttle control relay.
<b>5</b> <b>CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL RELAY.</b> Measure the resistance between ECM and electronic throttle control relay connector. <b>Connector &amp; terminal</b> <b>(B135) No. 7 — (B362) No. 8:</b> <b>(B135) No. 17 — (B362) No. 6:</b>	Is the resistance less than 1 $\Omega$ ?	Go to step 6.	Repair the open circuit of harness between ECM and electronic throttle control relay.
<b>6</b> <b>CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from electronic throttle control. 3) Measure the resistance between ECM and chassis ground. <b>Connector &amp; terminal</b> <b>(B134) No. 19 — Chassis ground:</b> <b>(B134) No. 18 — Chassis ground:</b> <b>(B134) No. 18 — (B136) No. 4:</b> <b>(B134) No. 28 — Chassis ground:</b>	Is the resistance 1 M $\Omega$ or more?	Go to step 7.	Repair the short circuit to ground in harness between ECM and electronic throttle control connector.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<b>7 CHECK SHORT CIRCUIT INSIDE THE ECM.</b> 1) Connect the connector to ECM. 2) Measure the resistance between electronic throttle control connector and engine ground. <b>Connector &amp; terminal</b> <i>(E57) No. 6 — Engine ground:</i> <i>(E57) No. 4 — Engine ground:</i>	Is the resistance 1 M $\Omega$ or more?	Go to step 8.	Repair the short circuit to ground in harness between ECM and electronic throttle control connector. Replace the ECM if defective. <Ref. to FU(H6DO)-52, Engine Control Module (ECM).>
<b>8 CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.</b> 1) Disconnect the connector from ECM. 2) Measure the resistance of harness between ECM and electronic throttle control connector. <b>Connector &amp; terminal</b> <i>(B134) No. 18 — (E57) No. 6:</i> <i>(B134) No. 28 — (E57) No. 4:</i> <i>(B134) No. 29 — (E57) No. 3:</i>	Is the resistance less than 1 $\Omega$ ?	Go to step 9.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit in harness between ECM and electronic throttle control connector • Poor contact of coupling connector
<b>9 CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.</b> 1) Connect the connector to ECM. 2) Measure the resistance between electronic throttle control connector and engine ground. <b>Connector &amp; terminal</b> <i>(E57) No. 3 — Engine ground:</i>	Is the resistance less than 5 $\Omega$ ?	Go to step 10.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit of harness between ECM and engine ground • Poor contact of ECM connector • Poor contact of coupling connector
<b>10 CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.</b> 1) Turn the ignition switch to ON. 2) Measure the voltage between electronic throttle control connector and engine ground. <b>Connector &amp; terminal</b> <i>(E57) No. 6 (+) — Engine ground (-):</i> <i>(E57) No. 4 (+) — Engine ground (-):</i>	Is the voltage 5 V or more?	Repair the short circuit to power in harness between ECM and electronic throttle control connector.	Go to step 11.
<b>11 CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance between ECM connectors. <b>Connector &amp; terminal</b> <i>(B134) No. 19 — (B134) No. 18:</i> <i>(B134) No. 19 — (B134) No. 28:</i>	Is the resistance 1 M $\Omega$ or more?	Go to step 12.	Repair the short circuit to power in harness between ECM and electronic throttle control connector.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<b>12 CHECK SENSOR OUTPUT.</b> 1) Connect all connectors. 2) Turn the ignition switch to ON. 3) Read the value of «Main-Throttle Sensor» using Subaru Select Monitor. NOTE: For detailed operation procedures, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H6DO)(diag)-36, Subaru Select Monitor.>	Is the value of «Main-Throttle Sensor» 0.81 — 0.87 V?	Go to step 13.	Repair the poor contact of electronic throttle control connector. Replace the electronic throttle control if defective. <Ref. to FU(H6DO)-19, Throttle Body.>
<b>13 CHECK SENSOR OUTPUT.</b> Read the value of «Sub-Throttle Sensor» using Subaru Select Monitor. NOTE: For detailed operation procedures, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H6DO)(diag)-36, Subaru Select Monitor.>	Is the value of «Sub-Throttle Sensor» 1.64 — 1.70 V?	Go to step 14.	Repair the poor contact of electronic throttle control connector. Replace the electronic throttle control if defective. <Ref. to FU(H6DO)-19, Throttle Body.>
<b>14 CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL MOTOR.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM and electronic throttle control. 3) Measure the resistance between ECM and electronic throttle control connector. <i>Connector &amp; terminal</i> (B134) No. 1 — (E57) No. 1: (B134) No. 2 — (E57) No. 2:	Is the resistance less than 1 Ω?	Go to step 15.	Repair the harness and connector. NOTE: In this case, repair the following item: <ul style="list-style-type: none"> <li>• Open circuit in harness between ECM and electronic throttle control</li> <li>• Poor contact of coupling connector</li> </ul>
<b>15 CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL MOTOR.</b> 1) Connect the connector to ECM. 2) Turn the ignition switch to ON. 3) Measure the voltage between electronic throttle control connector and engine ground. <i>Connector &amp; terminal</i> (E57) No. 2 (+) — Engine ground (-): (E57) No. 1 (+) — Engine ground (-):	Is the voltage 5 V or more?	Repair the short circuit to power in the harness between ECM and electronic throttle control.	Go to step 16.
<b>16 CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL MOTOR.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance between electronic throttle control connector and engine ground. <i>Connector &amp; terminal</i> (E57) No. 2 — Engine ground: (E57) No. 1 — Engine ground:	Is the resistance 1 MΩ or more?	Go to step 17.	Repair the short circuit to ground in harness between ECM and electronic throttle control.
<b>17 CHECK ELECTRONIC THROTTLE CONTROL MOTOR HARNESS.</b> Measure the resistance between electronic throttle control connectors. <i>Connector &amp; terminal</i> (E57) No. 2 — (E57) No. 1:	Is the resistance 1 MΩ or more?	Go to step 18.	Repair the short circuit of harness between ECM and electronic throttle control.

## Diagnostic Procedure with Diagnostic Trouble Code (DTC)

### ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<b>18</b> <b>CHECK ELECTRONIC THROTTLE CONTROL GROUND CIRCUIT.</b> Measure the resistance between ECM and chassis ground. <i><b>Connector &amp; terminal</b></i> <i>(B134) No. 3 — Chassis ground:</i> <i>(B134) No. 4 — Chassis ground:</i> <i>(B134) No. 6 — Chassis ground:</i> <i>(B137) No. 1 — Chassis ground:</i> <i>(B137) No. 3 — Chassis ground:</i> <i>(B137) No. 5 — Chassis ground:</i>	Is the resistance less than 5 $\Omega$ ?	Go to step 19.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit of harness between ECM and engine ground • Poor contact of coupling connector
<b>19</b> <b>CHECK ELECTRONIC THROTTLE CONTROL.</b> Measure the resistance between electronic throttle control terminals. <i><b>Terminals</b></i> <i><b>No. 2 — No. 1:</b></i>	Is the resistance 50 $\Omega$ or less?	Go to step 20.	Replace the electronic throttle control. <Ref. to FU(H6DO)-19, Throttle Body.>
<b>20</b> <b>CHECK ELECTRONIC THROTTLE CONTROL.</b> Move the throttle valve to the fully open and fully closed positions with fingers. Check that the valve returns to the specified position when releasing fingers.	Does the valve return to the specified position? Standard value: 3 mm (0.12 in) from fully closed position	Repair the poor contact of ECM connector.	Replace the electronic throttle control. <Ref. to FU(H6DO)-19, Throttle Body.>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## FF:DTC P2102 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT LOW

### DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-229, DTC P2102 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT LOW, Diagnostic Trouble Code (DTC) Detecting Criteria.>

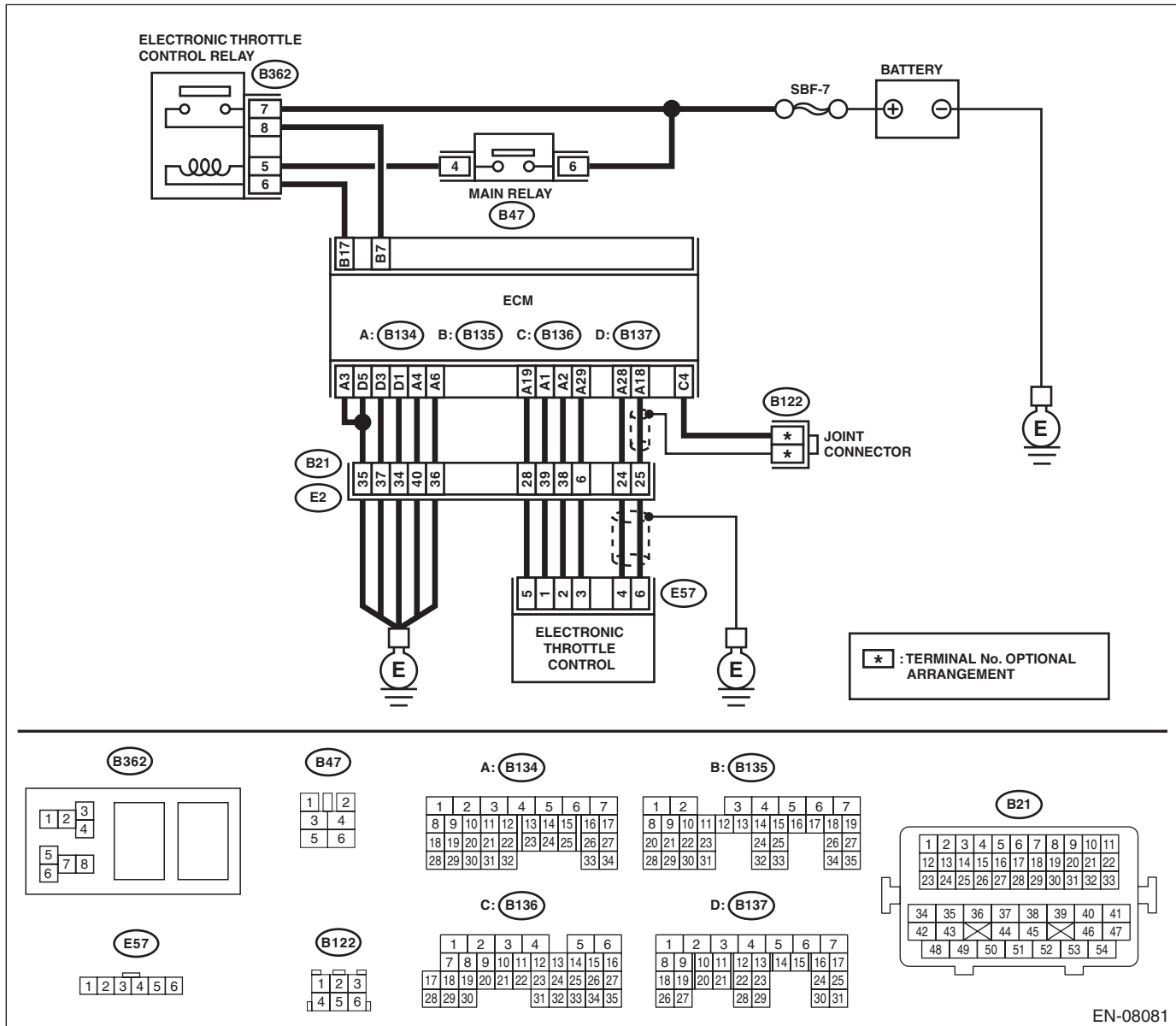
### TROUBLE SYMPTOM:

- Improper idling
- Poor driving performance
- Engine stalls.

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

### WIRING DIAGRAM:



EN-08081

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<b>1 CHECK ELECTRONIC THROTTLE CONTROL RELAY.</b> 1) Turn the ignition switch to OFF. 2) Remove the electronic throttle control relay. 3) Connect the battery to terminals No. 5 and No. 6 of electronic throttle control relay. 4) Measure the resistance between electronic throttle control relay terminals. <i>Terminals</i> <i>No. 7 — No. 8:</i>	Is the resistance less than 1 $\Omega$ ?	Go to step 2.	Replace the electronic throttle control relay. <Ref. to EN(H6DO)(diag)-9, Electrical Component Location.>
<b>2 CHECK POWER SUPPLY OF ELECTRONIC THROTTLE CONTROL RELAY.</b> Measure the voltage between electronic throttle control relay connector and chassis ground. <i>Connector &amp; terminal</i> <i>(B362) No. 7 (+) — Chassis ground (-):</i>	Is the voltage 10 V or more?	Go to step 3.	Repair the open or ground short circuit of power supply circuit.
<b>3 CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL RELAY.</b> 1) Disconnect the connectors from ECM. 2) Turn the ignition switch to ON. 3) Measure the voltage between electronic throttle control relay connector and chassis ground. <i>Connector &amp; terminal</i> <i>(B362) No. 6 (+) — Chassis ground (-):</i>	Is the voltage 10 V or more?	Repair the short circuit to power in harness between ECM and electronic throttle control relay.	Go to step 4.
<b>4 CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL RELAY.</b> 1) Turn the ignition switch to OFF. 2) Measure the resistance between electronic throttle control relay connector and chassis ground. <i>Connector &amp; terminal</i> <i>(B362) No. 6 — Chassis ground:</i> <i>(B362) No. 8 — Chassis ground:</i>	Is the resistance 1 M $\Omega$ or more?	Go to step 5.	Repair the ground short circuit of harness between ECM and electronic throttle control relay.
<b>5 CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL RELAY.</b> Measure the resistance between ECM and electronic throttle control relay connector. <i>Connector &amp; terminal</i> <i>(B135) No. 7 — (B362) No. 8:</i> <i>(B135) No. 17 — (B362) No. 6:</i>	Is the resistance less than 1 $\Omega$ ?	Repair the poor contact of ECM connector.	Repair the open circuit of harness between ECM and electronic throttle control relay.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## FG:DTC P2103 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT HIGH

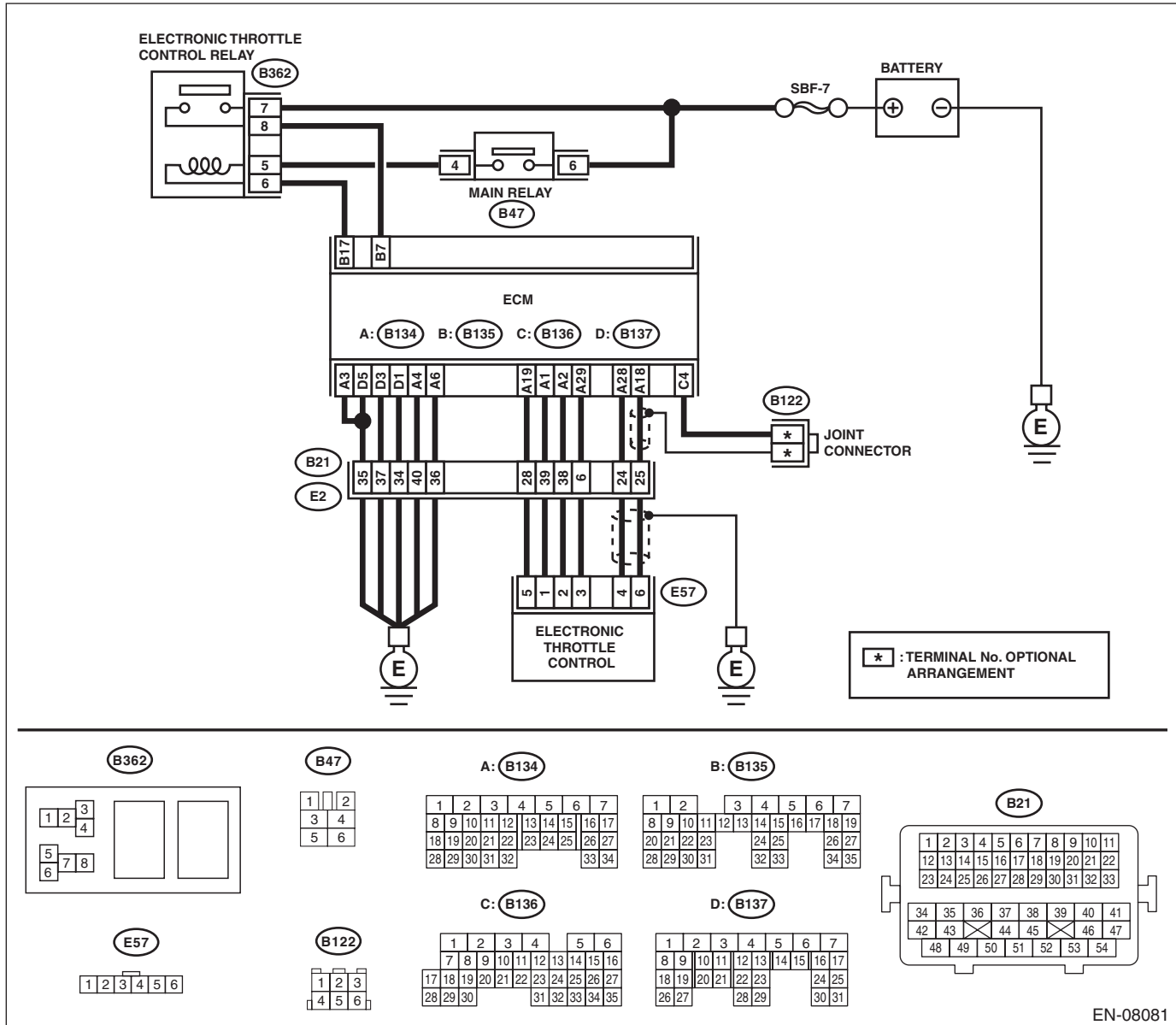
### DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-231, DTC P2103 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT HIGH, Diagnostic Trouble Code (DTC) Detecting Criteria.>

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

### WIRING DIAGRAM:



EN-08081

## Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<b>1 CHECK ELECTRONIC THROTTLE CONTROL RELAY.</b> 1) Turn the ignition switch to OFF. 2) Remove the electronic throttle control relay. 3) Measure the resistance between electronic throttle control relay terminals. <i>Terminals</i> <i>No. 7 — No. 8:</i>	Is the resistance 1 MΩ or more?	Go to step 2.	Replace the electronic throttle control relay. <Ref. to EN(H6DO)(diag)-9, Electrical Component Location.>
<b>2 CHECK SHORT CIRCUIT OF ELECTRONIC THROTTLE CONTROL RELAY POWER SUPPLY.</b> 1) Turn the ignition switch to ON. 2) Measure the voltage between electronic throttle control relay connector and chassis ground. <i>Connector &amp; terminal</i> <i>(B362) No. 8 (+) — Chassis ground (-):</i>	Is the voltage 10 V or more?	Repair the short circuit to power in harness between ECM and electronic throttle control relay.	Go to step 3.
<b>3 CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL RELAY.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM. 3) Measure the resistance between ECM and chassis ground. <i>Connector &amp; terminal</i> <i>(B135) No. 17 — Chassis ground:</i>	Is the resistance 1 MΩ or more?	Repair the poor contact of ECM connector.	Repair the ground short circuit of harness between ECM and electronic throttle control relay.

### FH:DTC P2109 THROTTLE/PEDAL POSITION SENSOR “A” MINIMUM STOP PERFORMANCE

NOTE:

For the diagnostic procedure, refer to DTC P2101. <Ref. to EN(H6DO)(diag)-336, DTC P2101 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT RANGE/PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>



# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## FI: DTC P2122 THROTTLE/PEDAL POSITION SENSOR/SWITCH "D" CIRCUIT LOW INPUT

### DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-235, DTC P2122 THROTTLE/PEDAL POSITION SENSOR/SWITCH "D" CIRCUIT LOW INPUT, Diagnostic Trouble Code (DTC) Detecting Criteria.>

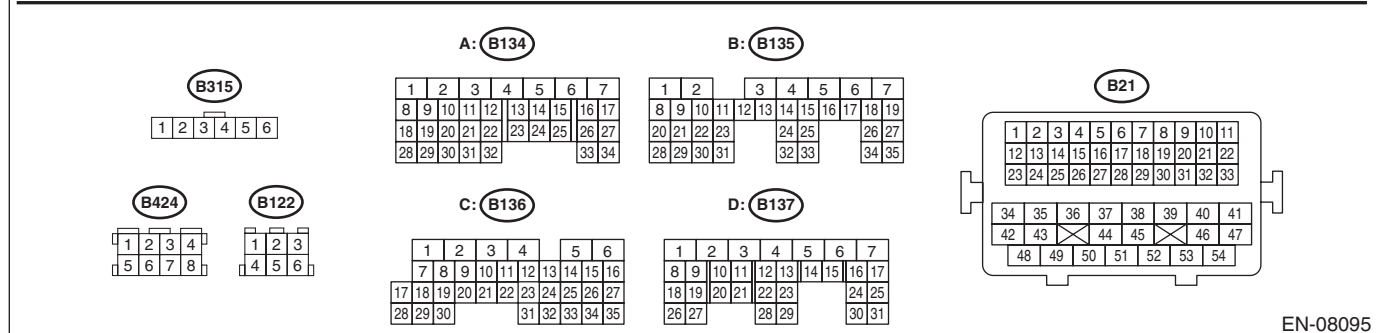
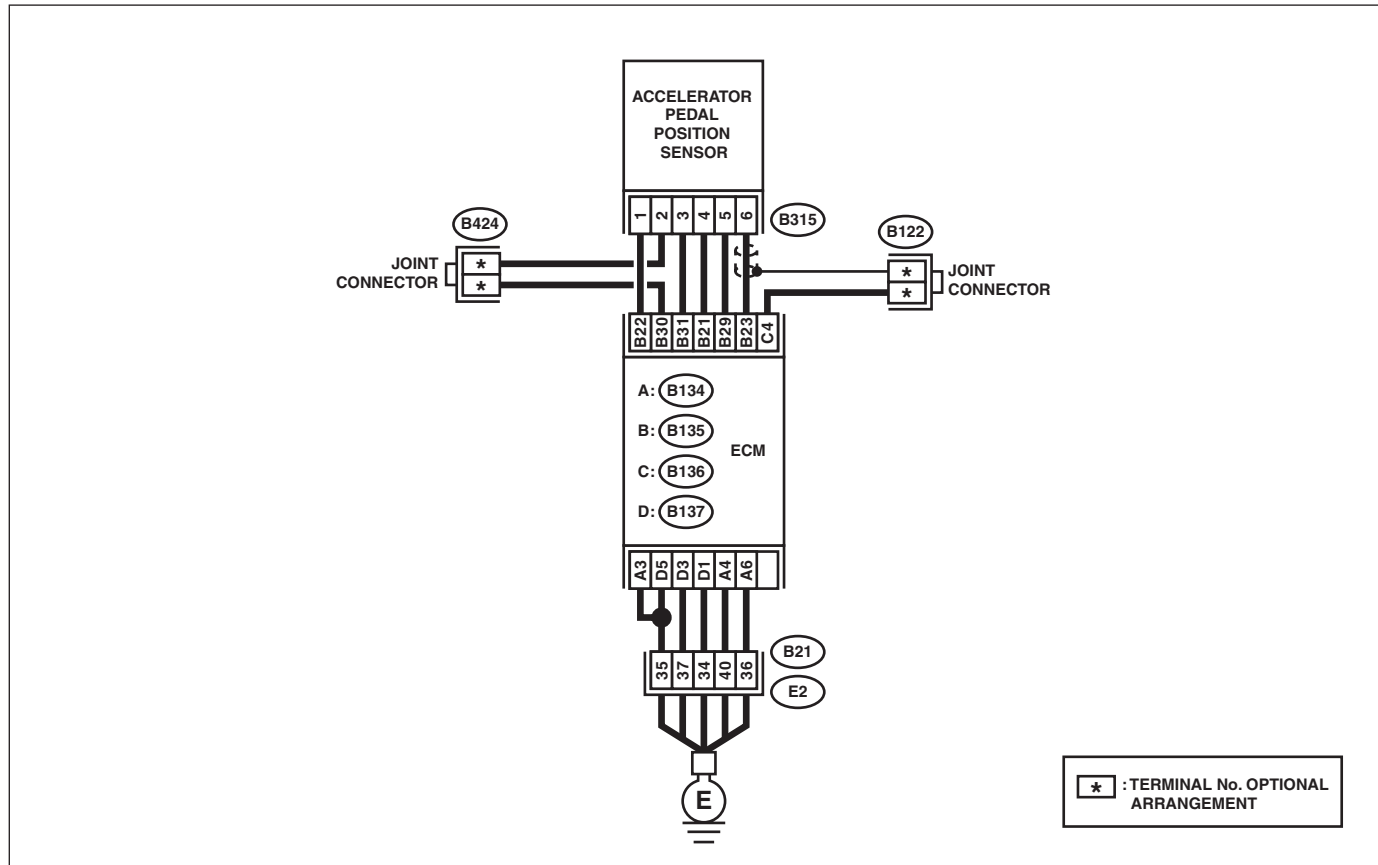
### TROUBLE SYMPTOM:

- Improper idling
- Poor driving performance

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

### WIRING DIAGRAM:



EN-08095

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<p><b>1</b></p> <p><b>CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR CONNECTOR.</b></p> <p>1) Turn the ignition switch to OFF.                  2) Disconnect the connectors from ECM and accelerator pedal position sensor.                  3) Measure the resistance between ECM and chassis ground.</p> <p><b>Connector &amp; terminal</b>  <b>(B135) No. 21 — Chassis ground:</b>  <b>(B135) No. 23 — Chassis ground:</b>  <b>(B135) No. 23 — (B136) No. 4:</b></p>	<p>Is the resistance 1 MΩ or more?</p>	<p>Go to step 2.</p>	<p>Repair the short circuit to ground in harness between ECM and accelerator pedal position sensor connector.</p>
<p><b>2</b></p> <p><b>CHECK SHORT CIRCUIT INSIDE THE ECM.</b></p> <p>1) Connect the connector to ECM.                  2) Measure the resistance between accelerator pedal position sensor connector and chassis ground.</p> <p><b>Connector &amp; terminal</b>  <b>(B315) No. 6 — Chassis ground:</b></p>	<p>Is the resistance 1 MΩ or more?</p>	<p>Replace the accelerator pedal. &lt;Ref. to SP(H6DO)-4, Accelerator Pedal.&gt;</p>	<p>Repair the short circuit to ground in harness between ECM and accelerator pedal position sensor connector. Replace the ECM if defective. &lt;Ref. to FU(H6DO)-52, Engine Control Module (ECM).&gt;</p>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## FJ: DTC P2123 THROTTLE/PEDAL POSITION SENSOR/SWITCH "D" CIRCUIT HIGH INPUT

### DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-237, DTC P2123 THROTTLE/PEDAL POSITION SENSOR/SWITCH "D" CIRCUIT HIGH INPUT, Diagnostic Trouble Code (DTC) Detecting Criteria.>

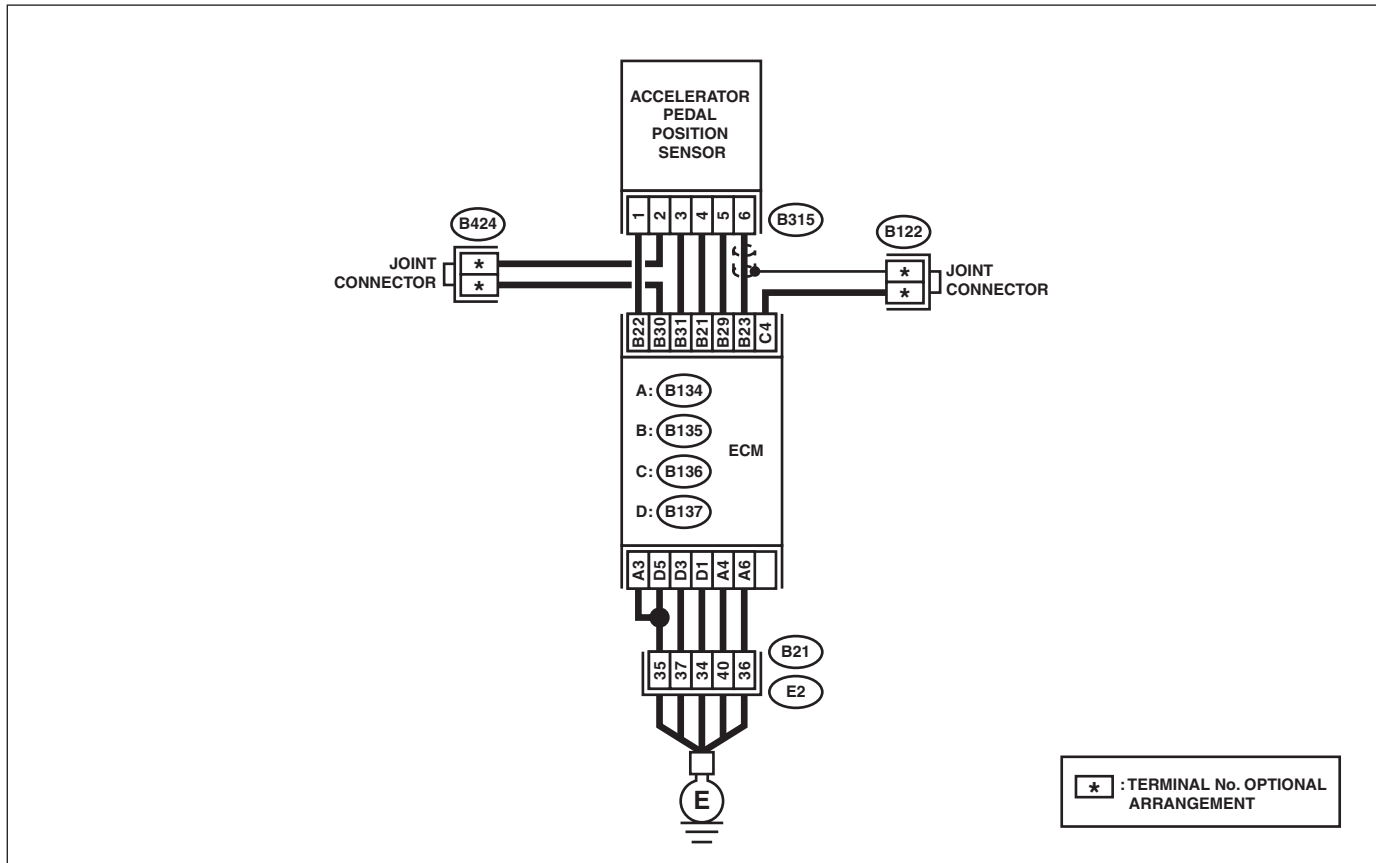
### TROUBLE SYMPTOM:

- Improper idling
- Poor driving performance

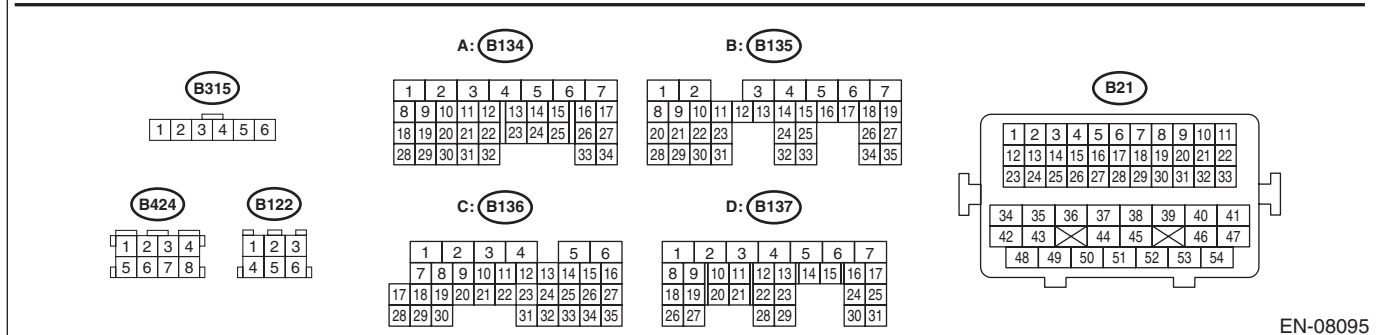
### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

### WIRING DIAGRAM:



\* : TERMINAL No. OPTIONAL ARRANGEMENT



EN-08095

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<p><b>1</b></p> <p><b>CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR CONNECTOR.</b></p> <p>1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM and accelerator pedal position sensor. 3) Measure the resistance of harness between ECM and accelerator pedal position sensor connector.</p> <p><b>Connector &amp; terminal</b> <b>(B135) No. 23 — (B315) No. 6:</b> <b>(B135) No. 29 — (B315) No. 5:</b></p>	Is the resistance less than 1 Ω?	Go to step 2.	Repair the open circuit in harness between ECM and accelerator pedal position sensor connector.
<p><b>2</b></p> <p><b>CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR CONNECTOR.</b></p> <p>1) Connect the connector to ECM. 2) Measure the resistance between accelerator pedal position sensor connector and chassis ground.</p> <p><b>Connector &amp; terminal</b> <b>(B315) No. 5 — Chassis ground:</b></p>	Is the resistance less than 5 Ω?	Go to step 3.	Repair the harness and connector. <b>NOTE:</b> In this case, repair the following item: • Open circuit of harness between ECM and engine ground • Poor contact of ECM connector • Poor contact of coupling connector
<p><b>3</b></p> <p><b>CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR CONNECTOR.</b></p> <p>1) Turn the ignition switch to ON. 2) Measure the voltage between accelerator pedal position sensor connector and chassis ground.</p> <p><b>Connector &amp; terminal</b> <b>(B315) No. 6 (+) — Chassis ground (-):</b></p>	Is the voltage 5 V or more?	Repair the short circuit to power supply in the harness between the ECM and accelerator pedal position sensor connector.	Go to step 4.
<p><b>4</b></p> <p><b>CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR CONNECTOR.</b></p> <p>1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM. 3) Measure the resistance between ECM connectors.</p> <p><b>Connector &amp; terminal</b> <b>(B135) No. 21 — (B135) No. 23:</b></p>	Is the resistance 1 MΩ or more?	Repair the poor contact of accelerator pedal position sensor connector. Replace the accelerator pedal if defective. <Ref. to SP(H6DO)-4, Accelerator Pedal.>	Repair the short circuit to power supply in the harness between the ECM and accelerator pedal position sensor connector.

## FK:DTC P2127 THROTTLE/PEDAL POSITION SENSOR/SWITCH “E” CIRCUIT LOW INPUT

### DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-239, DTC P2127 THROTTLE/PEDAL POSITION SENSOR/SWITCH “E” CIRCUIT LOW INPUT, Diagnostic Trouble Code (DTC) Detecting Criteria.>

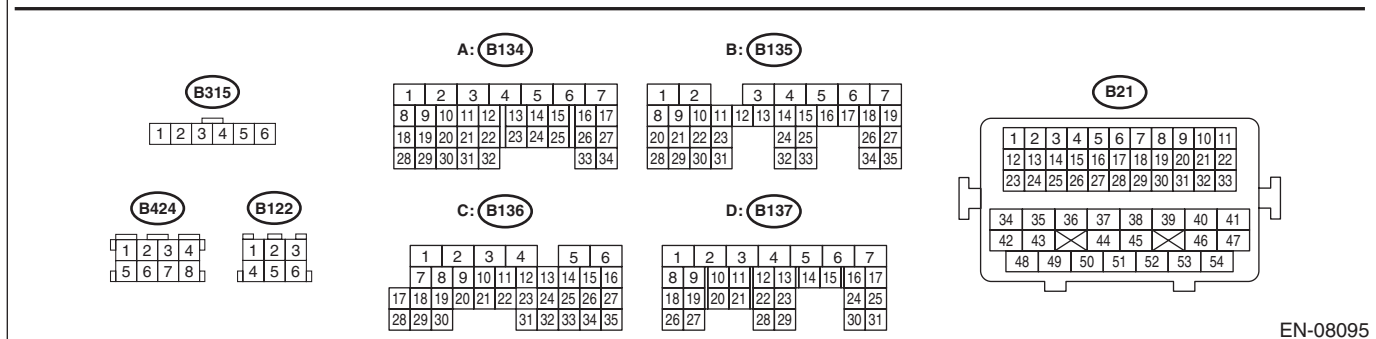
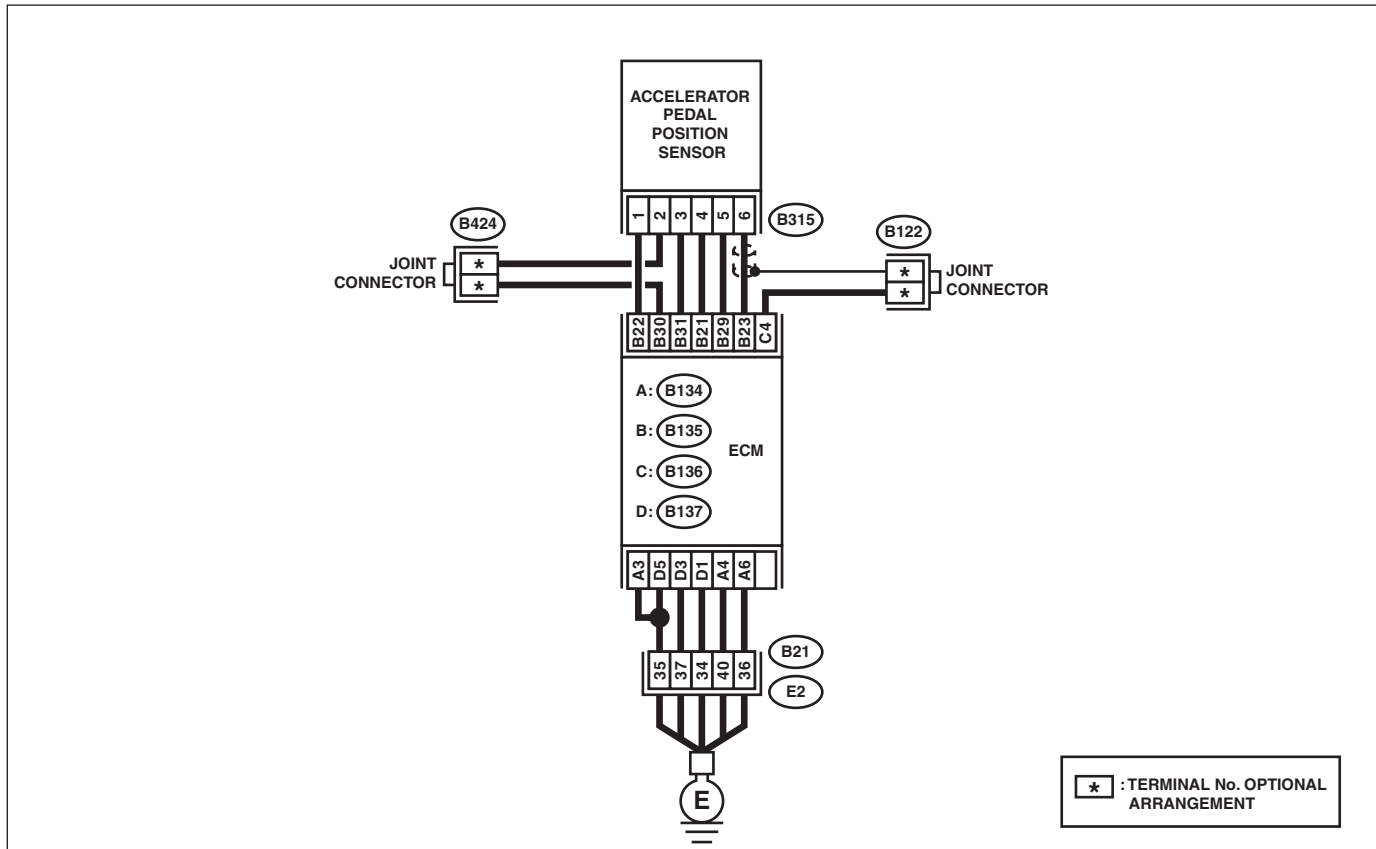
### TROUBLE SYMPTOM:

- Improper idling
- Poor driving performance

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

### WIRING DIAGRAM:



EN-08095

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<p><b>1</b></p> <p><b>CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR CONNECTOR.</b></p> <p>1) Turn the ignition switch to OFF.            2) Disconnect the connectors from ECM and accelerator pedal position sensor.            3) Measure the resistance between ECM and chassis ground.</p> <p><b>Connector &amp; terminal</b>  <b>(B135) No. 22 — Chassis ground:</b>  <b>(B135) No. 31 — Chassis ground:</b></p>	<p>Is the resistance 1 MΩ or more?</p>	<p>Go to step 2.</p>	<p>Repair the short circuit to ground in harness between ECM and accelerator pedal position sensor connector.</p>
<p><b>2</b></p> <p><b>CHECK SHORT CIRCUIT INSIDE THE ECM.</b></p> <p>1) Connect the connector to ECM.            2) Measure the resistance between accelerator pedal position sensor connector and chassis ground.</p> <p><b>Connector &amp; terminal</b>  <b>(B315) No. 3 — Chassis ground:</b></p>	<p>Is the resistance 1 MΩ or more?</p>	<p>Replace the accelerator pedal. &lt;Ref. to SP(H6DO)-4, Accelerator Pedal.&gt;</p>	<p>Repair the short circuit to ground in harness between ECM and accelerator pedal position sensor connector. Replace the ECM if defective. &lt;Ref. to FU(H6DO)-52, Engine Control Module (ECM).&gt;</p>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## FL:DTC P2128 THROTTLE/PEDAL POSITION SENSOR/SWITCH "E" CIRCUIT HIGH INPUT

### DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-241, DTC P2128 THROTTLE/PEDAL POSITION SENSOR/SWITCH "E" CIRCUIT HIGH INPUT, Diagnostic Trouble Code (DTC) Detecting Criteria.>

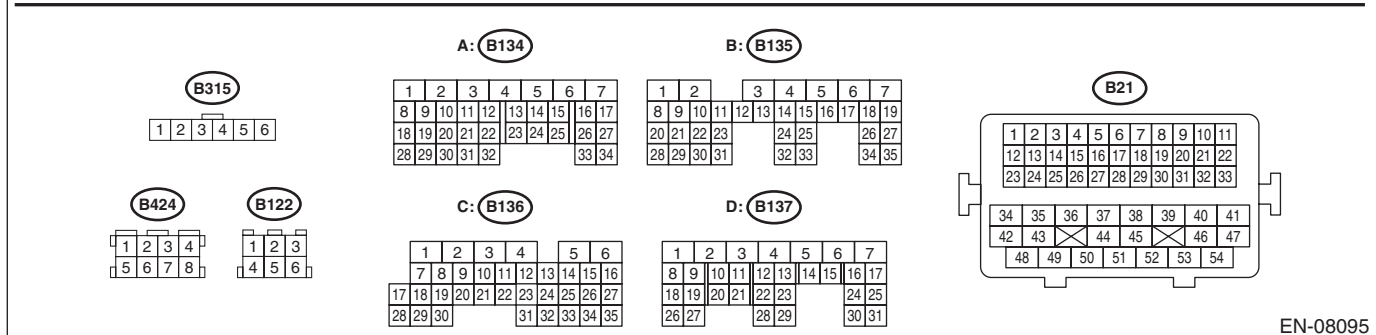
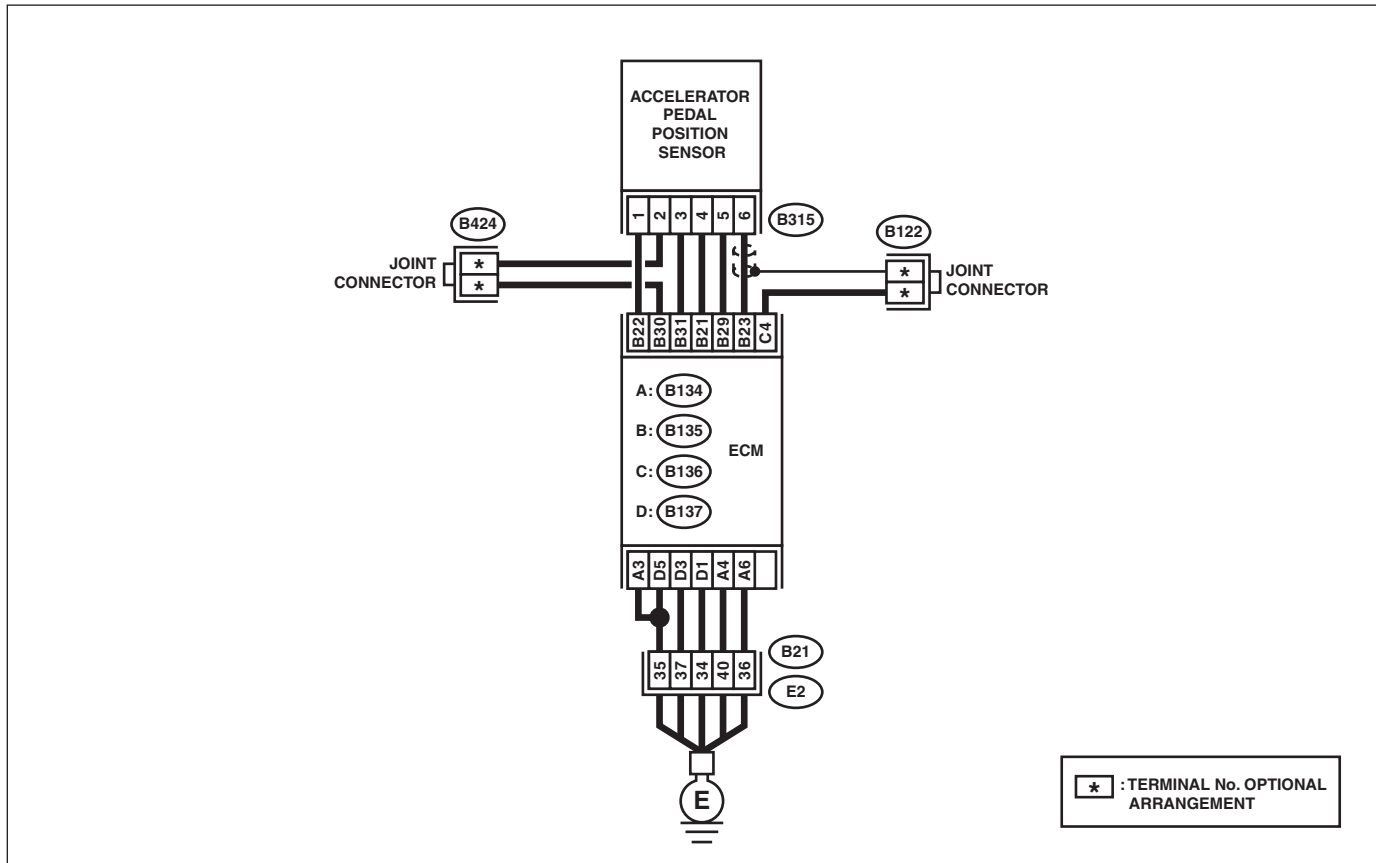
### TROUBLE SYMPTOM:

- Improper idling
- Poor driving performance

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

### WIRING DIAGRAM:



EN-08095

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<p><b>1</b>     <b>CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR CONNECTOR.</b></p> <p>1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM and accelerator pedal position sensor. 3) Measure the resistance of harness between ECM and accelerator pedal position sensor connector.</p> <p><b>Connector &amp; terminal</b> <b>(B135) No. 31 — (B315) No. 3:</b> <b>(B135) No. 30 — (B315) No. 2:</b></p>	Is the resistance less than 1 Ω?	Go to step 2.	Repair the open circuit in harness between ECM and accelerator pedal position sensor connector.
<p><b>2</b>     <b>CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR CONNECTOR.</b></p> <p>1) Connect the connector to ECM. 2) Measure the resistance between accelerator pedal position sensor connector and chassis ground.</p> <p><b>Connector &amp; terminal</b> <b>(B315) No. 2 — Chassis ground:</b></p>	Is the resistance less than 5 Ω?	Go to step 3.	Repair the harness and connector. <b>NOTE:</b> In this case, repair the following item: • Open circuit of harness between ECM and engine ground • Poor contact of ECM connector • Poor contact of coupling connector
<p><b>3</b>     <b>CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR CONNECTOR.</b></p> <p>1) Turn the ignition switch to ON. 2) Measure the voltage between accelerator pedal position sensor connector and chassis ground.</p> <p><b>Connector &amp; terminal</b> <b>(B315) No. 3 (+) — Chassis ground (-):</b></p>	Is the voltage 5 V or more?	Repair the short circuit to power supply in the harness between the ECM and accelerator pedal position sensor connector.	Go to step 4.
<p><b>4</b>     <b>CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR CONNECTOR.</b></p> <p>1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM. 3) Measure the resistance between ECM connectors.</p> <p><b>Connector &amp; terminal</b> <b>(B135) No. 22 — (B135) No. 31:</b></p>	Is the resistance 1 MΩ or more?	Repair the poor contact of accelerator pedal position sensor connector. Replace the accelerator pedal if defective. <Ref. to SP(H6DO)-4, Accelerator Pedal.>	Repair the short circuit to power supply in the harness between the ECM and accelerator pedal position sensor connector.



# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## FM:DTC P2135 THROTTLE/PEDAL POSITION SENSOR/SWITCH "A"/"B" VOLTAGE CORRELATION

### DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-243, DTC P2135 THROTTLE/PEDAL POSITION SENSOR/SWITCH "A"/"B" VOLTAGE CORRELATION, Diagnostic Trouble Code (DTC) Detecting Criteria.>

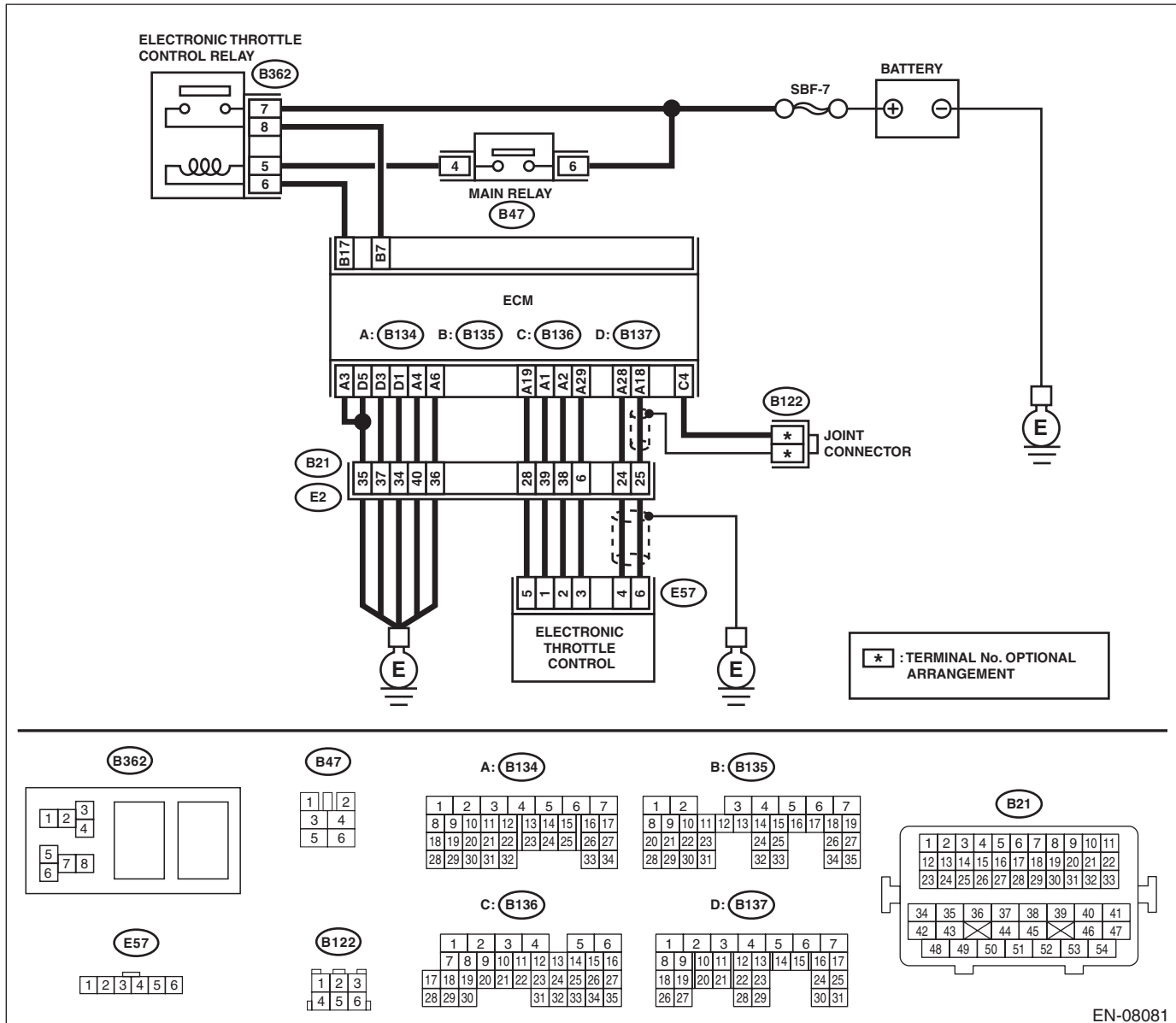
### TROUBLE SYMPTOM:

- Improper idling
- Poor driving performance

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

### WIRING DIAGRAM:



EN-08081

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<b>1</b> <b>CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM and electronic throttle control. 3) Measure the resistance between ECM and chassis ground. <b>Connector &amp; terminal</b> <b>(B134) No. 19 — Chassis ground:</b> <b>(B134) No. 18 — Chassis ground:</b> <b>(B134) No. 18 — (B136) No. 4:</b> <b>(B134) No. 28 — Chassis ground:</b>	Is the resistance 1 M $\Omega$ or more?	Go to step 2.	Repair the short circuit to ground in harness between ECM and electronic throttle control connector.
<b>2</b> <b>CHECK SHORT CIRCUIT INSIDE THE ECM.</b> 1) Connect the connector to ECM. 2) Measure the resistance between electronic throttle control connector and engine ground. <b>Connector &amp; terminal</b> <b>(E57) No. 6 — Engine ground:</b> <b>(E57) No. 4 — Engine ground:</b>	Is the resistance 1 M $\Omega$ or more?	Go to step 3.	Repair the short circuit to ground in harness between ECM and electronic throttle control connector. Replace the ECM if defective. <Ref. to FU(H6DO)-52, Engine Control Module (ECM).>
<b>3</b> <b>CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.</b> 1) Disconnect the connectors from ECM. 2) Measure the resistance of harness between ECM and electronic throttle control connector. <b>Connector &amp; terminal</b> <b>(B134) No. 18 — (E57) No. 6:</b> <b>(B134) No. 28 — (E57) No. 4:</b> <b>(B134) No. 29 — (E57) No. 3:</b>	Is the resistance less than 1 $\Omega$ ?	Go to step 4.	Repair the harness and connector. <b>NOTE:</b> In this case, repair the following item: <ul style="list-style-type: none"> <li>• Open circuit in harness between ECM and electronic throttle control connector</li> <li>• Poor contact of coupling connector</li> </ul>
<b>4</b> <b>CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.</b> 1) Connect the connector to ECM. 2) Measure the resistance between electronic throttle control connector and engine ground. <b>Connector &amp; terminal</b> <b>(E57) No. 3 — Engine ground:</b>	Is the resistance less than 5 $\Omega$ ?	Go to step 5.	Repair the harness and connector. <b>NOTE:</b> In this case, repair the following item: <ul style="list-style-type: none"> <li>• Open circuit of harness between ECM and engine ground</li> <li>• Poor contact of ECM connector</li> <li>• Poor contact of coupling connector</li> </ul>
<b>5</b> <b>CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.</b> 1) Turn the ignition switch to ON. 2) Measure the voltage between electronic throttle control connector and engine ground. <b>Connector &amp; terminal</b> <b>(E57) No. 6 (+) — Engine ground (-):</b> <b>(E57) No. 4 (+) — Engine ground (-):</b>	Is the voltage 5 V or more?	Repair the short circuit to power in harness between ECM and electronic throttle control connector.	Go to step 6.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<b>6</b> <b>CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM. 3) Measure the resistance between ECM connectors. <b>Connector &amp; terminal</b> <b>(B134) No. 19 — (B134) No. 18:</b> <b>(B134) No. 19 — (B134) No. 28:</b>	Is the resistance 1 M $\Omega$ or more?	Repair the poor contact of electronic throttle control connector. Replace the electronic throttle control if defective. <Ref. to FU(H6DO)-19, Throttle Body.>	Repair the short circuit to power in harness between ECM and electronic throttle control connector.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## FN:DTC P2138 THROTTLE/PEDAL POSITION SENSOR/SWITCH “D”/“E” VOLTAGE CORRELATION

### DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-245, DTC P2138 THROTTLE/PEDAL POSITION SENSOR/SWITCH “D”/“E” VOLTAGE CORRELATION, Diagnostic Trouble Code (DTC) Detecting Criteria.>

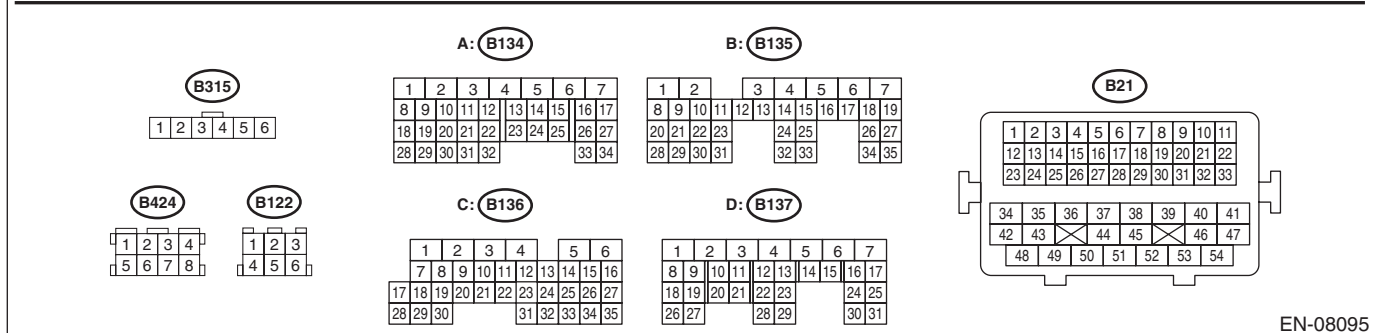
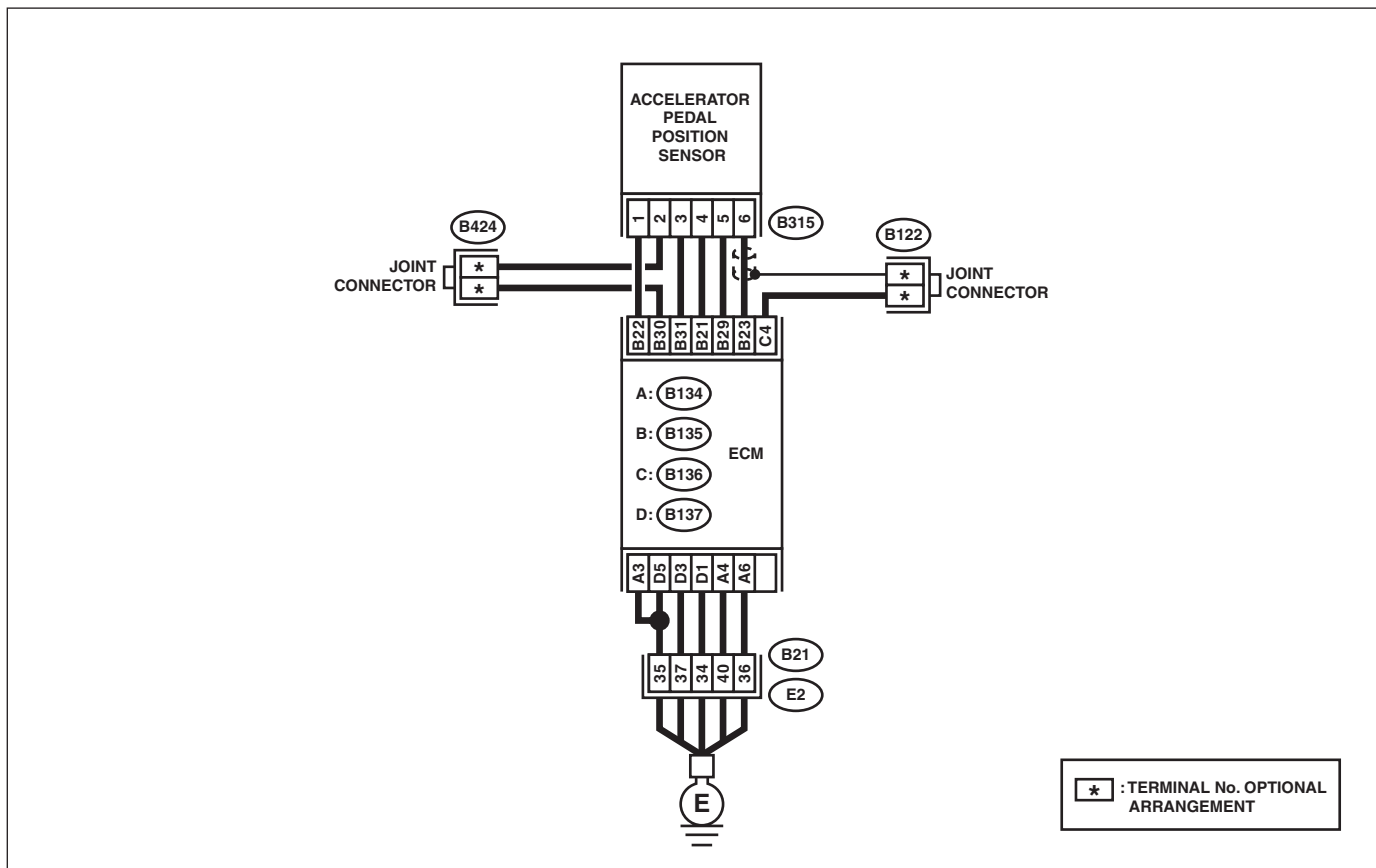
### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

### TROUBLE SYMPTOM:

- Improper idling
- Poor driving performance

### WIRING DIAGRAM:



EN-08095

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

	Step	Check	Yes	No
1	<p><b>CHECK ACCELERATOR PEDAL POSITION SENSOR OUTPUT.</b></p> <p>1) Turn the ignition switch to ON. 2) Measure the voltage between ECM and chassis ground.</p> <p><b>Connector &amp; terminal</b> <b>Main accelerator pedal position sensor signal</b> <b>(B135) No. 23 (+) — Chassis ground (-):</b> <b>Accelerator pedal position sensor signal</b> <b>(B135) No. 31 (+) — Chassis ground (-):</b></p>	Is the difference in measured values for the main accelerator pedal position sensor signal and the sub accelerator pedal position sensor signal 0 V?	Go to step 3.	Go to step 2.
2	<p><b>CHECK ACCELERATOR PEDAL POSITION SENSOR OUTPUT.</b></p> <p>1) Measure the voltage between accelerator pedal position sensor connector and chassis ground.</p> <p><b>Connector &amp; terminal</b> <b>(B315) No. 6 (+) — Chassis ground (-):</b> <b>(B315) No. 3 (+) — Chassis ground (-):</b></p>	Is the difference in measured values for the main accelerator pedal position sensor signal and the sub accelerator pedal position sensor signal 0 V?	Replace the accelerator pedal. <Ref. to SP(H6DO)-4, Accelerator Pedal.>	Repair the harness and connector. <b>NOTE:</b> In this case, repair the following item: • Open circuit in harness between ECM and accelerator pedal position sensor connector • Short circuit to ground in harness between ECM and accelerator pedal position sensor connector • Poor contact of coupling connector
3	<p><b>CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR CONNECTOR.</b></p> <p>Measure the resistance of harness between the accelerator pedal position sensor connector and chassis ground.</p> <p><b>Connector &amp; terminal</b> <b>(B315) No. 5 — Chassis ground:</b> <b>(B315) No. 2 — Chassis ground:</b></p>	Is the resistance less than 5 Ω?	Repair the poor contact of ECM connector.	Repair the harness and connector. <b>NOTE:</b> In this case, repair the following item: • Open circuit in harness between ECM and accelerator pedal position sensor connector • Open circuit of harness between ECM and engine ground • Poor contact of ECM connector • Poor contact of coupling connector

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## FO:DTC P219A BANK 1 AIR-FUEL RATIO IMBALANCE

### DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-247, DTC P219A BANK 1 AIR-FUEL RATIO IMBALANCE, Diagnostic Trouble Code (DTC) Detecting Criteria.>

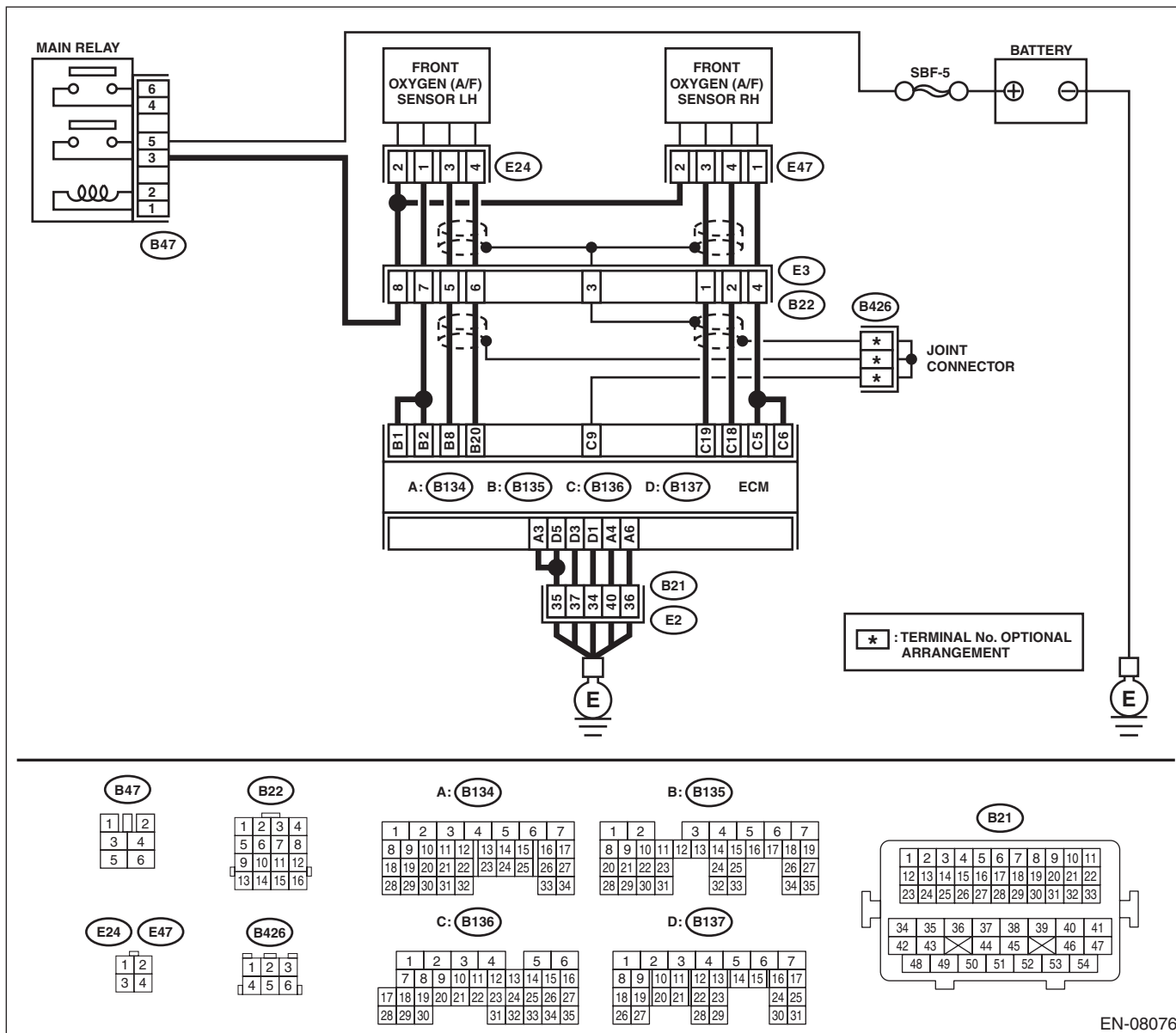
### TROUBLE SYMPTOM:

- Engine stalls.
- Improper idling

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

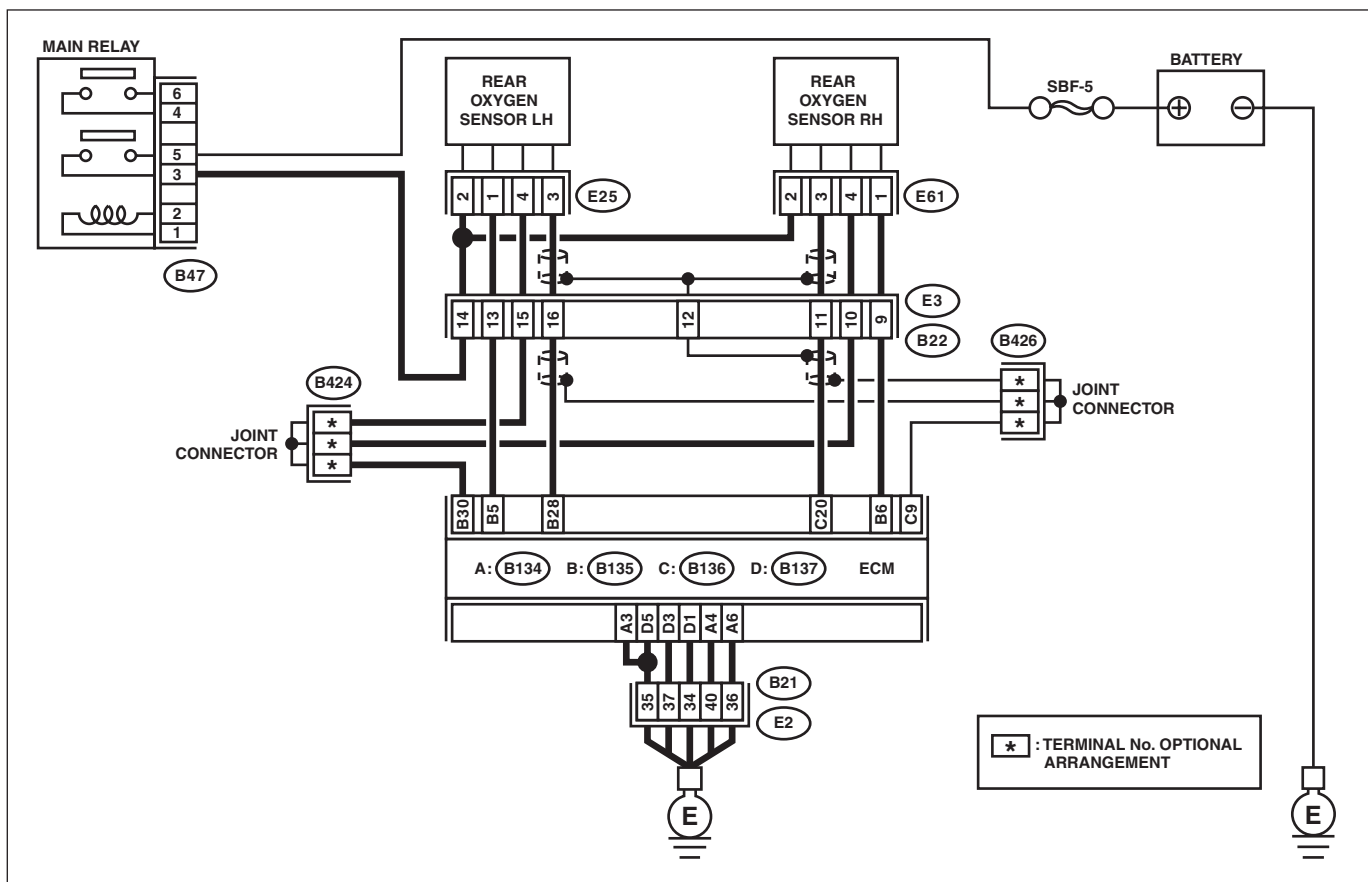
### WIRING DIAGRAM:



EN-08076

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

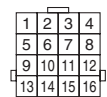
ENGINE (DIAGNOSTICS)



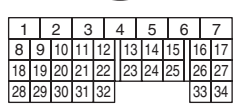
B47



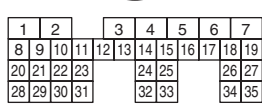
B22



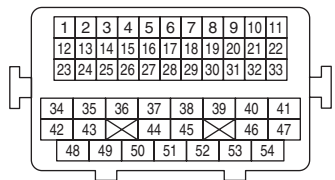
A: B134



B: B135



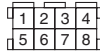
B21



E25 E61



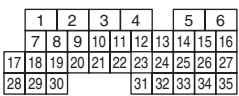
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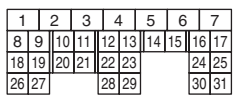
B426



C: B136



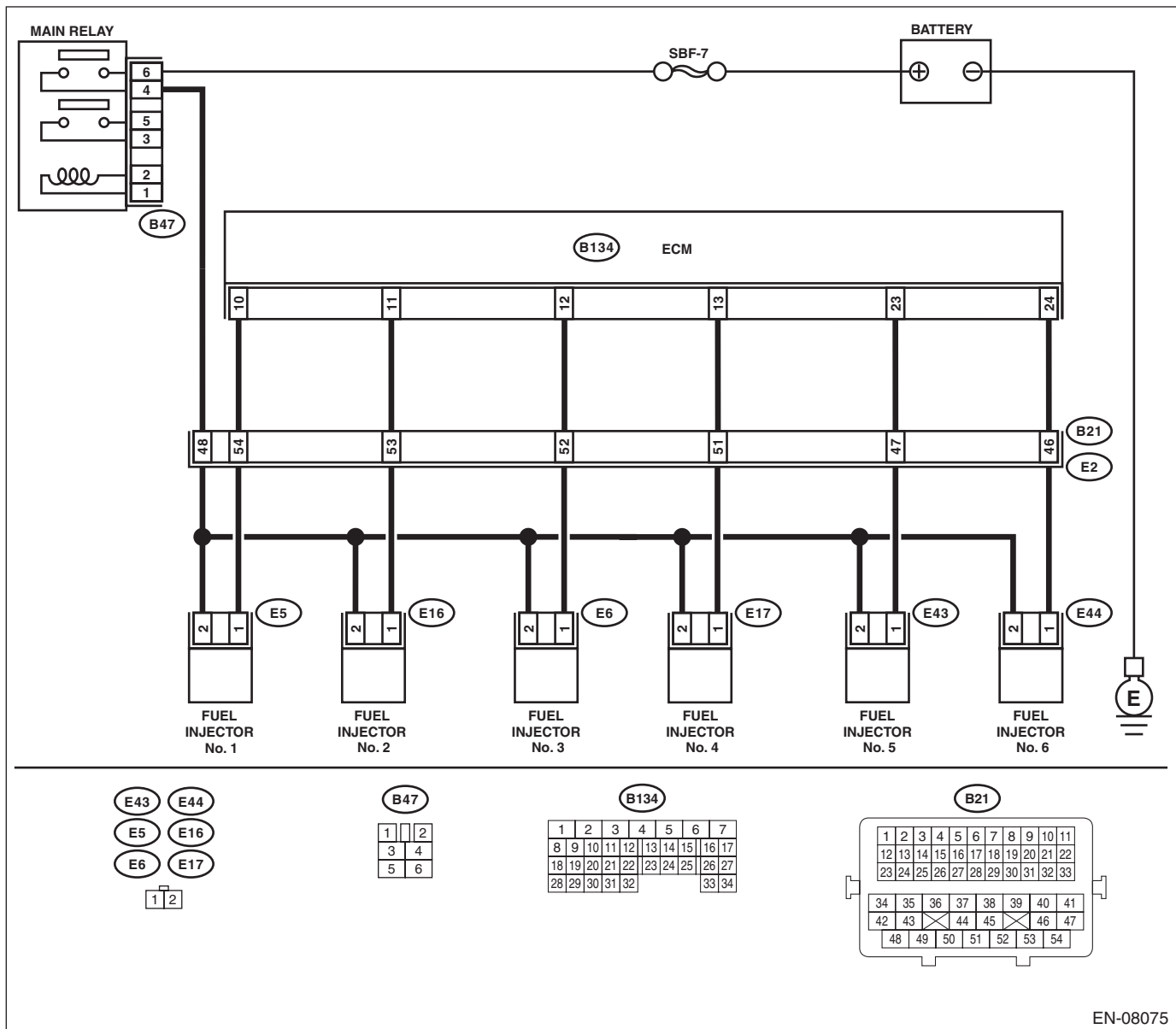
D: B137



EN-08077

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)



EN-08075

Step	Check	Yes	No
1	<b>CHECK FRONT OXYGEN (A/F) SENSOR CONNECTOR AND COUPLING CONNECTOR.</b>	Completely remove any water inside.	Go to step 2.
2	<b>CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM and front oxygen (A/F) sensor. 3) Measure the resistance of harness between ECM and front oxygen (A/F) sensor connector. <b>Connector &amp; terminal</b> <b>(B136) No. 19 — (E47) No. 3:</b> <b>(B136) No. 18 — (E47) No. 4:</b>	Is the resistance less than 1 Ω? Go to step 3.	Repair the harness and connector. <b>NOTE:</b> In this case, repair the following item: • Open circuit in harness between ECM and front oxygen (A/F) sensor connector • Poor contact of coupling connector



# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<b>3</b> <b>CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.</b> Measure the resistance between ECM and chassis ground. <i>Connector &amp; terminal</i> <i>(B136) No. 19 — Chassis ground:</i> <i>(B136) No. 18 — Chassis ground:</i>	Is the resistance 1 MΩ or more?	Go to step 4.	Repair the ground short circuit of harness between ECM and front oxygen (A/F) sensor connector.
<b>4</b> <b>CHECK OUTPUT SIGNAL FOR ECM.</b> 1) Connect the connector to ECM. 2) Turn the ignition switch to ON. 3) Measure the voltage between front oxygen (A/F) sensor connector and chassis ground. <i>Connector &amp; terminal</i> <i>(E47) No. 3 (+) — Chassis ground (-):</i>	Is the voltage 4.5 V or more?	Go to step 6.	Go to step 5.
<b>5</b> <b>CHECK OUTPUT SIGNAL FOR ECM.</b> Measure the voltage between front oxygen (A/F) sensor connector and chassis ground. <i>Connector &amp; terminal</i> <i>(E47) No. 4 (+) — Chassis ground (-):</i>	Is the voltage 4.95 V or more?	Go to step 6.	Go to step 7.
<b>6</b> <b>CHECK OUTPUT SIGNAL FOR ECM.</b> Measure the voltage between front oxygen (A/F) sensor connector and chassis ground. <i>Connector &amp; terminal</i> <i>(E47) No. 3 (+) — Chassis ground (-):</i> <i>(E47) No. 4 (+) — Chassis ground (-):</i>	Is the voltage 8 V or more?	Repair the short circuit to power in the harness between ECM and front oxygen (A/F) sensor connector. After repair, replace the ECM. <Ref. to FU(H6DO)-52, Engine Control Module (ECM).>	Repair the poor contact of ECM connector.
<b>7</b> <b>CHECK EXHAUST SYSTEM.</b>	Are there holes or loose bolts on exhaust system?	Repair the exhaust system.	Go to step 8.
<b>8</b> <b>CHECK AIR INTAKE SYSTEM.</b>	Are there holes, loose bolts or disconnection of hose on air intake system?	Repair the air intake system.	Go to step 9.
<b>9</b> <b>CHECK FUEL PRESSURE.</b> <b>WARNING:</b> Place “NO OPEN FLAMES” signs near the working area. <b>CAUTION:</b> Be careful not to spill fuel. 1) Connect the front oxygen (A/F) sensor connector. 2) Measure the fuel pressure. <Ref. to ME(H6DO)-30, INSPECTION, Fuel Pressure.> <b>CAUTION:</b> Release fuel pressure before removing the fuel pressure gauge.	Is the measured value 340 — 400 kPa (3.5 — 4.1 kgf/cm <sup>2</sup> , 49 — 58 psi)?	Go to step 10.	Repair the following item. Fuel pressure is too high: • Clogged fuel line or bent hose Fuel pressure is too low: • Improper fuel pump discharge • Clogged fuel line

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<p><b>10 CHECK ENGINE COOLANT TEMPERATURE SENSOR.</b></p> <p>1) Start the engine and warm up completely.</p> <p>2) Read the value of «Coolant Temp.» using the Subaru Select Monitor or a general scan tool.</p> <p>NOTE:</p> <ul style="list-style-type: none"> <li>• Subaru Select Monitor</li> </ul> <p>For detailed operation procedures, refer to “READ CURRENT DATA FOR ENGINE”. &lt;Ref. to EN(H6DO)(diag)-36, Subaru Select Monitor.&gt;</p> <ul style="list-style-type: none"> <li>• General scan tool</li> </ul> <p>For detailed operation procedures, refer to the general scan tool operation manual.</p>	<p>Is the value of «Coolant Temp.» 75°C (167°F) or more?</p>	<p>Go to step 11.</p>	<p>Replace the engine coolant temperature sensor. &lt;Ref. to FU(H6DO)-30, Engine Coolant Temperature Sensor.&gt;</p>
<p><b>11 CHECK MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR.</b></p> <p>1) Start the engine and warm up engine until coolant temperature is higher than 75°C (167°F).</p> <p>2) Place the select lever in “P” range or “N” range.</p> <p>3) Turn the A/C switch to OFF.</p> <p>4) Turn all the accessory switches to OFF.</p> <p>5) Read the value of «Mass Air Flow» using the Subaru Select Monitor or a general scan tool.</p> <p>NOTE:</p> <ul style="list-style-type: none"> <li>• Subaru Select Monitor</li> </ul> <p>For detailed operation procedures, refer to “READ CURRENT DATA FOR ENGINE”. &lt;Ref. to EN(H6DO)(diag)-36, Subaru Select Monitor.&gt;</p> <ul style="list-style-type: none"> <li>• General scan tool</li> </ul> <p>For detailed operation procedures, refer to the general scan tool operation manual.</p>	<p>Is the value of «Mass Air Flow» 2.0 — 5.0 g/s (0.26 — 0.66 lb/m)?</p>	<p>Go to step 12.</p>	<p>Replace the mass air flow and intake air temperature sensor. &lt;Ref. to FU(H6DO)-40, Mass Air Flow and Intake Air Temperature Sensor.&gt;</p>
<p><b>12 CHECK MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR.</b></p> <p>1) Start the engine and warm up engine until coolant temperature is higher than 75°C (167°F).</p> <p>2) Place the select lever in “P” range or “N” range.</p> <p>3) Turn the A/C switch to OFF.</p> <p>4) Turn all the accessory switches to OFF.</p> <p>5) Open the front hood.</p> <p>6) Measure the ambient temperature.</p> <p>7) Read the value of «Intake Air Temp.» using the Subaru Select Monitor or a general scan tool.</p> <p>NOTE:</p> <ul style="list-style-type: none"> <li>• Subaru Select Monitor</li> </ul> <p>For detailed operation procedures, refer to “READ CURRENT DATA FOR ENGINE”. &lt;Ref. to EN(H6DO)(diag)-36, Subaru Select Monitor.&gt;</p> <ul style="list-style-type: none"> <li>• General scan tool</li> </ul> <p>For detailed operation procedures, refer to the general scan tool operation manual.</p>	<p>Subtract ambient temperature from «Intake Air Temp.». Is the obtained value -10 — 50°C (-18 — 90°F)?</p>	<p>Go to step 13.</p>	<p>Check the mass air flow and intake air temperature sensor. &lt;Ref. to FU(H6DO)-40, Mass Air Flow and Intake Air Temperature Sensor.&gt;</p>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<p><b>13 CHECK REAR OXYGEN SENSOR DATA.</b></p> <p>1) Warm up the engine until engine coolant temperature is higher than 75°C (167°F), and keep the engine speed at 3,000 rpm. (2 minutes maximum)</p> <p>2) Read the value of «Front O2 Sensor #1» using the Subaru Select Monitor or a general scan tool.</p> <p>NOTE:</p> <ul style="list-style-type: none"> <li>• Subaru Select Monitor</li> </ul> <p>For detailed operation procedures, refer to “READ CURRENT DATA FOR ENGINE”. &lt;Ref. to EN(H6DO)(diag)-36, Subaru Select Monitor.&gt;</p> <ul style="list-style-type: none"> <li>• General scan tool</li> </ul> <p>For detailed operation procedures, refer to the general scan tool operation manual.</p>	<p>Is the value of «Front O2 Sensor #1» 0.490 V or more?</p>	<p>Go to step 14.</p>	<p>Go to step 15.</p>
<p><b>14 CHECK REAR OXYGEN SENSOR DATA.</b></p> <p>1) Warm up the engine until engine coolant temperature is higher than 75°C (167°F), and rapidly reduce the engine speed from 3,000 rpm.</p> <p>2) Read the value of «Front O2 Sensor #1» using the Subaru Select Monitor or a general scan tool.</p> <p>NOTE:</p> <ul style="list-style-type: none"> <li>• Subaru Select Monitor</li> </ul> <p>For detailed operation procedures, refer to “READ CURRENT DATA FOR ENGINE”. &lt;Ref. to EN(H6DO)(diag)-36, Subaru Select Monitor.&gt;</p> <ul style="list-style-type: none"> <li>• General scan tool</li> </ul> <p>For detailed operation procedures, refer to the general scan tool operation manual.</p>	<p>Is the value of «Front O2 Sensor #1» 0.250 V or less?</p>	<p>Go to step 16.</p>	<p>Go to step 15.</p>
<p><b>15 CHECK REAR OXYGEN SENSOR CONNECTOR AND COUPLING CONNECTOR.</b></p>	<p>Has water entered the connector?</p>	<p>Completely remove any water inside.</p>	<p>Go to step 17.</p>
<p><b>16 CHECK FRONT OXYGEN (A/F) SENSOR USING REAR OXYGEN SENSOR SIGNAL.</b></p> <p>1) Warm up the engine until engine coolant temperature is higher than 75°C (167°F), then keep the engine idling for 5 minutes or more.</p> <p>2) Read the value of «Front O2 Sensor #1» using the Subaru Select Monitor or a general scan tool.</p> <p>NOTE:</p> <ul style="list-style-type: none"> <li>• Subaru Select Monitor</li> </ul> <p>For detailed operation procedures, refer to “READ CURRENT DATA FOR ENGINE”. &lt;Ref. to EN(H6DO)(diag)-36, Subaru Select Monitor.&gt;</p> <ul style="list-style-type: none"> <li>• General scan tool</li> </ul> <p>For detailed operation procedures, refer to the general scan tool operation manual.</p>	<p>Is the value in «Front O2 Sensor #1» kept at 0.250 V or less for 5 minutes or more?</p>	<p>Replace the front oxygen (A/F) sensor. &lt;Ref. to FU(H6DO)-48, Front Oxygen (A/F) Sensor.&gt;</p>	<p>Go to step 17.</p>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<b>17 CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM and rear oxygen sensor. 3) Measure the resistance of harness between ECM and rear oxygen sensor connector. <b>Connector &amp; terminal</b> <b>(B136) No. 20 — (E61) No. 3:</b> <b>(B135) No. 30 — (E61) No. 4:</b>	Is the resistance less than 1 $\Omega$ ?	Go to step 18.	Repair the harness and connector. NOTE: In this case, repair the following item: <ul style="list-style-type: none"> <li>• Open circuit in harness between ECM and rear oxygen sensor connector</li> <li>• Poor contact of coupling connector</li> </ul>
<b>18 CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.</b> 1) Connect the connector to ECM. 2) Turn the ignition switch to ON. 3) Measure the voltage between rear oxygen sensor connector and chassis ground. <b>Connector &amp; terminal</b> <b>(E61) No. 3 (+) — Chassis ground (-):</b>	Is the voltage 0.2 — 0.5 V?	Replace the rear oxygen sensor. <Ref. to FU(H6DO)-50, Rear Oxygen Sensor.>	Go to step 19.
<b>19 CHECK OUTPUT SIGNAL OF ECM.</b> 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM and chassis ground on faulty cylinders. <b>Connector &amp; terminal</b> <b>#1 (B134) No. 10 (+) — Chassis ground (-):</b> <b>#2 (B134) No. 11 (+) — Chassis ground (-):</b> <b>#3 (B134) No. 12 (+) — Chassis ground (-):</b> <b>#4 (B134) No. 13 (+) — Chassis ground (-):</b> <b>#5 (B134) No. 23 (+) — Chassis ground (-):</b> <b>#6 (B134) No. 24 (+) — Chassis ground (-):</b>	Is the voltage 10 V or more?	Go to step 24.	Go to step 20.
<b>20 CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connector from fuel injector on faulty cylinders. 3) Measure the resistance between fuel injector connector and engine ground on faulty cylinders. <b>Connector &amp; terminal</b> <b>#1 (E5) No. 1 — Engine ground:</b> <b>#2 (E16) No. 1 — Engine ground:</b> <b>#3 (E6) No. 1 — Engine ground:</b> <b>#4 (E17) No. 1 — Engine ground:</b> <b>#5 (E43) No. 1 — Engine ground:</b> <b>#6 (E44) No. 1 — Engine ground:</b>	Is the resistance 1 M $\Omega$ or more?	Go to step 21.	Repair the short circuit to ground in harness between ECM and fuel injector connector.
<b>21 CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR.</b> Measure the resistance of harness between ECM and fuel injector connector on faulty cylinders. <b>Connector &amp; terminal</b> <b>#1 (B134) No. 10 — (E5) No. 1:</b> <b>#2 (B134) No. 11 — (E16) No. 1:</b> <b>#3 (B134) No. 12 — (E6) No. 1:</b> <b>#4 (B134) No. 13 — (E17) No. 1:</b> <b>#5 (B134) No. 23 — (E43) No. 1:</b> <b>#6 (B134) No. 24 — (E44) No. 1:</b>	Is the resistance less than 1 $\Omega$ ?	Go to step 22.	Repair the harness and connector. NOTE: In this case, repair the following item: <ul style="list-style-type: none"> <li>• Open circuit in harness between ECM and fuel injector connector</li> <li>• Poor contact of coupling connector</li> </ul>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<b>22 CHECK FUEL INJECTOR.</b> Measure the resistance between fuel injector terminals on faulty cylinder. <i>Terminals</i> <i>No. 1 — No. 2:</i>	Is the resistance 5 — 20 Ω?	Go to step 23.	Replace the faulty fuel injector. <Ref. to FU(H6DO)-42, Fuel Injector.>
<b>23 CHECK POWER SUPPLY LINE.</b> 1) Turn the ignition switch to ON. 2) Measure the voltage between fuel injector connector of faulty cylinders and engine ground. <i>Connector &amp; terminal</i> <i>#1 (E5) No. 2 (+) — Engine ground (-):</i> <i>#2 (E16) No. 2 (+) — Engine ground (-):</i> <i>#3 (E6) No. 2 (+) — Engine ground (-):</i> <i>#4 (E17) No. 2 (+) — Engine ground (-):</i> <i>#5 (E43) No. 2 (+) — Engine ground (-):</i> <i>#6 (E44) No. 2 (+) — Engine ground (-):</i>	Is the voltage 10 V or more?	Repair the poor contact of all connectors in fuel injector circuit.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit in harness between the main relay and fuel injector connector on faulty cylinders • Poor contact of coupling connector • Poor contact of main relay connector
<b>24 CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connector from fuel injector on faulty cylinders. 3) Turn the ignition switch to ON. 4) Measure the voltage between ECM and chassis ground on faulty cylinders. <i>Connector &amp; terminal</i> <i>#1 (B134) No. 10 (+) — Chassis ground (-):</i> <i>#2 (B134) No. 11 (+) — Chassis ground (-):</i> <i>#3 (B134) No. 12 (+) — Chassis ground (-):</i> <i>#4 (B134) No. 13 (+) — Chassis ground (-):</i> <i>#5 (B134) No. 23 (+) — Chassis ground (-):</i> <i>#6 (B134) No. 24 (+) — Chassis ground (-):</i>	Is the voltage 10 V or more?	Repair the short circuit to power in harness between ECM and fuel injector connector.	Go to step 25.
<b>25 CHECK FUEL INJECTOR.</b> 1) Turn the ignition switch to OFF. 2) Measure the resistance between fuel injector terminals on faulty cylinder. <i>Terminals</i> <i>No. 1 — No. 2:</i>	Is the resistance 5 — 20 Ω?	Go to step 26.	Replace the faulty fuel injector. <Ref. to FU(H6DO)-42, Fuel Injector.>
<b>26 CHECK INSTALLATION OF CAMSHAFT POSITION SENSOR/CRANKSHAFT POSITION SENSOR.</b>	Is the camshaft position sensor or crankshaft position sensor loosely installed?	Tighten the camshaft position sensor or crankshaft position sensor.	Go to step 27.
<b>27 CHECK CRANK PLATE.</b>	Is the crank sprocket rusted or the teeth of crank plate broken?	Replace the crank plate. <Ref. to ME(H6DO)-95, Cylinder Block.>	Go to step 28.
<b>28 CHECK INSTALLATION CONDITION OF TIMING CHAIN.</b> Turn the crankshaft using ST, and align the alignment mark on crank sprocket with alignment mark on cylinder block. ST 18252AA000 CRANKSHAFT SOCKET	Is the timing chain dislocated from its proper position?	Correct the installation condition of timing chain. <Ref. to ME(H6DO)-53, Timing Chain Assembly.>	Go to step 29.

## Diagnostic Procedure with Diagnostic Trouble Code (DTC)

### ENGINE (DIAGNOSTICS)

Step	Check	Yes	No	
<b>29</b>	<b>CHECK FUEL LEVEL.</b>	Is the fuel meter indication lower than the "Lower" level?	Refill the fuel so that the fuel meter indication is higher than the "Lower" level, and proceed to the next step. Go to step <b>30</b> .	Go to step <b>30</b> .
<b>30</b>	<b>CHECK STATUS OF MALFUNCTION INDICATOR LIGHT.</b> 1) Clear the memory using the Subaru Select Monitor or general scan tool. <Ref. to EN(H6DO)(diag)-58, Clear Memory Mode.> 2) Start the engine, and drive the vehicle 10 minutes or more.	Does the malfunction indicator light illuminate or blink?	Go to step <b>32</b> .	Go to step <b>31</b> .
<b>31</b>	<b>CHECK CAUSE OF MISFIRE.</b>	Was the cause of misfire identified when the engine is running?	Finish diagnostics operation, if the engine has no abnormality.	Repair the poor contact of connector. <b>NOTE:</b> In this case, repair the following item: • Poor contact of ignition coil connector • Poor contact of fuel injector connector on faulty cylinders • Poor contact of ECM connector • Poor contact of coupling connector
<b>32</b>	<b>CHECK AIR INTAKE SYSTEM.</b>	Is there any fault in air intake system?	Repair the air intake system. <b>NOTE:</b> 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 <b>33</b> .
<b>33</b>	<b>CHECK MISFIRE SYMPTOM.</b> 1) Turn the ignition switch to ON. 2) Check for DTC. <Ref. to EN(H6DO)(diag)-44, Read Diagnostic Trouble Code (DTC).>	Does the Subaru Select Monitor or general scan tool indicate only one DTC?	Go to step <b>36</b> .	Go to step <b>34</b> .
<b>34</b>	<b>CHECK DTC ON DISPLAY.</b>	Is DTC P0301, P0303 and P0305 displayed?	Go to step <b>37</b> .	Go to step <b>35</b> .
<b>35</b>	<b>CHECK DTC ON DISPLAY.</b>	Is DTC P0302, P0304 and P0306 displayed?	Go to step <b>38</b> .	Go to step <b>39</b> .

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
36 <b>ONLY ONE CYLINDER.</b>	Is there any fault in the cylinder?	Repair or replace faulty parts. NOTE: Check the following items. • Spark plug • Ignition coil • Fuel injector • Compression ratio	Check DTC P0171, P0172, P0174 or P0175 using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6DO)(diag)-84, List of Diagnostic Trouble Code (DTC).>
37 <b>GROUP OF #1, #3 AND #5 CYLINDERS.</b>	Is there any fault in #1, #3 and #5 cylinders?	Repair or replace faulty parts. NOTE: Check the following items. • Spark plug • Ignition coil • Fuel injector • Compression ratio • Skipping timing chain teeth	Check DTC P0171, P0172, P0174 or P0175 using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6DO)(diag)-84, List of Diagnostic Trouble Code (DTC).>
38 <b>GROUP OF #2, #4 AND #6 CYLINDERS.</b>	Is there any fault in #2, #4 and #6 cylinders?	Repair or replace faulty parts. NOTE: Check the following items. • Spark plug • Ignition coil • Fuel injector • Compression ratio • Skipping timing chain teeth	Check DTC P0171, P0172, P0174 or P0175 using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6DO)(diag)-84, List of Diagnostic Trouble Code (DTC).>
39 <b>CYLINDER AT RANDOM.</b>	Is the engine idle rough?	Check DTC P0171, P0172, P0174 or P0175 using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6DO)(diag)-84, List of Diagnostic Trouble Code (DTC).>	Repair or replace faulty parts. NOTE: Check the following items. • Spark plug • Ignition coil • Fuel injector • Compression ratio

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## FP:DTC P219B BANK 2 AIR-FUEL RATIO IMBALANCE

### DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-249, DTC P219B BANK 2 AIR-FUEL RATIO IMBALANCE, Diagnostic Trouble Code (DTC) Detecting Criteria.>

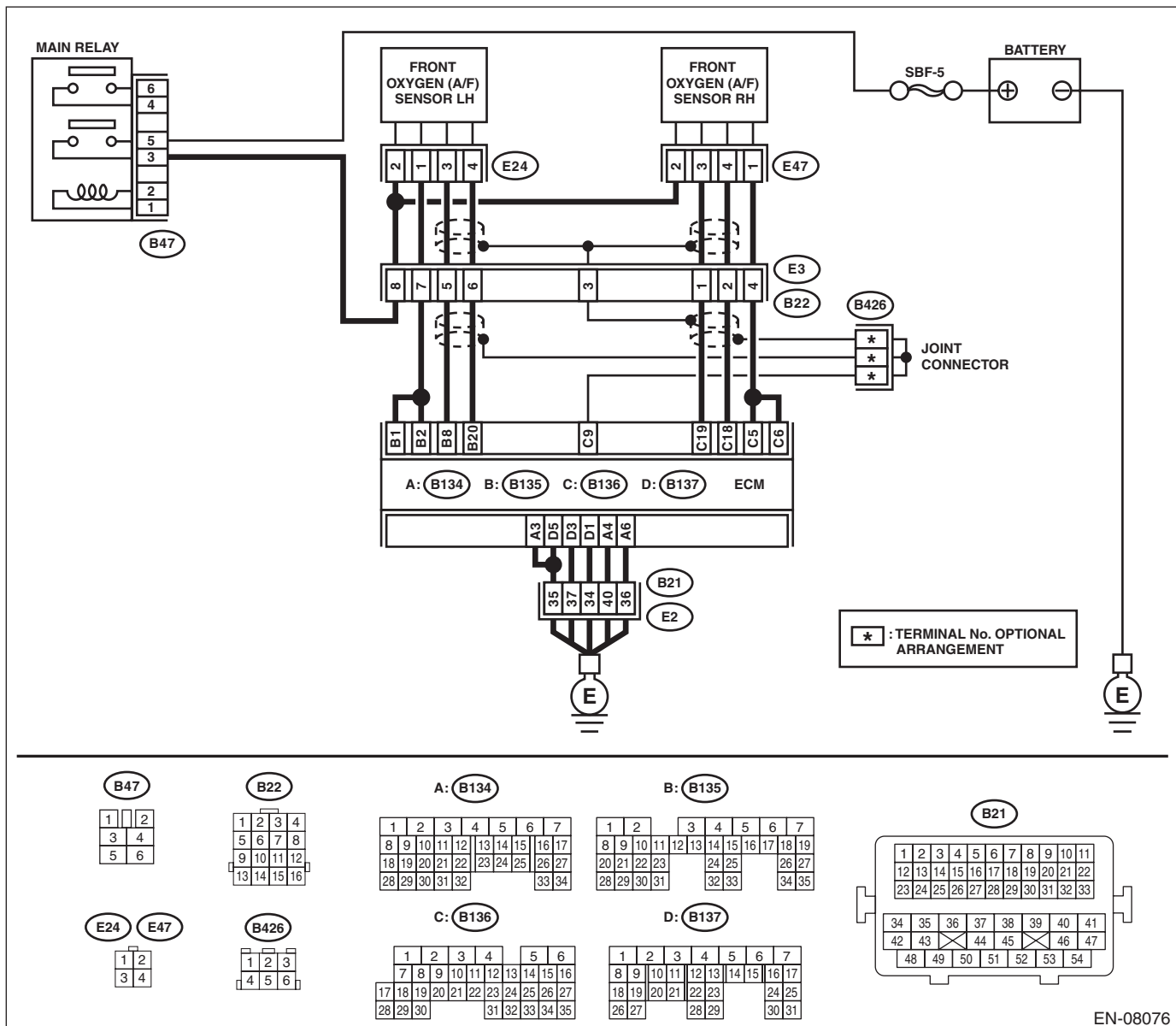
### TROUBLE SYMPTOM:

- Engine stalls.
- Improper idling

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

### WIRING DIAGRAM:

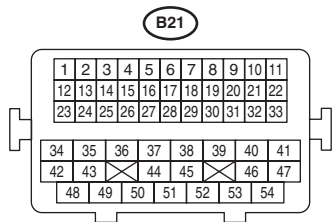
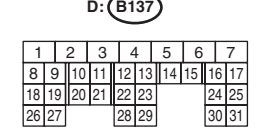
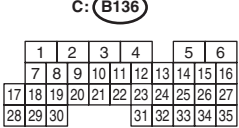
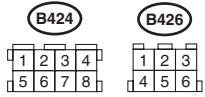
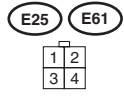
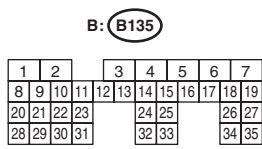
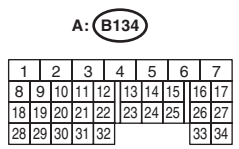
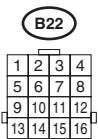
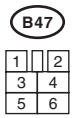
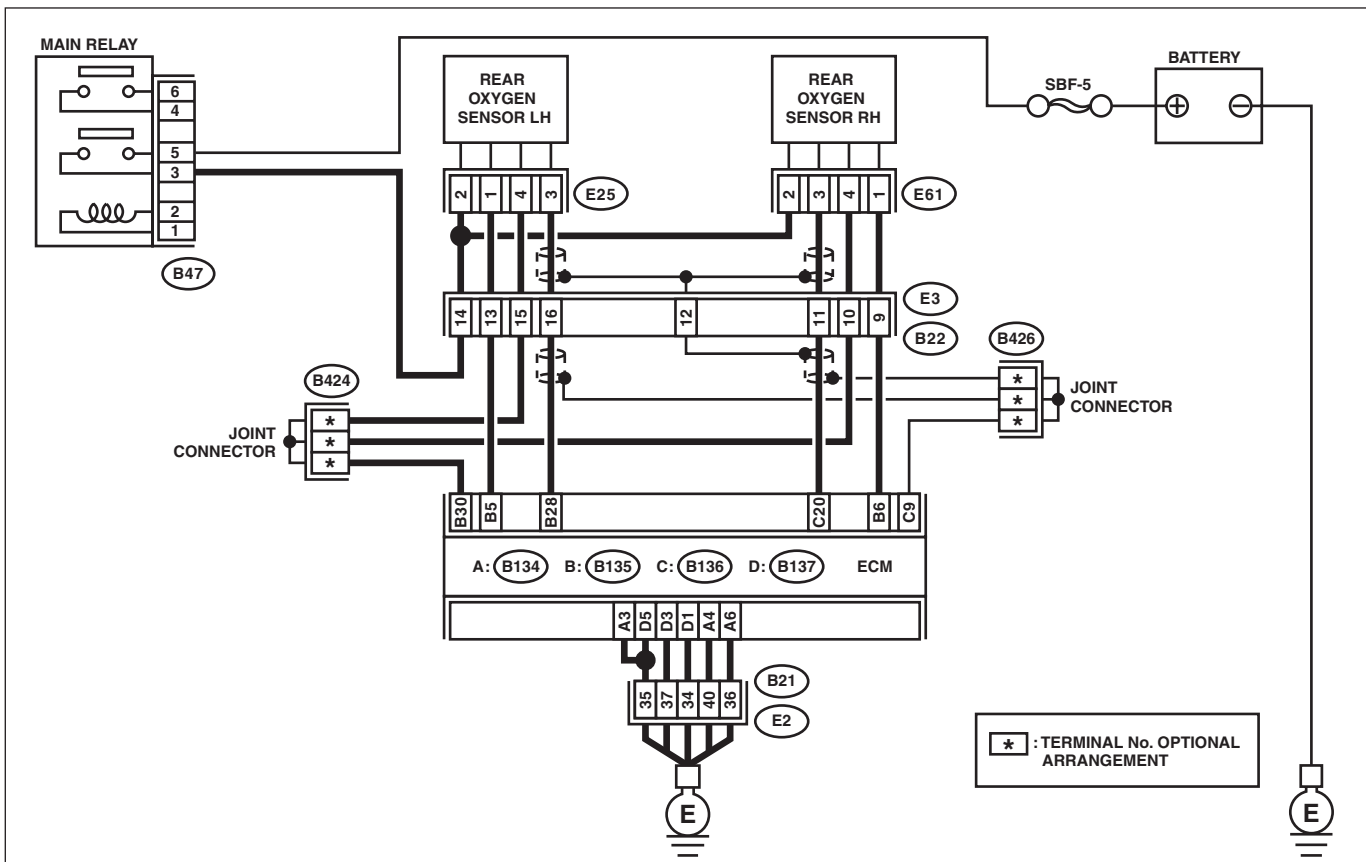


EN-08076



# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

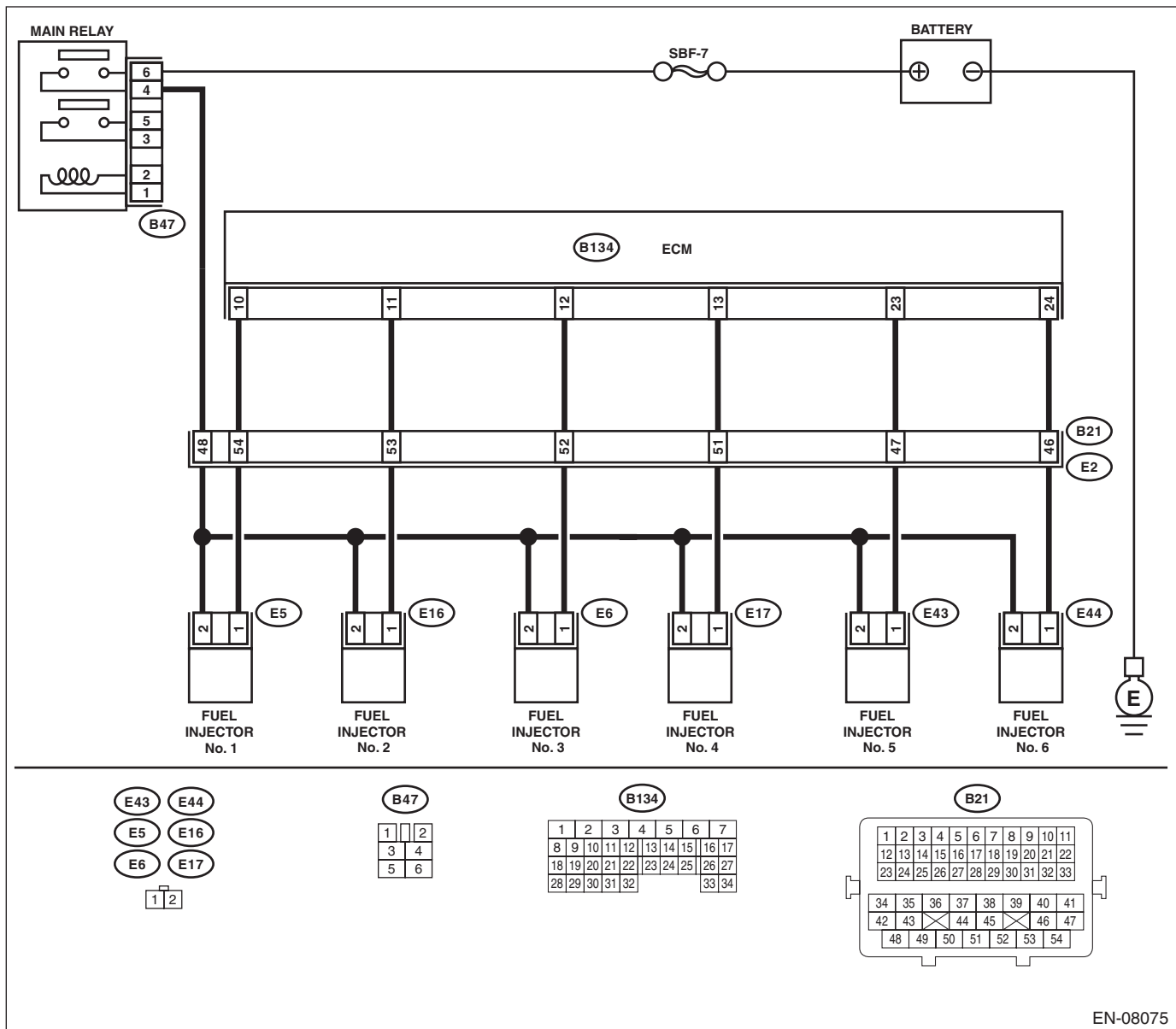
ENGINE (DIAGNOSTICS)



EN-08077

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)



EN-08075

Step	Check	Yes	No
1	<b>CHECK FRONT OXYGEN (A/F) SENSOR CONNECTOR AND COUPLING CONNECTOR.</b>	Completely remove any water inside.	Go to step 2.
2	<b>CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM and front oxygen (A/F) sensor. 3) Measure the resistance of harness between ECM and front oxygen (A/F) sensor connector. <b>Connector &amp; terminal</b> <b>(B135) No. 8 — (E24) No. 3:</b> <b>(B135) No. 20 — (E24) No. 4:</b>	Is the resistance less than 1 Ω? Go to step 3.	Repair the harness and connector. <b>NOTE:</b> In this case, repair the following item: • Open circuit in harness between ECM and front oxygen (A/F) sensor connector • Poor contact of coupling connector

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<b>3</b> <b>CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.</b> Measure the resistance between ECM and chassis ground. <i>Connector &amp; terminal</i> <i>(B135) No. 8 — Chassis ground:</i> <i>(B135) No. 20 — Chassis ground:</i>	Is the resistance 1 MΩ or more?	Go to step 4.	Repair the ground short circuit of harness between ECM and front oxygen (A/F) sensor connector.
<b>4</b> <b>CHECK OUTPUT SIGNAL FOR ECM.</b> 1) Connect the connector to ECM. 2) Turn the ignition switch to ON. 3) Measure the voltage between front oxygen (A/F) sensor connector and chassis ground. <i>Connector &amp; terminal</i> <i>(E24) No. 3 (+) — Chassis ground (-):</i>	Is the voltage 4.5 V or more?	Go to step 6.	Go to step 5.
<b>5</b> <b>CHECK OUTPUT SIGNAL FOR ECM.</b> Measure the voltage between front oxygen (A/F) sensor connector and chassis ground. <i>Connector &amp; terminal</i> <i>(E24) No. 4 (+) — Chassis ground (-):</i>	Is the voltage 4.95 V or more?	Go to step 6.	Go to step 7.
<b>6</b> <b>CHECK OUTPUT SIGNAL FOR ECM.</b> Measure the voltage between front oxygen (A/F) sensor connector and chassis ground. <i>Connector &amp; terminal</i> <i>(E24) No. 3 (+) — Chassis ground (-):</i> <i>(E24) No. 4 (+) — Chassis ground (-):</i>	Is the voltage 8 V or more?	Repair the short circuit to power in the harness between ECM and front oxygen (A/F) sensor connector. After repair, replace the ECM. <Ref. to FU(H6DO)-52, Engine Control Module (ECM).>	Repair the poor contact of ECM connector.
<b>7</b> <b>CHECK EXHAUST SYSTEM.</b>	Are there holes or loose bolts on exhaust system?	Repair the exhaust system.	Go to step 8.
<b>8</b> <b>CHECK AIR INTAKE SYSTEM.</b>	Are there holes, loose bolts or disconnection of hose on air intake system?	Repair the air intake system.	Go to step 9.
<b>9</b> <b>CHECK FUEL PRESSURE.</b> <b>WARNING:</b> Place "NO OPEN FLAMES" signs near the working area. <b>CAUTION:</b> Be careful not to spill fuel. 1) Connect the front oxygen (A/F) sensor connector. 2) Measure the fuel pressure. <Ref. to ME(H6DO)-30, INSPECTION, Fuel Pressure.> <b>CAUTION:</b> Release fuel pressure before removing the fuel pressure gauge.	Is the measured value 340 — 400 kPa (3.5 — 4.1 kgf/cm <sup>2</sup> , 49 — 58 psi)?	Go to step 10.	Repair the following item. Fuel pressure is too high: <ul style="list-style-type: none"> <li>• Clogged fuel line or bent hose</li> </ul> Fuel pressure is too low: <ul style="list-style-type: none"> <li>• Improper fuel pump discharge</li> <li>• Clogged fuel line</li> </ul>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<p><b>10 CHECK ENGINE COOLANT TEMPERATURE SENSOR.</b></p> <p>1) Start the engine and warm up completely.</p> <p>2) Read the value of «Coolant Temp.» using the Subaru Select Monitor or a general scan tool.</p> <p>NOTE:</p> <ul style="list-style-type: none"> <li>• Subaru Select Monitor</li> </ul> <p>For detailed operation procedures, refer to “READ CURRENT DATA FOR ENGINE”. &lt;Ref. to EN(H6DO)(diag)-36, Subaru Select Monitor.&gt;</p> <ul style="list-style-type: none"> <li>• General scan tool</li> </ul> <p>For detailed operation procedures, refer to the general scan tool operation manual.</p>	<p>Is the value of «Coolant Temp.» 75°C (167°F) or more?</p>	<p>Go to step 11.</p>	<p>Replace the engine coolant temperature sensor. &lt;Ref. to FU(H6DO)-30, Engine Coolant Temperature Sensor.&gt;</p>
<p><b>11 CHECK MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR.</b></p> <p>1) Start the engine and warm up engine until coolant temperature is higher than 75°C (167°F).</p> <p>2) Place the select lever in “P” range or “N” range.</p> <p>3) Turn the A/C switch to OFF.</p> <p>4) Turn all the accessory switches to OFF.</p> <p>5) Read the value of «Mass Air Flow» using the Subaru Select Monitor or a general scan tool.</p> <p>NOTE:</p> <ul style="list-style-type: none"> <li>• Subaru Select Monitor</li> </ul> <p>For detailed operation procedures, refer to “READ CURRENT DATA FOR ENGINE”. &lt;Ref. to EN(H6DO)(diag)-36, Subaru Select Monitor.&gt;</p> <ul style="list-style-type: none"> <li>• General scan tool</li> </ul> <p>For detailed operation procedures, refer to the general scan tool operation manual.</p>	<p>Is the value of «Mass Air Flow» 2.0 — 5.0 g/s (0.26 — 0.66 lb/m)?</p>	<p>Go to step 12.</p>	<p>Replace the mass air flow and intake air temperature sensor. &lt;Ref. to FU(H6DO)-40, Mass Air Flow and Intake Air Temperature Sensor.&gt;</p>
<p><b>12 CHECK MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR.</b></p> <p>1) Start the engine and warm up engine until coolant temperature is higher than 75°C (167°F).</p> <p>2) Place the select lever in “P” range or “N” range.</p> <p>3) Turn the A/C switch to OFF.</p> <p>4) Turn all the accessory switches to OFF.</p> <p>5) Open the front hood.</p> <p>6) Measure the ambient temperature.</p> <p>7) Read the value of «Intake Air Temp.» using the Subaru Select Monitor or a general scan tool.</p> <p>NOTE:</p> <ul style="list-style-type: none"> <li>• Subaru Select Monitor</li> </ul> <p>For detailed operation procedures, refer to “READ CURRENT DATA FOR ENGINE”. &lt;Ref. to EN(H6DO)(diag)-36, Subaru Select Monitor.&gt;</p> <ul style="list-style-type: none"> <li>• General scan tool</li> </ul> <p>For detailed operation procedures, refer to the general scan tool operation manual.</p>	<p>Subtract ambient temperature from «Intake Air Temp.». Is the obtained value -10 — 50°C (-18 — 90°F)?</p>	<p>Go to step 13.</p>	<p>Check the mass air flow and intake air temperature sensor. &lt;Ref. to FU(H6DO)-40, Mass Air Flow and Intake Air Temperature Sensor.&gt;</p>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<p><b>13 CHECK REAR OXYGEN SENSOR DATA.</b></p> <p>1) Warm up the engine until engine coolant temperature is higher than 75°C (167°F), and keep the engine speed at 3,000 rpm. (2 minutes maximum)</p> <p>2) Read the value of «Front O2 Sensor #2» using the Subaru Select Monitor or a general scan tool.</p> <p>NOTE:</p> <ul style="list-style-type: none"> <li>• Subaru Select Monitor</li> </ul> <p>For detailed operation procedures, refer to “READ CURRENT DATA FOR ENGINE”. &lt;Ref. to EN(H6DO)(diag)-36, Subaru Select Monitor.&gt;</p> <ul style="list-style-type: none"> <li>• General scan tool</li> </ul> <p>For detailed operation procedures, refer to the general scan tool operation manual.</p>	<p>Is the value of «Front O2 Sensor #2» 0.490 V or more?</p>	<p>Go to step 14.</p>	<p>Go to step 15.</p>
<p><b>14 CHECK REAR OXYGEN SENSOR DATA.</b></p> <p>1) Warm up the engine until engine coolant temperature is higher than 75°C (167°F), and rapidly reduce the engine speed from 3,000 rpm.</p> <p>2) Read the value of «Front O2 Sensor #2» using the Subaru Select Monitor or a general scan tool.</p> <p>NOTE:</p> <ul style="list-style-type: none"> <li>• Subaru Select Monitor</li> </ul> <p>For detailed operation procedures, refer to “READ CURRENT DATA FOR ENGINE”. &lt;Ref. to EN(H6DO)(diag)-36, Subaru Select Monitor.&gt;</p> <ul style="list-style-type: none"> <li>• General scan tool</li> </ul> <p>For detailed operation procedures, refer to the general scan tool operation manual.</p>	<p>Is the value of «Front O2 Sensor #2» 0.250 V or less?</p>	<p>Go to step 16.</p>	<p>Go to step 15.</p>
<p><b>15 CHECK REAR OXYGEN SENSOR CONNECTOR AND COUPLING CONNECTOR.</b></p>	<p>Has water entered the connector?</p>	<p>Completely remove any water inside.</p>	<p>Go to step 17.</p>
<p><b>16 CHECK FRONT OXYGEN (A/F) SENSOR USING REAR OXYGEN SENSOR SIGNAL.</b></p> <p>1) Warm up the engine until engine coolant temperature is higher than 75°C (167°F), then keep the engine idling for 5 minutes or more.</p> <p>2) Read the value of «Front O2 Sensor #2» using the Subaru Select Monitor or a general scan tool.</p> <p>NOTE:</p> <ul style="list-style-type: none"> <li>• Subaru Select Monitor</li> </ul> <p>For detailed operation procedures, refer to “READ CURRENT DATA FOR ENGINE”. &lt;Ref. to EN(H6DO)(diag)-36, Subaru Select Monitor.&gt;</p> <ul style="list-style-type: none"> <li>• General scan tool</li> </ul> <p>For detailed operation procedures, refer to the general scan tool operation manual.</p>	<p>Is the value in «Front O2 Sensor #2» kept at 0.250 V or less for 5 minutes or more?</p>	<p>Replace the front oxygen (A/F) sensor. &lt;Ref. to FU(H6DO)-48, Front Oxygen (A/F) Sensor.&gt;</p>	<p>Go to step 17.</p>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<b>17 CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM and rear oxygen sensor. 3) Measure the resistance of harness between ECM and rear oxygen sensor connector. <b>Connector &amp; terminal</b> <b>(B135) No. 28 — (E25) No. 3:</b> <b>(B135) No. 30 — (E25) No. 4:</b>	Is the resistance less than 1 $\Omega$ ?	Go to step 18.	Repair the harness and connector. NOTE: In this case, repair the following item: <ul style="list-style-type: none"> <li>• Open circuit in harness between ECM and rear oxygen sensor connector</li> <li>• Poor contact of coupling connector</li> </ul>
<b>18 CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.</b> 1) Connect the connector to ECM. 2) Turn the ignition switch to ON. 3) Measure the voltage between rear oxygen sensor connector and chassis ground. <b>Connector &amp; terminal</b> <b>(E25) No. 3 (+) — Chassis ground (-):</b>	Is the voltage 0.2 — 0.5 V?	Replace the rear oxygen sensor. <Ref. to FU(H6DO)-50, Rear Oxygen Sensor.>	Go to step 19.
<b>19 CHECK OUTPUT SIGNAL OF ECM.</b> 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM and chassis ground on faulty cylinders. <b>Connector &amp; terminal</b> <b>#1 (B134) No. 10 (+) — Chassis ground (-):</b> <b>#2 (B134) No. 11 (+) — Chassis ground (-):</b> <b>#3 (B134) No. 12 (+) — Chassis ground (-):</b> <b>#4 (B134) No. 13 (+) — Chassis ground (-):</b> <b>#5 (B134) No. 23 (+) — Chassis ground (-):</b> <b>#6 (B134) No. 24 (+) — Chassis ground (-):</b>	Is the voltage 10 V or more?	Go to step 24.	Go to step 20.
<b>20 CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connector from fuel injector on faulty cylinders. 3) Measure the resistance between fuel injector connector and engine ground on faulty cylinders. <b>Connector &amp; terminal</b> <b>#1 (E5) No. 1 — Engine ground:</b> <b>#2 (E16) No. 1 — Engine ground:</b> <b>#3 (E6) No. 1 — Engine ground:</b> <b>#4 (E17) No. 1 — Engine ground:</b> <b>#5 (E43) No. 1 — Engine ground:</b> <b>#6 (E44) No. 1 — Engine ground:</b>	Is the resistance 1 M $\Omega$ or more?	Go to step 21.	Repair the short circuit to ground in harness between ECM and fuel injector connector.
<b>21 CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR.</b> Measure the resistance of harness between ECM and fuel injector connector on faulty cylinders. <b>Connector &amp; terminal</b> <b>#1 (B134) No. 10 — (E5) No. 1:</b> <b>#2 (B134) No. 11 — (E16) No. 1:</b> <b>#3 (B134) No. 12 — (E6) No. 1:</b> <b>#4 (B134) No. 13 — (E17) No. 1:</b> <b>#5 (B134) No. 23 — (E43) No. 1:</b> <b>#6 (B134) No. 24 — (E44) No. 1:</b>	Is the resistance less than 1 $\Omega$ ?	Go to step 22.	Repair the harness and connector. NOTE: In this case, repair the following item: <ul style="list-style-type: none"> <li>• Open circuit in harness between ECM and fuel injector connector</li> <li>• Poor contact of coupling connector</li> </ul>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
<b>22 CHECK FUEL INJECTOR.</b> Measure the resistance between fuel injector terminals on faulty cylinder. <i>Terminals</i> <i>No. 1 — No. 2:</i>	Is the resistance 5 — 20 Ω?	Go to step 23.	Replace the faulty fuel injector. <Ref. to FU(H6DO)-42, Fuel Injector.>
<b>23 CHECK POWER SUPPLY LINE.</b> 1) Turn the ignition switch to ON. 2) Measure the voltage between fuel injector connector of faulty cylinders and engine ground. <i>Connector &amp; terminal</i> <i>#1 (E5) No. 2 (+) — Engine ground (-):</i> <i>#2 (E16) No. 2 (+) — Engine ground (-):</i> <i>#3 (E6) No. 2 (+) — Engine ground (-):</i> <i>#4 (E17) No. 2 (+) — Engine ground (-):</i> <i>#5 (E43) No. 2 (+) — Engine ground (-):</i> <i>#6 (E44) No. 2 (+) — Engine ground (-):</i>	Is the voltage 10 V or more?	Repair the poor contact of all connectors in fuel injector circuit.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit in harness between the main relay and fuel injector connector on faulty cylinders • Poor contact of coupling connector • Poor contact of main relay connector
<b>24 CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connector from fuel injector on faulty cylinders. 3) Turn the ignition switch to ON. 4) Measure the voltage between ECM and chassis ground on faulty cylinders. <i>Connector &amp; terminal</i> <i>#1 (B134) No. 10 (+) — Chassis ground (-):</i> <i>#2 (B134) No. 11 (+) — Chassis ground (-):</i> <i>#3 (B134) No. 12 (+) — Chassis ground (-):</i> <i>#4 (B134) No. 13 (+) — Chassis ground (-):</i> <i>#5 (B134) No. 23 (+) — Chassis ground (-):</i> <i>#6 (B134) No. 24 (+) — Chassis ground (-):</i>	Is the voltage 10 V or more?	Repair the short circuit to power in harness between ECM and fuel injector connector.	Go to step 25.
<b>25 CHECK FUEL INJECTOR.</b> 1) Turn the ignition switch to OFF. 2) Measure the resistance between fuel injector terminals on faulty cylinder. <i>Terminals</i> <i>No. 1 — No. 2:</i>	Is the resistance 5 — 20 Ω?	Go to step 26.	Replace the faulty fuel injector. <Ref. to FU(H6DO)-42, Fuel Injector.>
<b>26 CHECK INSTALLATION OF CAMSHAFT POSITION SENSOR/CRANKSHAFT POSITION SENSOR.</b>	Is the camshaft position sensor or crankshaft position sensor loosely installed?	Tighten the camshaft position sensor or crankshaft position sensor.	Go to step 27.
<b>27 CHECK CRANK PLATE.</b>	Is the crank sprocket rusted or the teeth of crank plate broken?	Replace the crank plate. <Ref. to ME(H6DO)-95, Cylinder Block.>	Go to step 28.
<b>28 CHECK INSTALLATION CONDITION OF TIMING CHAIN.</b> Turn the crankshaft using ST, and align the alignment mark on crank sprocket with alignment mark on cylinder block. ST 18252AA000 CRANKSHAFT SOCKET	Is the timing chain dislocated from its proper position?	Correct the installation condition of timing chain. <Ref. to ME(H6DO)-53, Timing Chain Assembly.>	Go to step 29.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## ENGINE (DIAGNOSTICS)

Step	Check	Yes	No	
<b>29</b>	<b>CHECK FUEL LEVEL.</b>	Is the fuel meter indication lower than the "Lower" level?	Refill the fuel so that the fuel meter indication is higher than the "Lower" level, and proceed to the next step. Go to step <b>30</b> .	Go to step <b>30</b> .
<b>30</b>	<b>CHECK STATUS OF MALFUNCTION INDICATOR LIGHT.</b> 1) Clear the memory using the Subaru Select Monitor or general scan tool. <Ref. to EN(H6DO)(diag)-58, Clear Memory Mode.> 2) Start the engine, and drive the vehicle 10 minutes or more.	Does the malfunction indicator light illuminate or blink?	Go to step <b>32</b> .	Go to step <b>31</b> .
<b>31</b>	<b>CHECK CAUSE OF MISFIRE.</b>	Was the cause of misfire identified when the engine is running?	Finish diagnostics operation, if the engine has no abnormality.	Repair the poor contact of connector. <b>NOTE:</b> In this case, repair the following item: <ul style="list-style-type: none"> <li>• Poor contact of ignition coil connector</li> <li>• Poor contact of fuel injector connector on faulty cylinders</li> <li>• Poor contact of ECM connector</li> <li>• Poor contact of coupling connector</li> </ul>
<b>32</b>	<b>CHECK AIR INTAKE SYSTEM.</b>	Is there any fault in air intake system?	Repair the air intake system. <b>NOTE:</b> Check the following items. <ul style="list-style-type: none"> <li>• Are there air leaks or air suction caused by loose or dislocated nuts and bolts?</li> <li>• Are there cracks or any disconnection of hoses?</li> </ul>	Go to step <b>33</b> .
<b>33</b>	<b>CHECK MISFIRE SYMPTOM.</b> 1) Turn the ignition switch to ON. 2) Check for DTC. <Ref. to EN(H6DO)(diag)-44, Read Diagnostic Trouble Code (DTC).>	Does the Subaru Select Monitor or general scan tool indicate only one DTC?	Go to step <b>36</b> .	Go to step <b>34</b> .
<b>34</b>	<b>CHECK DTC ON DISPLAY.</b>	Is DTC P0301, P0303 and P0305 displayed?	Go to step <b>37</b> .	Go to step <b>35</b> .
<b>35</b>	<b>CHECK DTC ON DISPLAY.</b>	Is DTC P0302, P0304 and P0306 displayed?	Go to step <b>38</b> .	Go to step <b>39</b> .



# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

Step	Check	Yes	No
36 <b>ONLY ONE CYLINDER.</b>	Is there any fault in the cylinder?	Repair or replace faulty parts. NOTE: Check the following items. • Spark plug • Ignition coil • Fuel injector • Compression ratio	Check DTC P0171, P0172, P0174 or P0175 using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6DO)(diag)-84, List of Diagnostic Trouble Code (DTC).>
37 <b>GROUP OF #1, #3 AND #5 CYLINDERS.</b>	Is there any fault in #1, #3 and #5 cylinders?	Repair or replace faulty parts. NOTE: Check the following items. • Spark plug • Ignition coil • Fuel injector • Compression ratio • Skipping timing chain teeth	Check DTC P0171, P0172, P0174 or P0175 using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6DO)(diag)-84, List of Diagnostic Trouble Code (DTC).>
38 <b>GROUP OF #2, #4 AND #6 CYLINDERS.</b>	Is there any fault in #2, #4 and #6 cylinders?	Repair or replace faulty parts. NOTE: Check the following items. • Spark plug • Ignition coil • Fuel injector • Compression ratio • Skipping timing chain teeth	Check DTC P0171, P0172, P0174 or P0175 using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6DO)(diag)-84, List of Diagnostic Trouble Code (DTC).>
39 <b>CYLINDER AT RANDOM.</b>	Is the engine idle rough?	Check DTC P0171, P0172, P0174 or P0175 using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6DO)(diag)-84, List of Diagnostic Trouble Code (DTC).>	Repair or replace faulty parts. NOTE: Check the following items. • Spark plug • Ignition coil • Fuel injector • Compression ratio

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## FQ:DTC P2227 BAROMETRIC PRESSURE CIRCUIT RANGE/PERFORMANCE

### DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-250, DTC P2227 BAROMETRIC PRESSURE CIRCUIT RANGE/PERFORMANCE, Diagnostic Trouble Code (DTC) Detecting Criteria.>

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

Step	Check	Yes	No
1 CHECK FOR ANY OTHER DTC ON DISPLAY.	Is any other DTC displayed?	Check DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6DO)(diag)-84, List of Diagnostic Trouble Code (DTC).>	Replace the ECM. <Ref. to FU(H6DO)-52, Engine Control Module (ECM).> NOTE: The barometric pressure sensor is built into the ECM.

## FR:DTC P2228 BAROMETRIC PRESSURE CIRCUIT LOW

### DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-251, DTC P2228 BAROMETRIC PRESSURE CIRCUIT LOW, Diagnostic Trouble Code (DTC) Detecting Criteria.>

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

Step	Check	Yes	No
1 CHECK FOR ANY OTHER DTC ON DISPLAY.	Is any other DTC displayed?	Check DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6DO)(diag)-84, List of Diagnostic Trouble Code (DTC).>	Replace the ECM. <Ref. to FU(H6DO)-52, Engine Control Module (ECM).> NOTE: The barometric pressure sensor is built into the ECM.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

## FS:DTC P2229 BAROMETRIC PRESSURE CIRCUIT HIGH

### DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-252, DTC P2229 BAROMETRIC PRESSURE CIRCUIT HIGH, Diagnostic Trouble Code (DTC) Detecting Criteria.>

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

Step	Check	Yes	No
1 CHECK FOR ANY OTHER DTC ON DISPLAY.	Is any other DTC displayed?	Check DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6DO)(diag)-84, List of Diagnostic Trouble Code (DTC).>	Replace the ECM. <Ref. to FU(H6DO)-52, Engine Control Module (ECM).> NOTE: The barometric pressure sensor is built into the ECM.

## FT:DTC P2610 ECM/PCM INTERNAL ENGINE OFF TIMER PERFORMANCE

### DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-253, DTC P2610 ECM/PCM INTERNAL ENGINE OFF TIMER PERFORMANCE, Diagnostic Trouble Code (DTC) Detecting Criteria.>

### CAUTION:

After servicing or replacing faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>, and Inspection Mode <Ref. to EN(H6DO)(diag)-45, PROCEDURE, Inspection Mode.>.

Step	Check	Yes	No
1 CHECK FOR ANY OTHER DTC ON DISPLAY.	Is any other DTC displayed?	Check DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6DO)(diag)-84, List of Diagnostic Trouble Code (DTC).>	Replace the ECM. <Ref. to FU(H6DO)-52, Engine Control Module (ECM).> NOTE: The soaking timer IC is built into the ECM.

## Diagnostic Procedure with Diagnostic Trouble Code (DTC)

ENGINE (DIAGNOSTICS)

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### **FU:DTC U0073 CAN FAILURE, BUS 'OFF' DETECTION**

NOTE:

For the diagnostic procedure, refer to LAN section. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>

### **FV:DTC U0101 CAN (TCU) DATA NOT LOADED**

NOTE:

For the diagnostic procedure, refer to LAN section. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>

### **FW:DTC U0122 CAN (VDC) DATA NOT LOADED**

NOTE:

For the diagnostic procedure, refer to LAN section. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>

### **FX:DTC U0140 CAN (BCU) DATA NOT LOADED**

NOTE:

For the diagnostic procedure, refer to LAN section. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>

### **FY:DTC U0402 CAN (TCU) DATA ABNORMAL**

NOTE:

For the diagnostic procedure, refer to LAN section. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>

### **FZ:DTC U0416 CAN (VDC) DATA ABNORMAL**

NOTE:

For the diagnostic procedure, refer to LAN section. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>

### **GA:DTC U0422 CAN (BCU) DATA ABNORMAL**

NOTE:

For the diagnostic procedure, refer to LAN section. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>

## 21. General Diagnostic Table

### A: INSPECTION

**NOTE:**

Malfunction of parts other than those listed is also possible. <Ref. to ME(H6DO)-123, Engine Trouble in General.>

Symptoms	Faulty parts
1. Engine stalls during idling.	1) Manifold absolute pressure sensor 2) Mass air flow and intake air temperature 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) 8) Electronic throttle control
2. Rough idling	1) Manifold absolute pressure sensor 2) Mass air flow and intake air temperature sensor 3) Engine coolant temperature sensor (*2) 4) Ignition parts (*1) 5) Air intake system (*5) 6) Fuel injection parts (*4) 7) Electronic throttle control 8) Crankshaft position sensor (*3) 9) Camshaft position sensor (*3) 10) Oxygen sensor 11) Fuel pump and fuel pump relay 12) EGR control valve
3. Engine does not return to idle.	1) Engine coolant temperature sensor 2) Electronic throttle control 3) Manifold absolute pressure sensor 4) Mass air flow and intake air temperature sensor 5) Accelerator pedal position sensor 6) Engine oil temperature sensor 7) EGR control valve
4. Poor acceleration	1) Manifold absolute pressure sensor 2) Mass air flow and intake air temperature sensor 3) Electronic throttle control 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) EGR control valve 10) Engine torque control signal circuit 11) Ignition parts (*1) 12) Accelerator pedal position sensor 13) Engine oil temperature sensor
5. Engine stalls, hesitates, or sputters at acceleration.	1) Manifold absolute pressure sensor 2) Mass air flow and intake air 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) Electronic throttle control 9) Fuel pump and fuel pump relay 10) EGR control valve

# General Diagnostic Table

## ENGINE (DIAGNOSTICS)

Symptoms	Faulty parts
6. Surging	<ol style="list-style-type: none"> <li>1) Mass air flow and intake air temperature sensor</li> <li>2) Manifold absolute pressure sensor</li> <li>3) Engine coolant temperature sensor (*2)</li> <li>4) Crankshaft position sensor (*3)</li> <li>5) Camshaft position sensor (*3)</li> <li>6) Fuel injection parts (*4)</li> <li>7) Electronic throttle control</li> <li>8) Fuel pump and fuel pump relay</li> <li>9) EGR control valve</li> </ol>
7. Spark knock	<ol style="list-style-type: none"> <li>1) Mass air flow and intake air temperature sensor</li> <li>2) Manifold absolute pressure sensor</li> <li>3) Engine coolant temperature sensor</li> <li>4) Knock sensor</li> <li>5) Fuel injection parts (*4)</li> <li>6) Fuel pump and fuel pump relay</li> <li>7) EGR control valve</li> </ol>
8. After burning in exhaust system	<ol style="list-style-type: none"> <li>1) Mass air flow and intake air temperature sensor</li> <li>2) Manifold absolute pressure sensor</li> <li>3) Engine coolant temperature sensor (*2)</li> <li>4) Fuel injection parts (*4)</li> <li>5) Fuel pump and fuel pump relay</li> </ol>

\*1: Check ignition coil and spark plug.

\*2: Indicate the symptom occurring only in cold temperatures.

\*3: Ensure secure installation.

\*4: Check the fuel injector and fuel pressure regulator.

\*5: Inspect for air leak in air intake system.

# GENERAL DESCRIPTION

# *GD(H6DO)*

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# List of Diagnostic Trouble Code (DTC)

## GENERAL DESCRIPTION

### 1. List of Diagnostic Trouble Code (DTC)

#### A: LIST

DTC	Item	Index
P0011	Intake Camshaft Position - Timing Over-Advanced or System Performance (Bank 1)	<Ref. to GD(H6DO)-11, DTC P0011 INTAKE CAMSHAFT POSITION - TIMING OVER-ADVANCED OR SYSTEM PERFORMANCE (BANK 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0014	Exhaust AVCS System 1 (Range/Performance)	<Ref. to GD(H6DO)-13, DTC P0014 EXHAUST AVCS SYSTEM 1 (RANGE/PERFORMANCE), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0016	Crankshaft Position - Camshaft Position Correlation (Bank1)	<Ref. to GD(H6DO)-15, DTC P0016 CRANKSHAFT POSITION - CAMSHAFT POSITION CORRELATION (BANK1), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0017	Crank and Cam Timing B System Failure (Bank 1)	<Ref. to GD(H6DO)-17, DTC P0017 CRANK AND CAM TIMING B SYSTEM FAILURE (BANK 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0018	Crankshaft Position - Camshaft Position Correlation (Bank2)	<Ref. to GD(H6DO)-19, DTC P0018 CRANKSHAFT POSITION - CAMSHAFT POSITION CORRELATION (BANK2), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0019	Crank and Cam Timing B System Failure (Bank 2)	<Ref. to GD(H6DO)-19, DTC P0019 CRANK AND CAM TIMING B SYSTEM FAILURE (BANK 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0021	Intake Camshaft Position - Timing Over-Advanced or System Performance (Bank 2)	<Ref. to GD(H6DO)-19, DTC P0021 INTAKE CAMSHAFT POSITION - TIMING OVER-ADVANCED OR SYSTEM PERFORMANCE (BANK 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0024	Exhaust AVCS System 2 (Range/Performance)	<Ref. to GD(H6DO)-19, DTC P0024 EXHAUST AVCS SYSTEM 2 (RANGE/PERFORMANCE), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0030	HO2S Heater Control Circuit (Bank 1 Sensor 1)	<Ref. to GD(H6DO)-20, DTC P0030 HO2S HEATER CONTROL CIRCUIT (BANK 1 SENSOR 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0031	HO2S Heater Control Circuit Low (Bank 1 Sensor 1)	<Ref. to GD(H6DO)-22, DTC P0031 HO2S HEATER CONTROL CIRCUIT LOW (BANK 1 SENSOR 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0032	HO2S Heater Control Circuit High (Bank 1 Sensor 1)	<Ref. to GD(H6DO)-24, DTC P0032 HO2S HEATER CONTROL CIRCUIT HIGH (BANK 1 SENSOR 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0037	HO2S Heater Control Circuit Low (Bank 1 Sensor 2)	<Ref. to GD(H6DO)-26, DTC P0037 HO2S HEATER CONTROL CIRCUIT LOW (BANK 1 SENSOR 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0038	HO2S Heater Control Circuit High (Bank 1 Sensor 2)	<Ref. to GD(H6DO)-28, DTC P0038 HO2S HEATER CONTROL CIRCUIT HIGH (BANK 1 SENSOR 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0050	HO2S Heater Control Circuit (Bank 2 Sensor 1)	<Ref. to GD(H6DO)-30, DTC P0050 HO2S HEATER CONTROL CIRCUIT (BANK 2 SENSOR 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0051	HO2S Heater Control Circuit Low (Bank 2 Sensor 1)	<Ref. to GD(H6DO)-30, DTC P0051 HO2S HEATER CONTROL CIRCUIT LOW (BANK 2 SENSOR 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0052	HO2S Heater Control Circuit High (Bank 2 Sensor 1)	<Ref. to GD(H6DO)-30, DTC P0052 HO2S HEATER CONTROL CIRCUIT HIGH (BANK 2 SENSOR 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0057	HO2S Heater Control Circuit Low (Bank 2 Sensor 2)	<Ref. to GD(H6DO)-30, DTC P0057 HO2S HEATER CONTROL CIRCUIT LOW (BANK 2 SENSOR 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0058	HO2S Heater Control Circuit High (Bank 2 Sensor 2)	<Ref. to GD(H6DO)-30, DTC P0058 HO2S HEATER CONTROL CIRCUIT HIGH (BANK 2 SENSOR 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0068	MAP/MAF - Throttle Position Correlation	<Ref. to GD(H6DO)-31, DTC P0068 MAP/MAF - THROTTLE POSITION CORRELATION, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0101	Mass or Volume Air Flow Circuit Range/Performance	<Ref. to GD(H6DO)-33, DTC P0101 MASS OR VOLUME AIR FLOW CIRCUIT RANGE/PERFORMANCE, Diagnostic Trouble Code (DTC) Detecting Criteria.>



# List of Diagnostic Trouble Code (DTC)

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P0102	Mass or Volume Air Flow Circuit Low Input	<Ref. to GD(H6DO)-35, DTC P0102 MASS OR VOLUME AIR FLOW CIRCUIT LOW INPUT, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0103	Mass or Volume Air Flow Circuit High Input	<Ref. to GD(H6DO)-37, DTC P0103 MASS OR VOLUME AIR FLOW CIRCUIT HIGH INPUT, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0107	Manifold Absolute Pressure/Barometric Pressure Circuit Low Input	<Ref. to GD(H6DO)-39, DTC P0107 MANIFOLD ABSOLUTE PRESSURE/BAROMETRIC PRESSURE CIRCUIT LOW INPUT, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0108	Manifold Absolute Pressure/Barometric Pressure Circuit High Input	<Ref. to GD(H6DO)-41, DTC P0108 MANIFOLD ABSOLUTE PRESSURE/BAROMETRIC PRESSURE CIRCUIT HIGH INPUT, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0111	Intake Air Temperature Sensor 1 Circuit Range/Performance	<Ref. to GD(H6DO)-43, DTC P0111 INTAKE AIR TEMPERATURE SENSOR 1 CIRCUIT RANGE/PERFORMANCE, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0112	Intake Air Temperature Sensor 1 Circuit Low	<Ref. to GD(H6DO)-46, DTC P0112 INTAKE AIR TEMPERATURE SENSOR 1 CIRCUIT LOW, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0113	Intake Air Temperature Sensor 1 Circuit High	<Ref. to GD(H6DO)-48, DTC P0113 INTAKE AIR TEMPERATURE SENSOR 1 CIRCUIT HIGH, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0117	Engine Coolant Temperature Circuit Low	<Ref. to GD(H6DO)-50, DTC P0117 ENGINE COOLANT TEMPERATURE CIRCUIT LOW, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0118	Engine Coolant Temperature Circuit High	<Ref. to GD(H6DO)-52, DTC P0118 ENGINE COOLANT TEMPERATURE CIRCUIT HIGH, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0122	Throttle/Pedal Position Sensor/Switch "A" Circuit Low	<Ref. to GD(H6DO)-54, DTC P0122 THROTTLE/PEDAL POSITION SENSOR/SWITCH "A" CIRCUIT LOW, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0123	Throttle/Pedal Position Sensor/Switch "A" Circuit High	<Ref. to GD(H6DO)-56, DTC P0123 THROTTLE/PEDAL POSITION SENSOR/SWITCH "A" CIRCUIT HIGH, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0125	Insufficient Coolant Temperature for Closed Loop Fuel Control	<Ref. to GD(H6DO)-58, DTC P0125 INSUFFICIENT COOLANT TEMPERATURE FOR CLOSED LOOP FUEL CONTROL, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0126	Insufficient Engine Coolant Temperature for Stable Operation	<Ref. to GD(H6DO)-60, DTC P0126 INSUFFICIENT ENGINE COOLANT TEMPERATURE FOR STABLE OPERATION, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0128	Coolant Thermostat (Engine Coolant Temperature Below Thermostat Regulating Temperature)	<Ref. to GD(H6DO)-62, DTC P0128 COOLANT THERMOSTAT (ENGINE COOLANT TEMPERATURE BELOW THERMOSTAT REGULATING TEMPERATURE), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0131	O2 Sensor Circuit Low Voltage (Bank 1 Sensor 1)	<Ref. to GD(H6DO)-66, DTC P0131 O2 SENSOR CIRCUIT LOW VOLTAGE (BANK 1 SENSOR 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0132	O2 Sensor Circuit High Voltage (Bank 1 Sensor 1)	<Ref. to GD(H6DO)-68, DTC P0132 O2 SENSOR CIRCUIT HIGH VOLTAGE (BANK 1 SENSOR 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0134	O2 Sensor Circuit No Activity Detected (Bank 1 Sensor 1)	<Ref. to GD(H6DO)-70, DTC P0134 O2 SENSOR CIRCUIT NO ACTIVITY DETECTED (BANK 1 SENSOR 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0137	O2 Sensor Circuit Low Voltage (Bank 1 Sensor 2)	<Ref. to GD(H6DO)-72, DTC P0137 O2 SENSOR CIRCUIT LOW VOLTAGE (BANK 1 SENSOR 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0138	O2 Sensor Circuit High Voltage (Bank 1 Sensor 2)	<Ref. to GD(H6DO)-74, DTC P0138 O2 SENSOR CIRCUIT HIGH VOLTAGE (BANK 1 SENSOR 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P013A	O2 Sensor Slow Response - Rich to Lean (Bank 1 Sensor 2)	<Ref. to GD(H6DO)-75, DTC P013A O2 SENSOR SLOW RESPONSE - RICH TO LEAN (BANK 1 SENSOR 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P013B	O2 Sensor Slow Response - Lean to Rich (Bank 1 Sensor 2)	<Ref. to GD(H6DO)-77, DTC P013B O2 SENSOR SLOW RESPONSE - LEAN TO RICH (BANK 1 SENSOR 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P013C	O2 Sensor Slow Response - Rich to Lean (Bank 2 Sensor 2)	<Ref. to GD(H6DO)-79, DTC P013C O2 SENSOR SLOW RESPONSE - RICH TO LEAN (BANK 2 SENSOR 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>

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P013D	O2 Sensor Slow Response - Lean to Rich (Bank 2 Sensor 2)	<Ref. to GD(H6DO)-79, DTC P013D O2 SENSOR SLOW RESPONSE - LEAN TO RICH (BANK 2 SENSOR 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P013E	O2 Sensor Delayed Response - Rich to Lean (Bank 1 Sensor 2)	<Ref. to GD(H6DO)-80, DTC P013E O2 SENSOR DELAYED RESPONSE - RICH TO LEAN (BANK 1 SENSOR 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P013F	O2 Sensor Delayed Response - Lean to Rich (Bank 1 Sensor 2)	<Ref. to GD(H6DO)-82, DTC P013F O2 SENSOR DELAYED RESPONSE - LEAN TO RICH (BANK 1 SENSOR 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0140	O2 Sensor Circuit No Activity Detected (Bank1 Sensor2)	<Ref. to GD(H6DO)-84, DTC P0140 O2 SENSOR CIRCUIT NO ACTIVITY DETECTED (BANK1 SENSOR2), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0141	O2 Sensor Heater Circuit (Bank1 Sensor2)	<Ref. to GD(H6DO)-86, DTC P0141 O2 SENSOR HEATER CIRCUIT (BANK1 SENSOR2), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P014A	O2 Sensor Delayed Response - Rich to Lean (Bank 2 Sensor 2)	<Ref. to GD(H6DO)-87, DTC P014A O2 SENSOR DELAYED RESPONSE - RICH TO LEAN (BANK 2 SENSOR 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P014B	O2 Sensor Delayed Response - Lean to Rich (Bank 2 Sensor 2)	<Ref. to GD(H6DO)-87, DTC P014B O2 SENSOR DELAYED RESPONSE - LEAN TO RICH (BANK 2 SENSOR 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P014C	O2 Sensor Slow Response - Rich to Lean (Bank 1 Sensor 1)	<Ref. to GD(H6DO)-88, DTC P014C O2 SENSOR SLOW RESPONSE - RICH TO LEAN (BANK 1 SENSOR 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P014D	O2 Sensor Slow Response - Lean to Rich (Bank 1 Sensor 1)	<Ref. to GD(H6DO)-90, DTC P014D O2 SENSOR SLOW RESPONSE - LEAN TO RICH (BANK 1 SENSOR 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P014E	O2 Sensor Slow Response - Rich to Lean (Bank 2 Sensor 1)	<Ref. to GD(H6DO)-90, DTC P014E O2 SENSOR SLOW RESPONSE - RICH TO LEAN (BANK 2 SENSOR 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P014F	O2 Sensor Slow Response - Lean to Rich (Bank 2 Sensor 1)	<Ref. to GD(H6DO)-91, DTC P014F O2 SENSOR SLOW RESPONSE - LEAN TO RICH (BANK 2 SENSOR 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0151	O2 Sensor Circuit Low Voltage (Bank 2 Sensor 1)	<Ref. to GD(H6DO)-91, DTC P0151 O2 SENSOR CIRCUIT LOW VOLTAGE (BANK 2 SENSOR 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0152	O2 Sensor Circuit High Voltage (Bank 2 Sensor 1)	<Ref. to GD(H6DO)-91, DTC P0152 O2 SENSOR CIRCUIT HIGH VOLTAGE (BANK 2 SENSOR 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0154	O2 Sensor Circuit No Activity Detected (Bank 2 Sensor 1)	<Ref. to GD(H6DO)-91, DTC P0154 O2 SENSOR CIRCUIT NO ACTIVITY DETECTED (BANK 2 SENSOR 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0157	O2 Sensor Circuit Low Voltage (Bank 2 Sensor 2)	<Ref. to GD(H6DO)-91, DTC P0157 O2 SENSOR CIRCUIT LOW VOLTAGE (BANK 2 SENSOR 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0158	O2 Sensor Circuit High Voltage (Bank 2 Sensor 2)	<Ref. to GD(H6DO)-91, DTC P0158 O2 SENSOR CIRCUIT HIGH VOLTAGE (BANK 2 SENSOR 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P015A	O2 Sensor Delayed Response - Rich to Lean (Bank 1 Sensor 1)	<Ref. to GD(H6DO)-92, DTC P015A O2 SENSOR DELAYED RESPONSE - RICH TO LEAN (BANK 1 SENSOR 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P015B	O2 Sensor Delayed Response - Lean to Rich (Bank 1 Sensor 1)	<Ref. to GD(H6DO)-95, DTC P015B O2 SENSOR DELAYED RESPONSE - LEAN TO RICH (BANK 1 SENSOR 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P015C	O2 Sensor Delayed Response - Rich to Lean (Bank 2 Sensor 1)	<Ref. to GD(H6DO)-95, DTC P015C O2 SENSOR DELAYED RESPONSE - RICH TO LEAN (BANK 2 SENSOR 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P015D	O2 Sensor Delayed Response - Lean to Rich (Bank 2 Sensor 1)	<Ref. to GD(H6DO)-95, DTC P015D O2 SENSOR DELAYED RESPONSE - LEAN TO RICH (BANK 2 SENSOR 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

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P0160	O2 Sensor Circuit No Activity Detected (Bank2 Sensor2)	<Ref. to GD(H6DO)-95, DTC P0160 O2 SENSOR CIRCUIT NO ACTIVITY DETECTED (BANK2 SENSOR2), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0161	O2 Sensor Heater Circuit (Bank2 Sensor2)	<Ref. to GD(H6DO)-95, DTC P0161 O2 SENSOR HEATER CIRCUIT (BANK2 SENSOR2), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0171	System Too Lean (Bank 1)	<Ref. to GD(H6DO)-96, DTC P0171 SYSTEM TOO LEAN (BANK 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0172	System Too Rich (Bank 1)	<Ref. to GD(H6DO)-97, DTC P0172 SYSTEM TOO RICH (BANK 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0174	System Too Lean (Bank 2)	<Ref. to GD(H6DO)-98, DTC P0174 SYSTEM TOO LEAN (BANK 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0175	System Too Rich (Bank 2)	<Ref. to GD(H6DO)-98, DTC P0175 SYSTEM TOO RICH (BANK 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0181	Fuel Temperature Sensor "A" Circuit Range/Performance	<Ref. to GD(H6DO)-99, DTC P0181 FUEL TEMPERATURE SENSOR "A" CIRCUIT RANGE/PERFORMANCE, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0182	Fuel Temperature Sensor "A" Circuit Low Input	<Ref. to GD(H6DO)-102, DTC P0182 FUEL TEMPERATURE SENSOR "A" CIRCUIT LOW INPUT, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0183	Fuel Temperature Sensor "A" Circuit High Input	<Ref. to GD(H6DO)-104, DTC P0183 FUEL TEMPERATURE SENSOR "A" CIRCUIT HIGH INPUT, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0196	Engine Oil Temperature Sensor Circuit Range/Performance	<Ref. to GD(H6DO)-106, DTC P0196 ENGINE OIL TEMPERATURE SENSOR CIRCUIT RANGE/PERFORMANCE, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0197	Engine Oil Temperature Sensor Low	<Ref. to GD(H6DO)-108, DTC P0197 ENGINE OIL TEMPERATURE SENSOR LOW, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0198	Engine Oil Temperature Sensor High	<Ref. to GD(H6DO)-109, DTC P0198 ENGINE OIL TEMPERATURE SENSOR HIGH, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0201	Injector #1	<Ref. to GD(H6DO)-110, DTC P0201 INJECTOR #1, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0202	Injector #2	<Ref. to GD(H6DO)-111, DTC P0202 INJECTOR #2, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0203	Injector #3	<Ref. to GD(H6DO)-111, DTC P0203 INJECTOR #3, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0204	Injector #4	<Ref. to GD(H6DO)-111, DTC P0204 INJECTOR #4, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0205	Injector #5	<Ref. to GD(H6DO)-111, DTC P0205 INJECTOR #5, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0206	Injector #6	<Ref. to GD(H6DO)-111, DTC P0206 INJECTOR #6, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0222	Throttle/Pedal Position Sensor/Switch "B" Circuit Low	<Ref. to GD(H6DO)-112, DTC P0222 THROTTLE/PEDAL POSITION SENSOR/SWITCH "B" CIRCUIT LOW, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0223	Throttle/Pedal Position Sensor/Switch "B" Circuit High	<Ref. to GD(H6DO)-114, DTC P0223 THROTTLE/PEDAL POSITION SENSOR/SWITCH "B" CIRCUIT HIGH, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0230	Fuel Pump Primary Circuit	<Ref. to GD(H6DO)-116, DTC P0230 FUEL PUMP PRIMARY CIRCUIT, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0301	Cylinder 1 Misfire Detected	<Ref. to GD(H6DO)-118, DTC P0301 CYLINDER 1 MISFIRE DETECTED, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0302	Cylinder 2 Misfire Detected	<Ref. to GD(H6DO)-125, DTC P0302 CYLINDER 2 MISFIRE DETECTED, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0303	Cylinder 3 Misfire Detected	<Ref. to GD(H6DO)-125, DTC P0303 CYLINDER 3 MISFIRE DETECTED, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0304	Cylinder 4 Misfire Detected	<Ref. to GD(H6DO)-125, DTC P0304 CYLINDER 4 MISFIRE DETECTED, Diagnostic Trouble Code (DTC) Detecting Criteria.>

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P0305	Cylinder 5 Misfire Detected	<Ref. to GD(H6DO)-125, DTC P0305 CYLINDER 5 MISFIRE DETECTED, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0306	Cylinder 6 Misfire Detected	<Ref. to GD(H6DO)-125, DTC P0306 CYLINDER 6 MISFIRE DETECTED, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0327	Knock Sensor 1 Circuit Low (Bank 1 or Single Sensor)	<Ref. to GD(H6DO)-126, DTC P0327 KNOCK SENSOR 1 CIRCUIT LOW (BANK 1 OR SINGLE SENSOR), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0328	Knock Sensor 1 Circuit High (Bank 1 or Single Sensor)	<Ref. to GD(H6DO)-128, DTC P0328 KNOCK SENSOR 1 CIRCUIT HIGH (BANK 1 OR SINGLE SENSOR), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0332	Knock Sensor 2 Circuit Low (Bank 2)	<Ref. to GD(H6DO)-129, DTC P0332 KNOCK SENSOR 2 CIRCUIT LOW (BANK 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0333	Knock Sensor 2 Circuit High (Bank 2)	<Ref. to GD(H6DO)-129, DTC P0333 KNOCK SENSOR 2 CIRCUIT HIGH (BANK 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0335	Crankshaft Position Sensor "A" Circuit	<Ref. to GD(H6DO)-130, DTC P0335 CRANKSHAFT POSITION SENSOR "A" CIRCUIT, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0336	Crankshaft Position Sensor "A" Circuit Range/Performance	<Ref. to GD(H6DO)-132, DTC P0336 CRANKSHAFT POSITION SENSOR "A" CIRCUIT RANGE/PERFORMANCE, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0340	Camshaft Position Sensor "A" Circuit (Bank 1 or Single Sensor)	<Ref. to GD(H6DO)-134, DTC P0340 CAMSHAFT POSITION SENSOR "A" CIRCUIT (BANK 1 OR SINGLE SENSOR), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0345	Camshaft Position Sensor "A" Circuit (Bank 2)	<Ref. to GD(H6DO)-135, DTC P0345 CAMSHAFT POSITION SENSOR "A" CIRCUIT (BANK 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0351	Ignition Coil A Primary/Secondary Circuit	<Ref. to GD(H6DO)-136, DTC P0351 IGNITION COIL A PRIMARY/SECONDARY CIRCUIT, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0352	Ignition Coil B Primary/Secondary Circuit	<Ref. to GD(H6DO)-137, DTC P0352 IGNITION COIL B PRIMARY/SECONDARY CIRCUIT, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0353	Ignition Coil C Primary/Secondary Circuit	<Ref. to GD(H6DO)-137, DTC P0353 IGNITION COIL C PRIMARY/SECONDARY CIRCUIT, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0354	Ignition Coil D Primary/Secondary Circuit	<Ref. to GD(H6DO)-137, DTC P0354 IGNITION COIL D PRIMARY/SECONDARY CIRCUIT, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0355	Ignition Coil E Primary/Secondary Circuit	<Ref. to GD(H6DO)-137, DTC P0355 IGNITION COIL E PRIMARY/SECONDARY CIRCUIT, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0356	Ignition Coil F Primary/Secondary Circuit	<Ref. to GD(H6DO)-137, DTC P0356 IGNITION COIL F PRIMARY/SECONDARY CIRCUIT, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0365	Camshaft Position Sensor "B" Circuit (Bank 1)	<Ref. to GD(H6DO)-138, DTC P0365 CAMSHAFT POSITION SENSOR "B" CIRCUIT (BANK 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0390	Camshaft Position Sensor "B" Circuit (Bank 2)	<Ref. to GD(H6DO)-139, DTC P0390 CAMSHAFT POSITION SENSOR "B" CIRCUIT (BANK 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0400	Exhaust Gas Recirculation Flow	<Ref. to GD(H6DO)-140, DTC P0400 EXHAUST GAS RECIRCULATION FLOW, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0420	Catalyst System Efficiency Below Threshold (Bank 1)	<Ref. to GD(H6DO)-143, DTC P0420 CATALYST SYSTEM EFFICIENCY BELOW THRESHOLD (BANK 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0442	Evaporative Emission Control System Leak Detected (Small Leak)	<Ref. to GD(H6DO)-145, DTC P0442 EVAPORATIVE EMISSION CONTROL SYSTEM LEAK DETECTED (SMALL LEAK), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0447	Evaporative Emission Control System Vent Control Circuit Open	<Ref. to GD(H6DO)-161, DTC P0447 EVAPORATIVE EMISSION CONTROL SYSTEM VENT CONTROL CIRCUIT OPEN, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0448	Evaporative Emission Control System Vent Control Circuit Shorted	<Ref. to GD(H6DO)-163, DTC P0448 EVAPORATIVE EMISSION CONTROL SYSTEM VENT CONTROL CIRCUIT SHORTED, Diagnostic Trouble Code (DTC) Detecting Criteria.>

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P0451	Evaporative Emission Control System Pressure Sensor	<Ref. to GD(H6DO)-165, DTC P0451 EVAPORATIVE EMISSION CONTROL SYSTEM PRESSURE SENSOR, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0452	Evaporative Emission Control System Pressure Sensor Low Input	<Ref. to GD(H6DO)-168, DTC P0452 EVAPORATIVE EMISSION CONTROL SYSTEM PRESSURE SENSOR LOW INPUT, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0453	Evaporative Emission Control System Pressure Sensor High Input	<Ref. to GD(H6DO)-170, DTC P0453 EVAPORATIVE EMISSION CONTROL SYSTEM PRESSURE SENSOR HIGH INPUT, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0456	Evaporative Emission Control System Leak Detected (Very Small Leak)	<Ref. to GD(H6DO)-171, DTC P0456 EVAPORATIVE EMISSION CONTROL SYSTEM LEAK DETECTED (VERY SMALL LEAK), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0457	Evaporative Emission Control System Leak Detected (Fuel Cap Loose/Off)	<Ref. to GD(H6DO)-171, DTC P0457 EVAPORATIVE EMISSION CONTROL SYSTEM LEAK DETECTED (FUEL CAP LOOSE/OFF), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0458	Evaporative Emission System Purge Control Valve Circuit Low	<Ref. to GD(H6DO)-172, DTC P0458 EVAPORATIVE EMISSION SYSTEM PURGE CONTROL VALVE CIRCUIT LOW, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0459	Evaporative Emission System Purge Control Valve Circuit High	<Ref. to GD(H6DO)-174, DTC P0459 EVAPORATIVE EMISSION SYSTEM PURGE CONTROL VALVE CIRCUIT HIGH, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0461	Fuel Level Sensor "A" Circuit Range/Performance	<Ref. to GD(H6DO)-176, DTC P0461 FUEL LEVEL SENSOR "A" CIRCUIT RANGE/PERFORMANCE, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0462	Fuel Level Sensor "A" Circuit Low	<Ref. to GD(H6DO)-178, DTC P0462 FUEL LEVEL SENSOR "A" CIRCUIT LOW, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0463	Fuel Level Sensor "A" Circuit High	<Ref. to GD(H6DO)-180, DTC P0463 FUEL LEVEL SENSOR "A" CIRCUIT HIGH, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0464	Fuel Level Sensor Circuit Intermittent	<Ref. to GD(H6DO)-182, DTC P0464 FUEL LEVEL SENSOR CIRCUIT INTERMITTENT, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0500	Vehicle Speed Sensor "A"	<Ref. to GD(H6DO)-185, DTC P0500 VEHICLE SPEED SENSOR "A", Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0506	Idle Air Control System RPM Lower Than Expected	<Ref. to GD(H6DO)-186, DTC P0506 IDLE AIR CONTROL SYSTEM RPM LOWER THAN EXPECTED, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0507	Idle Air Control System RPM Higher Than Expected	<Ref. to GD(H6DO)-187, DTC P0507 IDLE AIR CONTROL SYSTEM RPM HIGHER THAN EXPECTED, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P050A	Cold Start Idle Air Control System Performance	<Ref. to GD(H6DO)-188, DTC P050A COLD START IDLE AIR CONTROL SYSTEM PERFORMANCE, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P050B	Cold Start Ignition Timing Performance	<Ref. to GD(H6DO)-191, DTC P050B COLD START IGNITION TIMING PERFORMANCE, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0512	Starter Request Circuit	<Ref. to GD(H6DO)-192, DTC P0512 STARTER REQUEST CIRCUIT, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0513	Incorrect Immobilizer Key	<Ref. to GD(H6DO)-193, DTC P0513 INCORRECT IMMOBILIZER KEY, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0604	Internal Control Module Random Access Memory (RAM) Error	<Ref. to GD(H6DO)-194, DTC P0604 INTERNAL CONTROL MODULE RANDOM ACCESS MEMORY (RAM) ERROR, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0605	Internal Control Module Read Only Memory (ROM) Error	<Ref. to GD(H6DO)-195, DTC P0605 INTERNAL CONTROL MODULE READ ONLY MEMORY (ROM) ERROR, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0607	Throttle Control System Circuit Range/Performance	<Ref. to GD(H6DO)-196, DTC P0607 THROTTLE CONTROL SYSTEM CIRCUIT RANGE/PERFORMANCE, Diagnostic Trouble Code (DTC) Detecting Criteria.>

## List of Diagnostic Trouble Code (DTC)

### GENERAL DESCRIPTION

DTC	Item	Index
P0638	Throttle Actuator Control Range/Performance (Bank 1)	<Ref. to GD(H6DO)-198, DTC P0638 THROTTLE ACTUATOR CONTROL RANGE/PERFORMANCE (BANK 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0700	Transmission Control System (MIL Request)	<Ref. to GD(H6DO)-200, DTC P0700 TRANSMISSION CONTROL SYSTEM (MIL REQUEST), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P1152	O2 Sensor Circuit Range/Performance (Low) (Bank1 Sensor1)	<Ref. to GD(H6DO)-201, DTC P1152 O2 SENSOR CIRCUIT RANGE/PERFORMANCE (LOW) (BANK1 SENSOR1), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P1153	O2 Sensor Circuit Range/Performance (High) (Bank1 Sensor1)	<Ref. to GD(H6DO)-203, DTC P1153 O2 SENSOR CIRCUIT RANGE/PERFORMANCE (HIGH) (BANK1 SENSOR1), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P1154	O2 Sensor Circuit Range/Performance (Low) (Bank 2 Sensor 1)	<Ref. to GD(H6DO)-205, DTC P1154 O2 SENSOR CIRCUIT RANGE/PERFORMANCE (LOW) (BANK 2 SENSOR 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P1155	O2 Sensor Circuit Range/Performance (High) (Bank 2 Sensor 1)	<Ref. to GD(H6DO)-205, DTC P1155 O2 SENSOR CIRCUIT RANGE/PERFORMANCE (HIGH) (BANK 2 SENSOR 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P1160	Return Spring Failure	<Ref. to GD(H6DO)-206, DTC P1160 RETURN SPRING FAILURE, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P1443	Vent Control Solenoid Valve Function Problem	<Ref. to GD(H6DO)-208, DTC P1443 VENT CONTROL SOLENOID VALVE FUNCTION PROBLEM, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P1492	EGR Solenoid Valve Signal #1 Circuit Malfunction (Low Input)	<Ref. to GD(H6DO)-210, DTC P1492 EGR SOLENOID VALVE SIGNAL #1 CIRCUIT MALFUNCTION (LOW INPUT), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P1493	EGR Solenoid Valve Signal #1 Circuit Malfunction (High Input)	<Ref. to GD(H6DO)-212, DTC P1493 EGR SOLENOID VALVE SIGNAL #1 CIRCUIT MALFUNCTION (HIGH INPUT), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P1494	EGR Solenoid Valve Signal #2 Circuit Malfunction (Low Input)	<Ref. to GD(H6DO)-214, DTC P1494 EGR SOLENOID VALVE SIGNAL #2 CIRCUIT MALFUNCTION (LOW INPUT), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P1495	EGR Solenoid Valve Signal #2 Circuit Malfunction (High Input)	<Ref. to GD(H6DO)-214, DTC P1495 EGR SOLENOID VALVE SIGNAL #2 CIRCUIT MALFUNCTION (HIGH INPUT), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P1496	EGR Solenoid Valve Signal #3 Circuit Malfunction (Low Input)	<Ref. to GD(H6DO)-214, DTC P1496 EGR SOLENOID VALVE SIGNAL #3 CIRCUIT MALFUNCTION (LOW INPUT), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P1497	EGR Solenoid Valve Signal #3 Circuit Malfunction (High Input)	<Ref. to GD(H6DO)-214, DTC P1497 EGR SOLENOID VALVE SIGNAL #3 CIRCUIT MALFUNCTION (HIGH INPUT), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P1498	EGR Solenoid Valve Signal #4 Circuit Malfunction (Low Input)	<Ref. to GD(H6DO)-214, DTC P1498 EGR SOLENOID VALVE SIGNAL #4 CIRCUIT MALFUNCTION (LOW INPUT), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P1499	EGR Solenoid Valve Signal #4 Circuit Malfunction (High Input)	<Ref. to GD(H6DO)-214, DTC P1499 EGR SOLENOID VALVE SIGNAL #4 CIRCUIT MALFUNCTION (HIGH INPUT), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P1518	Starter Switch Circuit Low Input	<Ref. to GD(H6DO)-215, DTC P1518 STARTER SWITCH CIRCUIT LOW INPUT, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P1560	Back-Up Voltage Circuit Malfunction	<Ref. to GD(H6DO)-216, DTC P1560 BACK-UP VOLTAGE CIRCUIT MALFUNCTION, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P1570	Antenna	<Ref. to GD(H6DO)-217, DTC P1570 ANTENNA, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P1571	Reference Code Incompatibility	<Ref. to GD(H6DO)-217, DTC P1571 REFERENCE CODE INCOMPATIBILITY, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P1572	IMM Circuit Failure (Except Antenna Circuit)	<Ref. to GD(H6DO)-217, DTC P1572 IMM CIRCUIT FAILURE (EXCEPT ANTENNA CIRCUIT), Diagnostic Trouble Code (DTC) Detecting Criteria.>

# List of Diagnostic Trouble Code (DTC)

## GENERAL DESCRIPTION

DTC	Item	Index
P1574	Key Communication Failure	<Ref. to GD(H6DO)-217, DTC P1574 KEY COMMUNICATION FAILURE, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P1576	EGI Control Module EEPROM	<Ref. to GD(H6DO)-217, DTC P1576 EGI CONTROL MODULE EEPROM, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P1577	IMM Control Module EEPROM	<Ref. to GD(H6DO)-217, DTC P1577 IMM CONTROL MODULE EEPROM, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P1578	Meter Failure	<Ref. to GD(H6DO)-217, DTC P1578 METER FAILURE, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P2088	Intake Camshaft Position Actuator Control Circuit Low (Bank 1)	<Ref. to GD(H6DO)-218, DTC P2088 INTAKE CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT LOW (BANK 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P2089	Intake Camshaft Position Actuator Control Circuit High (Bank 1)	<Ref. to GD(H6DO)-219, DTC P2089 INTAKE CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT HIGH (BANK 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P2090	Exhaust Camshaft Position Actuator Control Circuit Low (Bank 1)	<Ref. to GD(H6DO)-220, DTC P2090 EXHAUST CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT LOW (BANK 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P2091	Exhaust Camshaft Position Actuator Control Circuit High (Bank 1)	<Ref. to GD(H6DO)-221, DTC P2091 EXHAUST CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT HIGH (BANK 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P2092	Intake Camshaft Position Actuator Control Circuit Low (Bank 2)	<Ref. to GD(H6DO)-222, DTC P2092 INTAKE CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT LOW (BANK 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P2093	Intake Camshaft Position Actuator Control Circuit High (Bank 2)	<Ref. to GD(H6DO)-222, DTC P2093 INTAKE CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT HIGH (BANK 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P2094	Exhaust Camshaft Position Actuator Control Circuit Low (Bank 2)	<Ref. to GD(H6DO)-222, DTC P2094 EXHAUST CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT LOW (BANK 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P2095	Exhaust Camshaft Position Actuator Control Circuit High (Bank 2)	<Ref. to GD(H6DO)-222, DTC P2095 EXHAUST CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT HIGH (BANK 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P2096	Post Catalyst Fuel Trim System Too Lean (Bank 1)	<Ref. to GD(H6DO)-223, DTC P2096 POST CATALYST FUEL TRIM SYSTEM TOO LEAN (BANK 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P2097	Post Catalyst Fuel Trim System Too Rich (Bank 1)	<Ref. to GD(H6DO)-225, DTC P2097 POST CATALYST FUEL TRIM SYSTEM TOO RICH (BANK 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P2098	Post Catalyst Fuel Trim System Too Lean Bank 2	<Ref. to GD(H6DO)-226, DTC P2098 POST CATALYST FUEL TRIM SYSTEM TOO LEAN BANK 2, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P2099	Post Catalyst Fuel Trim System Too Rich Bank 2	<Ref. to GD(H6DO)-226, DTC P2099 POST CATALYST FUEL TRIM SYSTEM TOO RICH BANK 2, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P2101	Throttle Actuator Control Motor Circuit Range/Performance	<Ref. to GD(H6DO)-227, DTC P2101 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT RANGE/PERFORMANCE, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P2102	Throttle Actuator Control Motor Circuit Low	<Ref. to GD(H6DO)-229, DTC P2102 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT LOW, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P2103	Throttle Actuator Control Motor Circuit High	<Ref. to GD(H6DO)-231, DTC P2103 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT HIGH, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P2109	Throttle/Pedal Position Sensor "A" Minimum Stop Performance	<Ref. to GD(H6DO)-233, DTC P2109 THROTTLE/PEDAL POSITION SENSOR "A" MINIMUM STOP PERFORMANCE, Diagnostic Trouble Code (DTC) Detecting Criteria.>

## List of Diagnostic Trouble Code (DTC)

### GENERAL DESCRIPTION

DTC	Item	Index
P2122	Throttle/Pedal Position Sensor/Switch "D" Circuit Low Input	<Ref. to GD(H6DO)-235, DTC P2122 THROTTLE/PEDAL POSITION SENSOR/SWITCH "D" CIRCUIT LOW INPUT, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P2123	Throttle/Pedal Position Sensor/Switch "D" Circuit High Input	<Ref. to GD(H6DO)-237, DTC P2123 THROTTLE/PEDAL POSITION SENSOR/SWITCH "D" CIRCUIT HIGH INPUT, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P2127	Throttle/Pedal Position Sensor/Switch "E" Circuit Low Input	<Ref. to GD(H6DO)-239, DTC P2127 THROTTLE/PEDAL POSITION SENSOR/SWITCH "E" CIRCUIT LOW INPUT, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P2128	Throttle/Pedal Position Sensor/Switch "E" Circuit High Input	<Ref. to GD(H6DO)-241, DTC P2128 THROTTLE/PEDAL POSITION SENSOR/SWITCH "E" CIRCUIT HIGH INPUT, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P2135	Throttle/Pedal Position Sensor/Switch "A"/"B" Voltage Correlation	<Ref. to GD(H6DO)-243, DTC P2135 THROTTLE/PEDAL POSITION SENSOR/SWITCH "A"/"B" VOLTAGE CORRELATION, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P2138	Throttle/Pedal Position Sensor/Switch "D"/"E" Voltage Correlation	<Ref. to GD(H6DO)-245, DTC P2138 THROTTLE/PEDAL POSITION SENSOR/SWITCH "D"/"E" VOLTAGE CORRELATION, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P219A	Bank 1 Air-Fuel Ratio Imbalance	<Ref. to GD(H6DO)-247, DTC P219A BANK 1 AIR-FUEL RATIO IMBALANCE, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P219B	Bank 2 Air-Fuel Ratio Imbalance	<Ref. to GD(H6DO)-249, DTC P219B BANK 2 AIR-FUEL RATIO IMBALANCE, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P2227	Barometric Pressure Circuit Range/Performance	<Ref. to GD(H6DO)-250, DTC P2227 BAROMETRIC PRESSURE CIRCUIT RANGE/PERFORMANCE, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P2228	Barometric Pressure Circuit Low	<Ref. to GD(H6DO)-251, DTC P2228 BAROMETRIC PRESSURE CIRCUIT LOW, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P2229	Barometric Pressure Circuit High	<Ref. to GD(H6DO)-252, DTC P2229 BAROMETRIC PRESSURE CIRCUIT HIGH, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P2610	ECM/PCM Internal Engine Off Timer Performance	<Ref. to GD(H6DO)-253, DTC P2610 ECM/PCM INTERNAL ENGINE OFF TIMER PERFORMANCE, Diagnostic Trouble Code (DTC) Detecting Criteria.>
U0073	CAN Failure, Bus 'Off' Detection	<Ref. to GD(H6DO)-261, DTC U0073 CAN FAILURE, BUS 'OFF' DETECTION, Diagnostic Trouble Code (DTC) Detecting Criteria.>
U0101	CAN (TCU) Data Not Loaded	<Ref. to GD(H6DO)-262, DTC U0101 CAN (TCU) DATA NOT LOADED, Diagnostic Trouble Code (DTC) Detecting Criteria.>
U0122	CAN (VDC) Data Not Loaded	<Ref. to GD(H6DO)-263, DTC U0122 CAN (VDC) DATA NOT LOADED, Diagnostic Trouble Code (DTC) Detecting Criteria.>
U0140	CAN (BCU) Data Not Loaded	<Ref. to GD(H6DO)-263, DTC U0140 CAN (BCU) DATA NOT LOADED, Diagnostic Trouble Code (DTC) Detecting Criteria.>
U0402	CAN (TCU) Data Abnormal	<Ref. to GD(H6DO)-264, DTC U0402 CAN (TCU) DATA ABNORMAL, Diagnostic Trouble Code (DTC) Detecting Criteria.>
U0416	CAN (VDC) Data Abnormal	<Ref. to GD(H6DO)-265, DTC U0416 CAN (VDC) DATA ABNORMAL, Diagnostic Trouble Code (DTC) Detecting Criteria.>
U0422	CAN (BCU) Data Abnormal	<Ref. to GD(H6DO)-265, DTC U0422 CAN (BCU) DATA ABNORMAL, Diagnostic Trouble Code (DTC) Detecting Criteria.>



## 2. Diagnostic Trouble Code (DTC) Detecting Criteria

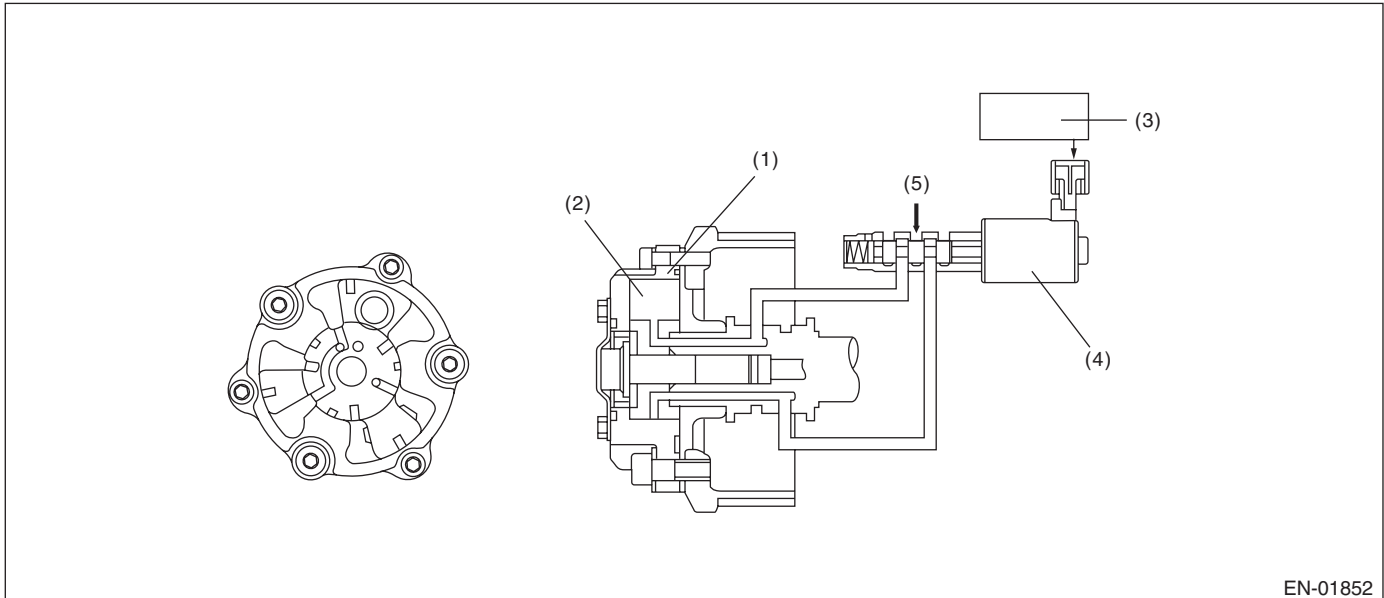
### A: DTC P0011 INTAKE CAMSHAFT POSITION - TIMING OVER-ADVANCED OR SYSTEM PERFORMANCE (BANK 1)

#### 1. OUTLINE OF DIAGNOSIS

Detect the AVCS system malfunction.

Judge as NG when the amount of AVCS actual timing advance does not approach to the amount of AVCS target timing advance.

#### 2. COMPONENT DESCRIPTION



EN-01852

- |                            |                                     |                  |
|----------------------------|-------------------------------------|------------------|
| (1) AVCS timing controller | (3) Engine control module (ECM)     | (5) Oil pressure |
| (2) Vane                   | (4) Oil flow control solenoid valve |                  |

#### 3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
Time of establishing all secondary parameter conditions	≥ 2000 ms
Battery voltage	≥ 10.9 V
Engine speed	≥ 1500 rpm
Engine coolant temperature	≥ 50 °C (122 °F)
AVCS control	Operation
Target timing advance change amount (per 64 ms)	< 1.07 °CA

#### 4. GENERAL DRIVING CYCLE

Perform the diagnosis continuously after warming up when the engine speed increases and AVCS operates.

# Diagnostic Trouble Code (DTC) Detecting Criteria

## GENERAL DESCRIPTION

---

### 5. DIAGNOSTIC METHOD

- 1) When the conditions during which the differences of AVCS target timing advance amount and AVCS actual timing advance amount is large continues for certain amount of time.
- 2) When the differences of target timing advance amount and actual timing advance amount is calculated during AVCS control, and the difference per predetermined time is the specified value or larger.

#### • Abnormality Judgment

Judge as NG when the following conditions are established within the predetermined time.

#### Judgment Value

Malfunction Criteria	Threshold Value
$\Sigma(\text{Target position} - \text{Actual position})$	> 15000 °CA (Bank 1) > 15000 °CA (Bank 2)
or	
$\Sigma(\text{Target position} - \text{Actual position})$	< -4800 °CA (Bank 1) < -4800 °CA (Bank 2)

**Time Needed for Diagnosis:** 60000 ms

**Malfunction Indicator Light Illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

#### • Normality Judgment

Judge as OK and clear the NG if the following conditions are established within the predetermined time.

#### Judgment Value

Malfunction Criteria	Threshold Value
$\Sigma(\text{Target position} - \text{Actual position})$	$\leq 15000$ °CA (Bank 1) $\leq 15000$ °CA (Bank 2) and $\geq -4800$ °CA (Bank 1) $\geq -4800$ °CA (Bank 2)

**Time Needed for Diagnosis:** 60000 ms

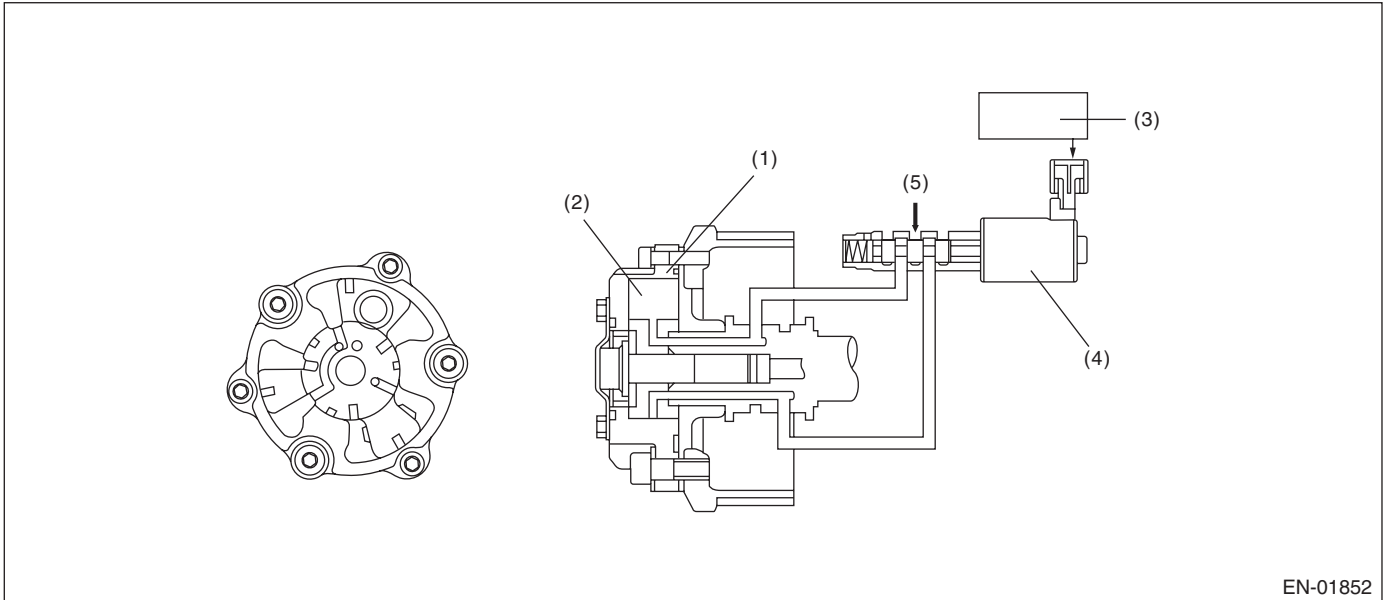
## B: DTC P0014 EXHAUST AVCS SYSTEM 1 (RANGE/PERFORMANCE)

### 1. OUTLINE OF DIAGNOSIS

Detect the exhaust AVCS system malfunction.

Judge as NG when the amount of exhaust AVCS actual timing advance does not approach to the amount of exhaust AVCS target timing advance.

### 2. COMPONENT DESCRIPTION



EN-01852

- |                                    |                                     |                  |
|------------------------------------|-------------------------------------|------------------|
| (1) Exhaust AVCS timing controller | (3) Engine control module (ECM)     | (5) Oil pressure |
| (2) Vane                           | (4) Oil flow control solenoid valve |                  |

### 3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
Time of establishing all secondary parameter conditions	≥ 2000 ms
Battery voltage	≥ 10.9 V
Engine speed	≥ 1500 rpm
Engine coolant temperature	≥ 50 °C (122 °F)
Exhaust AVCS control	Operation
Target timing advance change amount (per 64 ms)	< 1.07 °CA

### 4. GENERAL DRIVING CYCLE

Perform the diagnosis continuously after warming up when the engine speed increases and exhaust AVCS operates.

# Diagnostic Trouble Code (DTC) Detecting Criteria

## GENERAL DESCRIPTION

---

### 5. DIAGNOSTIC METHOD

- 1) When the conditions during which the differences of exhaust AVCS target timing advance amount and exhaust AVCS actual timing advance amount is large continues for certain amount of time.
- 2) When the differences of target timing advance amount and actual timing advance amount is calculated during exhaust AVCS control, and the difference per predetermined time is the specified value or larger.

#### • Abnormality Judgment

Judge as NG when the following conditions are established within the predetermined time.

#### Judgment Value

Malfunction Criteria	Threshold Value
$\Sigma(\text{Target position} - \text{Actual position})$	> 8000 °CA (bank 1) > 8000 °CA (bank 2)
or	
$\Sigma(\text{Target position} - \text{Actual position})$	< -4800 °CA (Bank 1) < -4800 °CA (Bank 2)

#### Time Needed for Diagnosis:

60000 ms

**Malfunction Indicator Light Illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

#### • Normality Judgment

Judge as OK and clear the NG if the following conditions are established within the predetermined time.

#### Judgment Value

Malfunction Criteria	Threshold Value
$\Sigma(\text{Target position} - \text{Actual position})$	$\leq 8000$ °CA (bank 1) $\leq 8000$ °CA (bank 2) and $\geq -4800$ °CA (Bank 1) $\geq -4800$ °CA (Bank 2)

**Time Needed for Diagnosis:** 60000 ms

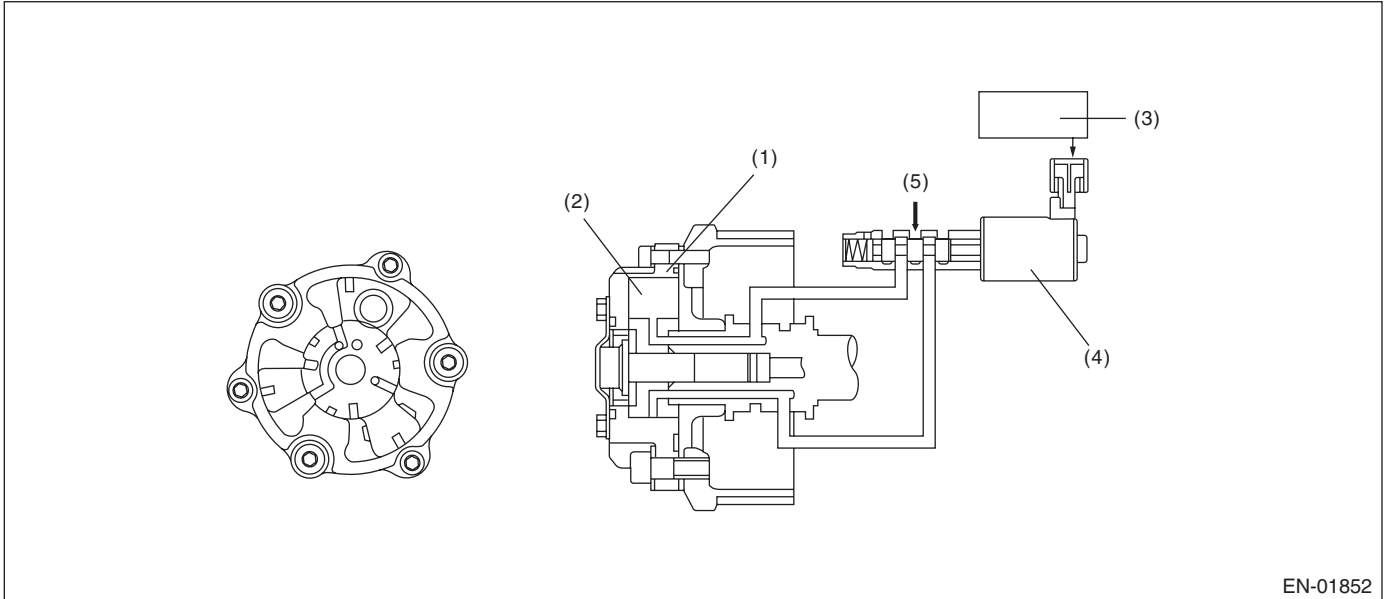
## C: DTC P0016 CRANKSHAFT POSITION - CAMSHAFT POSITION CORRELATION (BANK1)

### 1. OUTLINE OF DIAGNOSIS

Detect the AVCS system malfunction.

Judge as NG when standard timing advance amount is far from learning angle.

### 2. COMPONENT DESCRIPTION



EN-01852

(1) AVCS timing controller

(3) Engine control module (ECM)

(5) Oil pressure

(2) Vane

(4) Oil flow control solenoid valve

### 3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
Battery voltage	$\geq 10.9 \text{ V}$
Engine speed	$\geq 525 \text{ rpm}$ and $< 800 \text{ rpm}$
Engine coolant temperature	$\geq 75 \text{ }^\circ\text{C}$ (167 °F)
AVCS control	Not in operation
Target timing advance	0°CA

### 4. GENERAL DRIVING CYCLE

Perform the diagnosis continuously after warming up and while AVCS is not operating.

# Diagnostic Trouble Code (DTC) Detecting Criteria

## GENERAL DESCRIPTION

---

### 5. DIAGNOSTIC METHOD

Judge as NG when the absolute value of the difference between cam signal input position and learning value is out of specification.

#### • Abnormality Judgment

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

#### Judgment Value

Malfunction Criteria	Threshold Value
Crankshaft position when camshaft position sensor signal is input – Learning value	> 12 °CA

**Time Needed for Diagnosis:** 20000 ms

**Malfunction Indicator Light Illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

#### NOTE:

Initial standard learning value is the value of crank angle initially input at the production plant. And then it will be updated every time normal judgment has been completed. Learning value will not be updated if NG judgment occurs because timing belt or chain derails suddenly in process or because wrong assembly occurs during servicing.

#### • Normality Judgment

Judge as OK and clear the NG if the continuous time while the following conditions are established is more than the predetermined time.

#### Judgment Value

Malfunction Criteria	Threshold Value
Crankshaft position when camshaft position sensor signal is input – Learning value	≤ 12 °CA

**Time Needed for Diagnosis:** Less than 1 second

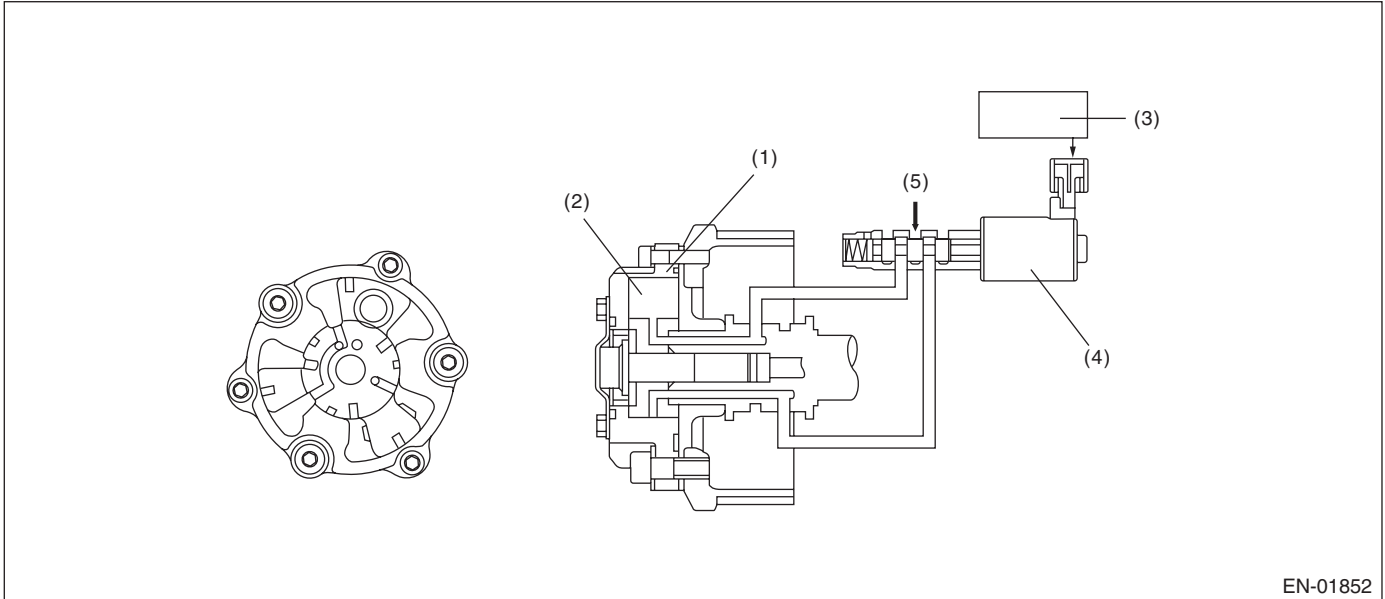
## D: DTC P0017 CRANK AND CAM TIMING B SYSTEM FAILURE (BANK 1)

### 1. OUTLINE OF DIAGNOSIS

Detect the exhaust AVCS system malfunction.

Judge as NG when standard timing advance amount is far from learning angle.

### 2. COMPONENT DESCRIPTION



EN-01852

- |                                    |                                     |                  |
|------------------------------------|-------------------------------------|------------------|
| (1) Exhaust AVCS timing controller | (3) Engine control module (ECM)     | (5) Oil pressure |
| (2) Vane                           | (4) Oil flow control solenoid valve |                  |

### 3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
Battery voltage	≥ 10.9 V
Engine speed	≥ 525 rpm and < 800 rpm
Engine coolant temperature	≥ 75 °C (167 °F)
Exhaust AVCS control	Not in operation
Target timing advance	0°CA

### 4. GENERAL DRIVING CYCLE

Perform the diagnosis continuously after warming up and while exhaust AVCS is not operating.

# Diagnostic Trouble Code (DTC) Detecting Criteria

## GENERAL DESCRIPTION

---

### 5. DIAGNOSTIC METHOD

Judge as NG when the absolute value of the difference between cam signal input position and learning value is out of specification.

#### • Abnormality Judgment

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

#### Judgment Value

Malfunction Criteria	Threshold Value
Crankshaft position when camshaft position sensor signal is input – Learning value	> 12 °CA

**Time Needed for Diagnosis:** 20000 ms

**Malfunction Indicator Light Illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

#### NOTE:

Initial standard learning value is the value of crank angle initially input at the production plant. And then it will be updated every time normal judgment has been completed. Learning value will not be updated if NG judgment occurs because timing belt or chain derails suddenly in process or because wrong assembly occurs during servicing.

#### • Normality Judgment

Judge as OK and clear the NG if the continuous time while the following conditions are established is more than the predetermined time.

#### Judgment Value

Malfunction Criteria	Threshold Value
Crankshaft position when camshaft position sensor signal is input – Learning value	≤ 12 °CA

**Time Needed for Diagnosis:** Less than 1 second



## **E: DTC P0018 CRANKSHAFT POSITION - CAMSHAFT POSITION CORRELATION (BANK2)**

### **1. OUTLINE OF DIAGNOSIS**

**NOTE:**

For the detection standard, refer to DTC P0016. <Ref. to GD(H6DO)-15, DTC P0016 CRANKSHAFT POSITION - CAMSHAFT POSITION CORRELATION (BANK1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

## **F: DTC P0019 CRANK AND CAM TIMING B SYSTEM FAILURE (BANK 2)**

### **1. OUTLINE OF DIAGNOSIS**

**NOTE:**

For the detection standard, refer to DTC P0017. <Ref. to GD(H6DO)-17, DTC P0017 CRANK AND CAM TIMING B SYSTEM FAILURE (BANK 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

## **G: DTC P0021 INTAKE CAMSHAFT POSITION - TIMING OVER-ADVANCED OR SYSTEM PERFORMANCE (BANK 2)**

### **1. OUTLINE OF DIAGNOSIS**

**NOTE:**

For the detection standard, refer to DTC P0011. <Ref. to GD(H6DO)-11, DTC P0011 INTAKE CAMSHAFT POSITION - TIMING OVER-ADVANCED OR SYSTEM PERFORMANCE (BANK 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

## **H: DTC P0024 EXHAUST AVCS SYSTEM 2 (RANGE/PERFORMANCE)**

### **1. OUTLINE OF DIAGNOSIS**

**NOTE:**

For the detection standard, refer to DTC P0014. <Ref. to GD(H6DO)-13, DTC P0014 EXHAUST AVCS SYSTEM 1 (RANGE/PERFORMANCE), Diagnostic Trouble Code (DTC) Detecting Criteria.>

# Diagnostic Trouble Code (DTC) Detecting Criteria

## GENERAL DESCRIPTION

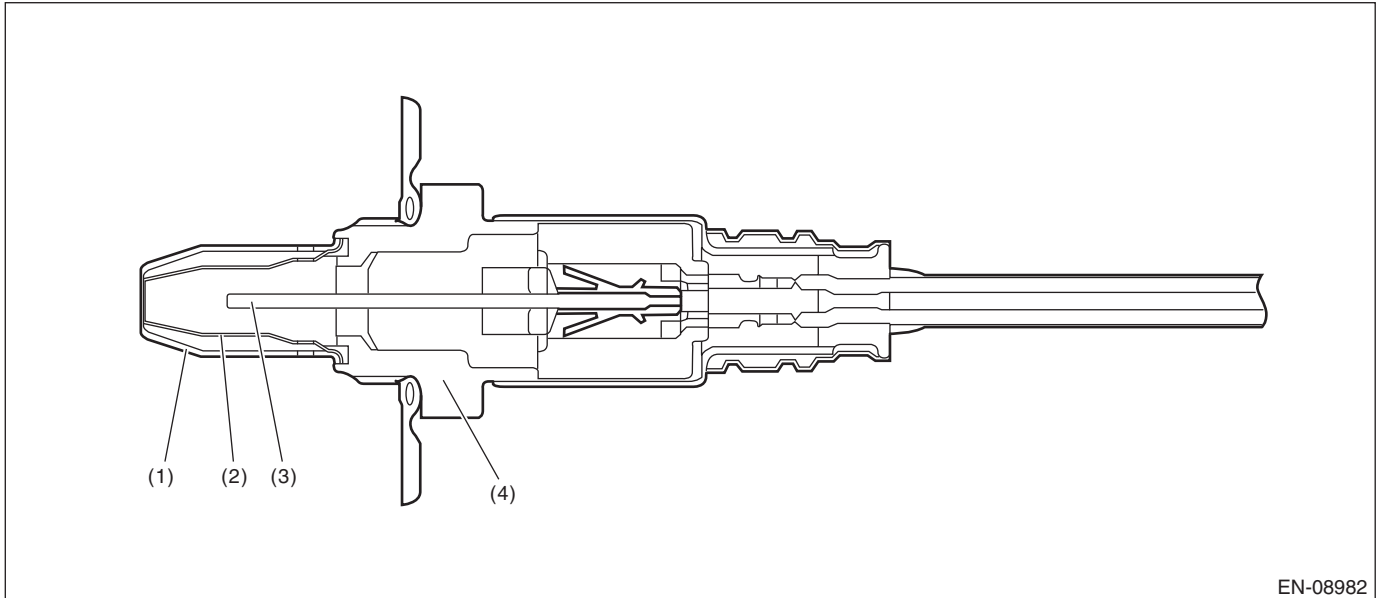
### I: DTC P0030 HO2S HEATER CONTROL CIRCUIT (BANK 1 SENSOR 1)

#### 1. OUTLINE OF DIAGNOSIS

Detect functional errors of the front oxygen (A/F) sensor heater.

Judge as NG when it is determined that the front oxygen (A/F) sensor impedance is large when looking at engine status such as deceleration fuel cut.

#### 2. COMPONENT DESCRIPTION



EN-08982

(1) Element cover (outer)

(3) Sensor element

(4) Sensor housing

(2) Element cover (inner)

#### 3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
Condition established time	$\geq 30000$ ms
Battery voltage	$\geq 10.9$ V
Heater current	Permitted
A/F sensor heater final control	Main energization status
After fuel cut	$\geq 20000$ ms

#### 4. GENERAL DRIVING CYCLE

Perform the diagnosis continuously after 30000 ms seconds or more have passed since the engine started.

# Diagnostic Trouble Code (DTC) Detecting Criteria

GENERAL DESCRIPTION

## 5. DIAGNOSTIC METHOD

### • Abnormality Judgment

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

#### Judgment Value

Malfunction Criteria	Threshold Value
Front oxygen (A/F) sensor impedance	> 50 $\Omega$

**Time Needed for Diagnosis:** 10000 ms

**Malfunction Indicator Light Illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

### • Normality Judgment

Judge as OK and clear the NG if the continuous time while the following conditions are established is more than the predetermined time.

#### Judgment Value

Malfunction Criteria	Threshold Value
Front oxygen (A/F) sensor impedance	$\leq$ 50 $\Omega$

**Time Needed for Diagnosis:** 10000 ms

# Diagnostic Trouble Code (DTC) Detecting Criteria

## GENERAL DESCRIPTION

### J: DTC P0031 HO2S HEATER CONTROL CIRCUIT LOW (BANK 1 SENSOR 1)

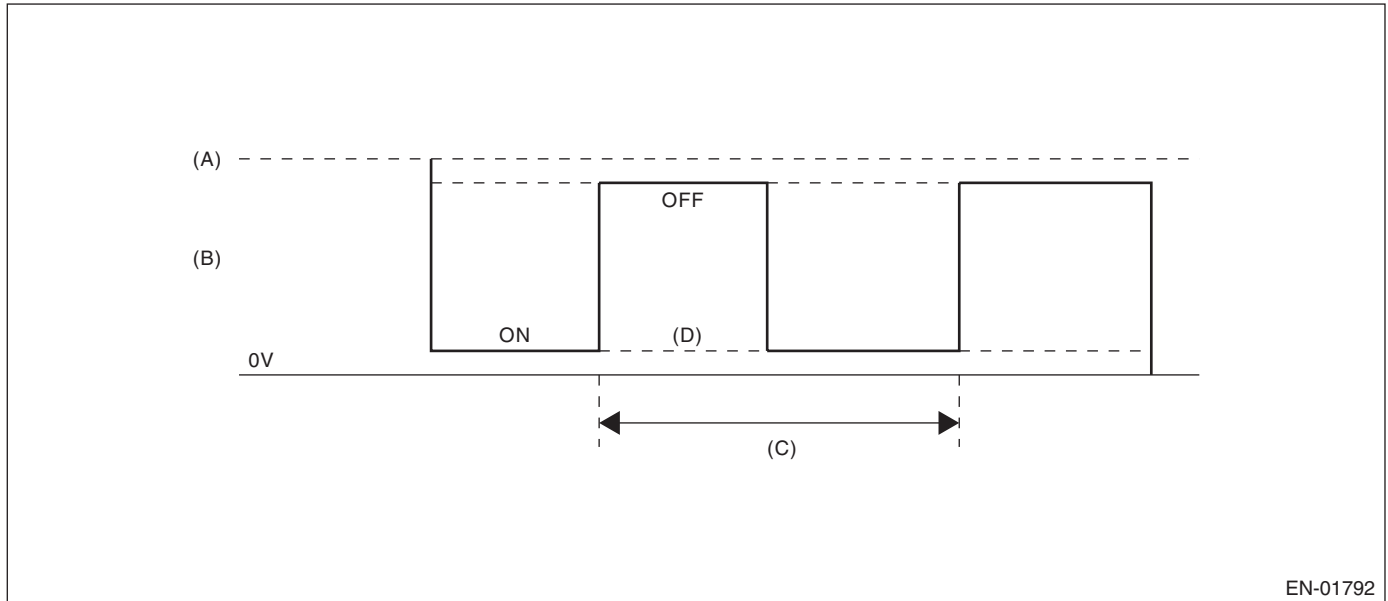
#### 1. OUTLINE OF DIAGNOSIS

Detect front oxygen (A/F) sensor heater open or short circuit.

The front oxygen (A/F) sensor heater performs duty control, and the output terminal voltage at ON is 0 V, and the output terminal voltage at OFF is the battery voltage.

Judge as NG when the terminal voltage remains Low.

#### 2. COMPONENT DESCRIPTION



(A) Battery voltage

(B) Front oxygen (A/F) sensor heater  
output voltage

(C) 128 ms

(D) Low error

#### 3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
Battery voltage	$\geq 10.9 \text{ V}$

#### 4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

# Diagnostic Trouble Code (DTC) Detecting Criteria

GENERAL DESCRIPTION

## 5. DIAGNOSTIC METHOD

### • Abnormality Judgment

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

#### Judgment Value

Malfunction Criteria	Threshold Value
Output voltage level	Low
Front oxygen (A/F) sensor heater control duty	< 87.5 %

**Time Needed for Diagnosis:** 4 ms × 250 time(s)

**Malfunction Indicator Light Illumination:** Illuminates as soon as a malfunction occurs.

### • Normality Judgment

Judge as OK and clear the NG if the continuous time while the following conditions are established is more than the predetermined time.

#### Judgment Value

Malfunction Criteria	Threshold Value
Output voltage level	High

**Time Needed for Diagnosis:** Less than 1 second

# Diagnostic Trouble Code (DTC) Detecting Criteria

## GENERAL DESCRIPTION

### K: DTC P0032 HO2S HEATER CONTROL CIRCUIT HIGH (BANK 1 SENSOR 1)

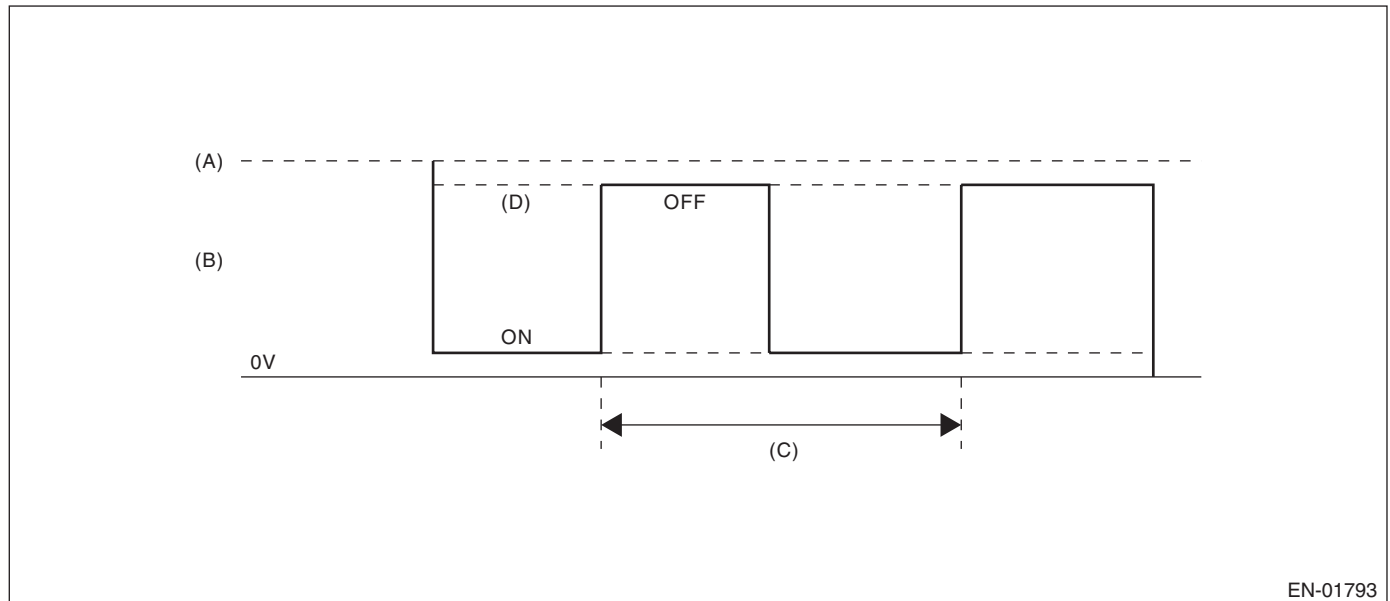
#### 1. OUTLINE OF DIAGNOSIS

Detect front oxygen (A/F) sensor heater open or short circuit.

The front oxygen (A/F) sensor heater performs duty control, and the output terminal voltage at ON is 0 V, and the output terminal voltage at OFF is the battery voltage.

Judge as NG when the terminal voltage remains High.

#### 2. COMPONENT DESCRIPTION



(A) Battery voltage

(B) Front oxygen (A/F) sensor heater  
output voltage

(C) 128 ms

(D) High error

#### 3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
Battery voltage	$\geq 10.9 \text{ V}$

#### 4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

# Diagnostic Trouble Code (DTC) Detecting Criteria

GENERAL DESCRIPTION

## 5. DIAGNOSTIC METHOD

### • Abnormality Judgment

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

#### Judgment Value

Malfunction Criteria	Threshold Value
Output voltage level	High
Front oxygen (A/F) sensor heater control duty	≥ 12.5 %

**Time Needed for Diagnosis:** 4 ms × 250 time(s)

**Malfunction Indicator Light Illumination:** Illuminates as soon as a malfunction occurs.

### • Normality Judgment

Judge as OK and clear the NG if the continuous time while the following conditions are established is more than the predetermined time.

#### Judgment Value

Malfunction Criteria	Threshold Value
Output voltage level	Low

**Time Needed for Diagnosis:** Less than 1 second

# Diagnostic Trouble Code (DTC) Detecting Criteria

## GENERAL DESCRIPTION

### L: DTC P0037 HO2S HEATER CONTROL CIRCUIT LOW (BANK 1 SENSOR 2)

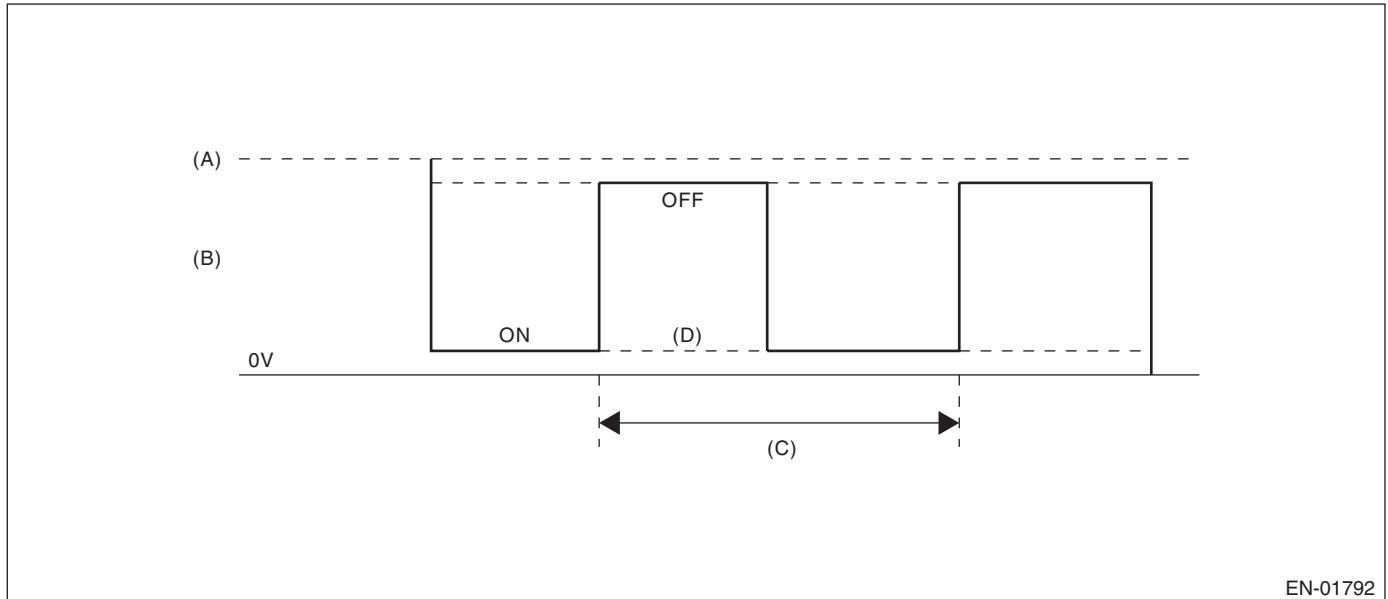
#### 1. OUTLINE OF DIAGNOSIS

Detect the rear oxygen sensor heater open or short circuit.

The rear oxygen sensor heater performs duty control, and the output terminal voltage at ON is 0 V, and the output terminal voltage at OFF is the battery voltage.

Judge as NG when the terminal voltage remains Low.

#### 2. COMPONENT DESCRIPTION



(A) Battery voltage

(B) Output voltage of the rear oxygen sensor heater

(C) 256 ms (cycles)

(D) Low error

#### 3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
Battery voltage	$\geq 10.9 \text{ V}$
Elapsed time after starting the engine	$\geq 1 \text{ s}$
Engine speed	$< 4500 \text{ rpm}$

#### 4. GENERAL DRIVING CYCLE

After starting the engine, perform the diagnosis continuously when engine is low speed.



# Diagnostic Trouble Code (DTC) Detecting Criteria

GENERAL DESCRIPTION

## 5. DIAGNOSTIC METHOD

### • Abnormality Judgment

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

#### Judgment Value

Malfunction Criteria	Threshold Value
Output voltage level	Low
Rear oxygen sensor heater control duty	< 75 %

**Time Needed for Diagnosis:** 8 ms × 1250 time(s)

**Malfunction Indicator Light Illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

### • Normality Judgment

Judge as OK and clear the NG if the continuous time while the following conditions are established is more than the predetermined time.

#### Judgment Value

Malfunction Criteria	Threshold Value
Output voltage level	High

**Time Needed for Diagnosis:** Less than 1 second

# Diagnostic Trouble Code (DTC) Detecting Criteria

## GENERAL DESCRIPTION

### M: DTC P0038 HO2S HEATER CONTROL CIRCUIT HIGH (BANK 1 SENSOR 2)

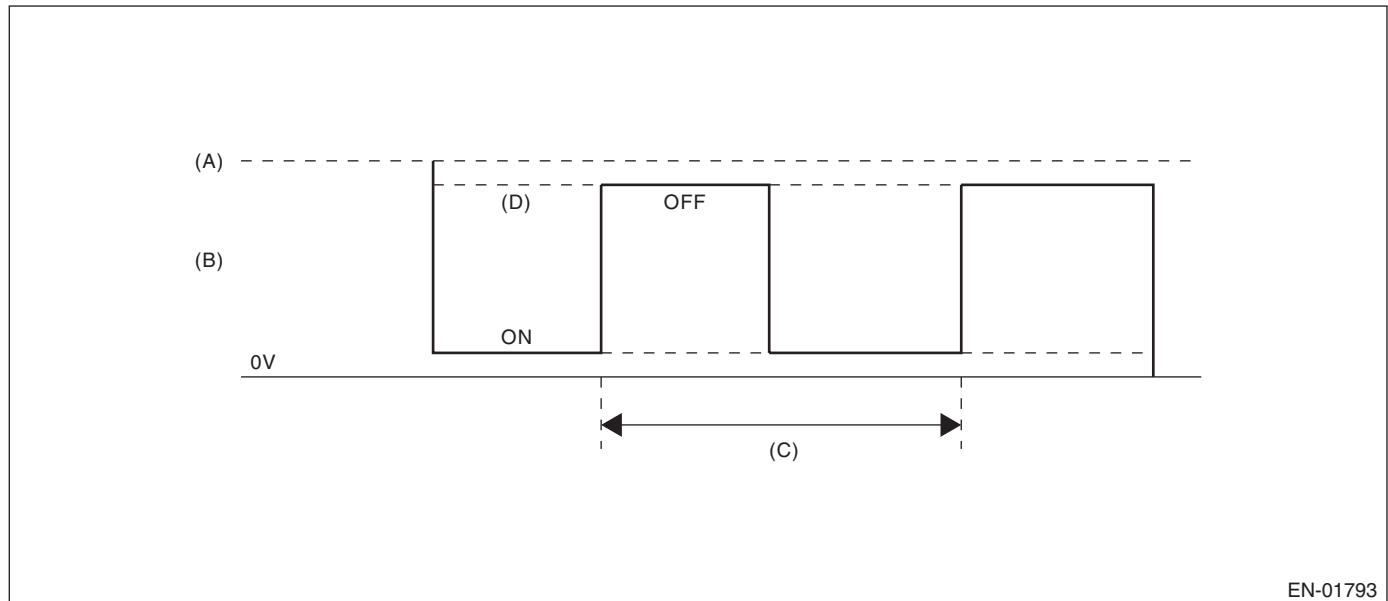
#### 1. OUTLINE OF DIAGNOSIS

Detect the rear oxygen sensor heater open or short circuit.

The rear oxygen sensor heater performs duty control, and the output terminal voltage at ON is 0 V, and the output terminal voltage at OFF is the battery voltage.

Judge as NG when the terminal voltage remains High.

#### 2. COMPONENT DESCRIPTION



EN-01793

(A) Battery voltage

(B) Output voltage of the rear oxygen sensor heater

(C) 256 ms (cycles)

(D) High error

#### 3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
Battery voltage	$\geq 10.9$ V
Elapsed time after starting the engine	$\geq 1$ s
Engine speed	$< 4500$ rpm

#### 4. GENERAL DRIVING CYCLE

After starting the engine, perform the diagnosis continuously when engine is low speed.

# Diagnostic Trouble Code (DTC) Detecting Criteria

GENERAL DESCRIPTION

## 5. DIAGNOSTIC METHOD

### • Abnormality Judgment

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

#### Judgment Value

Malfunction Criteria	Threshold Value
Output voltage level	High
Rear oxygen sensor heater control duty	≥ 15 %

**Time Needed for Diagnosis:** 8 ms × 1250 time(s)

**Malfunction Indicator Light Illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

### • Normality Judgment

Judge as OK and clear the NG if the continuous time while the following conditions are established is more than the predetermined time.

#### Judgment Value

Malfunction Criteria	Threshold Value
Output voltage level	Low

**Time Needed for Diagnosis:** Less than 1 second

## Diagnostic Trouble Code (DTC) Detecting Criteria

### GENERAL DESCRIPTION

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#### **N: DTC P0050 HO2S HEATER CONTROL CIRCUIT (BANK 2 SENSOR 1)**

##### **1. OUTLINE OF DIAGNOSIS**

###### NOTE:

For the detection standard, refer to DTC P0030. <Ref. to GD(H6DO)-20, DTC P0030 HO2S HEATER CONTROL CIRCUIT (BANK 1 SENSOR 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

#### **O: DTC P0051 HO2S HEATER CONTROL CIRCUIT LOW (BANK 2 SENSOR 1)**

##### **1. OUTLINE OF DIAGNOSIS**

###### NOTE:

For the detection standard, refer to DTC P0031. <Ref. to GD(H6DO)-22, DTC P0031 HO2S HEATER CONTROL CIRCUIT LOW (BANK 1 SENSOR 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

#### **P: DTC P0052 HO2S HEATER CONTROL CIRCUIT HIGH (BANK 2 SENSOR 1)**

##### **1. OUTLINE OF DIAGNOSIS**

###### NOTE:

For the detection standard, refer to DTC P0032. <Ref. to GD(H6DO)-24, DTC P0032 HO2S HEATER CONTROL CIRCUIT HIGH (BANK 1 SENSOR 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

#### **Q: DTC P0057 HO2S HEATER CONTROL CIRCUIT LOW (BANK 2 SENSOR 2)**

##### **1. OUTLINE OF DIAGNOSIS**

###### NOTE:

For the detection standard, refer to DTC P0037. <Ref. to GD(H6DO)-26, DTC P0037 HO2S HEATER CONTROL CIRCUIT LOW (BANK 1 SENSOR 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>

#### **R: DTC P0058 HO2S HEATER CONTROL CIRCUIT HIGH (BANK 2 SENSOR 2)**

##### **1. OUTLINE OF DIAGNOSIS**

###### NOTE:

For the detection standard, refer to DTC P0038. <Ref. to GD(H6DO)-28, DTC P0038 HO2S HEATER CONTROL CIRCUIT HIGH (BANK 1 SENSOR 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>

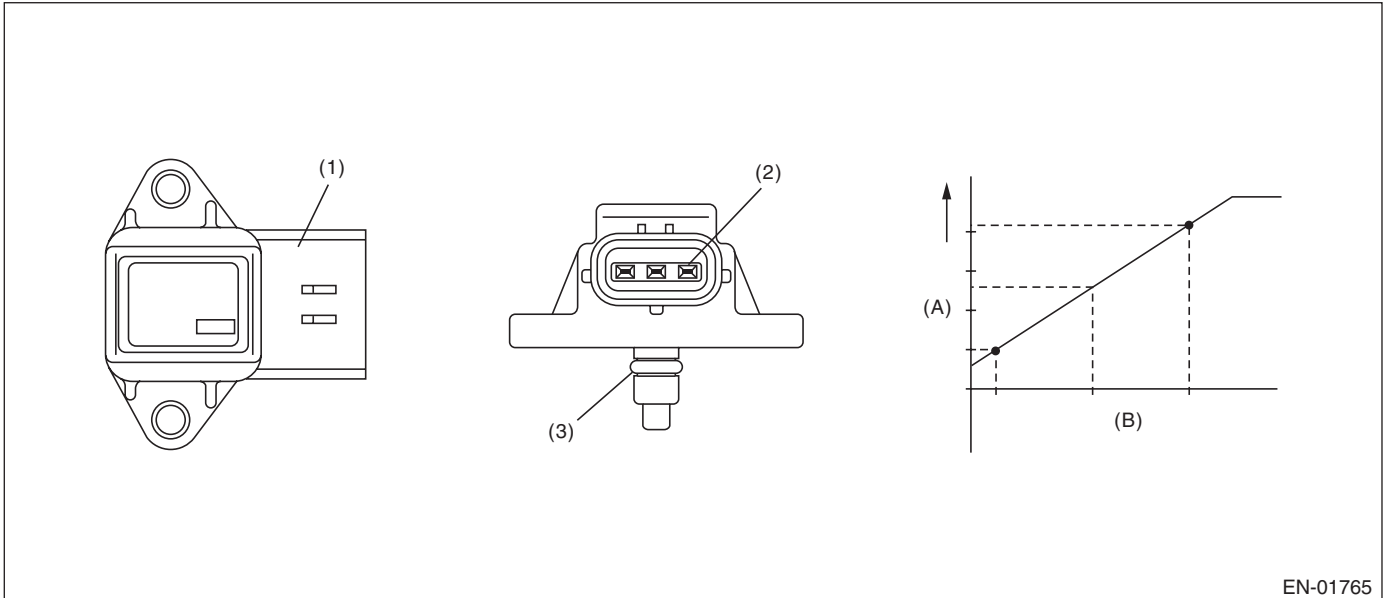
## S: DTC P0068 MAP/MAF - THROTTLE POSITION CORRELATION

### 1. OUTLINE OF DIAGNOSIS

Detect problems in the intake manifold pressure sensor output properties.

Judge as NG when the intake air pressure AD value is Low whereas it seemed to be High from the viewpoint of engine condition, or when it is High whereas it seemed to be Low from the engine condition.

### 2. COMPONENT DESCRIPTION



EN-01765

(A) Output voltage

(B) Absolute pressure

(1) Connector

(2) Terminals

(3) O-ring

### 3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
Engine coolant temperature	$\geq 75\text{ }^{\circ}\text{C}$ (167 $^{\circ}\text{F}$ )

### 4. GENERAL DRIVING CYCLE

Perform the diagnosis continuously after idling.

# Diagnostic Trouble Code (DTC) Detecting Criteria

## GENERAL DESCRIPTION

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### 5. DIAGNOSTIC METHOD

#### • Abnormality Judgment

Judge as NG when Low side or High side becomes NG.

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

#### Judgment Value

Malfunction Criteria	Threshold Value
<b>Low</b>	
Engine speed	< 2700 rpm
Throttle position	$\geq 15^\circ$
Output voltage	< 1.8 V
Engine load	> 1 g/rev (0.04 oz/rev)
<b>High</b>	
Engine speed	525 rpm — 850 rpm
Throttle position	< $4.3^\circ$
Output voltage	$\geq 2.78$ V
Engine load	< 0.6 g/rev (0.02 oz/rev)

#### Time Needed for Diagnosis:

Low side: 3000 ms

High side: 3000 ms

**Malfunction Indicator Light Illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

#### • Normality Judgment

Judge as OK and clear the NG when both Low side and High side become OK.

If the duration of time while the following conditions are met is longer than the time indicated, judge as OK.

#### Judgment Value

Malfunction Criteria	Threshold Value
<b>Low</b>	
Engine speed	< 2700 rpm
Throttle position	$\geq 15^\circ$
Output voltage	$\geq 1.8$ V
Engine load	> 1 g/rev (0.04 oz/rev)
<b>High</b>	
Engine speed	525 rpm — 850 rpm
Throttle position	< $4.3^\circ$
Output voltage	< 2.78 V
Engine load	< 0.6 g/rev (0.02 oz/rev)

#### Time Needed for Diagnosis:

Low side: Less than 1 second

High side: Less than 1 second

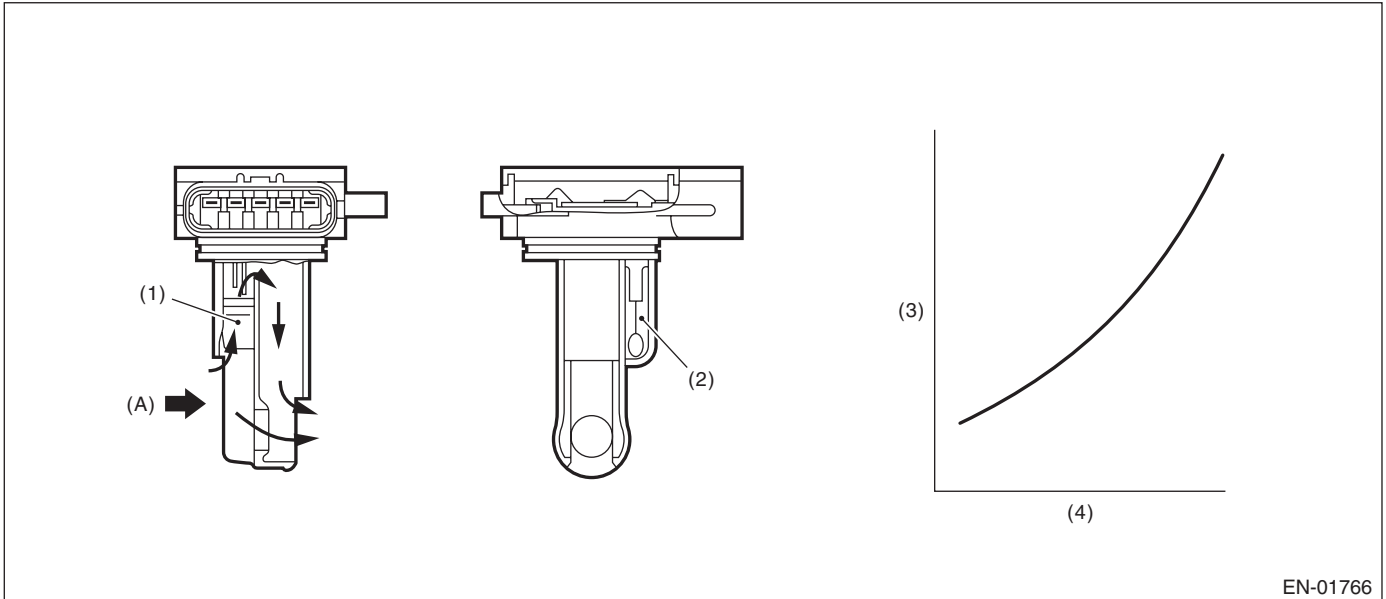
## T: DTC P0101 MASS OR VOLUME AIR FLOW CIRCUIT RANGE/PERFORMANCE

### 1. OUTLINE OF DIAGNOSIS

Detect the malfunction of air flow sensor output properties.

Judge as a low side NG when the air flow voltage indicates a small value regardless of running in a state where the air flow voltage increases. Judge as a high side NG when the air flow voltage indicates a large value regardless of running in a state where the air flow voltage decreases. Judge air flow sensor property NG when the Low side or High side becomes NG.

### 2. COMPONENT DESCRIPTION



EN-01766

(A) Air

(1) Air flow sensor

(3) Voltage (V)

(4) Amount of intake air (kg (lb)/s)

(2) Intake air temperature sensor

### 3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
Engine coolant temperature	$\geq 75\text{ }^{\circ}\text{C}$ (167 $^{\circ}\text{F}$ )

### 4. GENERAL DRIVING CYCLE

Perform the diagnosis continuously after idling.

# Diagnostic Trouble Code (DTC) Detecting Criteria

## GENERAL DESCRIPTION

### 5. DIAGNOSTIC METHOD

#### • Abnormality Judgment

Judge as NG when Low side or High side becomes NG.

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

#### Judgment Value

Malfunction Criteria	Threshold Value
<b>Low</b>	
Output voltage	< 1.74 V
Engine speed	≥ 2000 rpm
Throttle opening angle	≥ 15 °
Intake manifold pressure	≥ 73.3 kPa (550 mmHg, 21.7 inHg)
<b>High (1)</b>	
Output voltage	≥ 1.83 V
Engine speed	525 rpm — 850 rpm
Throttle opening angle	< 3.5 °
Intake manifold pressure	≥ 46.7 kPa (350 mmHg, 13.8 inHg)
<b>High (2)</b>	
Output voltage	≥ 1.73 V
Engine speed	525 rpm — 850 rpm
Throttle opening angle	< 3.5 °
Intake manifold pressure	≥ 46.7 kPa (350 mmHg, 13.8 inHg)
Fuel system diagnosis	Rich side malfunction

#### Time Needed for Diagnosis:

Low: 5000 ms

High: 5000 ms

**Malfunction Indicator Light Illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

#### • Normality Judgment

Judge as OK and clear the NG when both Low side and High side become OK.

Judge as OK and clear the NG if the continuous time while the following conditions are established is more than the predetermined time.

#### Judgment Value

Malfunction Criteria	Threshold Value
<b>Low</b>	
Output voltage	≥ 1.74 V
Engine speed	≥ 2000 rpm
Throttle opening angle	≥ 15 °
Intake manifold pressure	≥ 73.3 kPa (550 mmHg, 21.7 inHg)
<b>High</b>	
Output voltage	< 1.83 V
Engine speed	525 rpm — 850 rpm
Throttle opening angle	< 3.5 °
Intake manifold pressure	< 46.7 kPa (350 mmHg, 13.8 inHg)
Fuel system diagnosis	Rich side normal

#### Time Needed for Diagnosis:

Low: Less than 1 second

High: Less than 1 second

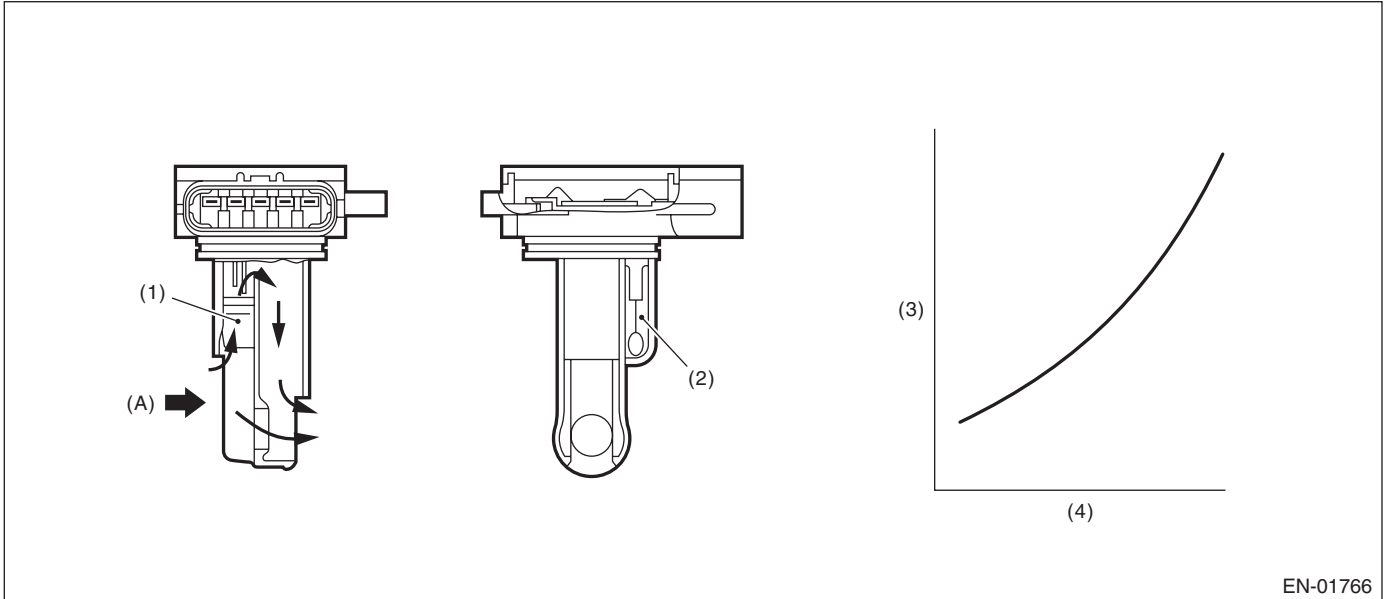


## U: DTC P0102 MASS OR VOLUME AIR FLOW CIRCUIT LOW INPUT

### 1. OUTLINE OF DIAGNOSIS

Detect open or short circuits of the air flow sensor.  
 Judge as NG if out of specification.

### 2. COMPONENT DESCRIPTION



EN-01766

(A) Air

(1) Air flow sensor

(3) Voltage (V)

(4) Amount of intake air (kg (lb)/s)

(2) Intake air temperature sensor

### 3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
None	

### 4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

# Diagnostic Trouble Code (DTC) Detecting Criteria

## GENERAL DESCRIPTION

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### 5. DIAGNOSTIC METHOD

#### • Abnormality Judgment

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

#### Judgment Value

Malfunction Criteria	Threshold Value
Output voltage	$\leq 0.2$ V

**Time Needed for Diagnosis:** 500 ms

**Malfunction Indicator Light Illumination:** Illuminates as soon as a malfunction occurs.

#### • Normality Judgment

Judge as OK and clear the NG if the continuous time while the following conditions are established is more than the predetermined time.

#### Judgment Value

Malfunction Criteria	Threshold Value
Output voltage	$> 0.2$ V

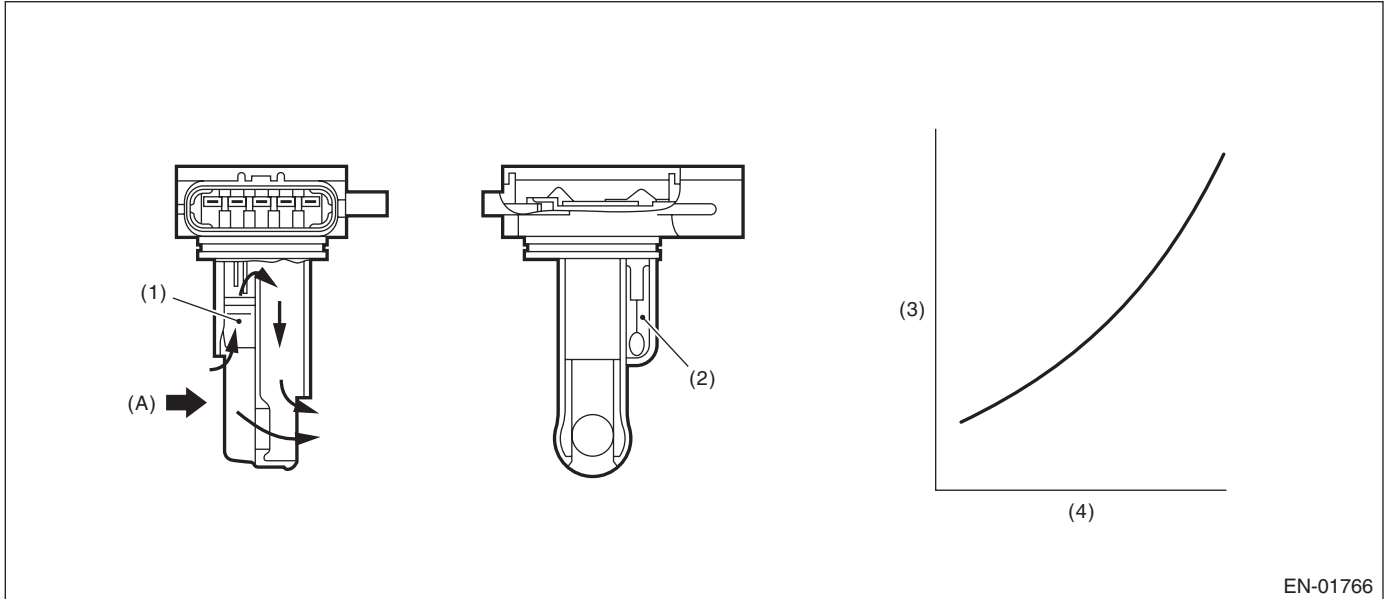
**Time Needed for Diagnosis:** Less than 1 second

## V: DTC P0103 MASS OR VOLUME AIR FLOW CIRCUIT HIGH INPUT

### 1. OUTLINE OF DIAGNOSIS

Detect open or short circuits of the air flow sensor.  
 Judge as NG if out of specification.

### 2. COMPONENT DESCRIPTION



EN-01766

(A) Air

(1) Air flow sensor

(3) Voltage (V)

(4) Amount of intake air (kg (lb)/s)

(2) Intake air temperature sensor

### 3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
None	

### 4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

# Diagnostic Trouble Code (DTC) Detecting Criteria

## GENERAL DESCRIPTION

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### 5. DIAGNOSTIC METHOD

#### • Abnormality Judgment

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

#### Judgment Value

Malfunction Criteria	Threshold Value
Output voltage	$\geq 4.857$ V

**Time Needed for Diagnosis:** 500 ms

**Malfunction Indicator Light Illumination:** Illuminates as soon as a malfunction occurs.

#### • Normality Judgment

Judge as OK and clear the NG if the continuous time while the following conditions are established is more than the predetermined time.

#### Judgment Value

Malfunction Criteria	Threshold Value
Output voltage	$< 4.857$ V

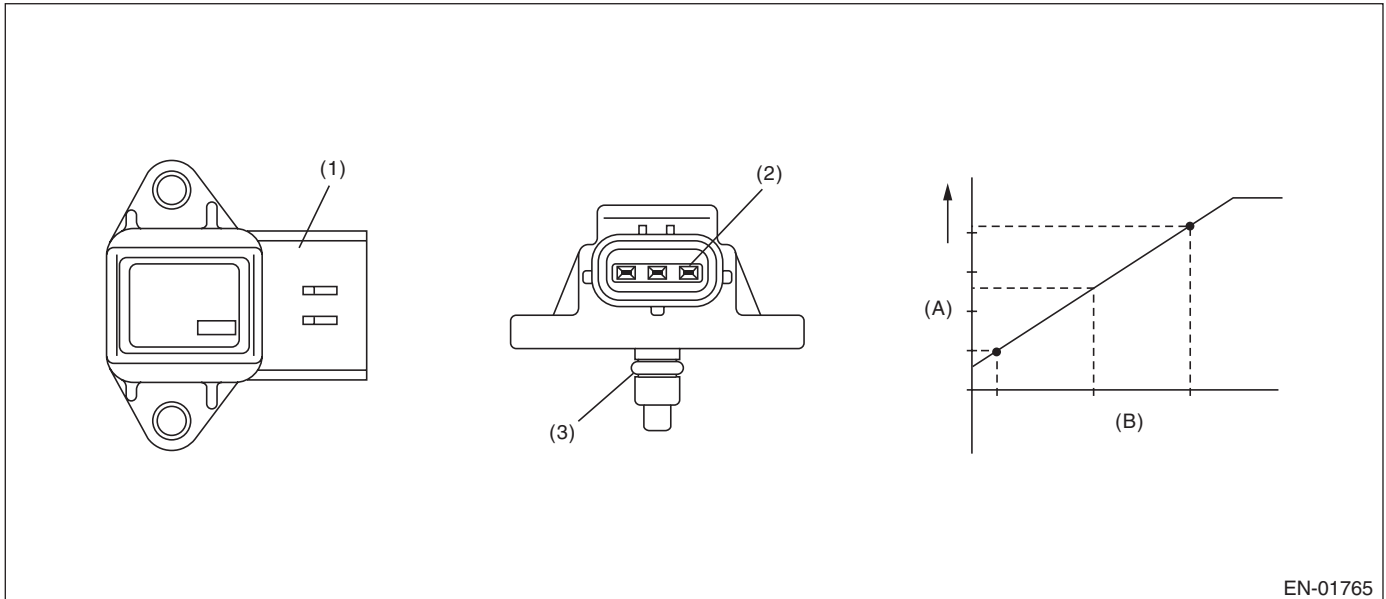
**Time Needed for Diagnosis:** Less than 1 second

## W: DTC P0107 MANIFOLD ABSOLUTE PRESSURE/BAROMETRIC PRESSURE CIRCUIT LOW INPUT

### 1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit of intake manifold pressure sensor.  
Judge as NG if out of specification.

### 2. COMPONENT DESCRIPTION



EN-01765

(A) Output voltage

(B) Absolute pressure

(1) Connector

(2) Terminals

(3) O-ring

### 3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
None	

### 4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

# Diagnostic Trouble Code (DTC) Detecting Criteria

## GENERAL DESCRIPTION

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### 5. DIAGNOSTIC METHOD

#### • Abnormality Judgment

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

#### Judgment Value

Malfunction Criteria	Threshold Value
Output voltage	$\leq 0.606$ V

**Time Needed for Diagnosis:** 500 ms

**Malfunction Indicator Light Illumination:** Illuminates as soon as a malfunction occurs.

#### • Normality Judgment

Judge as OK and clear the NG if the continuous time while the following conditions are established is more than the predetermined time.

#### Judgment Value

Malfunction Criteria	Threshold Value
Output voltage	$> 0.606$ V

**Time Needed for Diagnosis:** Less than 1 second

# Diagnostic Trouble Code (DTC) Detecting Criteria

GENERAL DESCRIPTION

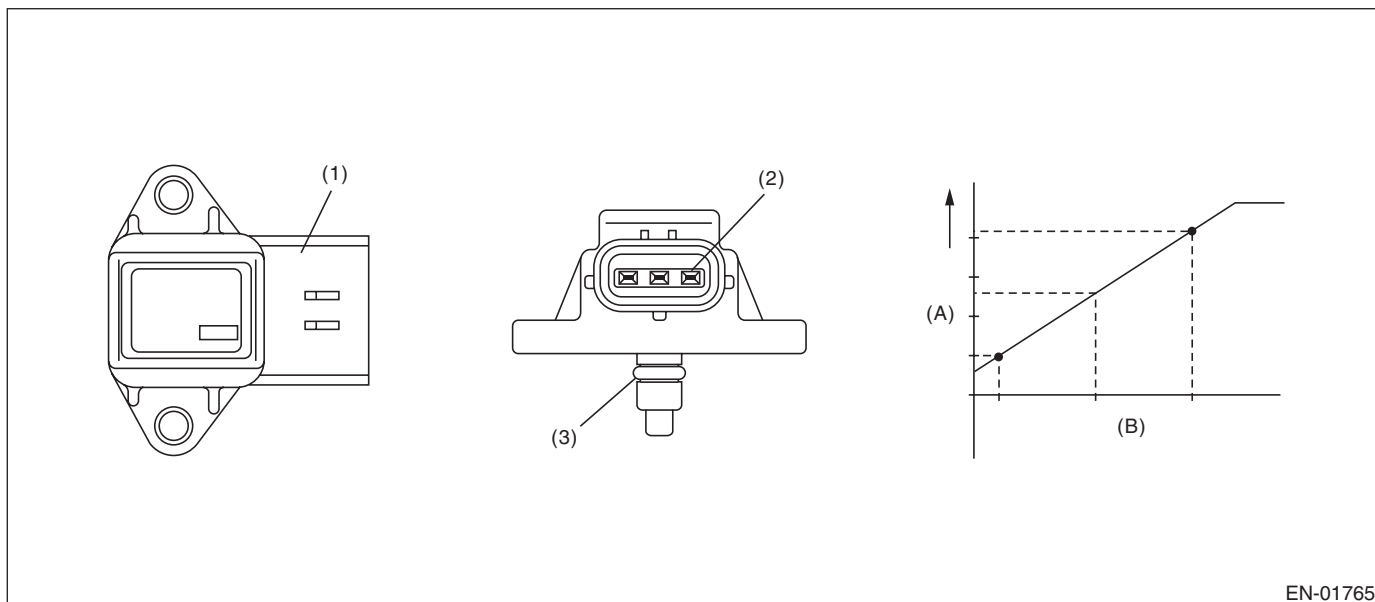
## X: DTC P0108 MANIFOLD ABSOLUTE PRESSURE/BAROMETRIC PRESSURE CIRCUIT HIGH INPUT

### 1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit of intake manifold pressure sensor.

Judge as NG if out of specification.

### 2. COMPONENT DESCRIPTION



(A) Output voltage

(B) Absolute pressure

(1) Connector

(2) Terminals

(3) O-ring

EN-01765

### 3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
None	

### 4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

# Diagnostic Trouble Code (DTC) Detecting Criteria

## GENERAL DESCRIPTION

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### 5. DIAGNOSTIC METHOD

#### • Abnormality Judgment

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

#### Judgment Value

Malfunction Criteria	Threshold Value
Output voltage	$\geq 3.906$ V

**Time Needed for Diagnosis:** 500 ms

**Malfunction Indicator Light Illumination:** Illuminates as soon as a malfunction occurs.

#### • Normality Judgment

Judge as OK and clear the NG if the continuous time while the following conditions are established is more than the predetermined time.

#### Judgment Value

Malfunction Criteria	Threshold Value
Output voltage	$< 3.906$ V

**Time Needed for Diagnosis:** Less than 1 second



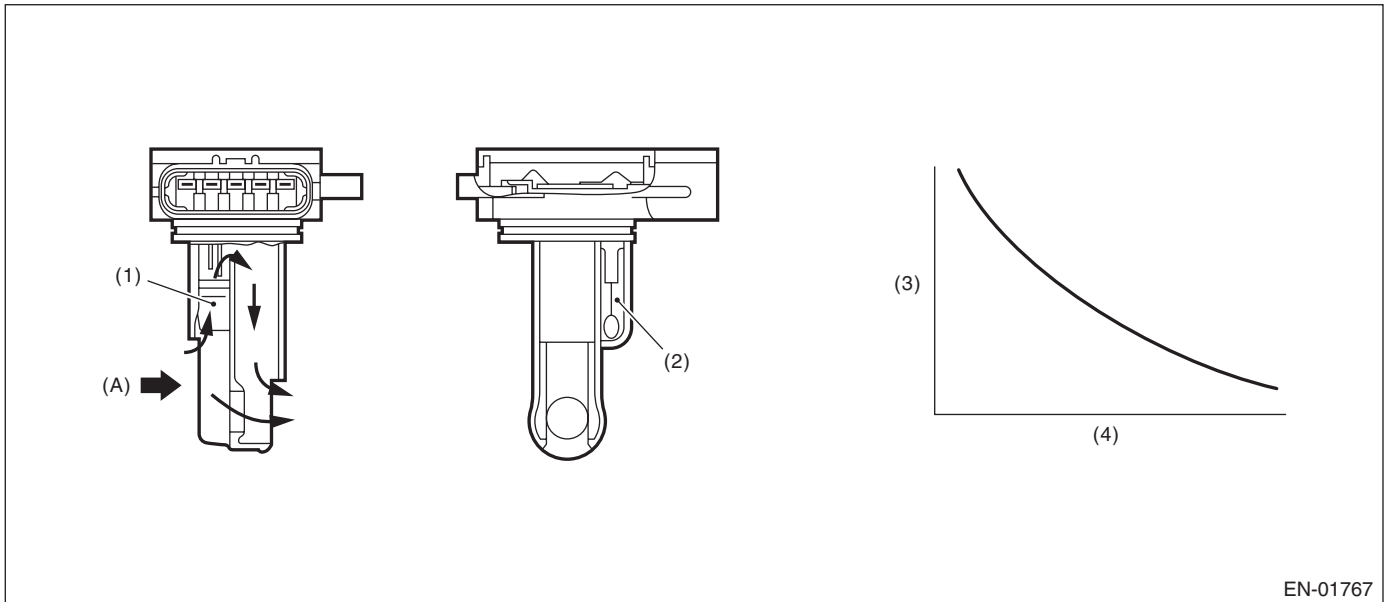
## Y: DTC P0111 INTAKE AIR TEMPERATURE SENSOR 1 CIRCUIT RANGE/PERFORMANCE

### 1. OUTLINE OF DIAGNOSIS

Detect the malfunction of intake air temperature sensor output property.

Judge as NG when the intake air temperature is not varied whereas it seemed to be varied from the viewpoint of engine condition.

### 2. COMPONENT DESCRIPTION



EN-01767

(A) Air

(1) Air flow sensor

(3) Resistance value ( $\Omega$ )

(4) Intake air temperature  $^{\circ}\text{C}$  ( $^{\circ}\text{F}$ )

(2) Intake air temperature sensor

# Diagnostic Trouble Code (DTC) Detecting Criteria

## GENERAL DESCRIPTION

### 3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
Engine coolant temperature at engine starting	< 35 °C (95 °F)
Battery voltage	≥ 10.9 V
Continuous time when the vehicle speed is less than 140 km/h (87 MPH)	≥ 600 s
Engine coolant temperature	≥ 75 °C (167 °F)
Intake air amount sum value	≥ Value of Map 1
Number of experiences under conditions below	≥ 3 time(s)
• Continuous time when vehicle speed is less than 4 km/h (2.5 MPH)	≥ Value from Map 2
• Continuous time when vehicle speed is 40 km/h (24.9 MPH) or more	≥ 15 s
and	
Establishing time of 1, 2	≥ 15 s
1. Intake air amount	≥ 10 g/s (0.35 oz/s)
2. Vehicle speed	≥ 4 km/h (2.5 MPH)

#### Map 1

Engine coolant temperature °C (°F)	-20 (-4)	-10 (14)	0 (32)	10 (50)	20 (68)
Intake air amount sum value (g (oz))	50000 (1763.5)	7400 (261)	6600 (232.78)	5800 (204.57)	5000 (176.35)

#### Map 2

Engine coolant temperature °C (°F)	-30 (-22)	0 (32)	10 (50)	20 (68)
Continuous time (s) when vehicle speed is less than 4 km/h (2.5 MPH)	250	40	32	24

### 4. GENERAL DRIVING CYCLE

Perform the diagnosis when the vehicle speed condition is met after warming up from a cold condition.

# Diagnostic Trouble Code (DTC) Detecting Criteria

GENERAL DESCRIPTION

## 5. DIAGNOSTIC METHOD

### • Abnormality Judgment

Judge as NG when the following conditions are established.

#### Judgment Value

Malfunction Criteria	Threshold Value
Output voltage difference between Max. and Min.	< 0.02 V(Equivalent to approximately 0.5°C (0.9°F) near 25°C)

**Time Needed for Diagnosis:** Less than 1 second

**Malfunction Indicator Light Illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

### • Normality Judgment

Judge as OK and clear the NG if the following conditions are established.

#### Judgment Value

Malfunction Criteria	Threshold Value
Output voltage difference between Max. and Min.	$\geq 0.02$ V

**Time Needed for Diagnosis:** Less than 1 second

# Diagnostic Trouble Code (DTC) Detecting Criteria

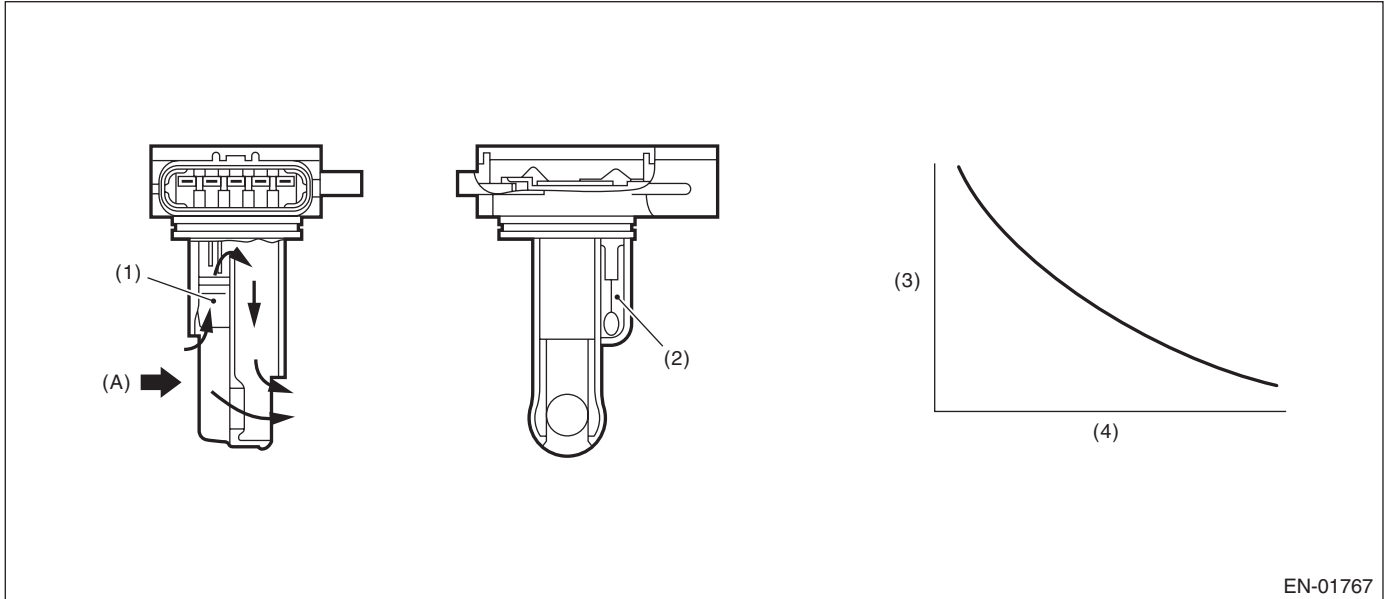
## GENERAL DESCRIPTION

### Z: DTC P0112 INTAKE AIR TEMPERATURE SENSOR 1 CIRCUIT LOW

#### 1. OUTLINE OF DIAGNOSIS

Detect open or short circuit of the intake air temperature sensor.  
Judge as NG if out of specification.

#### 2. COMPONENT DESCRIPTION



EN-01767

(A) Air

(1) Air flow sensor

(3) Resistance value ( $\Omega$ )

(4) Intake air temperature °C (°F)

(2) Intake air temperature sensor

#### 3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
None	

#### 4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

# Diagnostic Trouble Code (DTC) Detecting Criteria

GENERAL DESCRIPTION

## 5. DIAGNOSTIC METHOD

### • Abnormality Judgment

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

#### Judgment Value

Malfunction Criteria	Threshold Value
Output voltage	< 0.395 V

**Time Needed for Diagnosis:** 500 ms

**Malfunction Indicator Light Illumination:** Illuminates as soon as a malfunction occurs.

### • Normality Judgment

Judge as OK and clear the NG if the continuous time while the following conditions are established is more than the predetermined time.

#### Judgment Value

Malfunction Criteria	Threshold Value
Output voltage	$\geq 0.395$ V

**Time Needed for Diagnosis:** Less than 1 second

# Diagnostic Trouble Code (DTC) Detecting Criteria

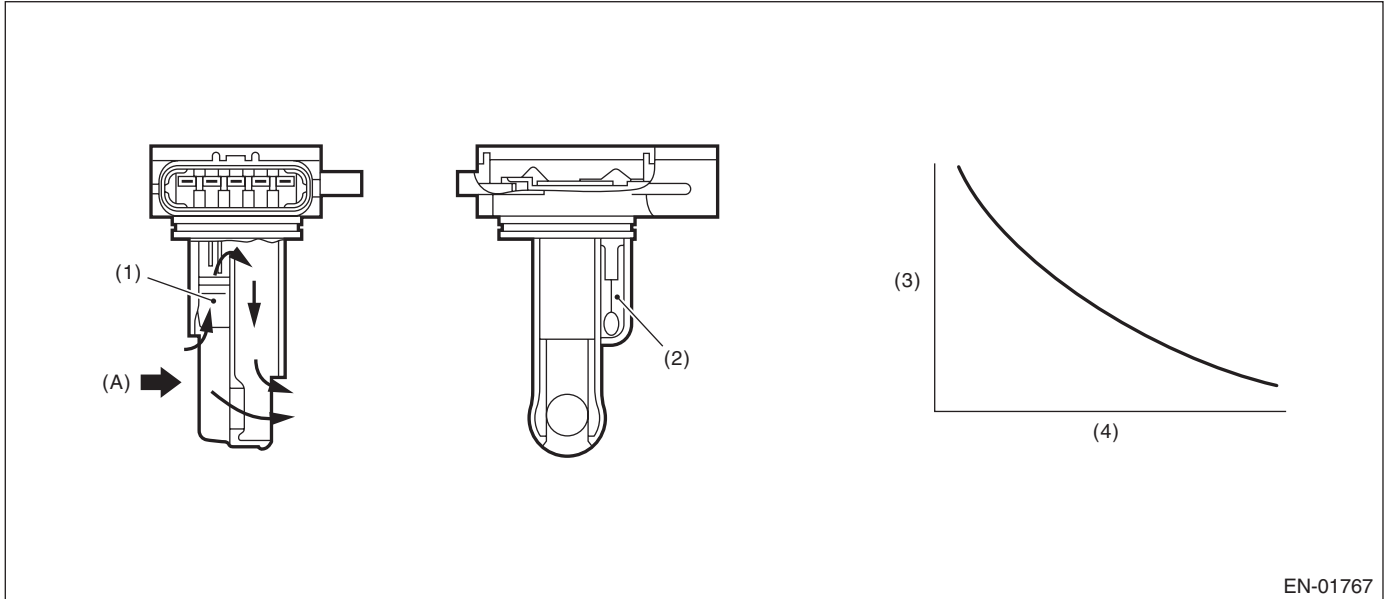
## GENERAL DESCRIPTION

### AA:DTC P0113 INTAKE AIR TEMPERATURE SENSOR 1 CIRCUIT HIGH

#### 1. OUTLINE OF DIAGNOSIS

Detect open or short circuit of the intake air temperature sensor.  
Judge as NG if out of specification.

#### 2. COMPONENT DESCRIPTION



EN-01767

(A) Air

(1) Air flow sensor

(3) Resistance value ( $\Omega$ )

(4) Intake air temperature °C (°F)

(2) Intake air temperature sensor

#### 3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
None	

#### 4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

# Diagnostic Trouble Code (DTC) Detecting Criteria

GENERAL DESCRIPTION

## 5. DIAGNOSTIC METHOD

### • Abnormality Judgment

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

#### Judgment Value

Malfunction Criteria	Threshold Value
Output voltage	$\geq 4.712$ V

**Time Needed for Diagnosis:** 500 ms

**Malfunction Indicator Light Illumination:** Illuminates as soon as a malfunction occurs.

### • Normality Judgment

Judge as OK and clear the NG if the continuous time while the following conditions are established is more than the predetermined time.

#### Judgment Value

Malfunction Criteria	Threshold Value
Output voltage	$< 4.712$ V

**Time Needed for Diagnosis:** Less than 1 second

# Diagnostic Trouble Code (DTC) Detecting Criteria

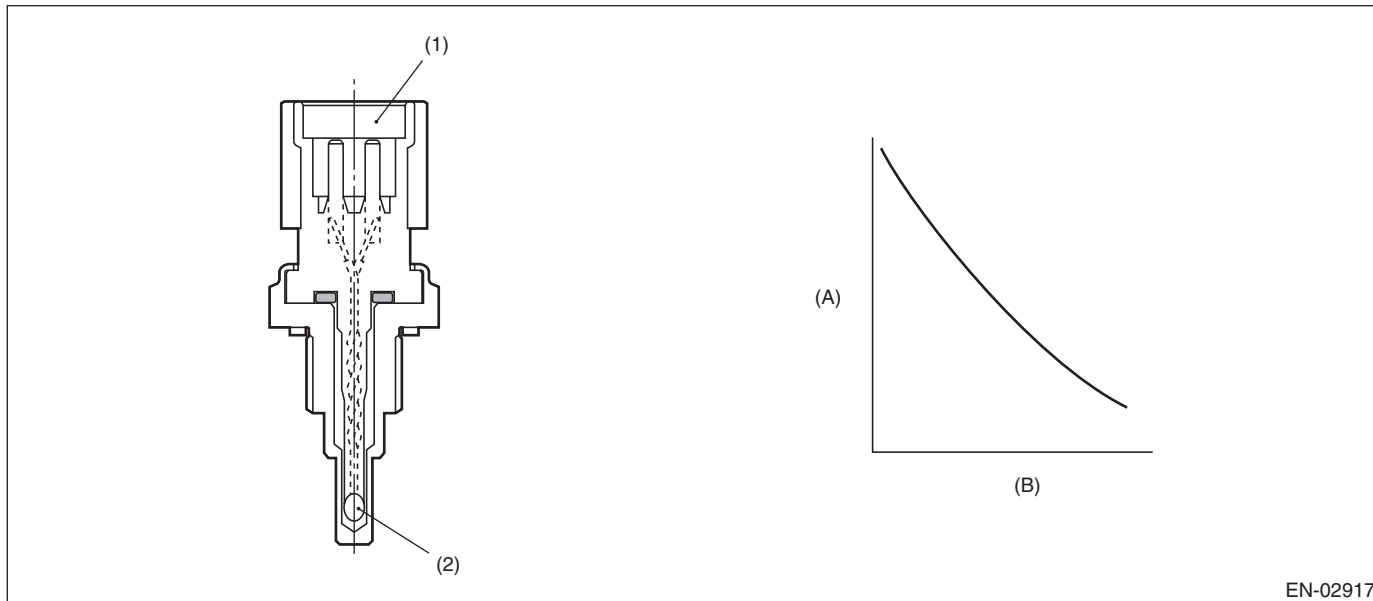
## GENERAL DESCRIPTION

### AB:DTC P0117 ENGINE COOLANT TEMPERATURE CIRCUIT LOW

#### 1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit of the engine coolant temperature sensor.  
Judge as NG if out of specification.

#### 2. COMPONENT DESCRIPTION



(A) Resistance value (k $\Omega$ )

(B) Temperature °C (°F)

(1) Connector

(2) Thermistor element

#### 3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
None	

#### 4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.



# Diagnostic Trouble Code (DTC) Detecting Criteria

GENERAL DESCRIPTION

## 5. DIAGNOSTIC METHOD

### • Abnormality Judgment

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

#### Judgment Value

Malfunction Criteria	Threshold Value
Output voltage	< 0.464 V

**Time Needed for Diagnosis:** 500 ms

**Malfunction Indicator Light Illumination:** Illuminates as soon as a malfunction occurs.

### • Normality Judgment

Judge as OK and clear the NG if the continuous time while the following conditions are established is more than the predetermined time.

#### Judgment Value

Malfunction Criteria	Threshold Value
Output voltage	$\geq 0.464$ V

**Time Needed for Diagnosis:** Less than 1 second

# Diagnostic Trouble Code (DTC) Detecting Criteria

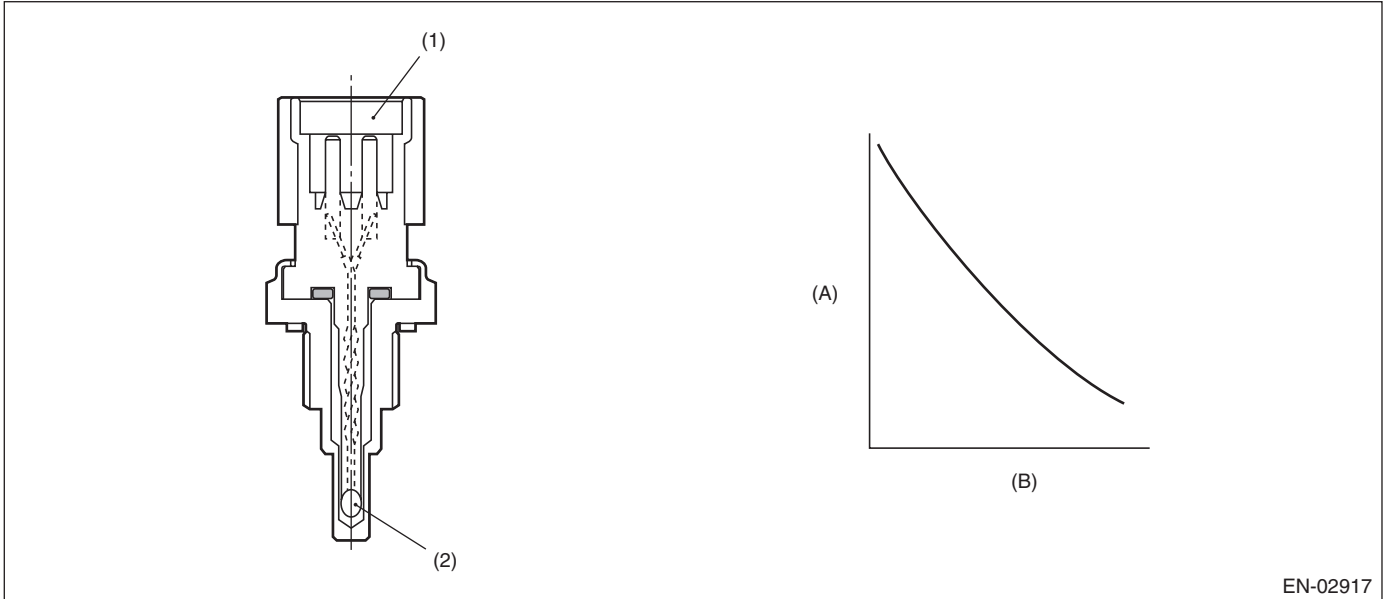
## GENERAL DESCRIPTION

### AC:DTC P0118 ENGINE COOLANT TEMPERATURE CIRCUIT HIGH

#### 1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit of the engine coolant temperature sensor.  
Judge as NG if out of specification.

#### 2. COMPONENT DESCRIPTION



EN-02917

(A) Resistance value (k $\Omega$ )

(B) Temperature °C (°F)

(1) Connector

(2) Thermistor element

#### 3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
None	

#### 4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

# Diagnostic Trouble Code (DTC) Detecting Criteria

GENERAL DESCRIPTION

## 5. DIAGNOSTIC METHOD

### • Abnormality Judgment

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

#### Judgment Value

Malfunction Criteria	Threshold Value
Output voltage	$\geq 4.702$ V

**Time Needed for Diagnosis:** 500 ms

**Malfunction Indicator Light Illumination:** Illuminates as soon as a malfunction occurs.

### • Normality Judgment

Judge as OK and clear the NG if the continuous time while the following conditions are established is more than the predetermined time.

#### Judgment Value

Malfunction Criteria	Threshold Value
Output voltage	$< 4.702$ V

**Time Needed for Diagnosis:** Less than 1 second

# Diagnostic Trouble Code (DTC) Detecting Criteria

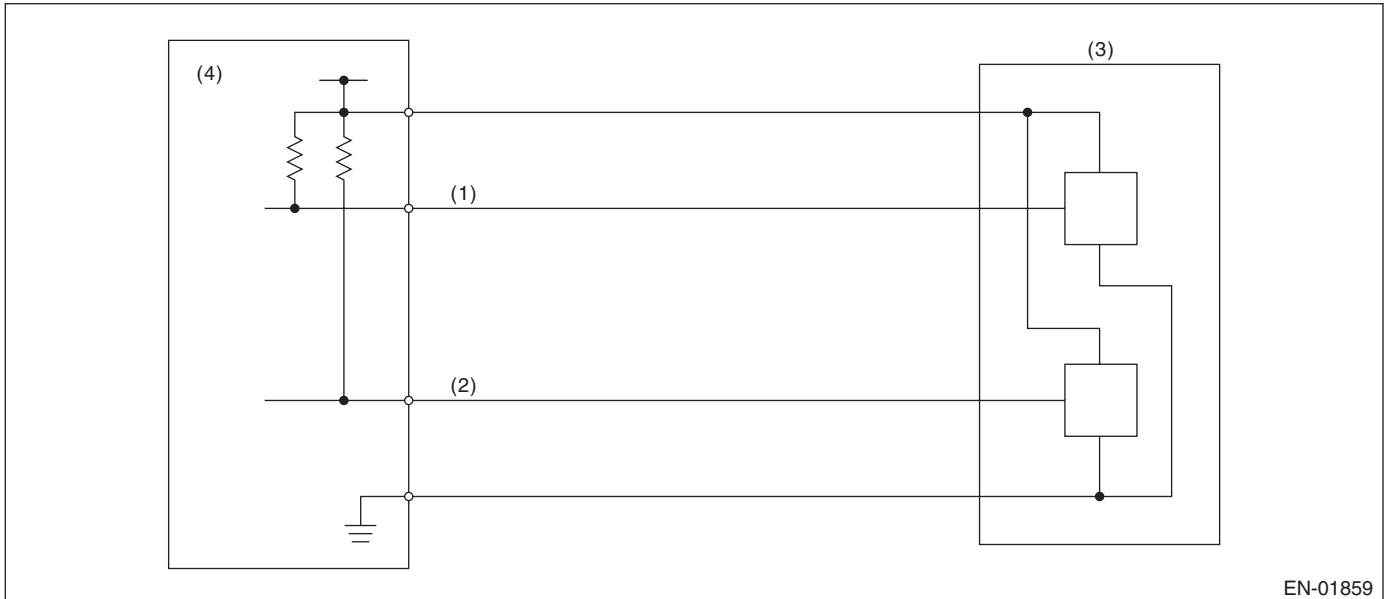
## GENERAL DESCRIPTION

### AD:DTC P0122 THROTTLE/PEDAL POSITION SENSOR/SWITCH "A" CIRCUIT LOW

#### 1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit of throttle position sensor 1.  
Judge as NG if out of specification.

#### 2. COMPONENT DESCRIPTION



(1) Throttle position sensor 1 signal  
(2) Throttle position sensor 2 signal

(3) Throttle position sensor

(4) Engine control module (ECM)

#### 3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
Ignition switch	ON
Battery voltage	$\geq 6\text{ V}$

#### 4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

# Diagnostic Trouble Code (DTC) Detecting Criteria

GENERAL DESCRIPTION

## 5. DIAGNOSTIC METHOD

### • Abnormality Judgment

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

#### Judgment Value

Malfunction Criteria	Threshold Value
Sensor 1 input voltage	$\leq 0.23$ V

**Time Needed for Diagnosis:** 24 ms

**Malfunction Indicator Light Illumination:** Illuminates as soon as a malfunction occurs.

### • Normality Judgment

Judge as OK and clear the NG if the continuous time while the following conditions are established is more than the predetermined time.

#### Judgment Value

Malfunction Criteria	Threshold Value
Sensor 1 input voltage	$> 0.23$ V

**Time Needed for Diagnosis:** 24 ms

# Diagnostic Trouble Code (DTC) Detecting Criteria

## GENERAL DESCRIPTION

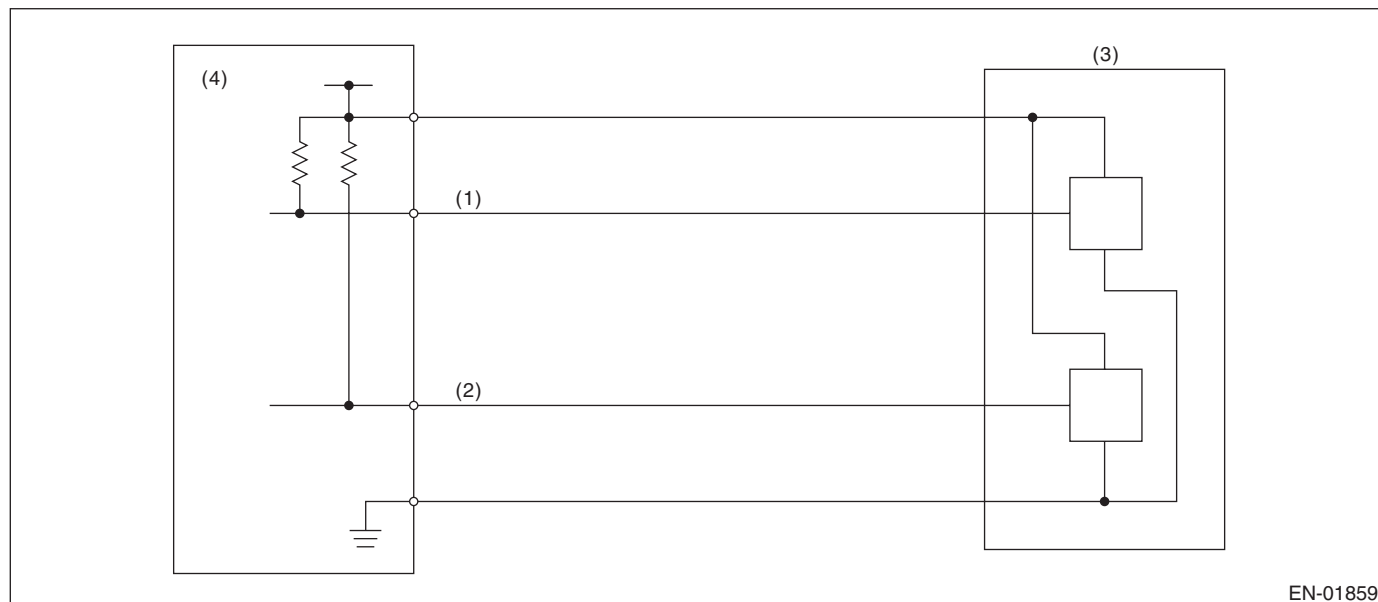
### AE:DTC P0123 THROTTLE/PEDAL POSITION SENSOR/SWITCH "A" CIRCUIT HIGH

#### 1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit of throttle position sensor 1.

Judge as NG if out of specification.

#### 2. COMPONENT DESCRIPTION



(1) Throttle position sensor 1 signal

(3) Throttle position sensor

(4) Engine control module (ECM)

(2) Throttle position sensor 2 signal

#### 3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
Ignition switch	ON
Battery voltage	$\geq 6\text{ V}$

#### 4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

# Diagnostic Trouble Code (DTC) Detecting Criteria

GENERAL DESCRIPTION

## 5. DIAGNOSTIC METHOD

### • Abnormality Judgment

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

#### Judgment Value

Malfunction Criteria	Threshold Value
Sensor 1 input voltage	$\geq 4.858$ V

**Time Needed for Diagnosis:** 24 ms

**Malfunction Indicator Light Illumination:** Illuminates as soon as a malfunction occurs.

### • Normality Judgment

Judge as OK and clear the NG if the continuous time while the following conditions are established is more than the predetermined time.

#### Judgment Value

Malfunction Criteria	Threshold Value
Sensor 1 input voltage	$< 4.858$ V

**Time Needed for Diagnosis:** 24 ms

# Diagnostic Trouble Code (DTC) Detecting Criteria

## GENERAL DESCRIPTION

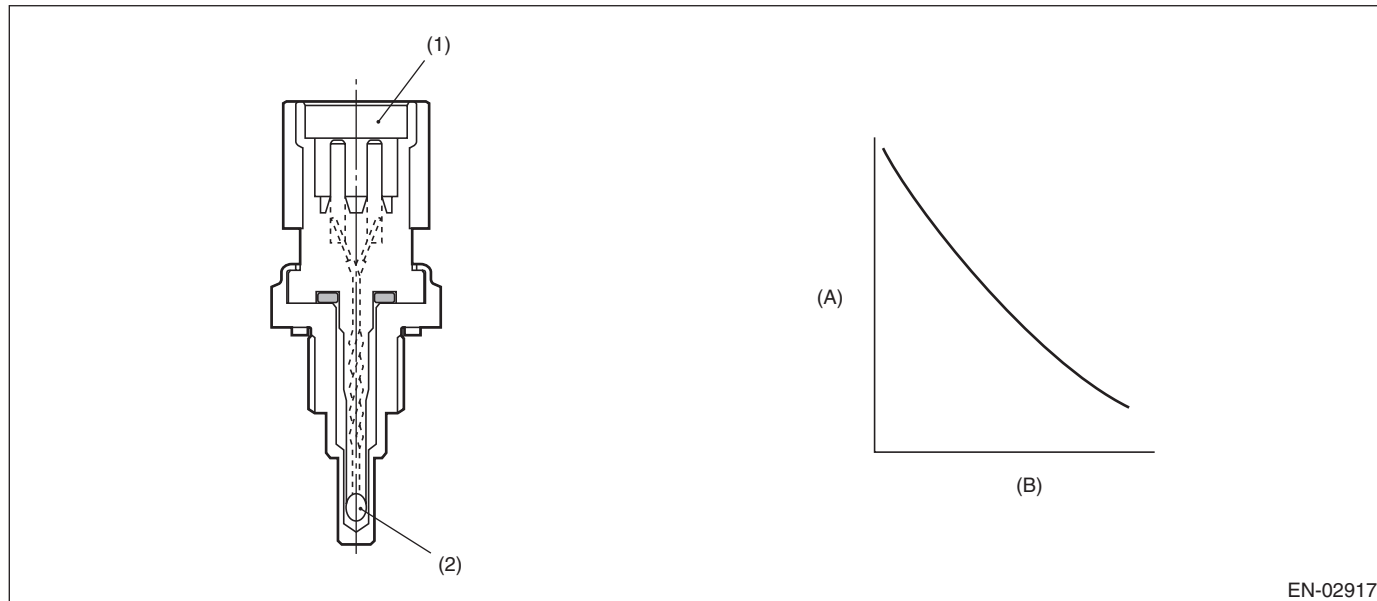
### AF:DTC P0125 INSUFFICIENT COOLANT TEMPERATURE FOR CLOSED LOOP FUEL CONTROL

#### 1. OUTLINE OF DIAGNOSIS

Detect the malfunction of engine coolant temperature output property.

Judge as NG when the engine coolant temperature does not rise in driving conditions where it should.

#### 2. COMPONENT DESCRIPTION



EN-02917

(A) Resistance value (k $\Omega$ )

(B) Temperature  $^{\circ}\text{C}$  ( $^{\circ}\text{F}$ )

(1) Connector

(2) Thermistor element

#### 3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
Engine speed	$\geq$ Value from Map
Battery voltage	$\geq 10.9 \text{ V}$

#### Map

Engine coolant temperature $^{\circ}\text{C}$ ( $^{\circ}\text{F}$ )	-40 (-40)	-30 (-22)	-20 (-4)	-10 (14)	0 (32)	10 (50)	20 (68)	30 (86)
Engine speed rpm	500	500	500	500	500	500	500	500

Engine coolant temperature $^{\circ}\text{C}$ ( $^{\circ}\text{F}$ )	40 (104)	50 (122)	60 (140)	70 (158)	80 (176)	90 (194)	100 (212)	110 (230)
Engine speed rpm	500	500	500	500	500	500	500	500

#### 4. GENERAL DRIVING CYCLE

Perform the diagnosis only once after engine start.



# Diagnostic Trouble Code (DTC) Detecting Criteria

GENERAL DESCRIPTION

## 5. DIAGNOSTIC METHOD

### • Abnormality Judgment

Judge as NG if the criteria below are met.

#### Judgment Value

Malfunction Criteria	Threshold Value
Engine coolant temperature	< 20 °C (68 °F)
Timer for diagnosis after engine start	≥ Judgment value of timer after engine start

Timer for diagnosis after engine start

a. Timer stop at fuel cut

b. During the driving conditions except a) above, timer counts up as follows.

64 ms + TWCNT ms (when at 64 ms)

TWCNT is defined as follows,

TWCNT = 0 at idle switch ON,

TWCNT show on the following table at idle switch OFF.

		Vehicle speed km/h (MPH)							
		0 (0)	8 (5)	16 (9.9)	24 (14.9)	32 (19.9)	40 (24.9)	48 (29.8)	56 (34.8)
Tempera- ture °C (°F)	-20 (-4)	0 ms	37.136 ms	74.272 ms	111.41 ms	126.66 ms	141.91 ms	163.59 ms	185.26 ms
	-10 (14)	0 ms	27.391 ms	54.782 ms	82.173 ms	99.65 ms	117.13 ms	135.96 ms	154.8 ms
	0 (32)	0 ms	17.646 ms	35.292 ms	52.938 ms	72.64 ms	92.341 ms	108.34 ms	124.33 ms
	10 (50)	0 ms	35 ms	40 ms	50 ms	65 ms	65 ms	65 ms	65 ms
	20 (68)	0 ms	35 ms	40 ms	50 ms	65 ms	65 ms	65 ms	65 ms

Judgment value of timer after engine starting

$$t = 429523 \text{ ms} - 28605 \text{ ms} \times T_i$$

$T_i$  : The lowest coolant temperature after engine start

**Time Needed for Diagnosis:** Less than 1 second

**Malfunction Indicator Light Illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

### • Normality Judgment

Judge as OK and clear the NG when the malfunction criteria below are met.

#### Judgment Value

Malfunction Criteria	Threshold Value
Engine coolant temperature	≥ 20 °C (68 °F)

**Time Needed for Diagnosis:** Less than 1 second

# Diagnostic Trouble Code (DTC) Detecting Criteria

## GENERAL DESCRIPTION

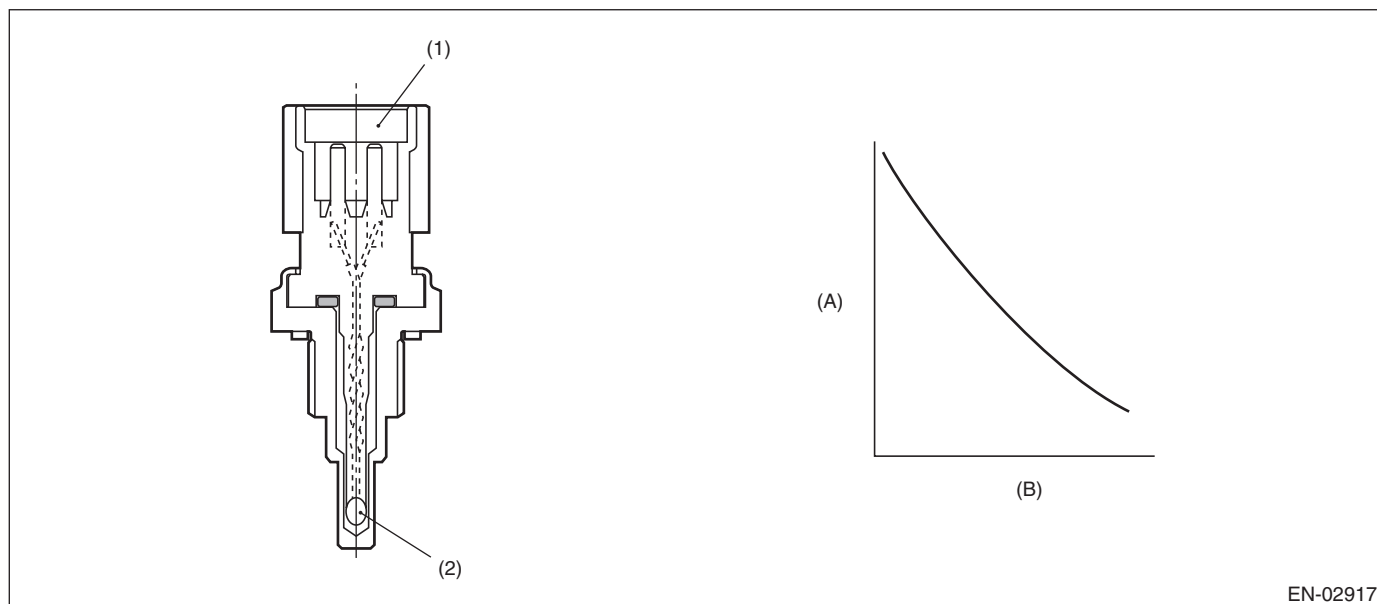
### AG:DTC P0126 INSUFFICIENT ENGINE COOLANT TEMPERATURE FOR STABLE OPERATION

#### 1. OUTLINE OF DIAGNOSIS

Detect the malfunction of the engine coolant temperature sensor characteristics.

When the ignition is ON after the specified period of soaking time has elapsed, compare the engine coolant temperature with intake air temperature. Judge as NG if the difference between two temperatures is larger than the predetermined value and the engine coolant temperature becomes the specified value or more.

#### 2. COMPONENT DESCRIPTION



EN-02917

- (A) Resistance value (kΩ)                      (B) Temperature °C (°F)
- (1) Connector                                      (2) Thermistor element

#### 3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
Battery voltage	≥ 10.9 V
Soaking time	≥ 21600 s
Engine coolant temperature at the last engine stop	≥ Value from Map

#### Map

Estimate ambient temperature °C (°F)	-7 (19.4)	8 (46.4)	10 (50)	25 (77)
Engine coolant temperature at the last engine stop °C (°F)	83.1 (181.6)	83.1 (181.6)	83.1 (181.6)	83.1 (181.6)

#### 4. GENERAL DRIVING CYCLE

Perform the diagnosis only once after starting the engine.

# Diagnostic Trouble Code (DTC) Detecting Criteria

GENERAL DESCRIPTION

## 5. DIAGNOSTIC METHOD

### • Abnormality Judgment

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

#### Judgment Value

Malfunction Criteria	Threshold Value
All of the following conditions are established.	
Engine coolant temperature – intake air temperature	> 15°C (27°F)
Engine coolant temperature	> 40 °C (104 °F)

**Time Needed for Diagnosis:** 512 ms

**Malfunction Indicator Light Illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

### • Normality Judgment

Judge as OK and clear the NG if the continuous time while the following conditions are established is more than the predetermined time.

#### Judgment Value

Malfunction Criteria	Threshold Value
When any one of the followings is established.	
Engine coolant temperature – intake air temperature	≤ 15°C (27°F)
Engine coolant temperature	≤ 40 °C (104 °F)

**Time Needed for Diagnosis:** Less than 1 second

# Diagnostic Trouble Code (DTC) Detecting Criteria

## GENERAL DESCRIPTION

### AH:DTC P0128 COOLANT THERMOSTAT (ENGINE COOLANT TEMPERATURE BELOW THERMOSTAT REGULATING TEMPERATURE)

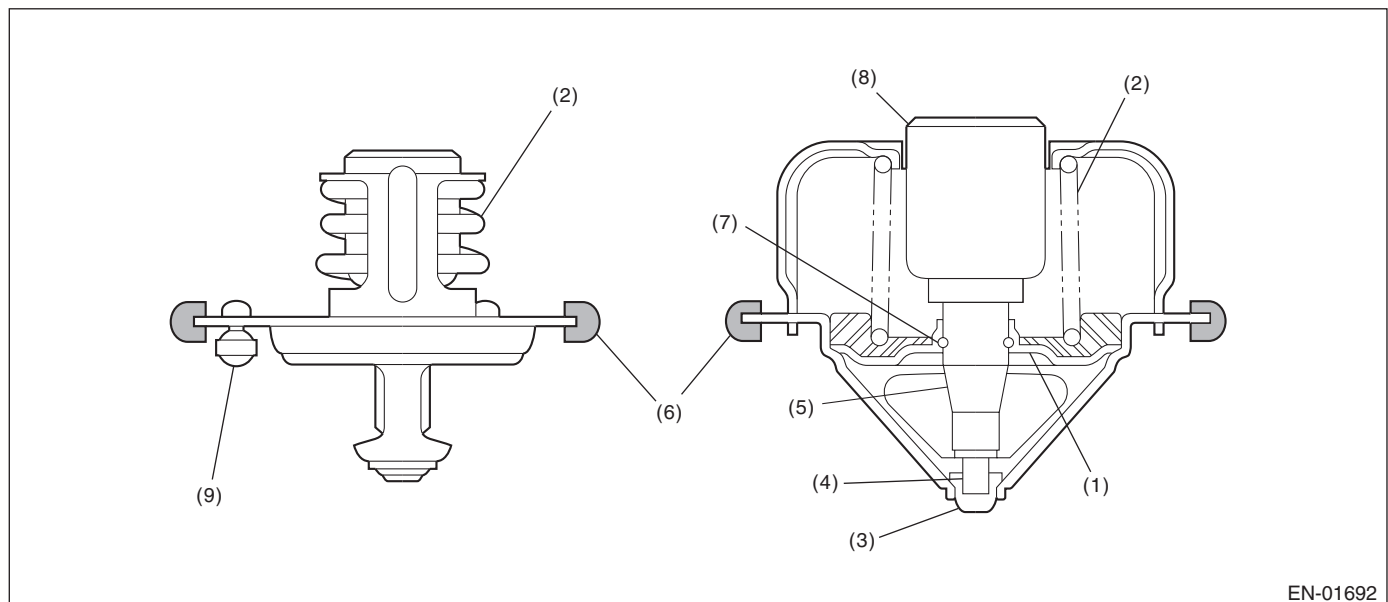
#### 1. OUTLINE OF DIAGNOSIS

Detect malfunctions of the thermostat function.

Judge as NG when any one of the following conditions is established.

- When the actual engine coolant temperature does not reach the maximum temperature necessary to perform other OBDII diagnosis and  $\Sigma$  (Estimated engine coolant temperature – actual engine coolant temperature) exceeded the predetermined value. (Judgment 1)
- When the actual engine coolant temperature does not reach the range within  $-11^{\circ}\text{C}$  ( $-19.8^{\circ}\text{F}$ ) from the regulated temperature and  $\Sigma$  (Estimated engine coolant temperature – actual engine coolant temperature) exceeded the predetermined value. (Judgment 2)
- When the difference between the estimated coolant temperature and the actual engine coolant temperature exceeds the predetermined value, and  $\Sigma$  (Estimated engine coolant temperature – actual engine coolant temperature) exceeded the predetermined value. (Judgment 3)

#### 2. COMPONENT DESCRIPTION



EN-01692

- |             |                 |                  |
|-------------|-----------------|------------------|
| (1) Valve   | (4) Piston      | (7) Stop ring    |
| (2) Spring  | (5) Guide       | (8) Wax element  |
| (3) Stopper | (6) Rubber seal | (9) Jiggle valve |

# Diagnostic Trouble Code (DTC) Detecting Criteria

GENERAL DESCRIPTION

## 3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
<Judgment 1>	
Battery voltage	≥ 10.9 V
Estimate ambient temperature	≥ -7 °C (19.4 °F)
Vehicle speed	≥ 30 km/h (18.6 MPH)
Estimated coolant temperature	≥ Value of Map 1
<Judgment 2>	
Battery voltage	≥ 10.9 V
Estimate ambient temperature	≥ -7 °C (19.4 °F)
Vehicle speed	≥ 30 km/h (18.6 MPH)
Estimated coolant temperature	≥ Value from Map 2
<Judgment 3>	
Battery voltage	≥ 10.9 V
Estimate ambient temperature	≥ -7 °C (19.4 °F)
Vehicle speed	≥ 30 km/h (18.6 MPH)
Estimated coolant temperature	≥ Value from Map 3

### Map 1

Engine coolant temperature at engine starting °C (°F)	-7 (19.4)	8 (46.4)	10 (50)	25 (77)
Estimated coolant temperature °C (°F)	75 (167)	75 (167)	75 (167)	75 (167)

### Map 2

Engine coolant temperature at engine starting °C (°F)	-7 (19.4)	8 (46.4)	10 (50)	25 (77)
Estimated coolant temperature °C (°F)	83.1 (181.6)	83.1 (181.6)	83.1 (181.6)	83.1 (181.6)

### Map 3

Engine coolant temperature at engine starting °C (°F)	-7 (19.4)	10 (50)	25 (77)	50 (122)
Estimated coolant temperature °C (°F)	56.3 (133.3)	64.3 (147.7)	71.4 (160.5)	83.1 (181.6)

## 4. GENERAL DRIVING CYCLE

Perform the diagnosis only once after starting the engine.

# Diagnostic Trouble Code (DTC) Detecting Criteria

## GENERAL DESCRIPTION

### 5. DIAGNOSTIC METHOD

#### • Abnormality Judgment

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

#### Judgment Value

Malfunction Criteria	Threshold Value
When any one of the followings is established.	
<Judgment 1>	
Actual engine coolant temperature and $\Sigma$ (Estimated engine coolant temperature – actual engine coolant temperature)	< Value of Map 4  > Value of Map 5
<Judgment 2>	
Actual engine coolant temperature and $\Sigma$ (Estimated engine coolant temperature – actual engine coolant temperature)	< Regulated temperature – Value of Map 6  > Value of Map 7
<Judgment 3>	
Estimated engine coolant temperature – actual engine coolant temperature and $\Sigma$ (Estimated engine coolant temperature – actual engine coolant temperature)	> Value of Map 8  > Value of Map 9

#### Map 4

Estimate ambient temperature °C (°F)	-7 (19.4)	8 (46.4)	10 (50)	25 (77)
Threshold Value °C (°F)	75 (167)	75 (167)	75 (167)	75 (167)

#### Map 5

Engine coolant temperature at engine starting °C (°F)	-7 (19.4)	0 (32)	8 (46.4)	10 (50)	25 (77)	30 (86)	35 (95)
Threshold Value °C (°F)	1731.6 (3116.9)	1731.6 (3116.9)	1731.6 (3116.9)	1731.6 (3116.9)	1731.6 (3116.9)	1731.6 (3116.9)	1200 (2160)

#### Map 6

Estimate ambient temperature °C (°F)	-7 (19.4)	8 (46.4)	10 (50)	25 (77)
Threshold Value °C (°F)	11.1 (20)	11.1 (20)	11.1 (20)	11.1 (20)

#### Map 7

Engine coolant temperature at engine starting °C (°F)	-7 (19.4)	0 (32)	8 (46.4)	10 (50)	25 (77)	35 (95)	45 (113)
Threshold Value °C (°F)	1731.6 (3116.9)	1731.6 (3116.9)	1731.6 (3116.9)	1731.6 (3116.9)	1731.6 (3116.9)	1731.6 (3116.9)	1200 (2160)

# Diagnostic Trouble Code (DTC) Detecting Criteria

GENERAL DESCRIPTION

## Map 8

Estimate ambient temperature °C (°F)	-7 (19.4)	8 (46.4)	10 (50)	25 (77)
Threshold Value °C (°F)	11.1 (20)	11.1 (20)	11.1 (20)	11.1 (20)

## Map 9

Engine coolant temperature at engine starting °C (°F)	-7 (19.4)	8 (46.4)	10 (50)	25 (77)
Threshold Value °C (°F)	1731.6 (3116.9)	1731.6 (3116.9)	1731.6 (3116.9)	1731.6 (3116.9)

**Time Needed for Diagnosis:** 300 — 700 seconds

**Malfunction Indicator Light Illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

### • Normality Judgment

Judge as OK and clear the NG if the continuous time while the following conditions are established is more than the predetermined time.

### Judgment Value

Malfunction Criteria	Threshold Value
All of the following conditions are established.	
<Judgment 1>	
Actual engine coolant temperature and $\Sigma$ (Estimated engine coolant temperature – actual engine coolant temperature)	$\geq$ Value of Map 4  $\leq$ Value of Map 5
<Judgment 2>	
Actual engine coolant temperature and $\Sigma$ (Estimated engine coolant temperature – actual engine coolant temperature)	$\geq$ Regulated temperature – Value of Map 6  $\leq$ Value of Map 7
<Judgment 3>	
Estimated engine coolant temperature – actual engine coolant temperature and $\Sigma$ (Estimated engine coolant temperature – actual engine coolant temperature) and Actual engine coolant temperature	$\leq$ Value of Map 8  $\leq$ Value of Map 9  $\geq$ Regulated temperature – Value of Map 10

## Map 10

Estimate ambient temperature °C (°F)	-7 (19.4)	8 (46.4)	10 (50)	25 (77)
Threshold Value °C (°F)	11.1 (20)	11.1 (20)	11.1 (20)	11.1 (20)

**Time Needed for Diagnosis:** 300 — 700 seconds

# Diagnostic Trouble Code (DTC) Detecting Criteria

## GENERAL DESCRIPTION

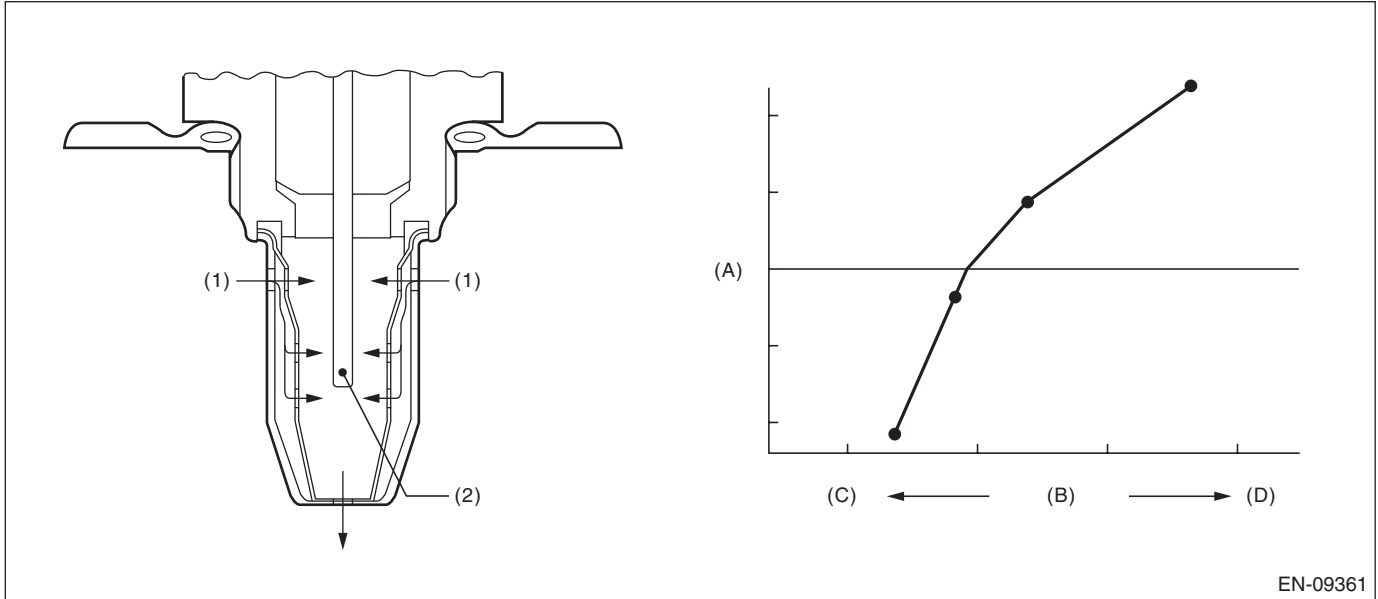
### AI: DTC P0131 O2 SENSOR CIRCUIT LOW VOLTAGE (BANK 1 SENSOR 1)

#### 1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit of sensor.

Judge as NG, when the element voltage is out of the specified range.

#### 2. COMPONENT DESCRIPTION



EN-09361

(A) Electromotive force

(B) Air fuel ratio

(C) Lean

(D) Rich

(1) Exhaust gas

(2) ZrO<sub>2</sub>

#### 3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
Battery voltage	$\geq 10.9$ V

#### 4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.



# Diagnostic Trouble Code (DTC) Detecting Criteria

GENERAL DESCRIPTION

## 5. DIAGNOSTIC METHOD

### • Abnormality Judgment

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

#### Judgment Value

Malfunction Criteria	Threshold Value
Input voltage (+) or Input voltage (-) or  Input voltage (+) – Input voltage (-)	< 1.128 V  < 0.23 V  < 0.644 V

#### Time Needed for Diagnosis:

Input voltage (+): 1000 ms

Input voltage (-): 1000 ms

|Input voltage (+) – Input voltage (-)|: 1000 ms

**Malfunction Indicator Light Illumination:** Illuminates as soon as a malfunction occurs.

### • Normality Judgment

Judge as OK and clear the NG if the continuous time while the following conditions are established is more than the predetermined time.

#### Judgment Value

Malfunction Criteria	Threshold Value
Input voltage (+) Input voltage (-)  Input voltage (+) – Input voltage (-)	$\geq 1.128$ V $\geq 0.23$ V $\geq 0.644$ V

**Time Needed for Diagnosis:** Less than 1 second

# Diagnostic Trouble Code (DTC) Detecting Criteria

## GENERAL DESCRIPTION

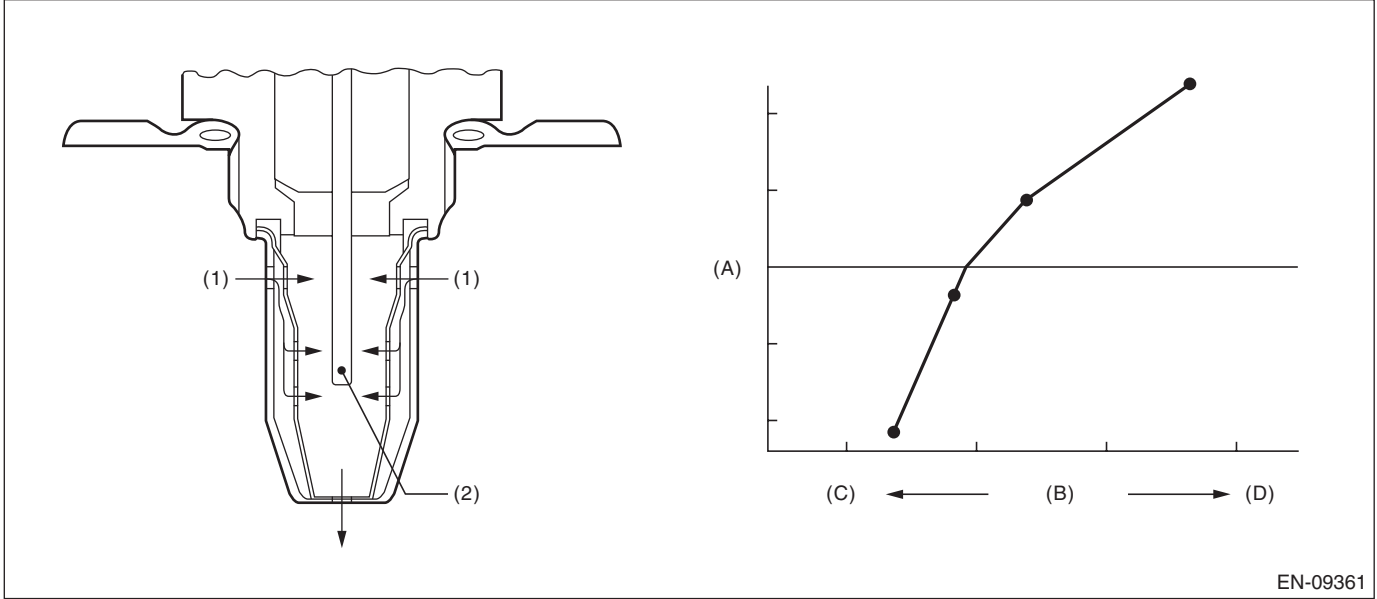
### AJ:DTC P0132 O2 SENSOR CIRCUIT HIGH VOLTAGE (BANK 1 SENSOR 1)

#### 1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit of sensor.

Judge as NG, when the element voltage is out of the specified range.

#### 2. COMPONENT DESCRIPTION



(A) Electromotive force

(B) Air fuel ratio

(C) Lean

(D) Rich

(1) Exhaust gas

(2)  $ZrO_2$

#### 3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
Battery voltage	$\geq 10.9$ V

#### 4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

# Diagnostic Trouble Code (DTC) Detecting Criteria

GENERAL DESCRIPTION

## 5. DIAGNOSTIC METHOD

### • Abnormality Judgment

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

#### Judgment Value

Malfunction Criteria	Threshold Value
Input voltage (+) or Input voltage (-)	> 3.589 V  > 3.541 V

#### Time Needed for Diagnosis:

Input voltage (+): 1000 ms

Input voltage (-): 1000 ms

**Malfunction Indicator Light Illumination:** Illuminates as soon as a malfunction occurs.

### • Normality Judgment

Judge as OK and clear the NG if the continuous time while the following conditions are established is more than the predetermined time.

#### Judgment Value

Malfunction Criteria	Threshold Value
Input voltage (+) Input voltage (-)	$\leq 3.589$ V $\leq 3.541$ V

**Time Needed for Diagnosis:** Less than 1 second

# Diagnostic Trouble Code (DTC) Detecting Criteria

## GENERAL DESCRIPTION

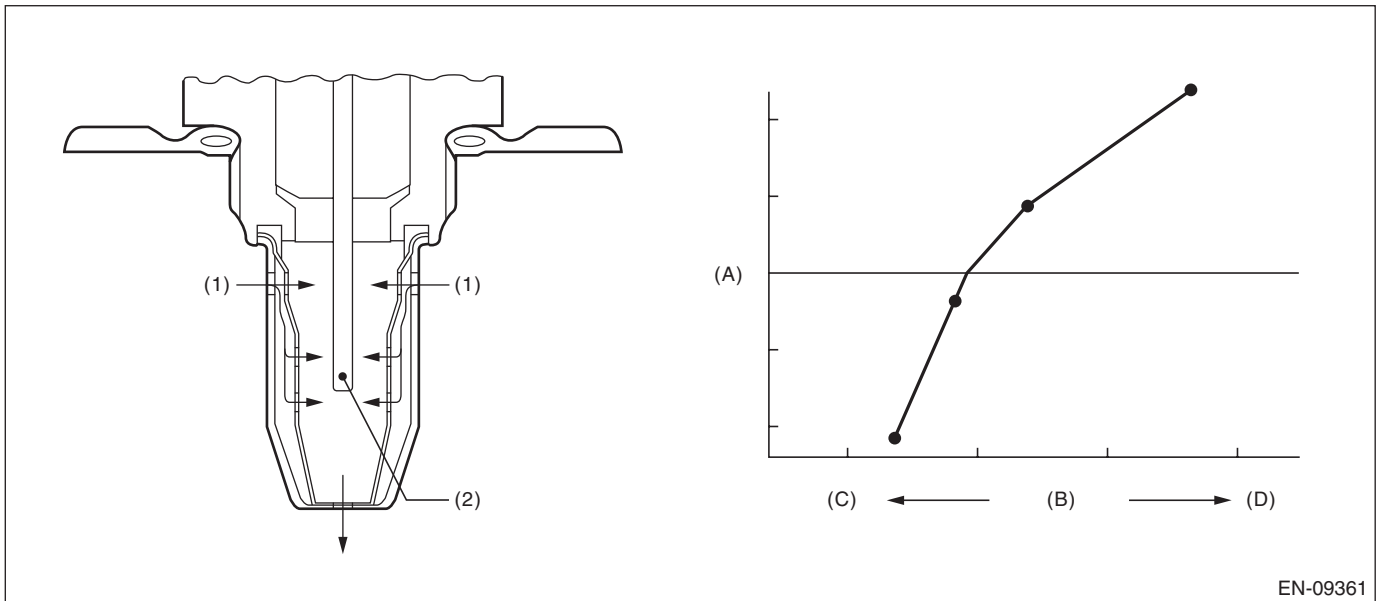
### AK:DTC P0134 O2 SENSOR CIRCUIT NO ACTIVITY DETECTED (BANK 1 SENSOR 1)

#### 1. OUTLINE OF DIAGNOSIS

Detect open circuits of the sensor.

Judge as NG when the impedance of the element is large.

#### 2. COMPONENT DESCRIPTION



(A) Electromotive force

(B) Air fuel ratio

(C) Lean

(D) Rich

(1) Exhaust gas

(2)  $ZrO_2$

#### 3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
None	

#### 4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

# Diagnostic Trouble Code (DTC) Detecting Criteria

GENERAL DESCRIPTION

## 5. DIAGNOSTIC METHOD

### • Abnormality Judgment

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

#### Judgment Value

Malfunction Criteria	Threshold Value
Battery voltage	$\geq 10.9 \text{ V}$
Time of heater control duty at 70 % or more	$\geq 30000 \text{ ms}$
Front oxygen (A/F) sensor impedance.	$> 500 \Omega$

**Time Needed for Diagnosis:** 5000 ms

**Malfunction Indicator Light Illumination:** Illuminates as soon as a malfunction occurs.

### • Normality Judgment

Judge as OK and clear the NG if the continuous time while the following conditions are established is more than the predetermined time.

#### Judgment Value

Malfunction Criteria	Threshold Value
Battery voltage	$\geq 10.9 \text{ V}$
Front oxygen (A/F) sensor impedance.	$\leq 500 \Omega$

**Time Needed for Diagnosis:** Less than 1 second

# Diagnostic Trouble Code (DTC) Detecting Criteria

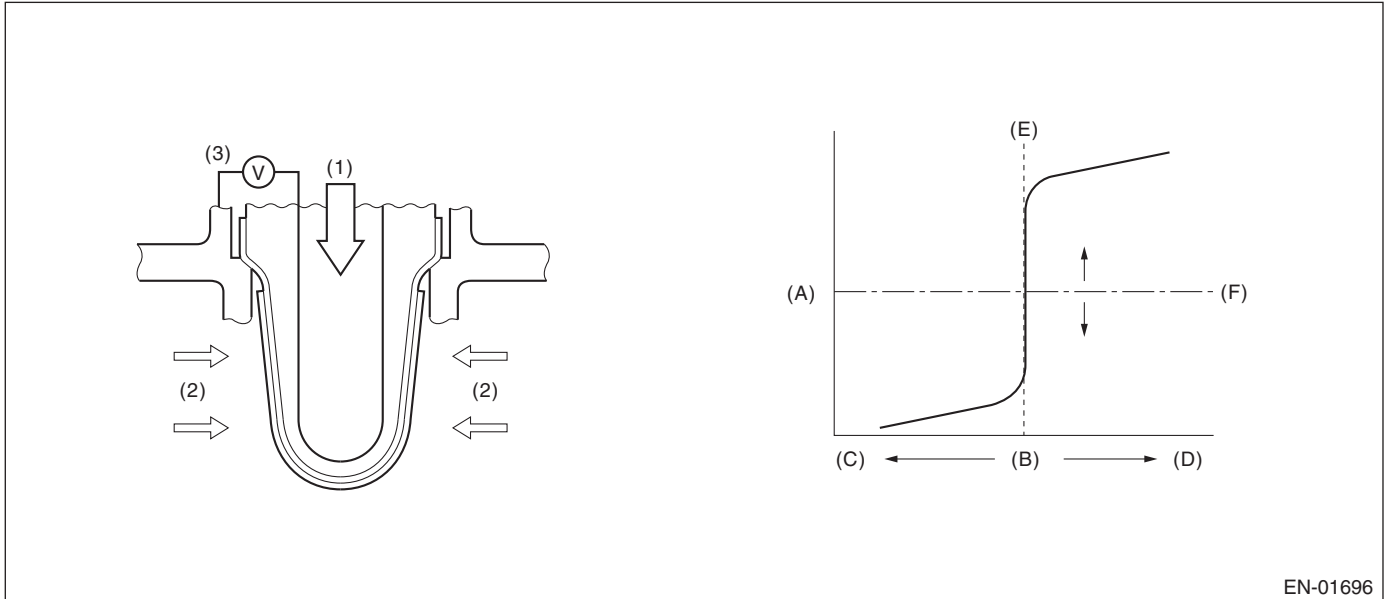
## GENERAL DESCRIPTION

### AL:DTC P0137 O2 SENSOR CIRCUIT LOW VOLTAGE (BANK 1 SENSOR 2)

#### 1. OUTLINE OF DIAGNOSIS

Detect continuity NG of the oxygen sensor. If the oxygen sensor voltage reading is not within the probable range considering the operating conditions, judge as NG.

#### 2. COMPONENT DESCRIPTION



EN-01696

(A) Electromotive force

(D) Lean

(1) Atmosphere

(B) Air fuel ratio

(E) Theoretical air fuel ratio

(2) Exhaust gas

(C) Rich

(F) Comparative voltage

(3) Electromotive force

# Diagnostic Trouble Code (DTC) Detecting Criteria

GENERAL DESCRIPTION

## 3. ENABLE CONDITION

### Used for abnormality judgment

Secondary Parameters	Enable Conditions
<b>High</b> Secondary air system Closed loop control at the oxygen sensor Misfire detection every 200 rotations Front oxygen (A/F) sensor compensation coefficient Battery voltage Engine coolant temperature	Not in operation In operation < 65535 time(s) Not in limit value ≥ 10.9 V ≥ 75 °C (167 °F)
<b>Low (1)</b> Secondary air system Closed loop control at the oxygen sensor Misfire detection every 200 rotations Front oxygen (A/F) sensor compensation coefficient Battery voltage Engine coolant temperature Amount of intake air	Not in operation In operation < 65535 time(s) Not in limit value ≥ 10.9 V ≥ 75 °C (167 °F) ≥ 10 g/s (0.35 oz/s)
<b>Low (2)</b> Secondary air system Closed loop control at the oxygen sensor Misfire detection every 200 rotations Front oxygen (A/F) sensor compensation coefficient Battery voltage Engine coolant temperature Amount of intake air Current continuation time of the rear oxygen sensor heater	Not in operation In operation < 65535 time(s) Not in limit value ≥ 10.9 V ≥ 75 °C (167 °F) < 10 g/s (0.35 oz/s) ≥ 25000 ms
<b>Low (3)</b> Secondary air system Closed loop control at the oxygen sensor Misfire detection every 200 rotations Front oxygen (A/F) sensor compensation coefficient Battery voltage Engine coolant temperature Amount of intake air Current continuation time of the rear oxygen sensor heater Fuel cut	Not in operation In operation < 65535 time(s) Not in limit value ≥ 10.9 V ≥ 75 °C (167 °F) < 10 g/s (0.35 oz/s) ≥ 25000 ms Experienced

### Used for normality judgment

Secondary Parameters	Enable Conditions
Secondary air system Closed loop control at the oxygen sensor Misfire detection every 200 rotations Front oxygen (A/F) sensor compensation coefficient Battery voltage Engine coolant temperature	Not in operation In operation < 65535 time(s) Not in limit value ≥ 10.9 V ≥ 75 °C (167 °F)

## 4. GENERAL DRIVING CYCLE

After starting the engine, continuously perform the diagnosis with the same engine condition.

# Diagnostic Trouble Code (DTC) Detecting Criteria

## GENERAL DESCRIPTION

### 5. DIAGNOSTIC METHOD

#### • Abnormality Judgment

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

#### Judgment Value

Malfunction Criteria	Threshold Value	DTC
<b>High</b>		P0138
Sensor output voltage	> 1.2 V	P0158
<b>Low</b>		P0137
Sensor output voltage	< 0.03 V	P0157

#### Time Needed for Diagnosis:

- High: 2500 ms
- Low (1): 20000 ms
- Low (2): 40000 ms
- Low (3): Value from Map

#### Map

Fuel cut time (s)	0	2000	10000
Time Needed for Diagnosis (s)	40000	40000	60000

**Malfunction Indicator Light Illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

#### • Normality Judgment

Judge as OK and clear the NG if the continuous time while the following conditions are established is more than the predetermined time.

#### Judgment Value

Malfunction Criteria	Threshold Value	DTC
<b>High</b>		P0138
Sensor output voltage	$\leq 1.2$ V	P0158
<b>Low</b>		P0137
Sensor output voltage	$\geq 0.03$ V	P0157

#### Time Needed for Diagnosis:

- High: Less than 1 second
- Low (1): Less than 1 second
- Low (2): Less than 1 second
- Low (3): Less than 1 second

## AM:DTC P0138 O2 SENSOR CIRCUIT HIGH VOLTAGE (BANK 1 SENSOR 2)

### 1. OUTLINE OF DIAGNOSIS

#### NOTE:

For the detection standard, refer to DTC P0137. <Ref. to GD(H6DO)-72, DTC P0137 O2 SENSOR CIRCUIT LOW VOLTAGE (BANK 1 SENSOR 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>



## AN:DTC P013A O2 SENSOR SLOW RESPONSE - RICH TO LEAN (BANK 1 SENSOR 2)

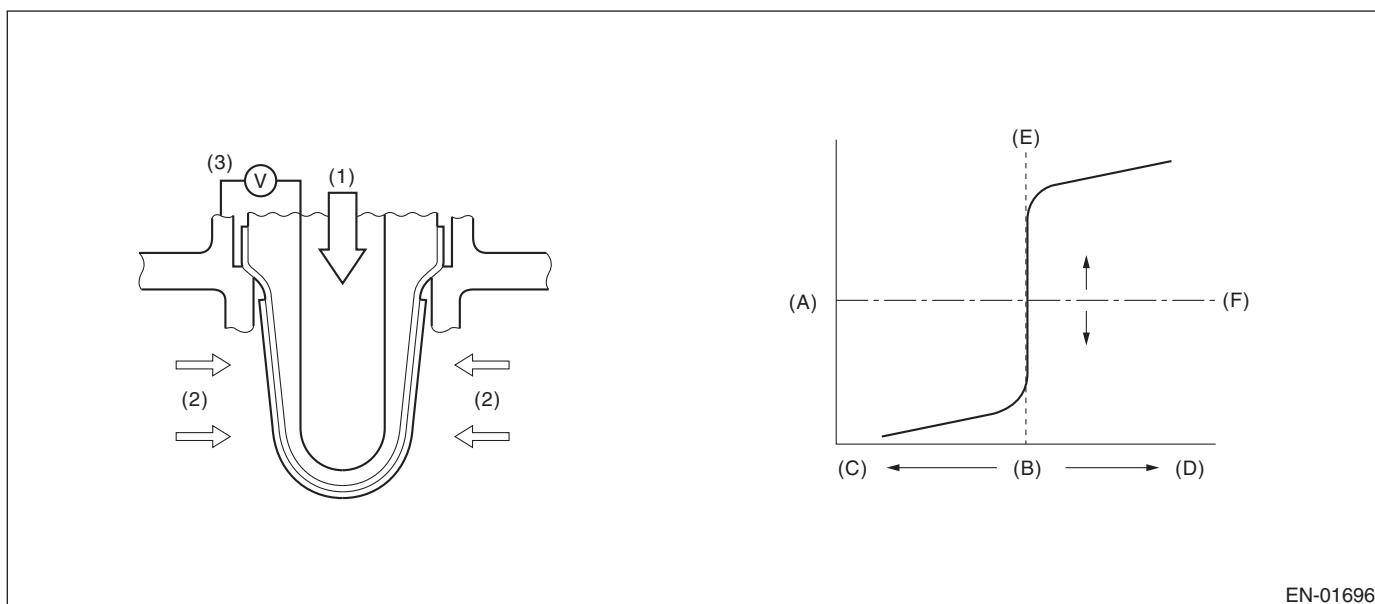
### 1. OUTLINE OF DIAGNOSIS

Detect the slow response of rich → lean for rear oxygen sensor output.

When the deceleration fuel cut has occurred, detect the trouble by calculating the time when the rear oxygen sensor output passes through the predetermined range of voltages.

Judge as NG when the response time is larger than the threshold value.

### 2. COMPONENT DESCRIPTION



EN-01696

- |                         |                                |                         |
|-------------------------|--------------------------------|-------------------------|
| (A) Electromotive force | (B) Air fuel ratio             | (C) Rich                |
| (D) Lean                | (E) Theoretical air fuel ratio | (F) Comparative voltage |
| (1) Atmosphere          | (2) Exhaust gas                | (3) Electromotive force |

### 3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Battery voltage	> 10.9 V
Rear oxygen sensor closed loop control	Operation
Current calculation time of the rear oxygen sensor heater after starting	≥ 180000 ms
Engine speed when fuel cut starts	≥ 1400 rpm
Rear oxygen sensor voltage when fuel cut starts	≥ 0.55 V
Fuel cut time	≥ 5000 ms
Engine coolant temperature when fuel cut starts	≥ 75 °C (167 °F)
Estimated temperature of rear oxygen sensor element when fuel cut starts	≥ 480 °C (896 °F)

### 4. GENERAL DRIVING CYCLE

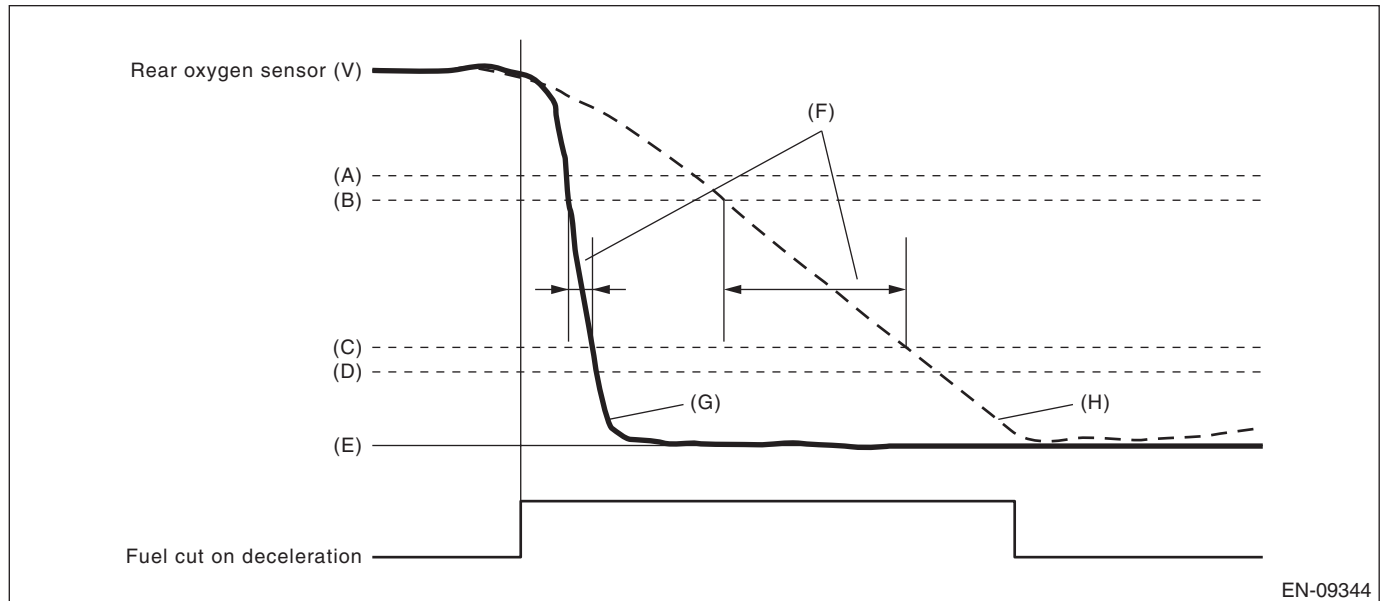
Perform diagnosis once during deceleration fuel cut from a constant and high speed driving, when rear oxygen sensor is warmed up sufficiently.

# Diagnostic Trouble Code (DTC) Detecting Criteria

## GENERAL DESCRIPTION

### 5. DIAGNOSTIC METHOD

Detect the trouble by calculating the response time of the rear oxygen sensor during fuel cut.



EN-09344

(A) 0.55 V	(B) 0.50 V	(C) 0.20 V
(D) 0.15 V	(E) 0 V	(F) Diagnostic parameter
(G) Normal	(H) Malfunction	

#### • Abnormality Judgment

Judge as NG when the following conditions are established.

#### Judgment Value

Malfunction Criteria	Threshold Value
Time when rear oxygen sensor voltage changed from 0.5 V to 0.2 V.	> 491 ms

**Time Needed for Diagnosis:** 10 seconds

**Malfunction Indicator Light Illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

#### • Normality Judgment

Judge as OK and clear the NG if the following conditions are established.

#### Judgment Value

Malfunction Criteria	Threshold Value
Time when rear oxygen sensor voltage changed from 0.5 V to 0.2 V.	≤ 491 ms

**Time Needed for Diagnosis:** 10 seconds

## AO:DTC P013B O2 SENSOR SLOW RESPONSE - LEAN TO RICH (BANK 1 SENSOR 2)

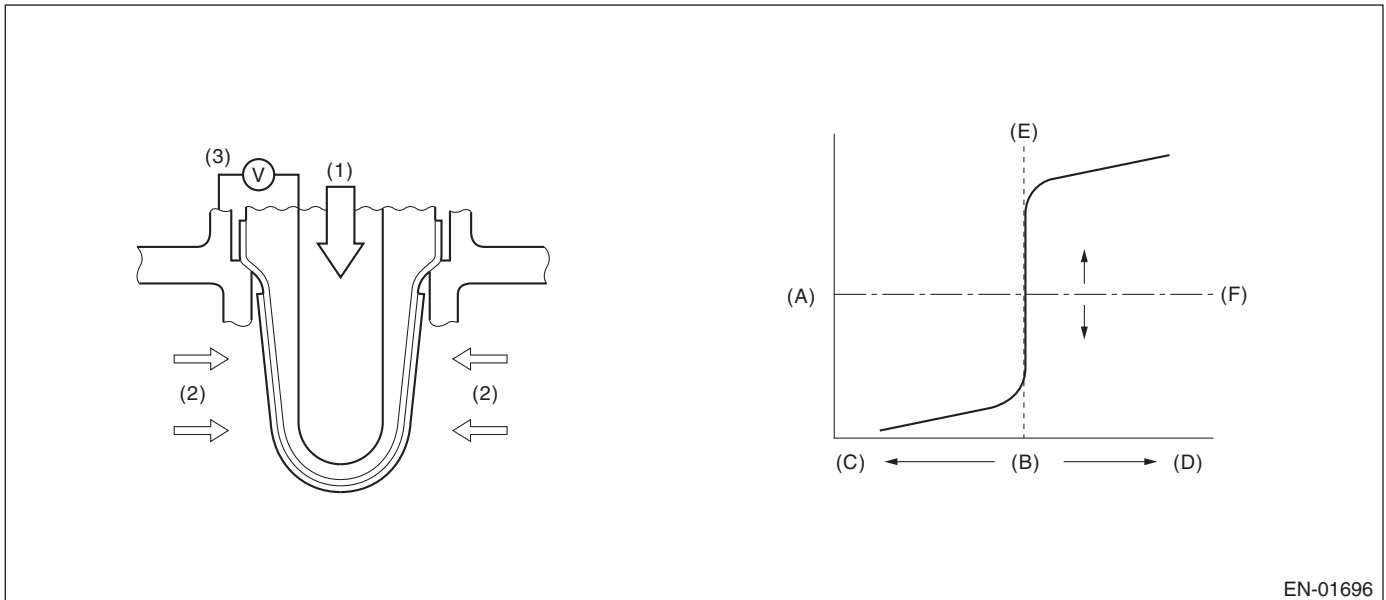
### 1. OUTLINE OF DIAGNOSIS

Detect the slow response of lean → rich for rear oxygen sensor output.

After the deceleration fuel cut has occurred, detect the trouble by calculating the time when the rear oxygen sensor output passes through the predetermined range of voltages.

Judge as NG when the response time is larger than the threshold value.

### 2. COMPONENT DESCRIPTION



EN-01696

- |                         |                                |                         |
|-------------------------|--------------------------------|-------------------------|
| (A) Electromotive force | (B) Air fuel ratio             | (C) Rich                |
| (D) Lean                | (E) Theoretical air fuel ratio | (F) Comparative voltage |
| (1) Atmosphere          | (2) Exhaust gas                | (3) Electromotive force |

### 3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Battery voltage	> 10.9 V
Rear oxygen sensor closed loop control	Operation
Fuel cut time	≥ 5000 ms

### 4. GENERAL DRIVING CYCLE

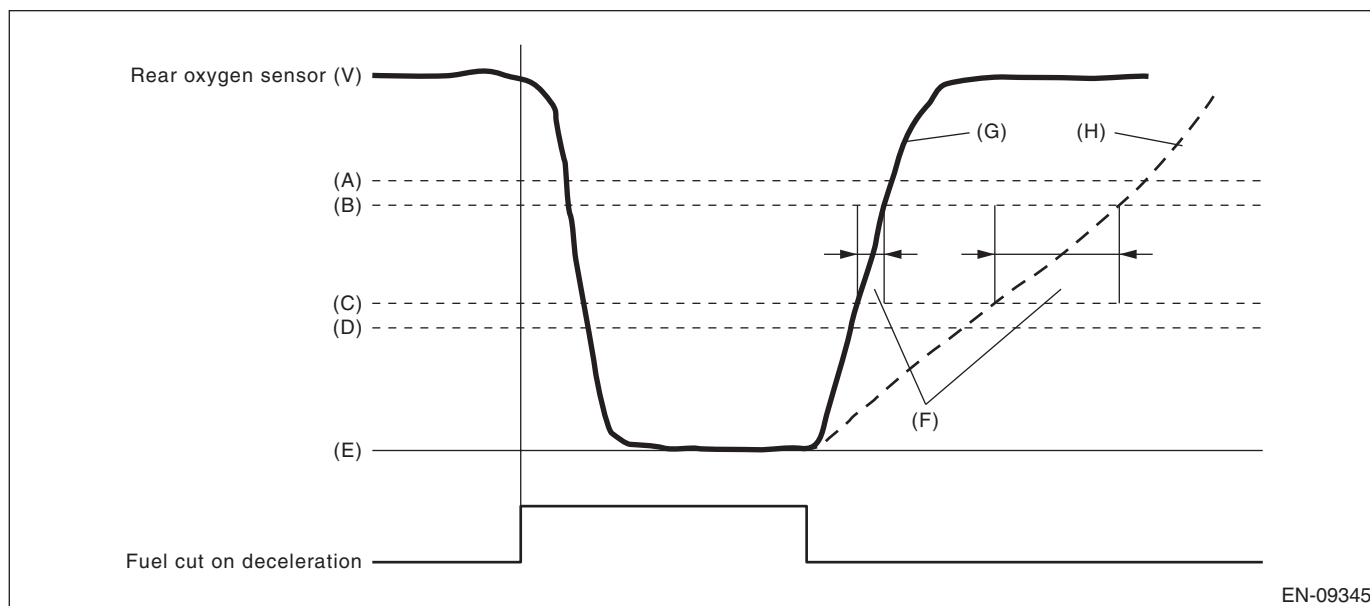
Perform diagnosis only once after recovering from a deceleration fuel cut continued for more than predetermined time.

# Diagnostic Trouble Code (DTC) Detecting Criteria

## GENERAL DESCRIPTION

### 5. DIAGNOSTIC METHOD

Detect the trouble by calculating the response time of the rear oxygen sensor after fuel cut.



EN-09345

- |            |                 |                          |
|------------|-----------------|--------------------------|
| (A) 0.55 V | (B) 0.50 V      | (C) 0.30 V               |
| (D) 0.25 V | (E) 0 V         | (F) Diagnostic parameter |
| (G) Normal | (H) Malfunction |                          |

#### • Abnormality Judgment

Judge as NG when the following conditions are established.

#### Judgment Value

Malfunction Criteria	Threshold Value
Time when rear oxygen sensor voltage changed from 0.3 V to 0.5 V.	> 4000 ms

**Time Needed for Diagnosis:** 10 seconds

**Malfunction Indicator Light Illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

#### • Normality Judgment

Judge as OK and clear the NG if the following conditions are established.

#### Judgment Value

Malfunction Criteria	Threshold Value
Time when rear oxygen sensor voltage changed from 0.3 V to 0.5 V.	≤ 4000 ms

**Time Needed for Diagnosis:** 10 seconds

## Diagnostic Trouble Code (DTC) Detecting Criteria

GENERAL DESCRIPTION

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### **AP:DTC P013C O2 SENSOR SLOW RESPONSE - RICH TO LEAN (BANK 2 SENSOR 2)**

#### **1. OUTLINE OF DIAGNOSIS**

**NOTE:**

For the detection standard, refer to DTC P013A. <Ref. to GD(H6DO)-75, DTC P013A O2 SENSOR SLOW RESPONSE - RICH TO LEAN (BANK 1 SENSOR 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>

### **AQ:DTC P013D O2 SENSOR SLOW RESPONSE - LEAN TO RICH (BANK 2 SENSOR 2)**

#### **1. OUTLINE OF DIAGNOSIS**

**NOTE:**

For the detection standard, refer to DTC P013B. <Ref. to GD(H6DO)-77, DTC P013B O2 SENSOR SLOW RESPONSE - LEAN TO RICH (BANK 1 SENSOR 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>

# Diagnostic Trouble Code (DTC) Detecting Criteria

## GENERAL DESCRIPTION

### AR:DTC P013E O2 SENSOR DELAYED RESPONSE - RICH TO LEAN (BANK 1 SENSOR 2)

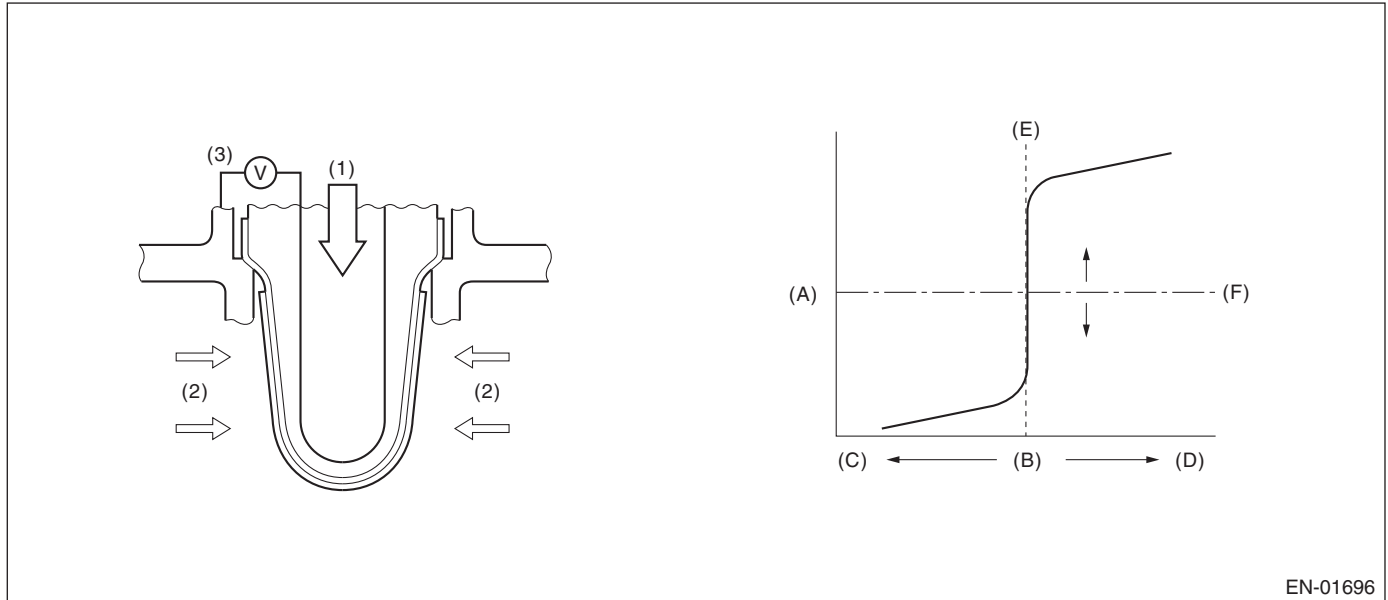
#### 1. OUTLINE OF DIAGNOSIS

Detect the delayed response of rear oxygen sensor output for rich → lean.

After the deceleration fuel cut has started, detect the trouble by calculating the time when the rear oxygen sensor output decreases to the predetermined voltages.

Judge as NG when the response time is larger than the threshold value.

#### 2. COMPONENT DESCRIPTION



EN-01696

- |                         |                                |                         |
|-------------------------|--------------------------------|-------------------------|
| (A) Electromotive force | (B) Air fuel ratio             | (C) Rich                |
| (D) Lean                | (E) Theoretical air fuel ratio | (F) Comparative voltage |
| (1) Atmosphere          | (2) Exhaust gas                | (3) Electromotive force |

#### 3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Battery voltage	> 10.9 V
Rear oxygen sensor closed loop control	Operation
Engine speed when fuel cut starts	≥ 1400 rpm
Rear oxygen sensor voltage when fuel cut starts	≥ 0.55 V
Fuel cut time	≥ 5000 ms
Engine coolant temperature when fuel cut starts	≥ 75 °C (167 °F)
Estimated temperature of rear oxygen sensor element when fuel cut starts	≥ 480 °C (896 °F)

#### 4. GENERAL DRIVING CYCLE

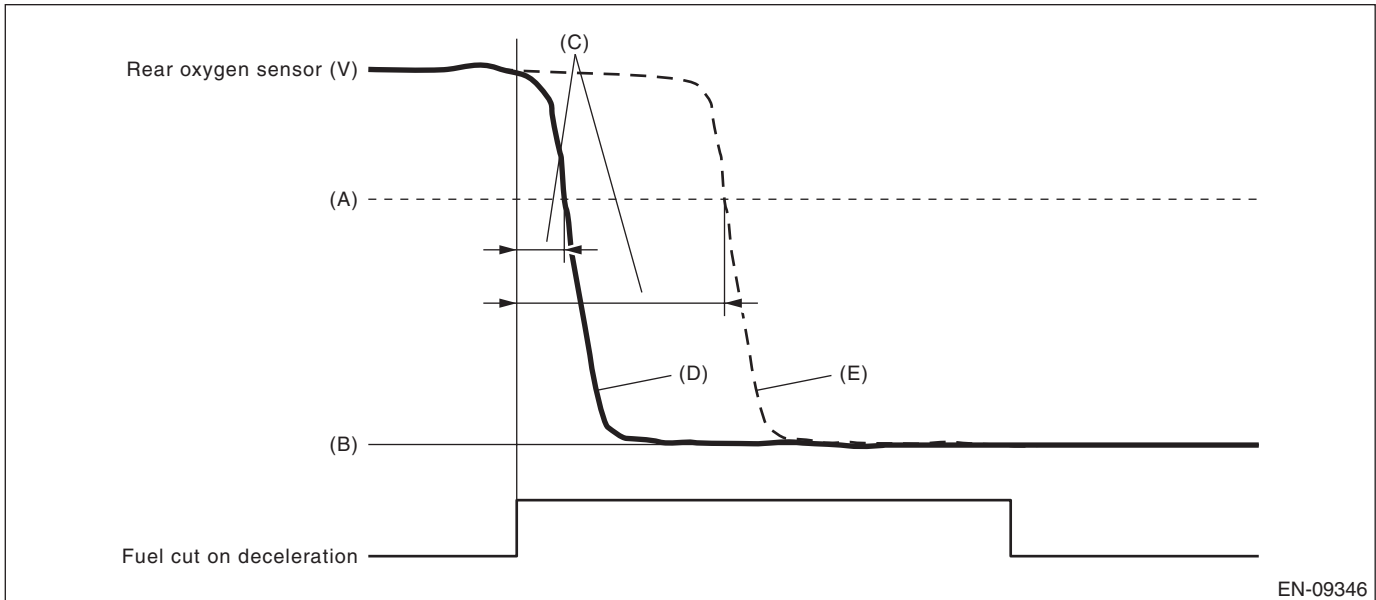
Perform diagnosis once during deceleration fuel cut from a constant and high speed driving, when rear oxygen sensor is warmed up sufficiently.

# Diagnostic Trouble Code (DTC) Detecting Criteria

GENERAL DESCRIPTION

## 5. DIAGNOSTIC METHOD

Detect the trouble by calculating the time from the beginning of the fuel cut to the beginning of the rear oxygen sensor voltage starting to drop.



EN-09346

(A) 0.5 V

(B) 0 V

(C) Diagnostic parameter

(D) Normal

(E) Malfunction

### • Abnormality Judgment

Judge as NG when the following conditions are established.

#### Judgment Value

Malfunction Criteria	Threshold Value
Time when rear oxygen sensor voltage changed to 0.5 V after the fuel cut started.	> 4000 ms

**Time Needed for Diagnosis:** 10 seconds

**Malfunction Indicator Light Illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

### • Normality Judgment

Judge as OK and clear the NG if the following conditions are established.

#### Judgment Value

Malfunction Criteria	Threshold Value
Time when rear oxygen sensor voltage changed to 0.5 V after the fuel cut started.	$\leq$ 4000 ms

**Time Needed for Diagnosis:** 10 seconds

# Diagnostic Trouble Code (DTC) Detecting Criteria

## GENERAL DESCRIPTION

### AS:DTC P013F O2 SENSOR DELAYED RESPONSE - LEAN TO RICH (BANK 1 SENSOR 2)

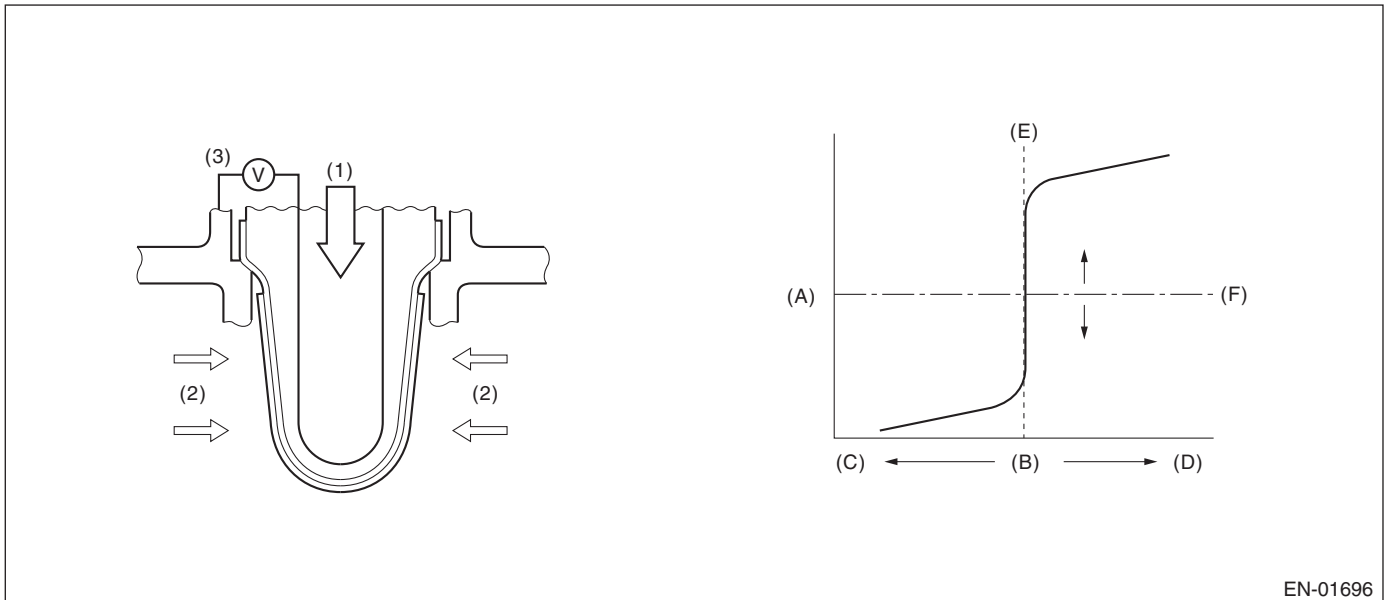
#### 1. OUTLINE OF DIAGNOSIS

Detect the delayed response of rear oxygen sensor output for lean → rich.

After the deceleration fuel cut has completed, detect the trouble by calculating the time when the rear oxygen sensor output increases to the predetermined voltages.

Judge as NG when the response time is larger than the threshold value.

#### 2. COMPONENT DESCRIPTION



EN-01696

(A) Electromotive force

(B) Air fuel ratio

(C) Rich

(D) Lean

(E) Theoretical air fuel ratio

(F) Comparative voltage

(1) Atmosphere

(2) Exhaust gas

(3) Electromotive force

#### 3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Battery voltage	> 10.9 V
Rear oxygen sensor closed loop control	Operation
Engine speed	≥ 500 rpm
Rear oxygen sensor voltage when fuel cut has completed	< 0.15 V
Fuel cut time	≥ 5000 ms
Engine coolant temperature when fuel cut has completed	≥ 75 °C (167 °F)
Estimated element temperature of rear oxygen sensor when fuel cut has completed	≥ 480 °C (896 °F)

#### 4. GENERAL DRIVING CYCLE

Perform diagnosis only once when recovering from the deceleration fuel cut continued for more than predetermined time with the rear oxygen sensor warmed up sufficiently.

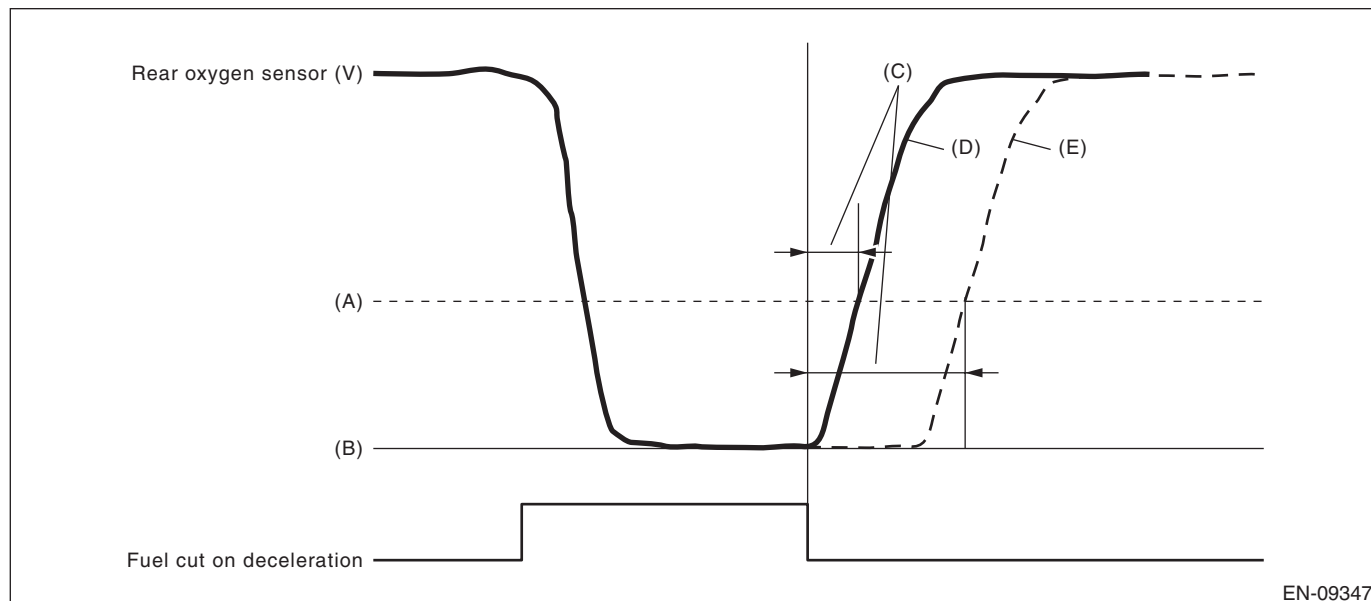


# Diagnostic Trouble Code (DTC) Detecting Criteria

GENERAL DESCRIPTION

## 5. DIAGNOSTIC METHOD

Detect the trouble by calculating the time from the completion of the fuel cut to the beginning of the rear oxygen sensor voltage starting to rise.



EN-09347

(A) 0.3 V

(B) 0 V

(C) Diagnostic parameter

(D) Normal

(E) Malfunction

### • Abnormality Judgment

Judge as NG when the following conditions are established.

#### Judgment Value

Malfunction Criteria	Threshold Value
The number of times that the rear oxygen sensor voltage changed to 0.3 V after the fuel cut has completed (time counter)	> 3750 time(s)

**Time Needed for Diagnosis:** 10 seconds

**Malfunction Indicator Light Illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

### • Normality Judgment

Judge as OK and clear the NG if the following conditions are established.

#### Judgment Value

Malfunction Criteria	Threshold Value
The number of times that the rear oxygen sensor voltage changed to 0.3 V after the fuel cut has completed (time counter)	$\leq$ 3750 time(s)

**Time Needed for Diagnosis:** 10 seconds

# Diagnostic Trouble Code (DTC) Detecting Criteria

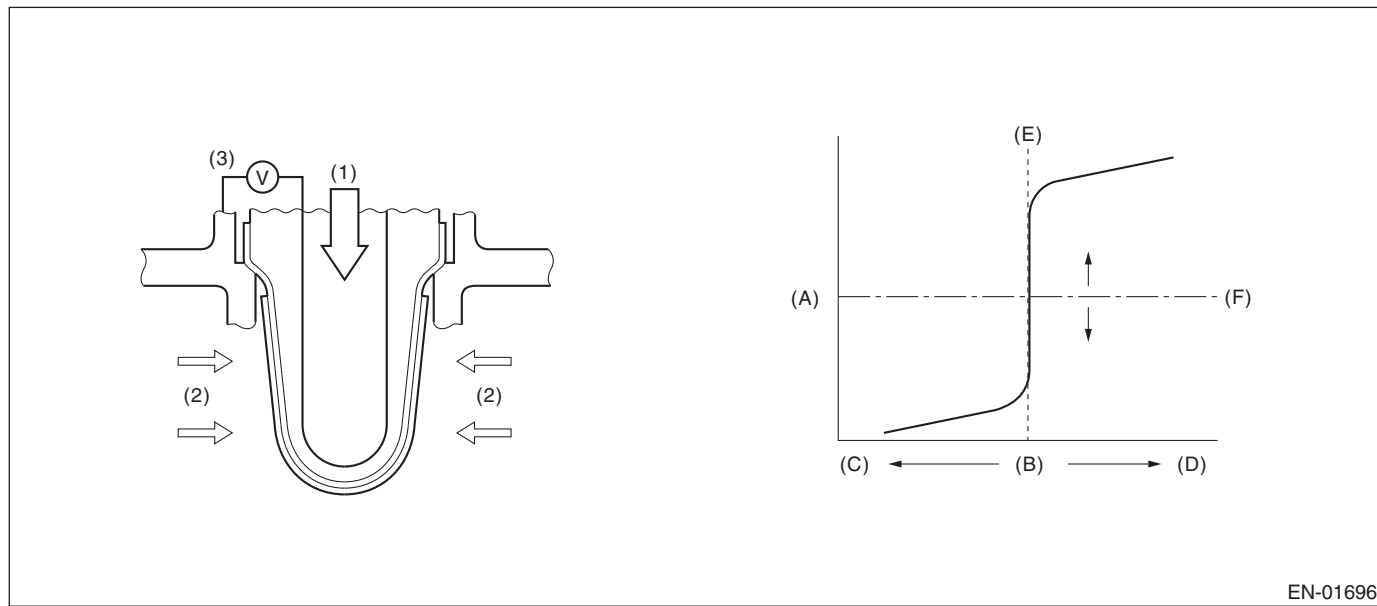
## GENERAL DESCRIPTION

### AT:DTC P0140 O2 SENSOR CIRCUIT NO ACTIVITY DETECTED (BANK1 SENSOR2)

#### 1. OUTLINE OF DIAGNOSIS

Detect the rear oxygen sensor open or short circuit. Judge as NG when the rear oxygen sensor voltage can be determined to be abnormal considering conditions such as intake air amount, engine coolant temperature, main feedback control and deceleration fuel cut.

#### 2. COMPONENT DESCRIPTION



EN-01696

- |                         |                                |                         |
|-------------------------|--------------------------------|-------------------------|
| (A) Electromotive force | (B) Air fuel ratio             | (C) Rich                |
| (D) Lean                | (E) Theoretical air fuel ratio | (F) Comparative voltage |
| (1) Atmosphere          | (2) Exhaust gas                | (3) Electromotive force |

#### 3. ENABLE CONDITION (USED ONLY FOR MALFUNCTION JUDGMENT)

Secondary Parameters	Enable Conditions
Closed loop control at the rear oxygen sensor	In operation
Target output voltage of rear oxygen sensor	$\geq 0.55 \text{ V} + 0.05 \text{ V}$
Amount of intake air	$\geq 10 \text{ g/s (0.35 oz/s)}$
Engine coolant temperature	$\geq 75 \text{ }^\circ\text{C (167 }^\circ\text{F)}$
Misfire detection every 200 rotations	$< 65535 \text{ time(s)}$
Front oxygen (A/F) sensor compensation coefficient	Not in limit value
Battery voltage	$\geq 10.9 \text{ V}$
Deceleration fuel cut of 5000 ms or more.	Experienced

#### 4. GENERAL DRIVING CYCLE

Perform the diagnosis once after starting the engine.

# Diagnostic Trouble Code (DTC) Detecting Criteria

GENERAL DESCRIPTION

## 5. DIAGNOSTIC METHOD

### • Abnormality Judgment

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

#### Judgment Value

Malfunction Criteria	Threshold Value
Minimum output voltage or Maximum output voltage	> 0.15 V  < 0.55 V

**Time Needed for Diagnosis:** 200000 ms

**Malfunction Indicator Light Illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

### • Normality Judgment

Judge as OK and clear the NG if the following conditions are established.

#### Judgment Value

Malfunction Criteria	Threshold Value
Diagnosis of the rear oxygen sensor voltage low side	Incomplete
Minimum output voltage	$\leq 0.15$ V
Maximum output voltage	$\geq 0.55$ V

# Diagnostic Trouble Code (DTC) Detecting Criteria

## GENERAL DESCRIPTION

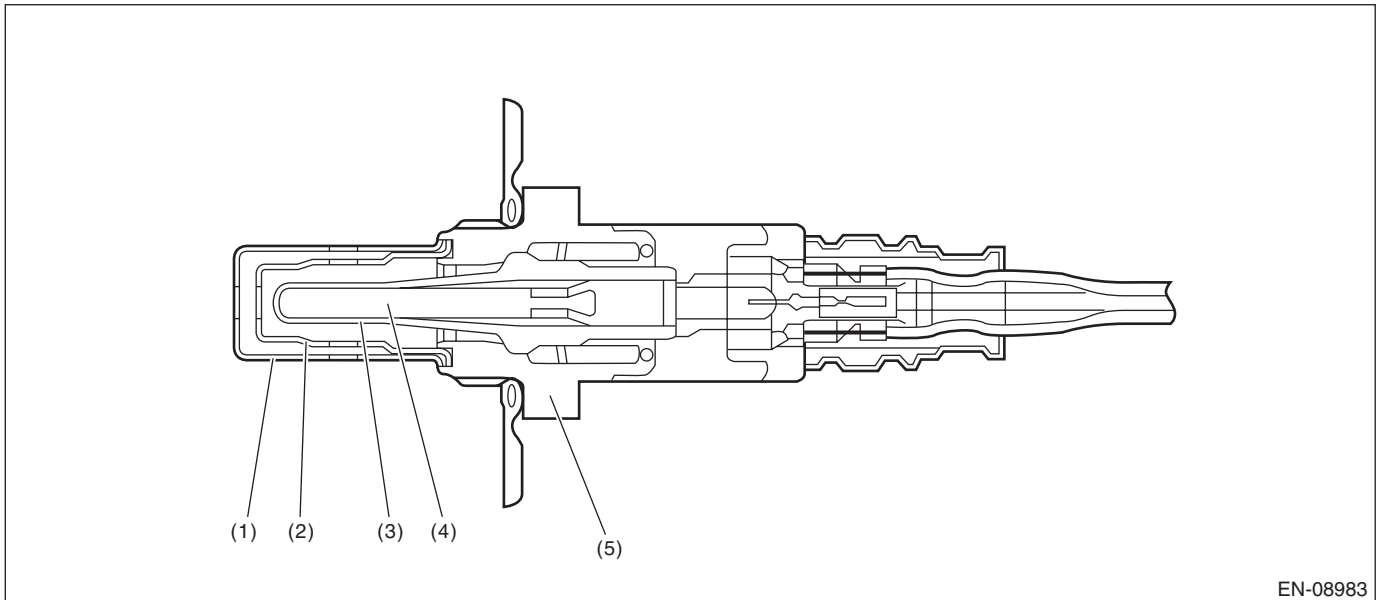
### AU:DTC P0141 O2 SENSOR HEATER CIRCUIT (BANK1 SENSOR2)

#### 1. OUTLINE OF DIAGNOSIS

Detect malfunction of the rear oxygen sensor heater.

Judge as NG if it is determined that the rear oxygen sensor impedance is large by observing the engine conditions.

#### 2. COMPONENT DESCRIPTION



(1) Element cover (outer)

(2) Element cover (inner)

(3) Sensor element

(4) Ceramic heater

(5) Sensor housing

#### 3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Battery voltage	$\geq 10.9 \text{ V}$
Elapsed time after starting the engine	$\geq 1000 \text{ ms}$
Engine coolant temperature	$\geq 75 \text{ }^\circ\text{C}$ (167 °F)
A/F sensor element impedance	$\leq 50 \text{ } \Omega$
A/F sensor heater control duty	$\leq 75 \%$
Rear oxygen sensor heater control duty	$< 70 \%$

#### 4. GENERAL DRIVING CYCLE

Perform the diagnosis continuously after 1000 ms seconds or more have passed since the engine started.

# Diagnostic Trouble Code (DTC) Detecting Criteria

GENERAL DESCRIPTION

## 5. DIAGNOSTIC METHOD

### • Abnormality Judgment

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

#### Judgment Value

Malfunction Criteria	Threshold Value
Output terminal for heater characteristics failure detection	Low

**Time Needed for Diagnosis:** 4 ms × 2500 time(s)

**Malfunction Indicator Light Illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

### • Normality Judgment

Judge as OK and clear the NG if the continuous time while the following conditions are established is more than the predetermined time.

#### Judgment Value

Malfunction Criteria	Threshold Value
Output terminal for heater characteristics failure detection	High

**Time Needed for Diagnosis:** 4 ms × 2500 time(s)

## AV:DTC P014A O2 SENSOR DELAYED RESPONSE - RICH TO LEAN (BANK 2 SENSOR 2)

### 1. OUTLINE OF DIAGNOSIS

NOTE:

For the detection standard, refer to DTC P013E. <Ref. to GD(H6DO)-80, DTC P013E O2 SENSOR DELAYED RESPONSE - RICH TO LEAN (BANK 1 SENSOR 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>

## AW:DTC P014B O2 SENSOR DELAYED RESPONSE - LEAN TO RICH (BANK 2 SENSOR 2)

### 1. OUTLINE OF DIAGNOSIS

NOTE:

For the detection standard, refer to DTC P013F. <Ref. to GD(H6DO)-82, DTC P013F O2 SENSOR DELAYED RESPONSE - LEAN TO RICH (BANK 1 SENSOR 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>

# Diagnostic Trouble Code (DTC) Detecting Criteria

## GENERAL DESCRIPTION

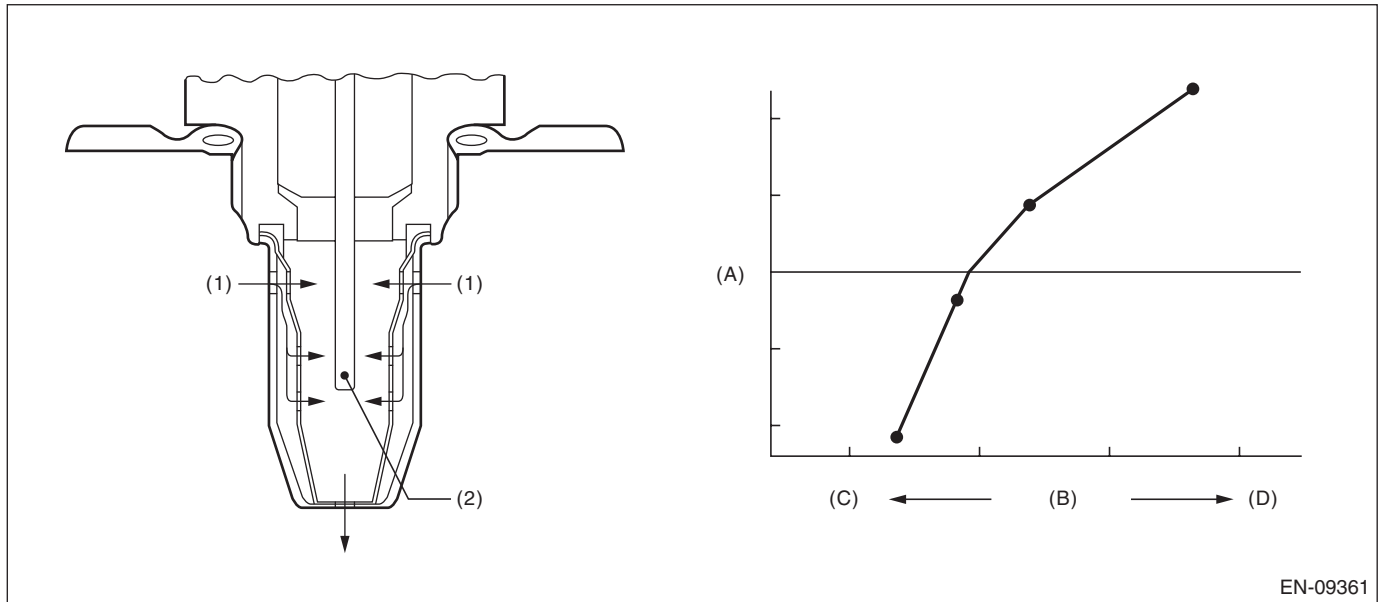
### AX:DTC P014C O2 SENSOR SLOW RESPONSE - RICH TO LEAN (BANK 1 SENSOR 1)

#### 1. OUTLINE OF DIAGNOSIS

Detect the slow response of front oxygen (A/F) sensor.

For diagnosis, detect the trouble by processing the  $\lambda$  waveform in normal driving without forcibly changing the target air fuel ratio.

#### 2. COMPONENT DESCRIPTION



EN-09361

(A) Electromotive force

(B) Air fuel ratio

(C) Lean

(D) Rich

(1) Exhaust gas

(2)  $ZrO_2$

#### 3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Battery voltage	> 10.9 V
Closed loop control with main feedback	Operation
Front oxygen (A/F) sensor impedance	$\geq 0 \Omega$ and < 50 $\Omega$
Elapsed time after starting the engine	$\geq 40000$ ms
Engine coolant temperature	$\geq 0$ °C (32 °F)
Engine speed	$\geq 1000$ rpm
Amount of intake air	$\geq 10$ g/s (0.35 oz/s)
After fuel cut	$\geq 3000$ ms
Learning value of EVAP conc. during purge	< 0.2
Total time of operating canister purge	$\geq 20$ s
Engine load change	< 0.02 g/rev (0 oz/rev)
Idle switch	OFF

#### 4. GENERAL DRIVING CYCLE

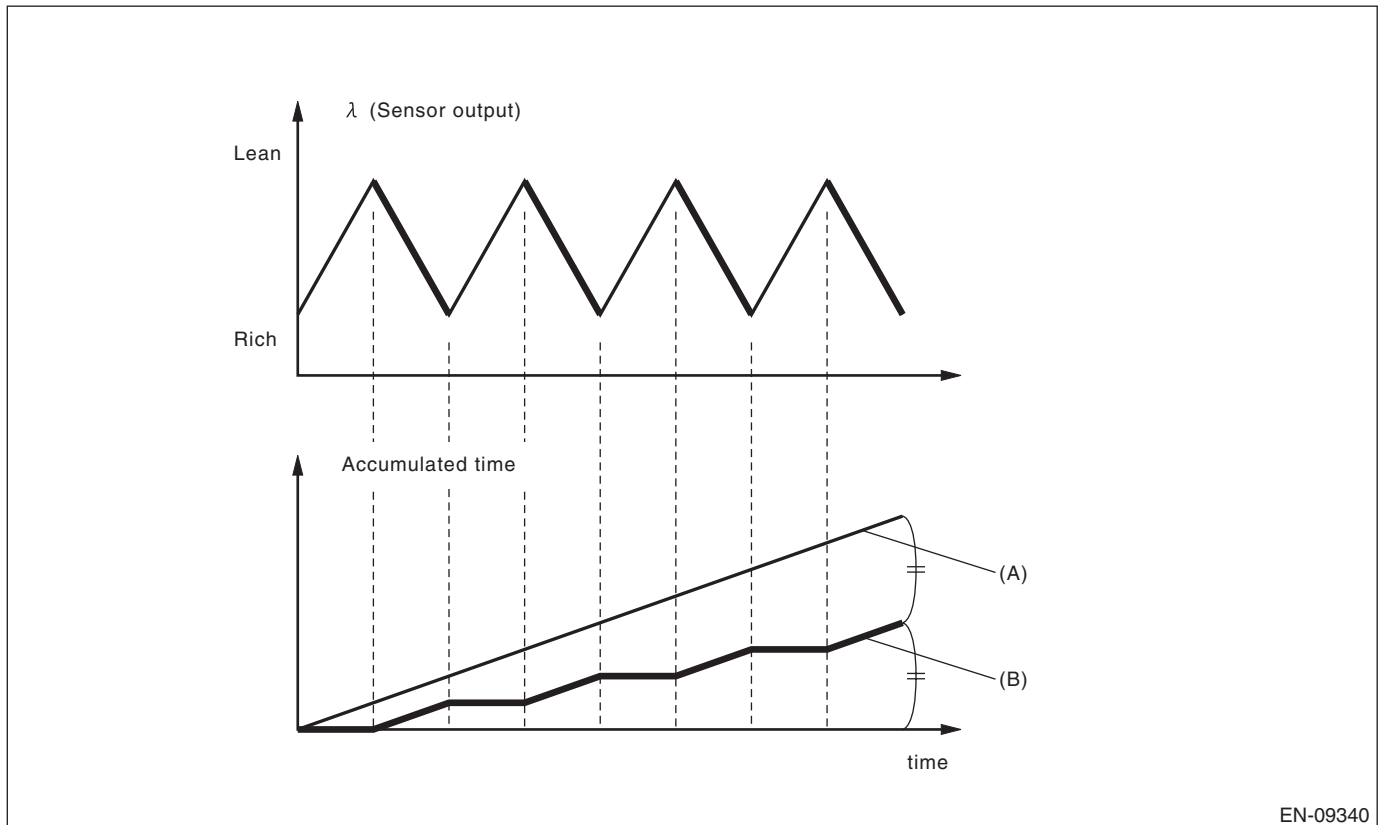
Perform diagnosis only once in a city driving including normal acceleration and deceleration.

# Diagnostic Trouble Code (DTC) Detecting Criteria

GENERAL DESCRIPTION

## 5. DIAGNOSTIC METHOD 1

Detect the malfunction by checking “Cumulative value of time when  $\lambda$  changes from lean  $\rightarrow$  rich” in comparison to “Time during which diagnosis is in progress”.



EN-09340

- (A) Time during which diagnosis is in progress      (B) Cumulative value of time when  $\lambda$  changes from lean  $\rightarrow$  rich

### • Abnormality Judgment

Judge as NG when the following conditions are established.

#### Judgment Value

Malfunction Criteria	Threshold Value	DTC
(Cumulative value of time when $\lambda$ changes from lean $\rightarrow$ rich) / (Time during which diagnosis is in progress)	< 0.4	P014C P014E
	> 0.68	P014D P014F

**Time Needed for Diagnosis:** 90 seconds

**Malfunction Indicator Light Illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

### • Normality Judgment

Judge as OK and clear the NG if the following conditions are established.

#### Judgment Value

Malfunction Criteria	Threshold Value	DTC
(Cumulative value of time when $\lambda$ changes from lean $\rightarrow$ rich) / (Time during which diagnosis is in progress)	$\geq 0.4$	P014C P014E
	$\leq 0.68$	P014D P014F

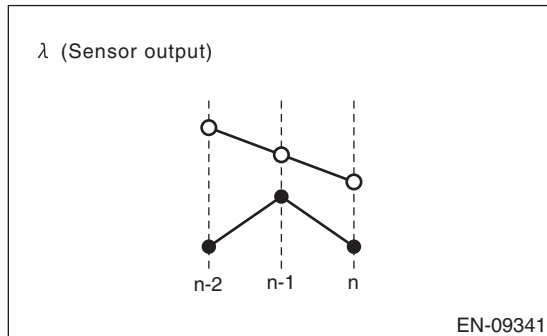
**Time Needed for Diagnosis:** 90 seconds

# Diagnostic Trouble Code (DTC) Detecting Criteria

## GENERAL DESCRIPTION

### 6. DIAGNOSTIC METHOD 2

Detect the malfunction by the cumulative value obtained from the amount of variation in  $\lambda$  change.



#### • Abnormality Judgment

Judge as NG when the following conditions are established.

#### Judgment Value

Malfunction Criteria	Threshold Value	DTC
Cumulative value obtained from the amount of variation in $\lambda$ change $\Sigma  (\lambda(n) - \lambda(n-1)) - (\lambda(n-1) - \lambda(n-2)) $	< Value from Map	P014C, P014D, P014E and P014F

#### Map

Cumulative value obtained from the amount of variation in $\lambda$ $\Sigma  \lambda(n) - \lambda(n-1) $	0.30	2.00
Cumulative value obtained from the amount of variation in $\lambda$ change	0.80	1.50

**Time Needed for Diagnosis:** 90 seconds

**Malfunction Indicator Light Illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

#### • Normality Judgment

Judge as OK and clear the NG if the following conditions are established.

#### Judgment Value

Malfunction Criteria	Threshold Value	DTC
Cumulative value obtained from the amount of variation in $\lambda$ change $\Sigma  (\lambda(n) - \lambda(n-1)) - (\lambda(n-1) - \lambda(n-2)) $	$\geq$ Value from Map	P014C, P014D, P014E and P014F

**Time Needed for Diagnosis:** 90 seconds

### AY:DTC P014D O2 SENSOR SLOW RESPONSE - LEAN TO RICH (BANK 1 SENSOR 1)

#### 1. OUTLINE OF DIAGNOSIS

NOTE:

For the detection standard, refer to DTC P014C. <Ref. to GD(H6DO)-88, DTC P014C O2 SENSOR SLOW RESPONSE - RICH TO LEAN (BANK 1 SENSOR 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

### AZ:DTC P014E O2 SENSOR SLOW RESPONSE - RICH TO LEAN (BANK 2 SENSOR 1)

#### 1. OUTLINE OF DIAGNOSIS

NOTE:

For the detection standard, refer to DTC P014C. <Ref. to GD(H6DO)-88, DTC P014C O2 SENSOR SLOW RESPONSE - RICH TO LEAN (BANK 1 SENSOR 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>



# Diagnostic Trouble Code (DTC) Detecting Criteria

GENERAL DESCRIPTION

## **BA:DTC P014F O2 SENSOR SLOW RESPONSE - LEAN TO RICH (BANK 2 SENSOR 1)**

### **1. OUTLINE OF DIAGNOSIS**

NOTE:

For the detection standard, refer to DTC P014C. <Ref. to GD(H6DO)-88, DTC P014C O2 SENSOR SLOW RESPONSE - RICH TO LEAN (BANK 1 SENSOR 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

## **BB:DTC P0151 O2 SENSOR CIRCUIT LOW VOLTAGE (BANK 2 SENSOR 1)**

### **1. OUTLINE OF DIAGNOSIS**

NOTE:

For the detection standard, refer to DTC P0131. <Ref. to GD(H6DO)-66, DTC P0131 O2 SENSOR CIRCUIT LOW VOLTAGE (BANK 1 SENSOR 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

## **BC:DTC P0152 O2 SENSOR CIRCUIT HIGH VOLTAGE (BANK 2 SENSOR 1)**

### **1. OUTLINE OF DIAGNOSIS**

NOTE:

For the detection standard, refer to DTC P0132. <Ref. to GD(H6DO)-68, DTC P0132 O2 SENSOR CIRCUIT HIGH VOLTAGE (BANK 1 SENSOR 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

## **BD:DTC P0154 O2 SENSOR CIRCUIT NO ACTIVITY DETECTED (BANK 2 SENSOR 1)**

### **1. OUTLINE OF DIAGNOSIS**

NOTE:

For the detection standard, refer to DTC P0134. <Ref. to GD(H6DO)-70, DTC P0134 O2 SENSOR CIRCUIT NO ACTIVITY DETECTED (BANK 1 SENSOR 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

## **BE:DTC P0157 O2 SENSOR CIRCUIT LOW VOLTAGE (BANK 2 SENSOR 2)**

### **1. OUTLINE OF DIAGNOSIS**

NOTE:

For the detection standard, refer to DTC P0137. <Ref. to GD(H6DO)-72, DTC P0137 O2 SENSOR CIRCUIT LOW VOLTAGE (BANK 1 SENSOR 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>

## **BF:DTC P0158 O2 SENSOR CIRCUIT HIGH VOLTAGE (BANK 2 SENSOR 2)**

### **1. OUTLINE OF DIAGNOSIS**

NOTE:

For the detection standard, refer to DTC P0137. <Ref. to GD(H6DO)-72, DTC P0137 O2 SENSOR CIRCUIT LOW VOLTAGE (BANK 1 SENSOR 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>

# Diagnostic Trouble Code (DTC) Detecting Criteria

## GENERAL DESCRIPTION

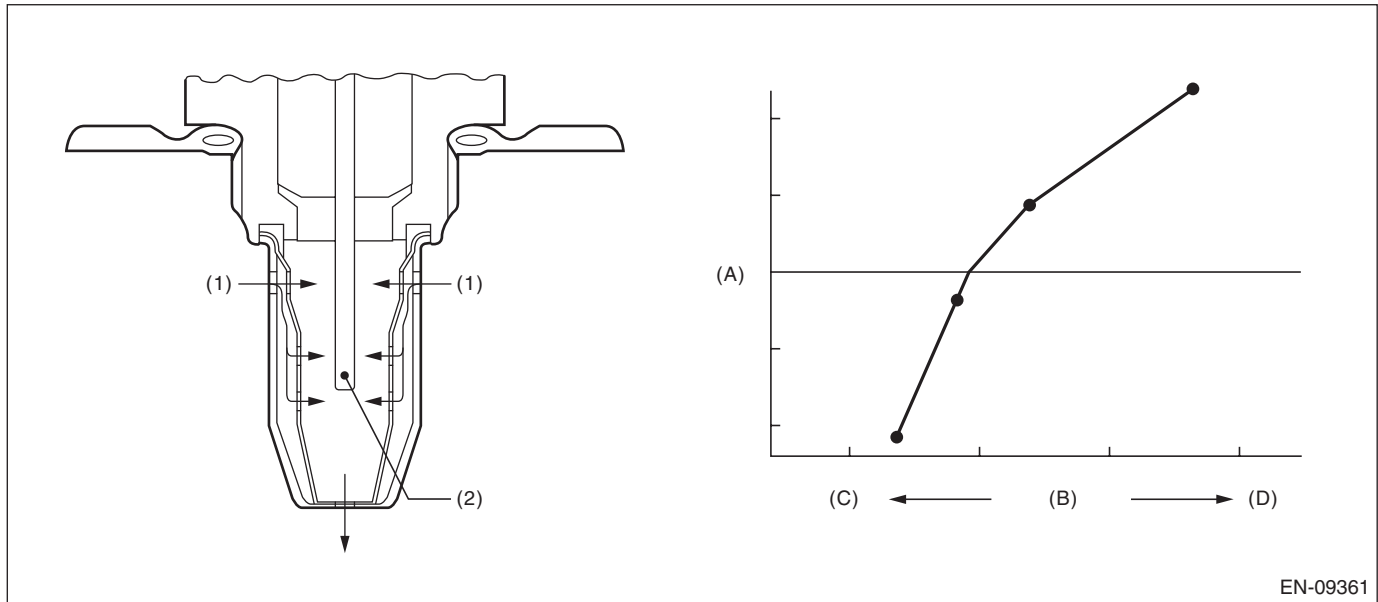
### BG:DTC P015A O2 SENSOR DELAYED RESPONSE - RICH TO LEAN (BANK 1 SENSOR 1)

#### 1. OUTLINE OF DIAGNOSIS

Detect the slow response of front oxygen (A/F) sensor.

For diagnosis, detect the trouble by processing the  $\lambda$  waveform in normal driving without forcibly changing the target air fuel ratio.

#### 2. COMPONENT DESCRIPTION



EN-09361

(A) Electromotive force

(B) Air fuel ratio

(C) Lean

(D) Rich

(1) Exhaust gas

(2) ZrO<sub>2</sub>

#### 3. ENABLE CONDITIONS

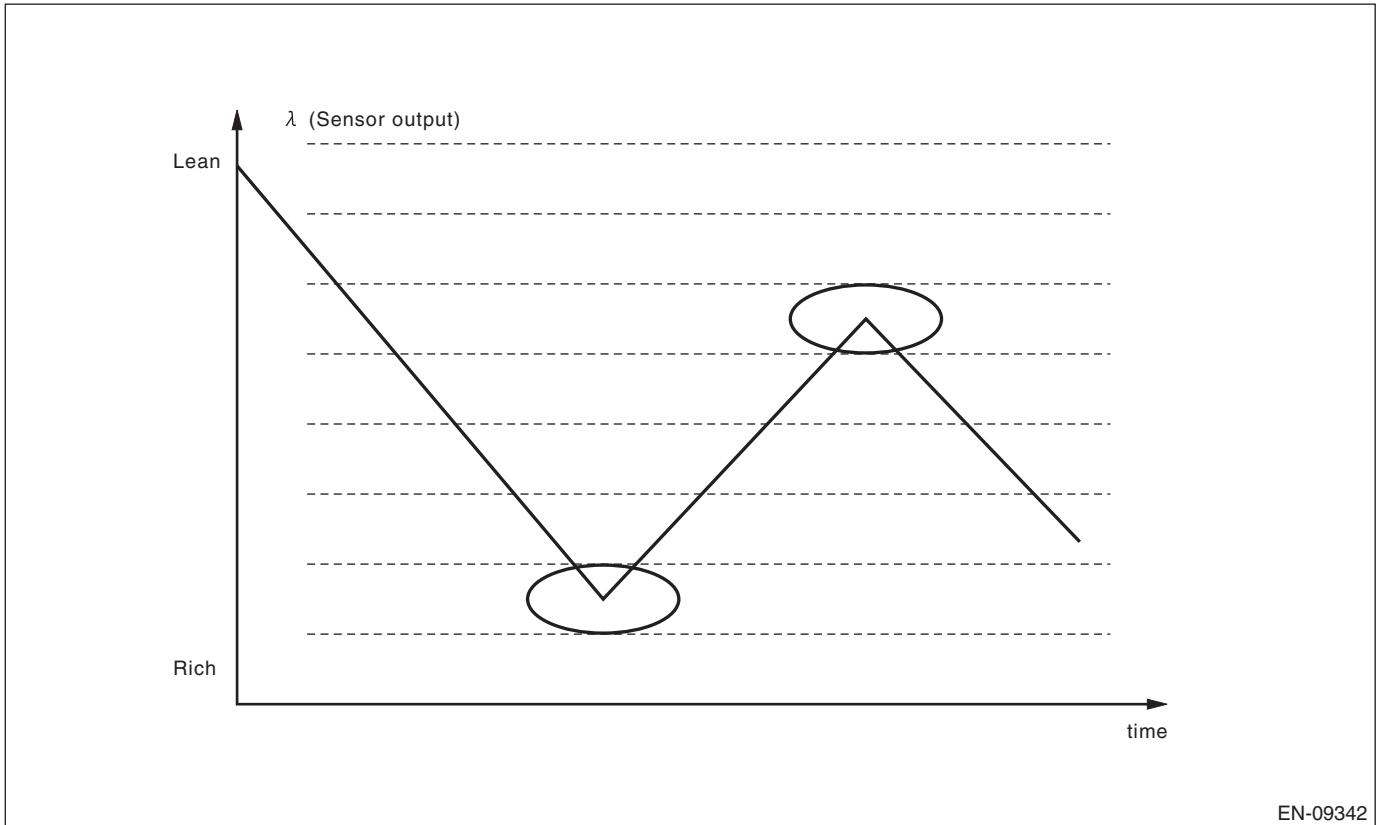
Secondary Parameters	Enable Conditions
Battery voltage	> 10.9 V
Closed loop control with main feedback	Operation
Front oxygen (A/F) sensor impedance	≥ 0 Ω and < 50 Ω
Elapsed time after starting the engine	≥ 40000 ms
Engine coolant temperature	≥ 0 °C (32 °F)
Engine speed	≥ 1000 rpm
Amount of intake air	≥ 10 g/s (0.35 oz/s)
After fuel cut	≥ 3000 ms
Learning value of EVAP conc. during purge	< 0.2
Total time of operating canister purge	≥ 20 s
Engine load change	< 0.02 g/rev (0 oz/rev)
Idle switch	OFF

#### 4. GENERAL DRIVING CYCLE

Perform diagnosis only once in a city driving including normal acceleration and deceleration.

## 5. DIAGNOSTIC METHOD 1

Detect the malfunction depending on the average value of time necessary for  $\lambda$  to inverse the air fuel ratio from "Lean  $\rightarrow$  Rich  $\rightarrow$  Lean" to "Rich  $\rightarrow$  Lean  $\rightarrow$  Rich".



EN-09342

### • Abnormality Judgment

Judge as NG when the following conditions are established.

#### Judgment Value

Malfunction Criteria	Threshold Value	DTC
Average value of time necessary for $\lambda$ to inverse the air fuel ratio to Lean $\rightarrow$ Rich $\rightarrow$ Lean.	> 170 ms	P015A P015C
Average value of time necessary for $\lambda$ to inverse the air fuel ratio to Rich $\rightarrow$ Lean $\rightarrow$ Rich.	> 375 ms	P015B P015D

**Time Needed for Diagnosis:** 50 times of inversion

**Malfunction Indicator Light Illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

### • Normality Judgment

Judge as OK and clear the NG if the following conditions are established.

#### Judgment Value

Malfunction Criteria	Threshold Value	DTC
Average value of time necessary for $\lambda$ to inverse the air fuel ratio to Lean $\rightarrow$ Rich $\rightarrow$ Lean.	$\leq$ 170 ms	P015A P015C
Average value of time necessary for $\lambda$ to inverse the air fuel ratio to Rich $\rightarrow$ Lean $\rightarrow$ Rich.	$\leq$ 375 ms	P015B P015D

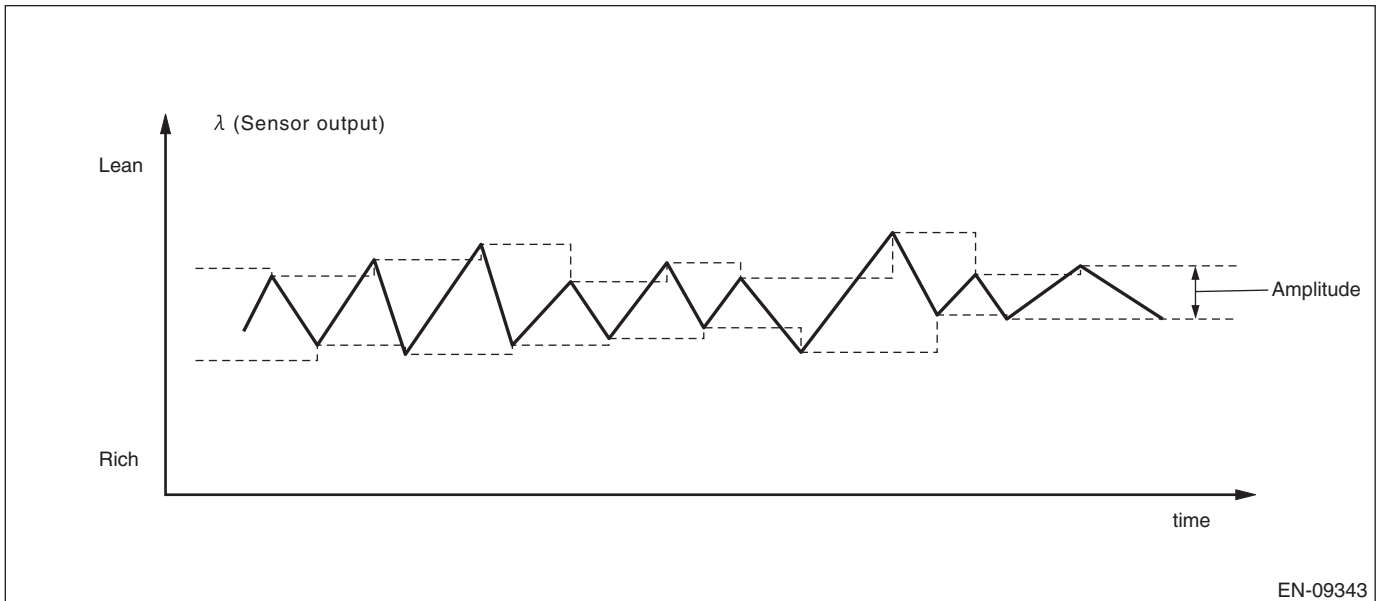
**Time Needed for Diagnosis:** 50 times of inversion

# Diagnostic Trouble Code (DTC) Detecting Criteria

## GENERAL DESCRIPTION

### 6. DIAGNOSTIC METHOD 2

Detect the malfunction by calculating the average amplitude of  $\lambda$ .



EN-09343

#### • Abnormality Judgment

Judge as NG when the following conditions are established.

#### Judgment Value

Malfunction Criteria	Threshold Value	DTC
Average value for $\lambda$ amplitude	> 0.055	P015A, P015B, P015C and P015D

**Time Needed for Diagnosis:** 60 seconds

**Malfunction Indicator Light Illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

#### • Normality Judgment

Judge as OK and clear the NG if the following conditions are established.

#### Judgment Value

Malfunction Criteria	Threshold Value	DTC
Average value for $\lambda$ amplitude	$\leq$ 0.055	P015A, P015B, P015C and P015D

**Time Needed for Diagnosis:** 60 seconds

# Diagnostic Trouble Code (DTC) Detecting Criteria

GENERAL DESCRIPTION

## **BH:DTC P015B O2 SENSOR DELAYED RESPONSE - LEAN TO RICH (BANK 1 SENSOR 1)**

### **1. OUTLINE OF DIAGNOSIS**

#### **NOTE:**

For the detection standard, refer to DTC P015A. <Ref. to GD(H6DO)-92, DTC P015A O2 SENSOR DELAYED RESPONSE - RICH TO LEAN (BANK 1 SENSOR 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

## **BI: DTC P015C O2 SENSOR DELAYED RESPONSE - RICH TO LEAN (BANK 2 SENSOR 1)**

### **1. OUTLINE OF DIAGNOSIS**

#### **NOTE:**

For the detection standard, refer to DTC P015A. <Ref. to GD(H6DO)-92, DTC P015A O2 SENSOR DELAYED RESPONSE - RICH TO LEAN (BANK 1 SENSOR 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

## **BJ:DTC P015D O2 SENSOR DELAYED RESPONSE - LEAN TO RICH (BANK 2 SENSOR 1)**

### **1. OUTLINE OF DIAGNOSIS**

#### **NOTE:**

For the detection standard, refer to DTC P015A. <Ref. to GD(H6DO)-92, DTC P015A O2 SENSOR DELAYED RESPONSE - RICH TO LEAN (BANK 1 SENSOR 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

## **BK:DTC P0160 O2 SENSOR CIRCUIT NO ACTIVITY DETECTED (BANK2 SENSOR2)**

### **1. OUTLINE OF DIAGNOSIS**

#### **NOTE:**

For the detection standard, refer to DTC P0140. <Ref. to GD(H6DO)-84, DTC P0140 O2 SENSOR CIRCUIT NO ACTIVITY DETECTED (BANK1 SENSOR2), Diagnostic Trouble Code (DTC) Detecting Criteria.>

## **BL:DTC P0161 O2 SENSOR HEATER CIRCUIT (BANK2 SENSOR2)**

### **1. OUTLINE OF DIAGNOSIS**

#### **NOTE:**

For the detection standard, refer to DTC P0141. <Ref. to GD(H6DO)-86, DTC P0141 O2 SENSOR HEATER CIRCUIT (BANK1 SENSOR2), Diagnostic Trouble Code (DTC) Detecting Criteria.>

# Diagnostic Trouble Code (DTC) Detecting Criteria

## GENERAL DESCRIPTION

### BM:DTC P0171 SYSTEM TOO LEAN (BANK 1)

#### 1. OUTLINE OF DIAGNOSIS

Detect fuel system malfunction by the amount of main feedback control.

##### Diagnostic method

Fuel system is diagnosed by comparing the target air fuel ratio calculated by ECM with the actual air fuel ratio measured by sensor.

#### 2. ENABLE CONDITION

Secondary Parameters	Enable Conditions
A/F main learning system	In operation
Engine coolant temperature	$\geq 75\text{ }^{\circ}\text{C}$ (167 °F)
Engine load change	$< 0.02\text{ g/rev}$ (0 oz/rev)
Engine load	$\geq$ Value of Map 1

##### Map 1

Engine speed (rpm)	Idling	700	1000	1500	2000	2500	3000	3500	4000	4500	5000
Measured value (g (oz)/rev)	na	0.357 (0.01)	0.25 (0.01)	0.25 (0.01)	0.317 (0.01)	0.326 (0.01)	0.337 (0.01)	0.397 (0.01)	0.439 (0.02)	0.454 (0.02)	0.454 (0.02)

#### 3. GENERAL DRIVING CYCLE

Perform the diagnosis continuously at idling or at a constant speed after warming up the engine.

#### 4. DIAGNOSTIC METHOD

##### • Abnormality Judgment

Compare the diagnostic value (fsobd) with the threshold value, and if a condition meeting the malfunction criteria below continues for 10 s  $\times$  5 time(s) or more, judge that there is a fault in the fuel system.

##### Judgment Value

Malfunction Criteria	Threshold Value
$\text{fsobd} = (\text{sglmd} - \text{tglm da}) + \text{faf} + \text{flaf}$ In this case: sglmd = measured lambda tglm da = target lambda faf = main feedback compensation coefficient (every 64 milliseconds) flaf = main feedback learning compensation coefficient	$\geq$ Value from Map 2

##### Map 2

Amount of air (g (oz)/s)	0 (0)	3.2 (0.11)	6.4 (0.23)	9.6 (0.34)	12.8 (0.45)	16 (0.56)	19.2 (0.68)
fsobdL1 (%)	1.4	1.4	1.332	1.265	1.265	1.265	1.265

**Time Needed for Diagnosis:** 10 s  $\times$  5 time(s)

**Malfunction Indicator Light Illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

##### • Normality Judgment

Judge as OK and clear the NG if the continuous time while the following conditions are established is more than the predetermined time.

##### Judgment Value

Malfunction Criteria	Threshold Value
$\text{fsobd} = (\text{sglmd} - \text{tglm da}) + \text{faf} + \text{flaf}$	$< 1.15$

**Time Needed for Diagnosis:** 10 s

# Diagnostic Trouble Code (DTC) Detecting Criteria

GENERAL DESCRIPTION

## BN:DTC P0172 SYSTEM TOO RICH (BANK 1)

### 1. OUTLINE OF DIAGNOSIS

Detect fuel system malfunction by the amount of main feedback control.

#### Diagnostic method

Fuel system is diagnosed by comparing the target air fuel ratio calculated by ECM with the actual air fuel ratio measured by sensor.

### 2. ENABLE CONDITION

Secondary Parameters	Enable Conditions
A/F main learning system	In operation
Engine coolant temperature	$\geq 75\text{ }^{\circ}\text{C}$ (167 $^{\circ}\text{F}$ )
Engine load change	$\leq 0.02\text{ g/rev}$ (0 oz/rev)
Learning value of EVAP conc.	$< 0.2$
Cumulative time of canister purge after engine start	$\geq 20\text{ s}$
Continuous period after canister purge starting	$\geq 5000\text{ ms}$
Engine load	$\geq$ Value of Map 1

#### Map 1

Engine speed (rpm)	Idling	700	1000	1500	2000	2500	3000	3500	4000	4500	5000
Measured value (g (oz)/rev)	na	0.357 (0.01)	0.25 (0.01)	0.25 (0.01)	0.317 (0.01)	0.326 (0.01)	0.337 (0.01)	0.397 (0.01)	0.439 (0.02)	0.454 (0.02)	0.454 (0.02)

### 3. GENERAL DRIVING CYCLE

Perform the diagnosis continuously at idling or at a constant speed after warming up the engine.

### 4. DIAGNOSTIC METHOD

#### • Abnormality Judgment

Compare the diagnostic value (fsobd) with the threshold value, and if a condition meeting the malfunction criteria below continues for 10 s  $\times$  10 time(s) or more, judge that there is a fault in the fuel system.

#### Judgment Value

Malfunction Criteria	Threshold Value
$\text{fsobd} = (\text{sglmd} - \text{tglm da}) + \text{faf} + \text{flaf}$ In this case: sglmd = measured lambda tglm da = target lambda faf = main feedback compensation coefficient (every 64 milliseconds) flaf = main feedback learning compensation coefficient	$<$ Value of Map 2

#### Map 2

Amount of air (g (oz)/s)	0 (0)	3.2 (0.11)	6.4 (0.23)	9.6 (0.34)	12.8 (0.45)	16 (0.56)	19.2 (0.68)
fsobdL1 (%)	0.6	0.6	0.688	0.715	0.725	0.735	0.735

**Time Needed for Diagnosis:** 10 s  $\times$  10 time(s)

**Malfunction Indicator Light Illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

#### • Normality Judgment

Judge as OK if the status that the criteria below are met continues for 10 seconds.

#### Judgment Value

Malfunction Criteria	Threshold Value
$\text{fsobd} = (\text{sglmd} - \text{tglm da}) + \text{faf} + \text{flaf}$	$\geq 0.85$

**Time Needed for Diagnosis:** 10 s

## Diagnostic Trouble Code (DTC) Detecting Criteria

### GENERAL DESCRIPTION

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#### **BO:DTC P0174 SYSTEM TOO LEAN (BANK 2)**

##### **1. OUTLINE OF DIAGNOSIS**

###### NOTE:

For the detection standard, refer to DTC P0171. <Ref. to GD(H6DO)-96, DTC P0171 SYSTEM TOO LEAN (BANK 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

#### **BP:DTC P0175 SYSTEM TOO RICH (BANK 2)**

##### **1. OUTLINE OF DIAGNOSIS**

###### NOTE:

For the detection standard, refer to DTC P0172. <Ref. to GD(H6DO)-97, DTC P0172 SYSTEM TOO RICH (BANK 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>



# Diagnostic Trouble Code (DTC) Detecting Criteria

GENERAL DESCRIPTION

## BQ:DTC P0181 FUEL TEMPERATURE SENSOR “A” CIRCUIT RANGE/PERFORMANCE

### 1. OUTLINE OF DIAGNOSIS

Detect faults in the fuel temperature sensor output properties.

Diagnosis is performed in two methods (drift diagnosis and stuck diagnosis). If either is NG, judge as NG. If both are OK, Judge as OK and clear the NG.

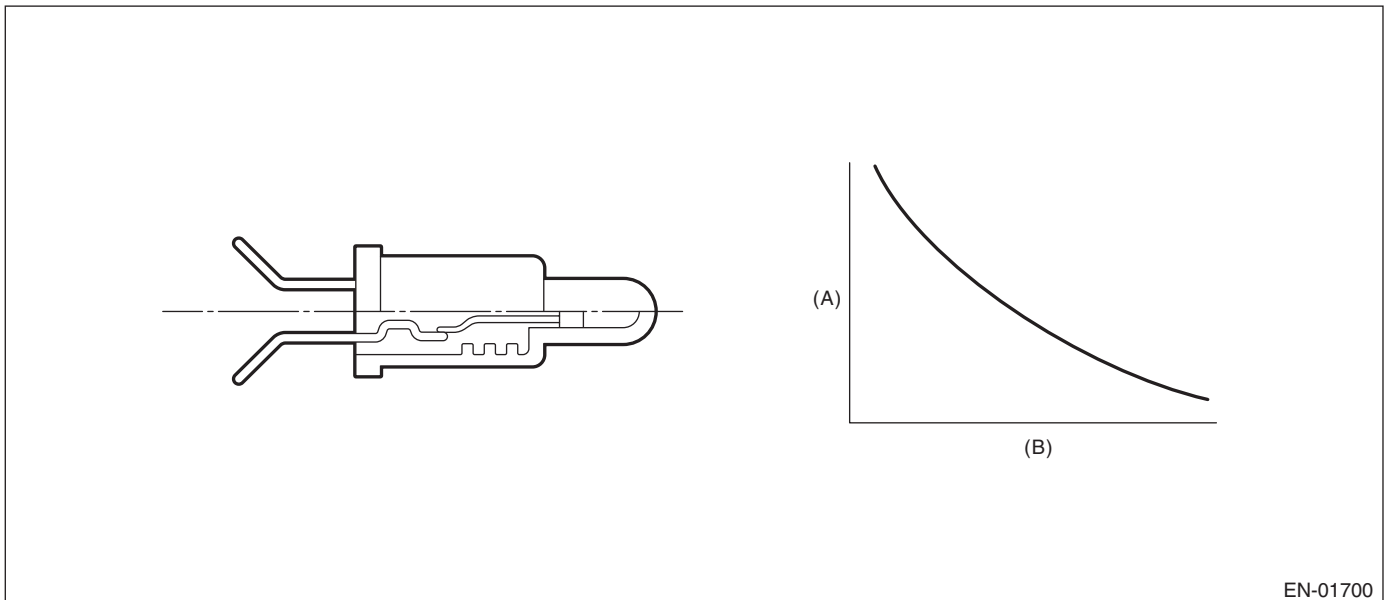
#### Drift Diagnosis

Normally fuel temperature is lower than engine coolant temperature. When the fuel temperature becomes higher than the engine coolant temperature, the range is considered to be shifted, and judged as NG.

#### Stuck Diagnosis

As the engine warms up (cumulative amount of intake air after starting is large), if the fuel temperature which should rise does not, determine as being stuck and NG.

### 2. COMPONENT DESCRIPTION



EN-01700

(A) Resistance value ( $\Omega$ )

(B) Fuel temperature °C (°F)

### 3. ENABLE CONDITION

#### DRIFT DIAGNOSIS

Secondary Parameters	Enable Conditions
None	

### 4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

# Diagnostic Trouble Code (DTC) Detecting Criteria

## GENERAL DESCRIPTION

### 5. DIAGNOSTIC METHOD

#### • Abnormality Judgment

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

#### Judgment Value

Malfunction Criteria	Threshold Value
Fuel level	≥ 9.6 ℓ (2.54 US gal, 2.11 Imp gal)
Elapsed time after starting the engine	≥ 20 s
Engine coolant temperature – Engine coolant temperature at engine start	> 10 °C (18°F)
Fuel temperature – Engine coolant temperature	≥ 10 °C (18°F)
Battery voltage	≥ 10.9 V

**Time Needed for Diagnosis:** 120 s

**Malfunction Indicator Light Illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

#### • Normality Judgment

Judge as OK and clear the NG if the continuous time while the following conditions are established is more than the predetermined time.

#### Judgment Value

Malfunction Criteria	Threshold Value
Fuel level	≥ 9.6 ℓ (2.54 US gal, 2.11 Imp gal)
Elapsed time after starting the engine	≥ 20 s
Engine coolant temperature – Engine coolant temperature at engine start	> 10 °C (18°F)
Fuel temperature – Engine coolant temperature	< 10 °C (18°F)
Battery voltage	≥ 10.9 V
Engine coolant temperature	< 75 °C (167 °F)

**Time Needed for Diagnosis:** Less than 1 second

### 6. ENABLE CONDITION

#### Stuck Diagnosis

Secondary Parameters	Enable Conditions
Elapsed time after starting the engine	≥ 20000 ms
Battery voltage	≥ 10.9 V

### 7. GENERAL DRIVING CYCLE

Always perform diagnosis after 20 seconds have passed since the engine started.

# Diagnostic Trouble Code (DTC) Detecting Criteria

GENERAL DESCRIPTION

## 8. DIAGNOSTIC METHOD

### • Abnormality Judgment

Judge as NG when the following conditions are established.

#### Judgment Value

Malfunction Criteria	Threshold Value
Accumulated amount of intake air	$\geq 551043$ g (19435.29 oz)
Fuel temperature difference between Max. and Min.	$< 2$ °C (3.6°F)

**Time Needed for Diagnosis:** Less than 1 second

**Malfunction Indicator Light Illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

### • Normality Judgment

Judge as OK and clear the NG if the following conditions are established.

#### Judgment Value

Malfunction Criteria	Threshold Value
Fuel temperature difference between Max. and Min.	$\geq 2$ °C (3.6°F)

**Time Needed for Diagnosis:** Less than 1 second

# Diagnostic Trouble Code (DTC) Detecting Criteria

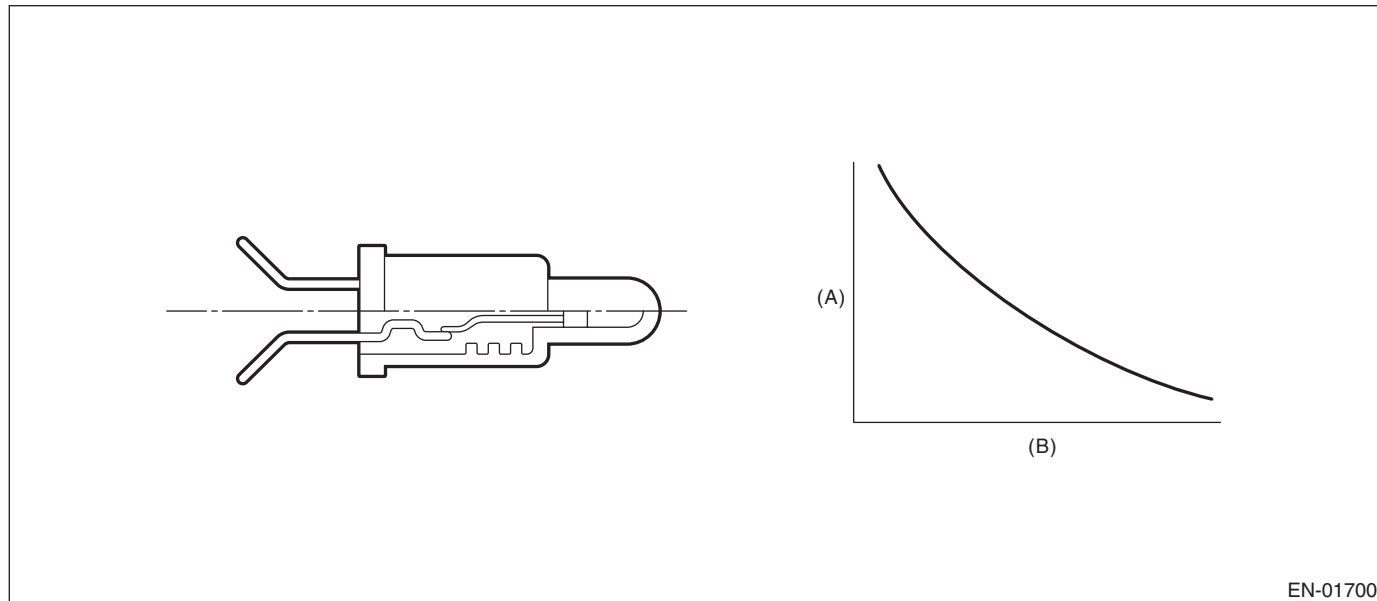
## GENERAL DESCRIPTION

### BR:DTC P0182 FUEL TEMPERATURE SENSOR “A” CIRCUIT LOW INPUT

#### 1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit of fuel temperature sensor.  
Judge as NG if out of specification.

#### 2. COMPONENT DESCRIPTION



(A) Resistance value ( $\Omega$ )

(B) Fuel temperature °C (°F)

#### 3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
None	

#### 4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

# Diagnostic Trouble Code (DTC) Detecting Criteria

GENERAL DESCRIPTION

## 5. DIAGNOSTIC METHOD

### • Abnormality Judgment

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

#### Judgment Value

Malfunction Criteria	Threshold Value
Output voltage	< 0.344 V
Battery voltage	≥ 10.9 V

**Time Needed for Diagnosis:** 2500 ms

**Malfunction Indicator Light Illumination:** Illuminates as soon as a malfunction occurs.

### • Normality Judgment

Judge as OK and clear the NG if the continuous time while the following conditions are established is more than the predetermined time.

#### Judgment Value

Malfunction Criteria	Threshold Value
Output voltage	≥ 0.344 V
Battery voltage	≥ 10.9 V

**Time Needed for Diagnosis:** Less than 1 second

# Diagnostic Trouble Code (DTC) Detecting Criteria

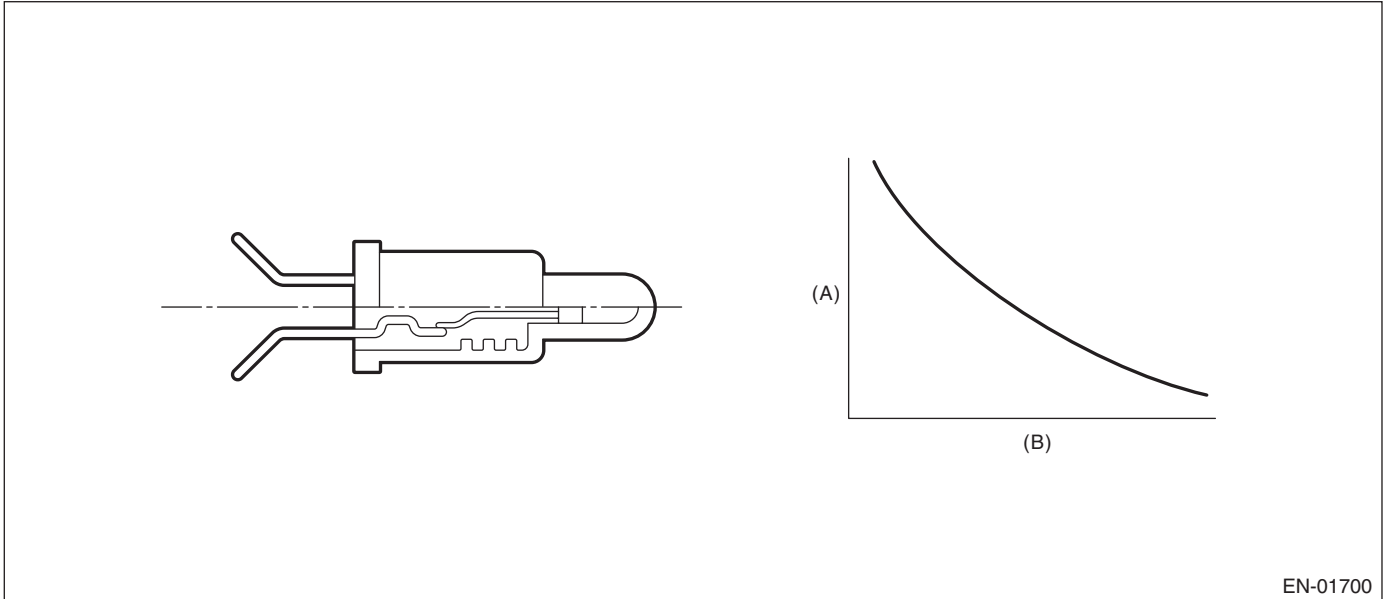
## GENERAL DESCRIPTION

### BS:DTC P0183 FUEL TEMPERATURE SENSOR “A” CIRCUIT HIGH INPUT

#### 1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit of fuel temperature sensor.  
Judge as NG if out of specification.

#### 2. COMPONENT DESCRIPTION



(A) Resistance value ( $\Omega$ )

(B) Fuel temperature °C (°F)

#### 3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
None	

#### 4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

# Diagnostic Trouble Code (DTC) Detecting Criteria

GENERAL DESCRIPTION

## 5. DIAGNOSTIC METHOD

### • Abnormality Judgment

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

#### Judgment Value

Malfunction Criteria	Threshold Value
Output voltage	$\geq 4.722 \text{ V}$
Battery voltage	$\geq 10.9 \text{ V}$

**Time Needed for Diagnosis:** 2500 ms

**Malfunction Indicator Light Illumination:** Illuminates as soon as a malfunction occurs.

### • Normality Judgment

Judge as OK and clear the NG if the continuous time while the following conditions are established is more than the predetermined time.

#### Judgment Value

Malfunction Criteria	Threshold Value
Output voltage	$< 4.722 \text{ V}$
Battery voltage	$\geq 10.9 \text{ V}$

**Time Needed for Diagnosis:** Less than 1 second

# Diagnostic Trouble Code (DTC) Detecting Criteria

## GENERAL DESCRIPTION

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### BT:DTC P0196 ENGINE OIL TEMPERATURE SENSOR CIRCUIT RANGE/PERFORMANCE

#### 1. OUTLINE OF DIAGNOSIS

Detect for abnormal values in the oil temperature sensor output properties.

Judge as NG when the oil temperature does not rise even though the engine is running under a condition where it should rise.

#### 2. ENABLE CONDITION

Secondary Parameters	Enable Conditions
Battery voltage	≥ 10.9 V
Engine speed	≥ Value from Map

#### Map

Engine coolant temperature °C (°F)	-40 (-40)	-30 (-22)	-20 (-4)	-10 (14)	0 (32)	10 (50)	20 (68)	30 (86)
Engine speed rpm	500	500	500	500	500	500	500	500

Engine coolant temperature °C (°F)	40 (104)	50 (122)	60 (140)	70 (158)	80 (176)	90 (194)	100 (212)	110 (230)
Engine speed rpm	500	500	500	500	500	500	500	500

#### 3. GENERAL DRIVING CYCLE

Perform the diagnosis continuously after starting the engine.



# Diagnostic Trouble Code (DTC) Detecting Criteria

GENERAL DESCRIPTION

## 4. DIAGNOSTIC METHOD

### • Abnormality Judgment

Judge as NG when the following conditions are established.

#### Judgment Value

Malfunction Criteria	Threshold Value
Engine oil temperature After engine start oil temperature sensor characteristic diagnosis timer.	< 50 °C (122 °F) ≥ Judgment value for after engine start oil temperature sensor characteristic diagnosis timer

After engine start oil temperature sensor characteristic diagnosis timer (timer for diagnosis).

a. Timer stop at fuel cut

b. During the driving conditions except a) above, timer counts up as follows.

64 ms + TOILCNT ms (when at 64 ms)

Where, TOILCNT is determined as follows,

TOILCNT = 0 at idle switch ON

For TOILCNT at Idle switch off, refer to the following table.

		Vehicle speed km/h (MPH)							
		0 (0)	8 (5)	16 (9.9)	24 (14.9)	32 (19.9)	40 (24.9)	48 (29.8)	56 (34.8)
Temperature °C (°F)	-40 (-40)	0 ms	32 ms	76 ms	130 ms	149 ms	171 ms	176 ms	181 ms
	-30 (-22)	0 ms	93 ms	121 ms	157 ms	170 ms	184 ms	193 ms	203 ms
	-20 (-4)	0 ms	123 ms	148 ms	184 ms	193 ms	204 ms	214 ms	226 ms
	-10 (14)	0 ms	166 ms	187 ms	208 ms	223 ms	239 ms	242 ms	245 ms
	0 (32)	0 ms	187 ms	212 ms	243 ms	252 ms	262 ms	266 ms	270 ms

After engine start oil temperature characteristic diagnosis timer judgment value (t).

$t = 3600000 \text{ ms} - 60000 \text{ ms} \times T_i$  ( $t \geq 2400000$ )

$T_i$  = The lowest coolant temperature after starting the engine.

**Time Needed for Diagnosis:** Less than 1 second

**Malfunction Indicator Light Illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

### • Normality Judgment

Judge as OK and clear the NG if the following conditions are established.

#### Judgment Value

Malfunction Criteria	Threshold Value
Engine oil temperature	≥ 50 °C (122 °F)

**Time Needed for Diagnosis:** Less than 1 second

# Diagnostic Trouble Code (DTC) Detecting Criteria

## GENERAL DESCRIPTION

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### BU:DTC P0197 ENGINE OIL TEMPERATURE SENSOR LOW

#### 1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit of the oil temperature sensor.  
Judge as NG when outside of the judgment value.

#### 2. ENABLE CONDITION

Secondary Parameters	Enable Conditions
None	

#### 3. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

#### 4. DIAGNOSTIC METHOD

##### • Abnormality Judgment

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

##### Judgment Value

Malfunction Criteria	Threshold Value
Output voltage	< 0.197 V

**Time Needed for Diagnosis:** 500 ms

**Malfunction Indicator Light Illumination:** Illuminates as soon as a malfunction occurs.

##### • Normality Judgment

Judge as OK and clear the NG if the continuous time while the following conditions are established is more than the predetermined time.

##### Judgment Value

Malfunction Criteria	Threshold Value
Output voltage	$\geq 0.197$ V

**Time Needed for Diagnosis:** Less than 1 second

# Diagnostic Trouble Code (DTC) Detecting Criteria

GENERAL DESCRIPTION

## BV:DTC P0198 ENGINE OIL TEMPERATURE SENSOR HIGH

### 1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit of the oil temperature sensor.  
Judge as NG when outside of the judgment value.

### 2. ENABLE CONDITION

Secondary Parameters	Enable Conditions
None	

### 3. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

### 4. DIAGNOSTIC METHOD

#### • Abnormality Judgment

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

#### Judgment Value

Malfunction Criteria	Threshold Value
Output voltage	$\geq 4.694$ V

**Time Needed for Diagnosis:** 500 ms

**Malfunction Indicator Light Illumination:** Illuminates as soon as a malfunction occurs.

#### • Normality Judgment

Judge as OK and clear the NG if the continuous time while the following conditions are established is more than the predetermined time.

#### Judgment Value

Malfunction Criteria	Threshold Value
Output voltage	$< 4.694$ V

**Time Needed for Diagnosis:** Less than 1 second

# Diagnostic Trouble Code (DTC) Detecting Criteria

## GENERAL DESCRIPTION

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### BW:DTC P0201 INJECTOR #1

#### 1. OUTLINE OF DIAGNOSIS

Based on the self-diagnostic result of the injector driving IC, judge the injector driving circuit as normal or abnormal.

Injector driving IC detects the status of “fuel remains injected” or “fuel is not injected” as a malfunction.

#### 2. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Battery voltage	$\geq 10.9 \text{ V}$
Elapsed time after starting the engine	$> 1 \text{ s}$
Engine speed	$> 500 \text{ rpm}$
Injection time	$\geq 1000 \mu\text{s}$ and $< 120000000/\text{engine speed} - 1000 \mu\text{s}$
Injection status	Not during fuel cut and Not during asynchronous injection controlled by crankshaft position sensor

#### 3. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

#### 4. DIAGNOSTIC METHOD

##### • Abnormality Judgment

Judge as NG when the following conditions are established.

##### Judgment Value

Malfunction Criteria	Threshold Value
Injector driving IC information	Malfunction

**Time Needed for Diagnosis:** 2500 ms

**Malfunction Indicator Light Illumination:** Illuminates as soon as a malfunction occurs.

##### • Normality Judgment

Judge as OK and clear the NG if the following conditions are established.

##### Judgment Value

Malfunction Criteria	Threshold Value
Injector driving IC information	Normal

**Time Needed for Diagnosis:** Less than 1 second

# Diagnostic Trouble Code (DTC) Detecting Criteria

GENERAL DESCRIPTION

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## **BX:DTC P0202 INJECTOR #2**

### **1. OUTLINE OF DIAGNOSIS**

NOTE:

For the detection standard, refer to DTC P0201. <Ref. to GD(H6DO)-110, DTC P0201 INJECTOR #1, Diagnostic Trouble Code (DTC) Detecting Criteria.>

## **BY:DTC P0203 INJECTOR #3**

### **1. OUTLINE OF DIAGNOSIS**

NOTE:

For the detection standard, refer to DTC P0201. <Ref. to GD(H6DO)-110, DTC P0201 INJECTOR #1, Diagnostic Trouble Code (DTC) Detecting Criteria.>

## **BZ:DTC P0204 INJECTOR #4**

### **1. OUTLINE OF DIAGNOSIS**

NOTE:

For the detection standard, refer to DTC P0201. <Ref. to GD(H6DO)-110, DTC P0201 INJECTOR #1, Diagnostic Trouble Code (DTC) Detecting Criteria.>

## **CA:DTC P0205 INJECTOR #5**

### **1. OUTLINE OF DIAGNOSIS**

NOTE:

For the detection standard, refer to DTC P0201. <Ref. to GD(H6DO)-110, DTC P0201 INJECTOR #1, Diagnostic Trouble Code (DTC) Detecting Criteria.>

## **CB:DTC P0206 INJECTOR #6**

### **1. OUTLINE OF DIAGNOSIS**

NOTE:

For the detection standard, refer to DTC P0201. <Ref. to GD(H6DO)-110, DTC P0201 INJECTOR #1, Diagnostic Trouble Code (DTC) Detecting Criteria.>

# Diagnostic Trouble Code (DTC) Detecting Criteria

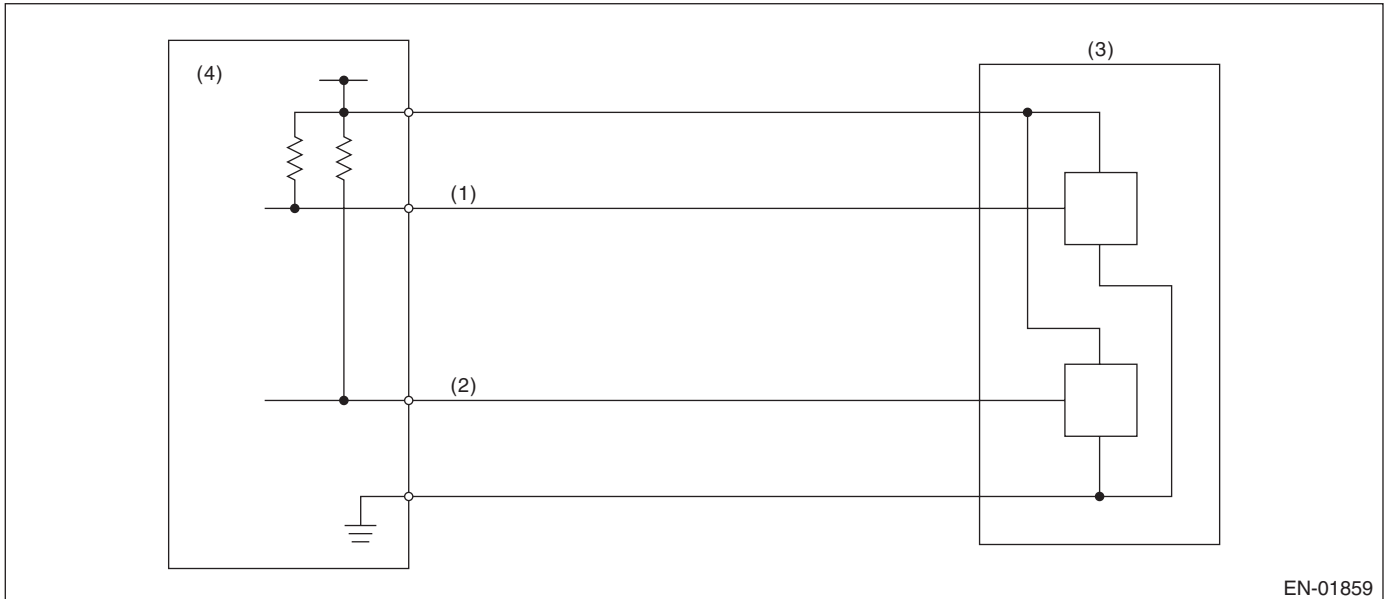
## GENERAL DESCRIPTION

### CC:DTC P0222 THROTTLE/PEDAL POSITION SENSOR/SWITCH “B” CIRCUIT LOW

#### 1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit of throttle position sensor 2.  
Judge as NG if out of specification.

#### 2. COMPONENT DESCRIPTION



(1) Throttle position sensor 1 signal  
(2) Throttle position sensor 2 signal

(3) Throttle position sensor

(4) Engine control module (ECM)

#### 3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
Ignition switch	ON
Battery voltage	$\geq 6\text{ V}$

#### 4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

# Diagnostic Trouble Code (DTC) Detecting Criteria

GENERAL DESCRIPTION

## 5. DIAGNOSTIC METHOD

### • Abnormality Judgment

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

#### Judgment Value

Malfunction Criteria	Threshold Value
Sensor 2 input voltage	$\leq 1.07 \text{ V}$

**Time Needed for Diagnosis:** 24 ms

**Malfunction Indicator Light Illumination:** Illuminates as soon as a malfunction occurs.

### • Normality Judgment

Judge as OK and clear the NG if the continuous time while the following conditions are established is more than the predetermined time.

#### Judgment Value

Malfunction Criteria	Threshold Value
Sensor 2 input voltage	$> 1.07 \text{ V}$

**Time Needed for Diagnosis:** 24 ms

# Diagnostic Trouble Code (DTC) Detecting Criteria

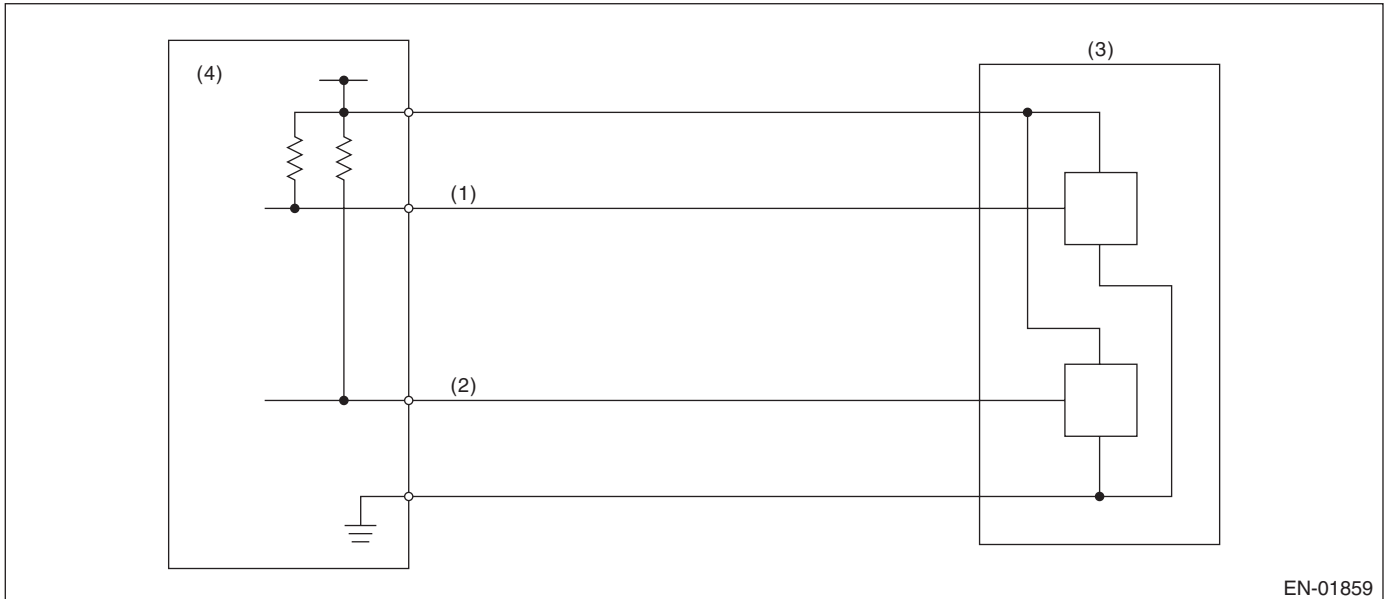
## GENERAL DESCRIPTION

### CD:DTC P0223 THROTTLE/PEDAL POSITION SENSOR/SWITCH “B” CIRCUIT HIGH

#### 1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit of throttle position sensor 2.  
Judge as NG if out of specification.

#### 2. COMPONENT DESCRIPTION



(1) Throttle position sensor 1 signal  
(2) Throttle position sensor 2 signal

(3) Throttle position sensor

(4) Engine control module (ECM)

#### 3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
Ignition switch	ON
Battery voltage	$\geq 6\text{ V}$

#### 4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.



# Diagnostic Trouble Code (DTC) Detecting Criteria

GENERAL DESCRIPTION

## 5. DIAGNOSTIC METHOD

### • Abnormality Judgment

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

#### Judgment Value

Malfunction Criteria	Threshold Value
Sensor 2 input voltage	$\geq 4.858$ V

**Time Needed for Diagnosis:** 24 ms

**Malfunction Indicator Light Illumination:** Illuminates as soon as a malfunction occurs.

### • Normality Judgment

Judge as OK and clear the NG if the continuous time while the following conditions are established is more than the predetermined time.

#### Judgment Value

Malfunction Criteria	Threshold Value
Sensor 2 input voltage	$< 4.858$ V

**Time Needed for Diagnosis:** 24 ms

# Diagnostic Trouble Code (DTC) Detecting Criteria

## GENERAL DESCRIPTION

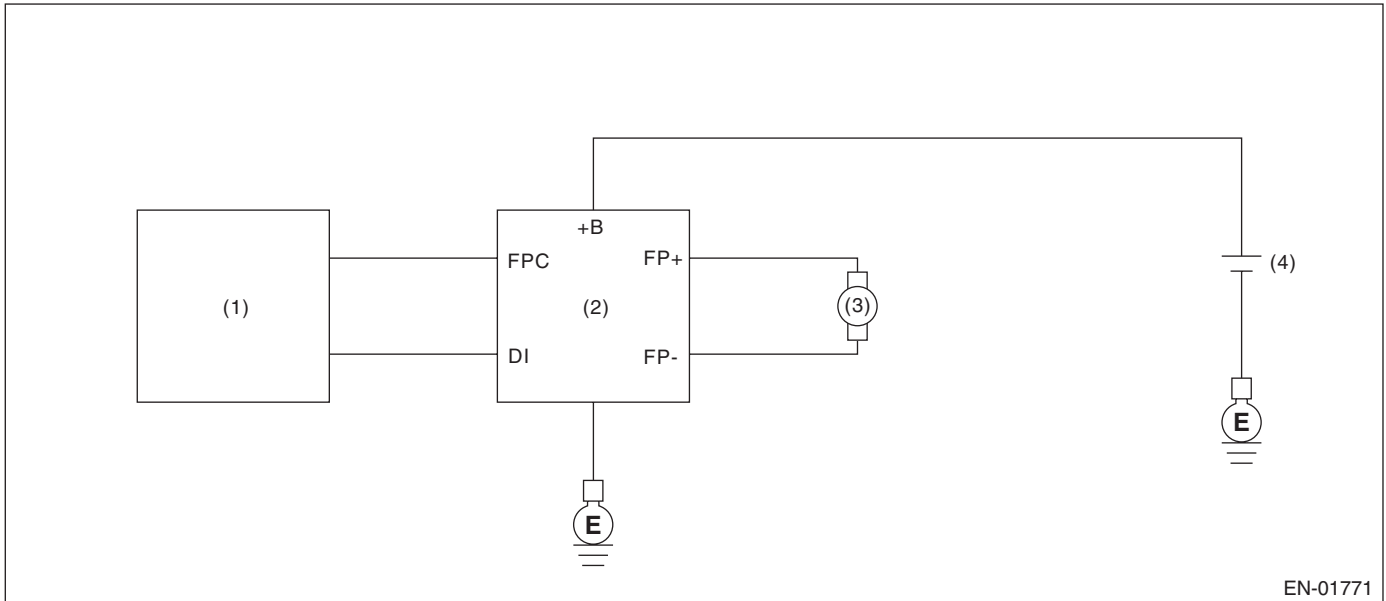
### CE:DTC P0230 FUEL PUMP PRIMARY CIRCUIT

#### 1. OUTLINE OF DIAGNOSIS

Detect the malfunction of fuel pump control unit.

Judge as NG when the NG signal is sent through a diagnostic line coming from the fuel pump control unit. Fuel pump control unit detects the open or short circuit malfunction for each line, and then sends NG signals if one of them is found NG.

#### 2. COMPONENT DESCRIPTION



(1) Engine control module (ECM)

(3) Fuel pump

(4) Battery

(2) Fuel pump control unit

#### 3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
None	

#### 4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

# Diagnostic Trouble Code (DTC) Detecting Criteria

GENERAL DESCRIPTION

## 5. DIAGNOSTIC METHOD

### • Abnormality Judgment

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

#### Judgment Value

Malfunction Criteria	Threshold Value
Battery voltage	$\geq 8$ V
Elapsed time after starting the engine	$\geq 180000$ ms
Fuel pump control	ON
Fuel pump control unit output diagnosis signal	Low
Fuel level	$\geq 9.6$ ℓ (2.54 US gal, 2.11 Imp gal)

**Time Needed for Diagnosis:** 2500 ms

**Malfunction Indicator Light Illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

### • Normality Judgment

Judge as OK and clear the NG if the continuous time while the following conditions are established is more than the predetermined time.

#### Judgment Value

Malfunction Criteria	Threshold Value
Battery voltage	$\geq 8$ V
Elapsed time after starting the engine	$\geq 180000$ ms
Fuel pump control	ON
Fuel pump control unit output diagnosis signal	High
Fuel level	$\geq 9.6$ ℓ (2.54 US gal, 2.11 Imp gal)

**Time Needed for Diagnosis:** Less than 1 second

# Diagnostic Trouble Code (DTC) Detecting Criteria

## GENERAL DESCRIPTION

### CF:DTC P0301 CYLINDER 1 MISFIRE DETECTED

#### 1. OUTLINE OF DIAGNOSIS

Detect the presence of misfire occurrence. (Revolution fluctuation method)

Monitoring Misfire which influences exhaust deterioration (1.5 times of FTP) and catalyst damage is made obligatory by the law. Misfire affecting these two has two patterns below:

- Intermittent misfire (The same cylinder misfires in random, or different cylinders misfire in random.): FTP 1.5 times misfire
- Every time misfire (The same cylinder misfires every time.): FTP 1.5 times misfire, Catalyst damage misfire

The following detecting methods are adopted for these detection.

1) Intermittent misfire: FTP 1.5 times misfire

- 120° Interval Difference Method
- 360° Interval Difference Method (whole range)
- 720° Interval Difference Method (3,000 rpm or more)

2) Misfire every time: FTP 1.5 times misfire, Catalyst damage misfire

- 360° Interval Difference Method

#### 2. ENABLE CONDITION

Secondary Parameters	Enable Conditions
All secondary parameters enable conditions	≥ 1024 ms
Intake manifold pressure change at 120°CA	< Value of Map 1
Throttle position change during 16 milliseconds	< 20 °
Fuel shut-off function	Not in operation
Fuel level	≥ 9.6 ℓ (2.54 US gal, 2.11 Imp gal)
Vehicle dynamic control or AT torque control	Not in operation
Evaporative system leak check	Not in operation
Engine speed	450 rpm — 6500 rpm
Intake manifold pressure	≥ Value from Map 2
Battery voltage	≥ 8 V
Fuel parameter determination	Not extremely low volatility
Elapsed time after starting the engine	≥ 0 ms
Engine speed change during 32 milliseconds	< 500 rpm

#### Map 1

rpm	700	1000	1500	2000	2500	3000	3500	4000
kPa (mmHg, inHg)	20 (150, 5.9)	20 (150, 5.9)	20 (150, 5.9)	20 (150, 5.9)	20 (150, 5.9)	20 (150, 5.9)	20 (150, 5.9)	20 (150, 5.9)

rpm	4500	5000	5500	6000	6500	7000
kPa (mmHg, inHg)	20 (150, 5.9)	20 (150, 5.9)	20 (150, 5.9)	20 (150, 5.9)	20 (150, 5.9)	20 (150, 5.9)

# Diagnostic Trouble Code (DTC) Detecting Criteria

GENERAL DESCRIPTION

## Map 2

- Normal ignition

		Barometric pressure (kPa (mmHg, inHg))						
		60 (450.0, 17.7)	66.7 (500.0, 19.7)	72.2 (542.0, 21.3)	85.2 (639.0, 25.2)	86.2 (647.0, 25.5)	92 (690.0, 27.2)	100.5 (754.0, 29.7)
Engine speed (rpm)	700	22.4 (168.4, 6.6)	22.4 (168.4, 6.6)	22.4 (168.4, 6.6)	23.3 (174.5, 6.9)	23.6 (176.7, 7)	24.4 (183.4, 7.2)	26.5 (198.7, 7.8)
	1000	21.3 (159.7, 6.3)	21.3 (159.7, 6.3)	21.3 (159.7, 6.3)	22.4 (168.2, 6.6)	22.8 (170.8, 6.7)	23.4 (175.4, 6.9)	25.3 (189.8, 7.5)
	1500	20.8 (156.1, 6.1)	20.8 (156.1, 6.1)	20.8 (156.1, 6.1)	22 (165.2, 6.5)	22.2 (166.7, 6.6)	22.9 (172.2, 6.8)	24.6 (184.3, 7.3)
	2000	22.3 (167.4, 6.6)	22.3 (167.4, 6.6)	22.3 (167.4, 6.6)	23.9 (179.2, 7.1)	24.2 (181.8, 7.2)	25 (187.6, 7.4)	26.9 (201.7, 7.9)
	2500	20.7 (155.0, 6.1)	20.7 (155.0, 6.1)	20.7 (155.0, 6.1)	21.8 (163.9, 6.5)	21.9 (164.4, 6.5)	22.8 (171.0, 6.7)	24.3 (182.1, 7.2)
	3000	22.3 (167.1, 6.6)	22.3 (167.1, 6.6)	22.3 (167.1, 6.6)	23.6 (177.0, 7)	23.9 (179.5, 7.1)	24.8 (185.7, 7.3)	26.4 (197.9, 7.8)
	3500	25.3 (189.9, 7.5)	25.3 (189.9, 7.5)	25.3 (189.9, 7.5)	26.6 (199.3, 7.8)	26.2 (196.9, 7.8)	27.4 (205.7, 8.1)	28.5 (214.1, 8.4)
	4000	25 (187.4, 7.4)	25 (187.4, 7.4)	25 (187.4, 7.4)	26.6 (199.9, 7.9)	25.9 (194.6, 7.7)	27.1 (203.0, 8)	28 (210.3, 8.3)
	4500	26.5 (199.1, 7.8)	26.5 (199.1, 7.8)	26.5 (199.1, 7.8)	27.6 (206.9, 8.1)	26.7 (200.2, 7.9)	28 (209.8, 8.3)	28.7 (215.3, 8.5)
	5000	28.5 (213.8, 8.4)	28.5 (213.8, 8.4)	28.5 (213.8, 8.4)	29.5 (221.6, 8.7)	28.6 (214.9, 8.5)	29.9 (224.5, 8.8)	30.7 (230.0, 9.1)
	5500	30.5 (228.5, 9)	30.5 (228.5, 9)	30.5 (228.5, 9)	31.5 (236.3, 9.3)	30.6 (229.6, 9)	31.9 (239.2, 9.4)	32.6 (244.8, 9.6)
	6000	32.4 (243.2, 9.6)	32.4 (243.2, 9.6)	32.4 (243.2, 9.6)	33.5 (251.0, 9.9)	32.6 (244.3, 9.6)	33.8 (253.9, 10)	34.6 (259.5, 10.2)
	6400	34 (255.0, 10)	34 (255.0, 10)	34 (255.0, 10)	35 (262.8, 10.3)	34.1 (256.1, 10.1)	35.4 (265.7, 10.5)	36.2 (271.2, 10.7)

kPa (mmHg, inHg)

# Diagnostic Trouble Code (DTC) Detecting Criteria

## GENERAL DESCRIPTION

- Idling ignition

		Barometric pressure (kPa (mmHg, inHg))						
		60 (450.0, 17.7)	66.7 (500.0, 19.7)	72.2 (542.0, 21.3)	85.2 (639.0, 25.2)	86.2 (647.0, 25.5)	92 (690.0, 27.2)	100.5 (754.0, 29.7)
Engine speed (rpm)	700	22.4 (168.4, 6.6)	22.4 (168.4, 6.6)	22.4 (168.4, 6.6)	23.3 (174.5, 6.9)	23.6 (176.7, 7)	24.4 (183.4, 7.2)	26.5 (198.7, 7.8)
	1000	21.4 (160.4, 6.3)	21.4 (160.4, 6.3)	21.4 (160.4, 6.3)	22.5 (168.9, 6.6)	24.2 (181.3, 7.1)	26.3 (197.7, 7.8)	23.9 (179.3, 7.1)
	1500	21.8 (163.4, 6.4)	21.8 (163.4, 6.4)	21.8 (163.4, 6.4)	23 (172.5, 6.8)	24.8 (185.8, 7.3)	25.8 (193.3, 7.6)	24.5 (183.5, 7.2)
	2000	26.9 (202.1, 8)	26.9 (202.1, 8)	26.9 (202.1, 8)	28.5 (213.9, 8.4)	28.6 (214.5, 8.4)	29.9 (224.6, 8.8)	31.7 (237.6, 9.4)
	2500	27 (202.7, 8)	27 (202.7, 8)	27 (202.7, 8)	28.2 (211.5, 8.3)	28.4 (212.7, 8.4)	29.1 (218.5, 8.6)	30.7 (230.2, 9.1)
	3000	29 (217.3, 8.6)	29 (217.3, 8.6)	29 (217.3, 8.6)	30.3 (227.2, 8.9)	30.5 (228.6, 9)	32.2 (241.4, 9.5)	33.2 (249.1, 9.8)
	3500	32 (240.1, 9.5)	32 (240.1, 9.5)	32 (240.1, 9.5)	33.3 (249.5, 9.8)	33.9 (254.6, 10)	34.5 (259.0, 10.2)	36 (270.1, 10.6)
	4000	32 (240.1, 9.5)	32 (240.1, 9.5)	32 (240.1, 9.5)	33.7 (252.6, 9.9)	33.3 (250.0, 9.8)	34.3 (257.6, 10.1)	36 (270.0, 10.6)
	4500	34.1 (255.7, 10.1)	34.1 (255.7, 10.1)	34.1 (255.7, 10.1)	35.1 (263.5, 10.4)	33.7 (252.8, 10)	35.6 (266.8, 10.5)	36.4 (273.4, 10.8)
	5000	36 (270.4, 10.6)	36 (270.4, 10.6)	36 (270.4, 10.6)	37.1 (278.2, 11)	35.7 (267.5, 10.5)	37.5 (281.5, 11.1)	38.4 (288.1, 11.3)
	5500	38 (285.1, 11.2)	38 (285.1, 11.2)	38 (285.1, 11.2)	39 (292.9, 11.5)	37.6 (282.2, 11.1)	39.5 (296.2, 11.7)	40.4 (302.8, 11.9)
	6000	40 (299.9, 11.8)	40 (299.9, 11.8)	40 (299.9, 11.8)	41 (307.6, 12.1)	39.6 (297.0, 11.7)	41.4 (310.9, 12.2)	42.3 (317.5, 12.5)
	6400	41.5 (311.6, 12.3)	41.5 (311.6, 12.3)	41.5 (311.6, 12.3)	42.6 (319.4, 12.6)	41.2 (308.7, 12.2)	43 (322.7, 12.7)	43.9 (329.2, 13)

kPa (mmHg, inHg)

### 3. GENERAL DRIVING CYCLE

- If conditions are met, it is possible to detect the misfires from idling to high engine speed. However, to avoid excessive load or harm to the engine, perform diagnosis at idle.
- Perform the diagnosis continuously.

# Diagnostic Trouble Code (DTC) Detecting Criteria

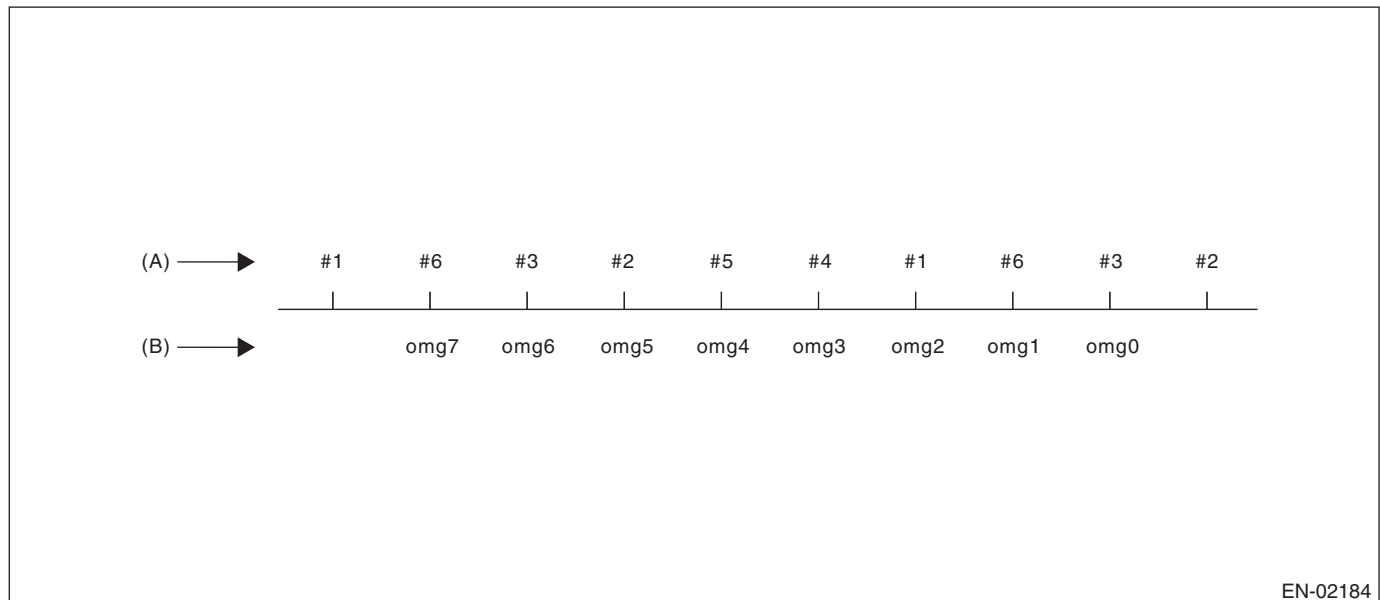
GENERAL DESCRIPTION

## 4. DIAGNOSTIC METHOD

When a misfire occurs, the engine speed will decrease and the crankshaft position speed will change. Calculate the interval difference value (diagnostic value) from crankshaft position speed by the following formula, and judge whether a misfire is occurring or not comparing the calculated result with judgment value. Count the number of misfires, if the misfire ratio is higher during 1000 revs. or 200 revs., judge corresponding cylinders as NG.

Diagnostic value calculation (Calculate from angle speed) →	Misfire detection every single ignition (Compare diagnostic value with judgment value) →	NG judgment (Misfire occurrence judgment required by the law) (Compare number of misfire with judgment value)
	<ul style="list-style-type: none"> <li>• 120° Interval Difference Method</li> <li>• 360° Interval Difference Method</li> <li>• 720° Interval Difference Method</li> </ul>	<ul style="list-style-type: none"> <li>• FTP 1.5 times misfire NG judgment</li> <li>• Catalyst damage misfire NG judgment</li> </ul>

As shown in the following figure, pick a cylinder as the standard and name it omg 0. And the former crankshaft position speed is named omg 1, the second former crankshaft position speed is named omg 2, the third is named omg 3, etc.



EN-02184

(A) Ignition order

(B) Crankshaft position speed

# Diagnostic Trouble Code (DTC) Detecting Criteria

## GENERAL DESCRIPTION

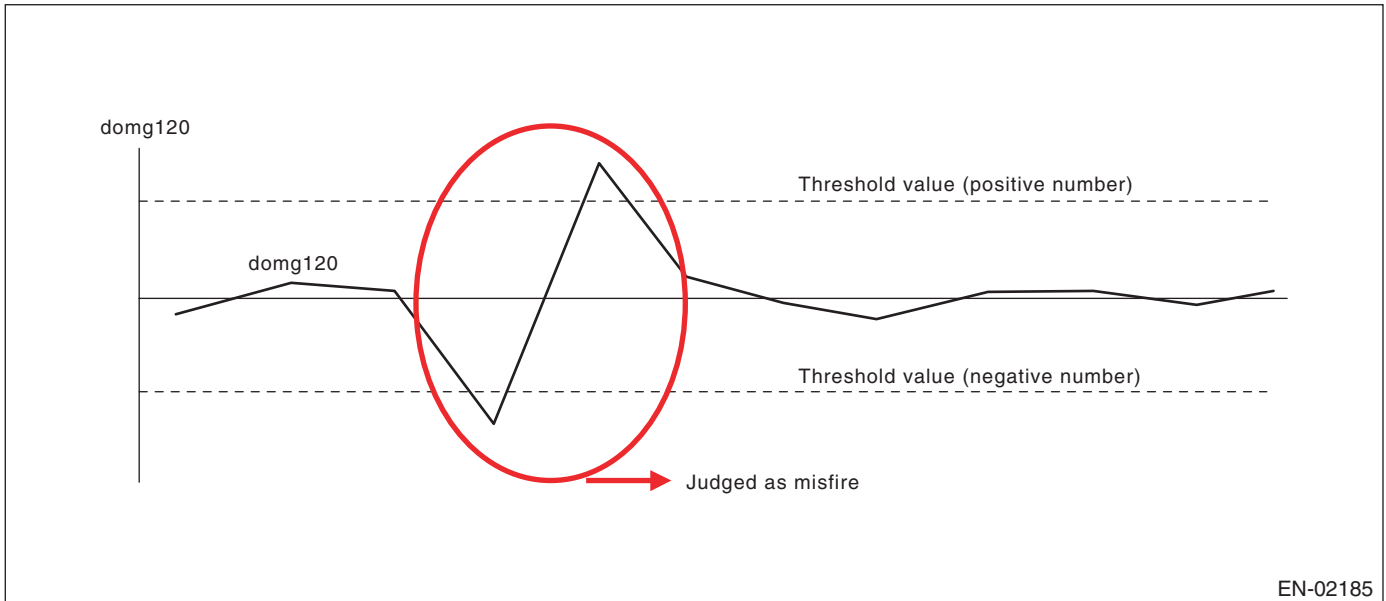
### 120° Interval Difference Method

Diagnostic value  $\text{domg } 120 = (\text{omg } 1 - \text{omg } 0) - (\text{omg } 7 - \text{omg } 1)/6$

Judge as a misfire in the following cases.

- $\text{domg } 120 > \text{judgment value of positive side}$
- $\text{domg } 121 \leq \text{judgment value of negative side}$

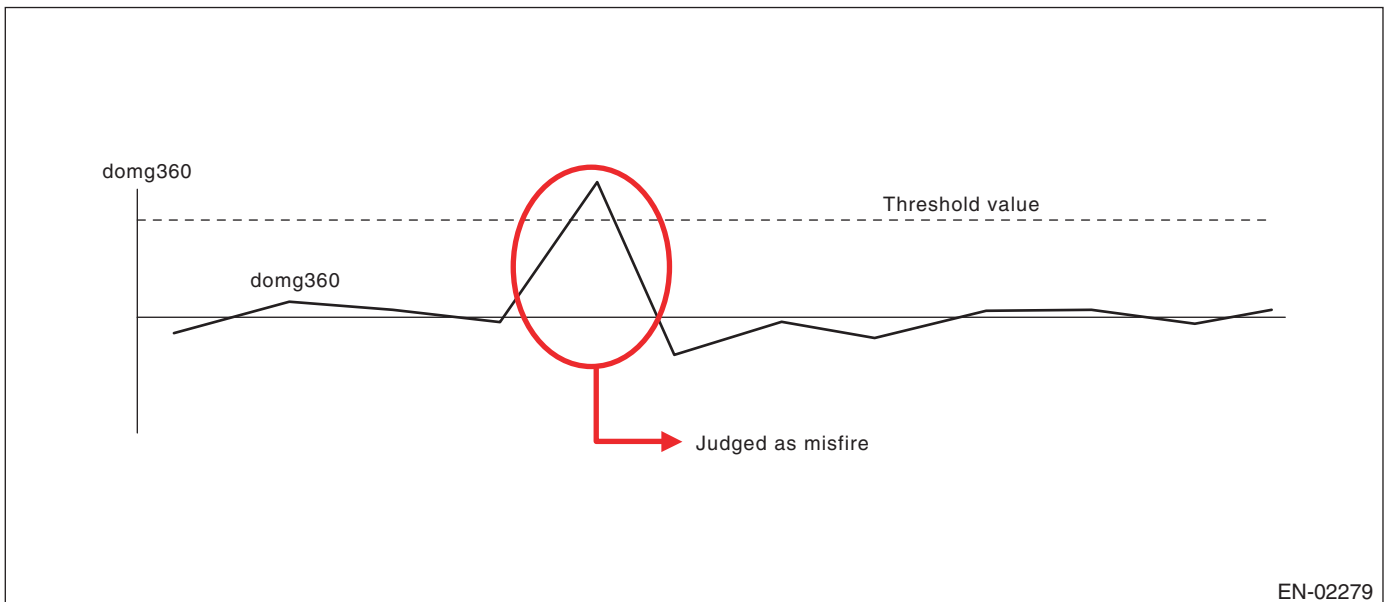
(Diagnostic value before 120° CA)



### 360° Interval Difference Method

Diagnostic value  $\text{domg } 360 = (\text{omg } 1 - \text{omg } 0) - (\text{omg } 4 - \text{omg } 3)$

Misfire judgment  $\text{domg } 360 > \text{Judgment value} \rightarrow \text{Judge as misfire}$



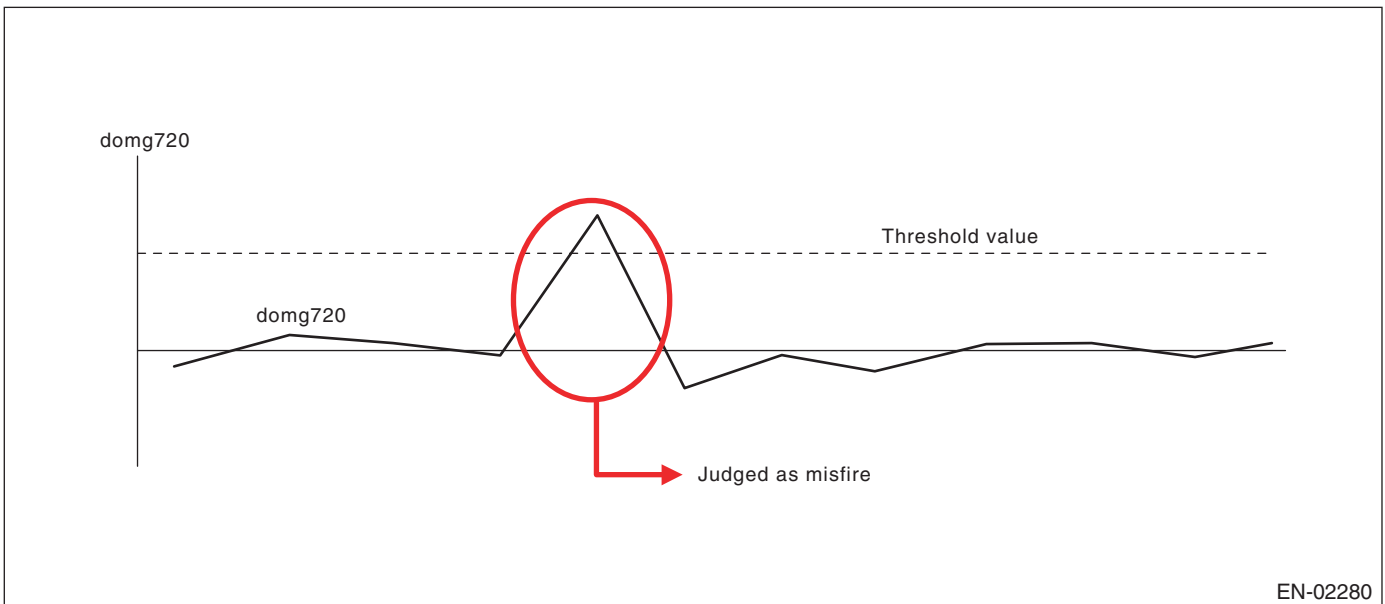


# Diagnostic Trouble Code (DTC) Detecting Criteria

GENERAL DESCRIPTION

## 720° Interval Difference Method

Diagnostic value	$\text{domg 720} = (\text{omg 1} - \text{omg 0}) - (\text{omg 7} - \text{omg 6})$
Misfire judgment	$\text{domg 720} > \text{Judgment value} \rightarrow \text{Judge as misfire}$



- FTP 1.5 times misfire (Misfire occurrence level which influences exhaust gas)

- Abnormality Judgment

**Judgment Value (Judge that malfunction occurs when the misfire ratio is high in 1000 engine revs.)**

Malfunction Criteria	Threshold Value
FTP emission diagnostic value	$\geq 40 \times 100/3000\%$ in 1000 revs.

**Time Needed for Diagnosis:** 1000 engine revs.

**Malfunction Indicator Light Illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

- Normality Judgment

**Judgment Value**

Malfunction Criteria	Threshold Value
FTP emission diagnostic value	$< 40 \times 100/3000\%$ in 1000 revs.

**Time Needed for Diagnosis:** 1000 engine revs.

# Diagnostic Trouble Code (DTC) Detecting Criteria

## GENERAL DESCRIPTION

- Catalyst damage misfire (Misfire occurrence level damaging catalyst)
- Abnormality Judgment

### Judgment Value

Malfunction Criteria	Threshold Value
Catalyst damage misfire diagnostic value	≥ Value from Map 3

### Map 3

		Intake air (g(oz)/rev)									
		0.16 (0.01)	0.28 (0.01)	0.4 (0.01)	0.52 (0.02)	0.64 (0.02)	0.76 (0.03)	0.92 (0.03)	1.1 (0.04)	1.5 (0.05)	2 (0.07)
Engine speed (rpm)	650	150	150	150	150	150	120	96	72	72	72
	1000	150	150	150	120	120	120	78	36	36	36
	1500	150	150	120	120	120	85.5	54.6	40.2	40.2	40.2
	2000	120	120	120	120	120	66.6	40.2	40.2	40.2	40.2
	2500	102.75	102.75	102.9	87.3	87.3	53.4	40.2	40.2	40.2	40.2
	3000	85.8	85.8	85.8	54.6	54.6	40.2	40.2	40.2	40.2	40.2
	3500	70.02	70.02	63	45	42	30	30	30	30	30
	4000	54.6	54.6	40.2	30	30	30	30	30	30	30
	4500	42.3	42.3	30	30	30	30	30	30	30	30
	5000	30	30	30	30	30	30	30	30	30	30
	5500	30	30	30	30	30	30	30	30	30	30
	6000	30	30	30	30	30	30	30	30	30	30
	6400	30	30	30	30	30	30	30	30	30	30
7000	30	30	30	30	30	30	30	30	30	30	

**Time Needed for Diagnosis:** 200 engine revs.

**Malfunction Indicator Light Illumination:** Illuminates as soon as a malfunction occurs.

- Normality Judgment

### Judgment Value

Malfunction Criteria	Threshold Value
Catalyst damage misfire diagnostic value	< Value of Map 3

**Time Needed for Diagnosis:** 200 engine revs.

## **CG:DTC P0302 CYLINDER 2 MISFIRE DETECTED**

### **1. OUTLINE OF DIAGNOSIS**

**NOTE:**

For the detection standard, refer to DTC P0301. <Ref. to GD(H6DO)-118, DTC P0301 CYLINDER 1 MISFIRE DETECTED, Diagnostic Trouble Code (DTC) Detecting Criteria.>

## **CH:DTC P0303 CYLINDER 3 MISFIRE DETECTED**

### **1. OUTLINE OF DIAGNOSIS**

**NOTE:**

For the detection standard, refer to DTC P0301. <Ref. to GD(H6DO)-118, DTC P0301 CYLINDER 1 MISFIRE DETECTED, Diagnostic Trouble Code (DTC) Detecting Criteria.>

## **CI: DTC P0304 CYLINDER 4 MISFIRE DETECTED**

### **1. OUTLINE OF DIAGNOSIS**

**NOTE:**

For the detection standard, refer to DTC P0301. <Ref. to GD(H6DO)-118, DTC P0301 CYLINDER 1 MISFIRE DETECTED, Diagnostic Trouble Code (DTC) Detecting Criteria.>

## **CJ:DTC P0305 CYLINDER 5 MISFIRE DETECTED**

### **1. OUTLINE OF DIAGNOSIS**

**NOTE:**

For the detection standard, refer to DTC P0301. <Ref. to GD(H6DO)-118, DTC P0301 CYLINDER 1 MISFIRE DETECTED, Diagnostic Trouble Code (DTC) Detecting Criteria.>

## **CK:DTC P0306 CYLINDER 6 MISFIRE DETECTED**

### **1. OUTLINE OF DIAGNOSIS**

**NOTE:**

For the detection standard, refer to DTC P0301. <Ref. to GD(H6DO)-118, DTC P0301 CYLINDER 1 MISFIRE DETECTED, Diagnostic Trouble Code (DTC) Detecting Criteria.>

# Diagnostic Trouble Code (DTC) Detecting Criteria

## GENERAL DESCRIPTION

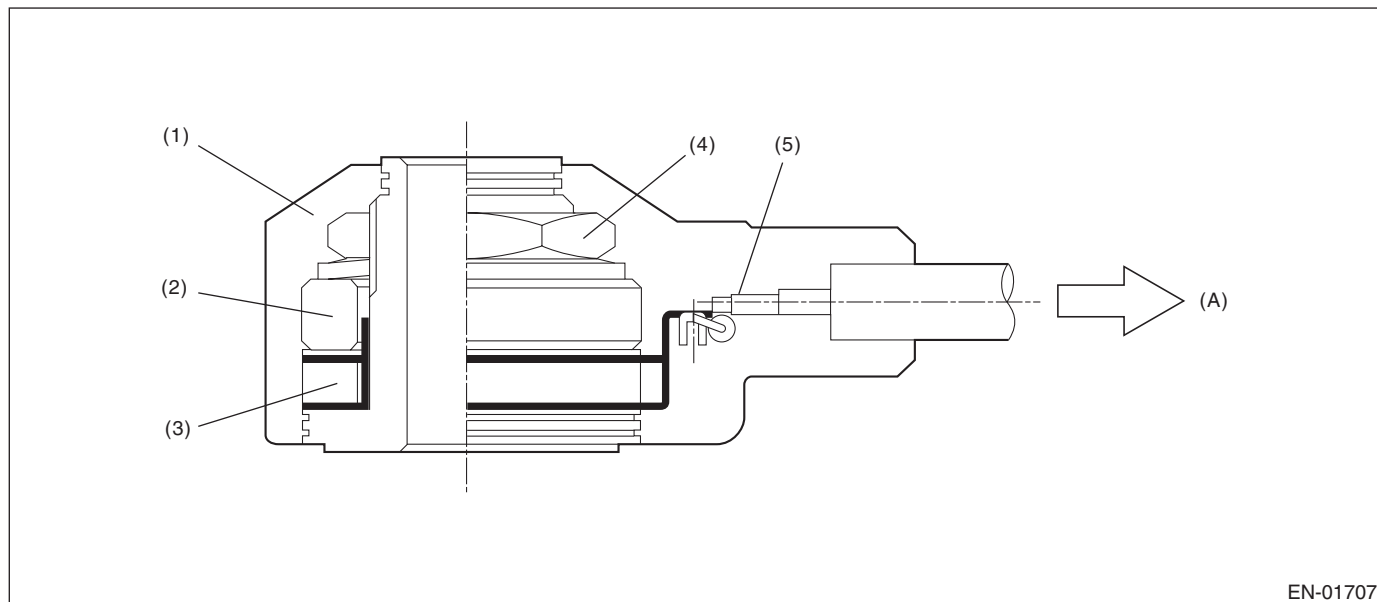
### CL:DTC P0327 KNOCK SENSOR 1 CIRCUIT LOW (BANK 1 OR SINGLE SENSOR)

#### 1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit of knock sensor.

Judge as NG if out of specification.

#### 2. COMPONENT DESCRIPTION



EN-01707

(A) To knock sensor harness

(1) Case

(3) Piezoelectric element

(5) Resistance

(2) Weight

(4) Nut

#### 3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
None	

#### 4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

# Diagnostic Trouble Code (DTC) Detecting Criteria

GENERAL DESCRIPTION

## 5. DIAGNOSTIC METHOD

### • Abnormality Judgment

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

#### Judgment Value

Malfunction Criteria	Threshold Value
Output voltage	< 0.243 V

**Time Needed for Diagnosis:** 1000 ms

**Malfunction Indicator Light Illumination:** Illuminates as soon as a malfunction occurs.

### • Normality Judgment

Judge as OK and clear the NG if the continuous time while the following conditions are established is more than the predetermined time.

#### Judgment Value

Malfunction Criteria	Threshold Value
Output voltage	$\geq 0.243$ V

**Time Needed for Diagnosis:** Less than 1 second

# Diagnostic Trouble Code (DTC) Detecting Criteria

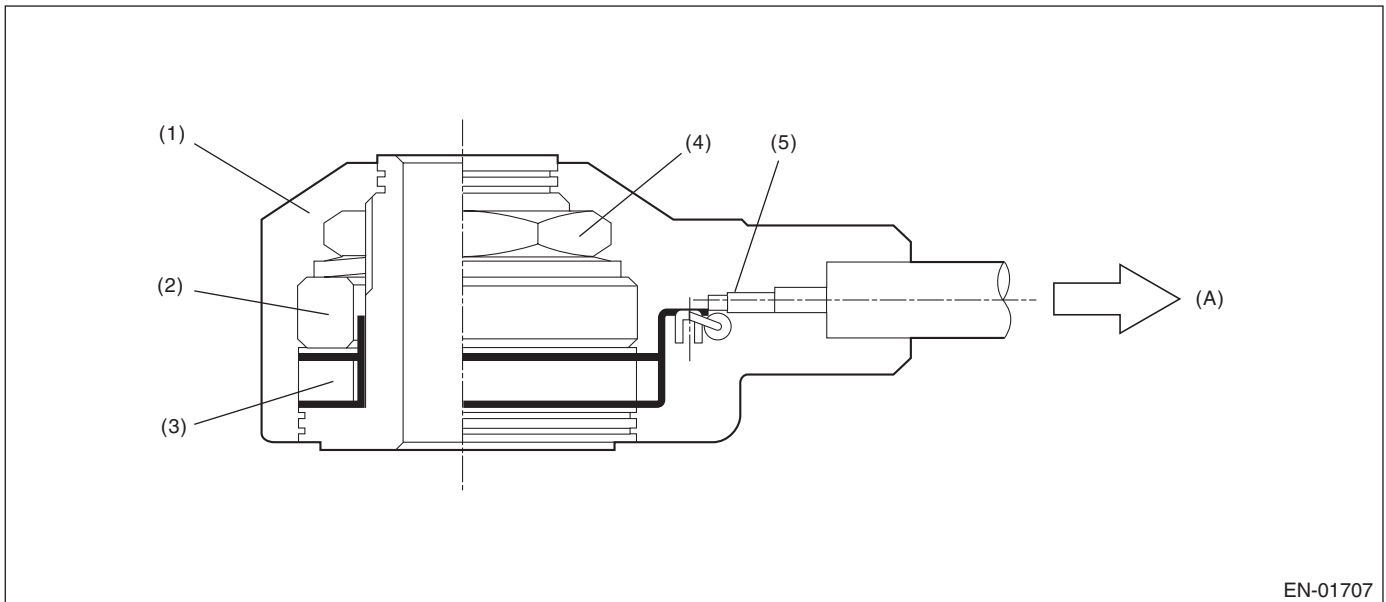
## GENERAL DESCRIPTION

### CM:DTC P0328 KNOCK SENSOR 1 CIRCUIT HIGH (BANK 1 OR SINGLE SENSOR)

#### 1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit of knock sensor.  
Judge as NG if out of specification.

#### 2. COMPONENT DESCRIPTION



(A) To knock sensor harness

(1) Case

(2) Weight

(3) Piezoelectric element

(4) Nut

(5) Resistance

#### 3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
None	

#### 4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

# Diagnostic Trouble Code (DTC) Detecting Criteria

GENERAL DESCRIPTION

## 5. DIAGNOSTIC METHOD

### • Abnormality Judgment

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

#### Judgment Value

Malfunction Criteria	Threshold Value
Output voltage	$\geq 4.709$ V

**Time Needed for Diagnosis:** 1000 ms

**Malfunction Indicator Light Illumination:** Illuminates as soon as a malfunction occurs.

### • Normality Judgment

Judge as OK and clear the NG if the continuous time while the following conditions are established is more than the predetermined time.

#### Judgment Value

Malfunction Criteria	Threshold Value
Output voltage	$< 4.709$ V

**Time Needed for Diagnosis:** Less than 1 second

## CN:DTC P0332 KNOCK SENSOR 2 CIRCUIT LOW (BANK 2)

### 1. OUTLINE OF DIAGNOSIS

NOTE:

For the detection standard, refer to DTC P0327. <Ref. to GD(H6DO)-126, DTC P0327 KNOCK SENSOR 1 CIRCUIT LOW (BANK 1 OR SINGLE SENSOR), Diagnostic Trouble Code (DTC) Detecting Criteria.>

## CO:DTC P0333 KNOCK SENSOR 2 CIRCUIT HIGH (BANK 2)

### 1. OUTLINE OF DIAGNOSIS

NOTE:

For the detection standard, refer to DTC P0328. <Ref. to GD(H6DO)-128, DTC P0328 KNOCK SENSOR 1 CIRCUIT HIGH (BANK 1 OR SINGLE SENSOR), Diagnostic Trouble Code (DTC) Detecting Criteria.>

# Diagnostic Trouble Code (DTC) Detecting Criteria

## GENERAL DESCRIPTION

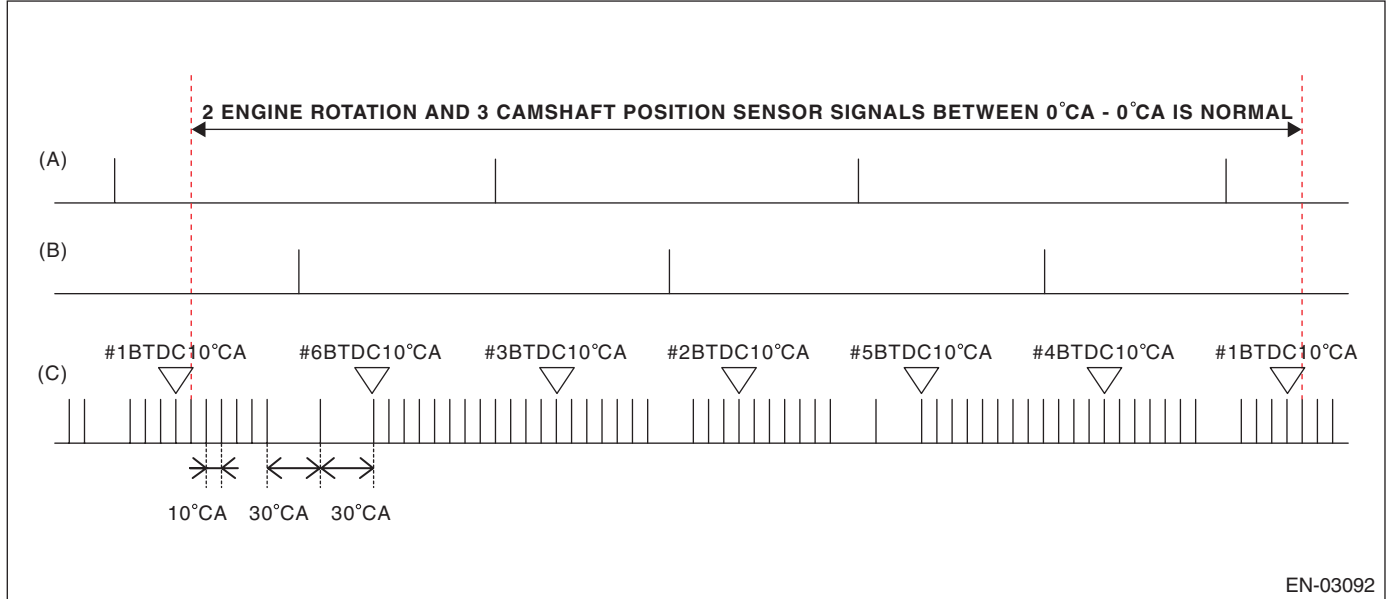
### CP:DTC P0335 CRANKSHAFT POSITION SENSOR "A" CIRCUIT

#### 1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit of the crankshaft position sensor.

Judge as NG when the crank signal is not input even though the starter was rotated.

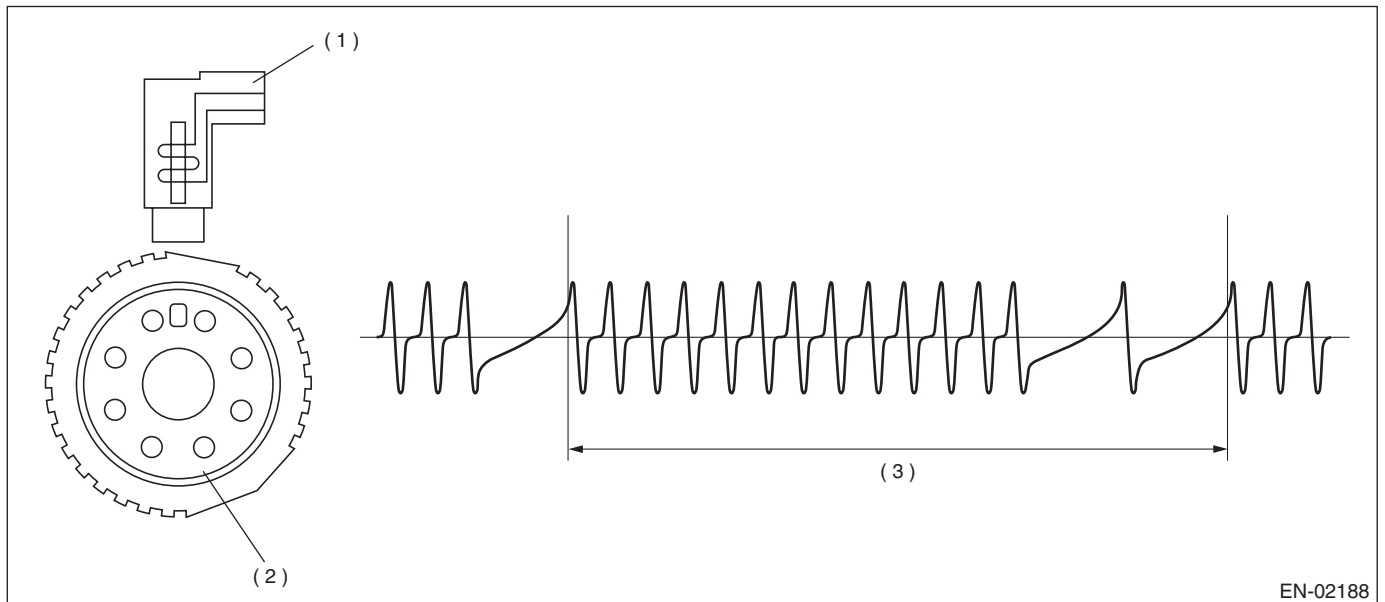
#### 2. COMPONENT DESCRIPTION



(A) Camshaft signal (RH)

(B) Camshaft signal (LH)

(C) Crankshaft signal



(1) Crankshaft position sensor

(2) Crank sprocket

(3) Crankshaft half-turn

#### 3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
None	

#### 4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.



# Diagnostic Trouble Code (DTC) Detecting Criteria

GENERAL DESCRIPTION

## 5. DIAGNOSTIC METHOD

### • Abnormality Judgment

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

#### Judgment Value

Malfunction Criteria	Threshold Value
Starter switch	ON
Crankshaft position sensor signal	Not detected
Battery voltage	$\geq 8 \text{ V}$

**Time Needed for Diagnosis:** 3000 ms

**Malfunction Indicator Light Illumination:** Illuminates as soon as a malfunction occurs.

### • Normality Judgment

Judge as OK and clear the NG if the continuous time while the following conditions are established is more than the predetermined time.

#### Judgment Value

Malfunction Criteria	Threshold Value
Crankshaft position sensor signal	Input exists
Battery voltage	$\geq 8 \text{ V}$

**Time Needed for Diagnosis:** Less than 1 second

# Diagnostic Trouble Code (DTC) Detecting Criteria

## GENERAL DESCRIPTION

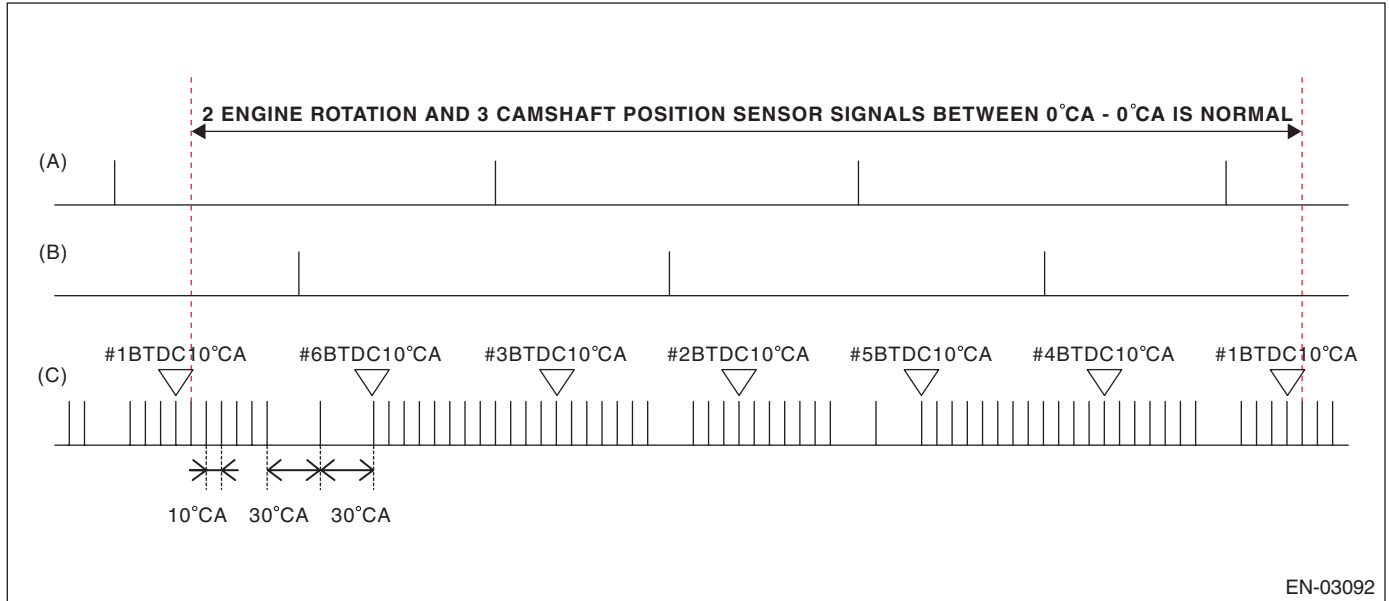
### CQ:DTC P0336 CRANKSHAFT POSITION SENSOR "A" CIRCUIT RANGE/PERFORMANCE

#### 1. OUTLINE OF DIAGNOSIS

Detect for faults in crankshaft position sensor output properties.

Judge as NG when there is a problem in the number of crankshaft signals for every revolution of crankshaft.

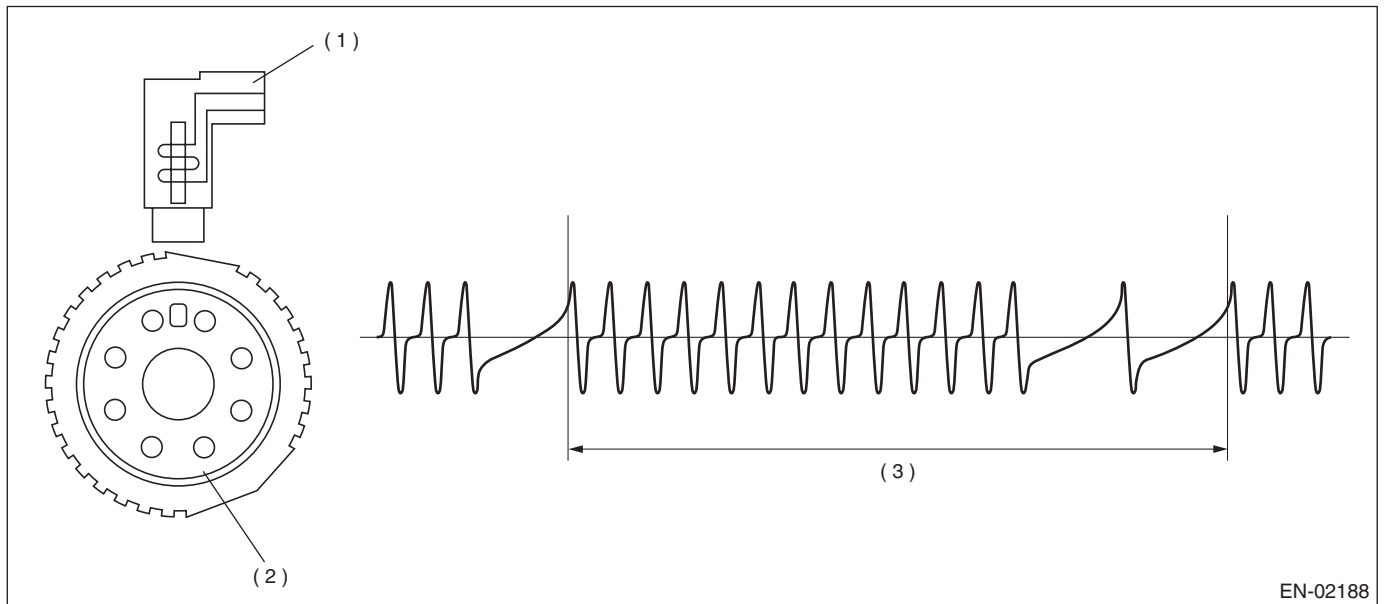
#### 2. COMPONENT DESCRIPTION



(A) Camshaft signal (RH)

(B) Camshaft signal (LH)

(C) Crankshaft signal



(1) Crankshaft position sensor

(2) Crank sprocket

(3) Crankshaft half-turn

#### 3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
Battery voltage	≥ 8 V
Engine speed	< 3000 rpm

# Diagnostic Trouble Code (DTC) Detecting Criteria

GENERAL DESCRIPTION

## 4. GENERAL DRIVING CYCLE

Perform the diagnosis continuously under 3000 rpm engine speed.

## 5. DIAGNOSTIC METHOD

### • Abnormality Judgment

Judge as NG when the following conditions are established.

#### Judgment Value

Malfunction Criteria	Threshold Value
Cylinder number identification	Completed
Amount of crank sensor signal during 1 rev of crankshaft.	Not = 30

**Time Needed for Diagnosis:** 10 engine revs. engine revs.

**Malfunction Indicator Light Illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

### • Normality Judgment

Judge as OK and clear the NG if the continuous time while the following conditions are established is more than the predetermined time.

#### Judgment Value

Malfunction Criteria	Threshold Value
Cylinder number identification	Completed
Amount of crank sensor signal during 1 rev of crankshaft.	= 30

**Time Needed for Diagnosis:** Less than 1 second

# Diagnostic Trouble Code (DTC) Detecting Criteria

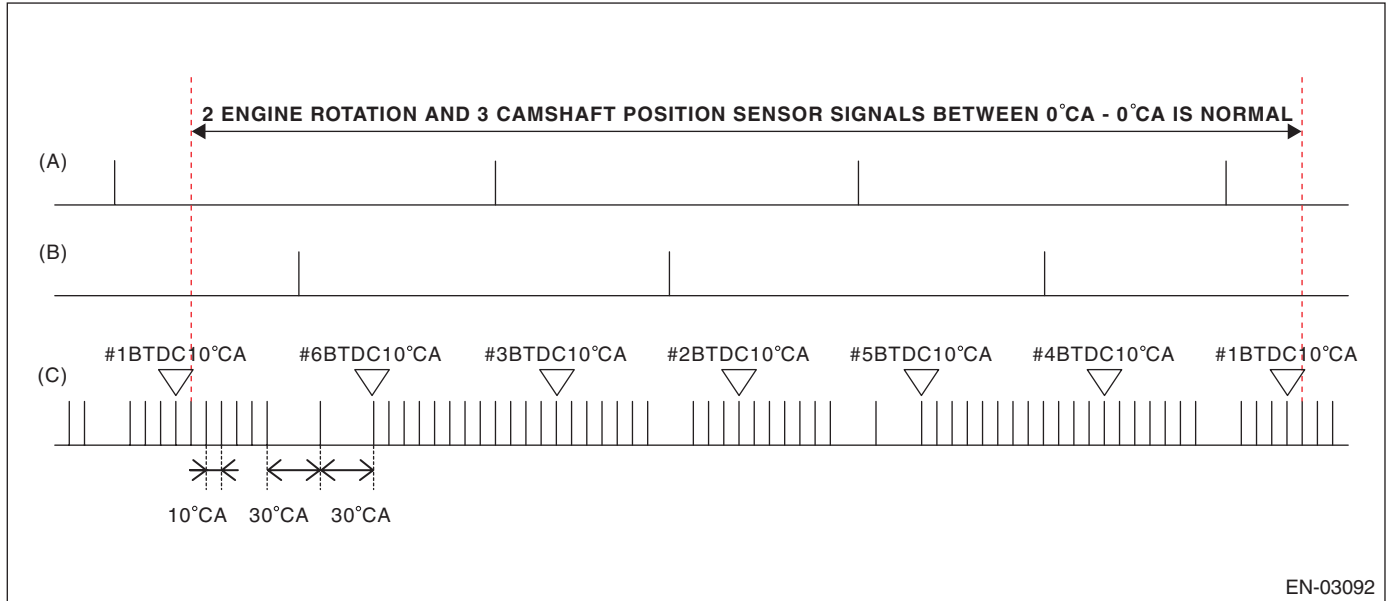
## GENERAL DESCRIPTION

### CR:DTC P0340 CAMSHAFT POSITION SENSOR "A" CIRCUIT (BANK 1 OR SINGLE SENSOR)

#### 1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit of the camshaft position sensor.  
Judge as NG when the number of camshaft signals remains abnormal.

#### 2. COMPONENT DESCRIPTION

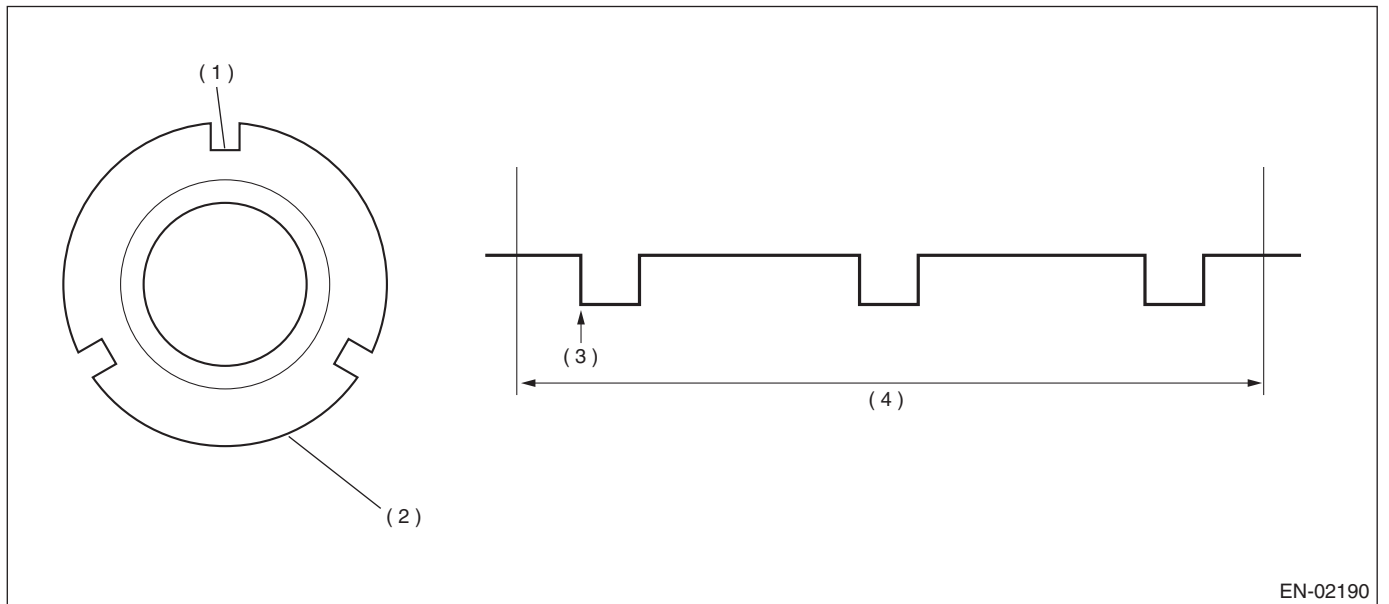


EN-03092

(A) Camshaft signal (RH)

(B) Camshaft signal (LH)

(C) Crankshaft signal



EN-02190

(1) Throttle

(3) Detecting point

(4) Camshaft one revolution (crankshaft two revolutions)

(2) Camshaft plate

#### 3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
Battery voltage	≥ 8 V

# Diagnostic Trouble Code (DTC) Detecting Criteria

GENERAL DESCRIPTION

## 4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

## 5. DIAGNOSTIC METHOD

### • Abnormality Judgment 1

Judge as NG when the condition where the number of camshaft position sensor signals are less than 3 times during 2 engine speed. continues.

#### Judgment Value

Malfunction Criteria	Threshold Value
Amount of camshaft sensor signal during 2 revs.	< 3 time(s)

**Time Needed for Diagnosis:** Engine two revolutions × 4 time(s)

**Malfunction Indicator Light Illumination:** Illuminates as soon as a malfunction occurs.

### • Normality Judgment 1

Judge as OK and clear the NG when the malfunction criteria below are met.

#### Judgment Value

Malfunction Criteria	Threshold Value
Camshaft position sensor signal	≥ 3 time(s)

**Time Needed for Diagnosis:** Two engine revs.

### • Abnormality Judgment 2

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

#### Judgment Value

Malfunction Criteria	Threshold Value
Starter	ON
Camshaft position sensor signal	No input

**Time Needed for Diagnosis:** 3000 ms

### • Normality Judgment 2

Judge as OK and clear the NG if the continuous time while the following conditions are established is more than the predetermined time.

#### Judgment Value

Malfunction Criteria	Threshold Value
Camshaft position sensor signal	Input exists

**Time Needed for Diagnosis:** Less than 1 second

## CS:DTC P0345 CAMSHAFT POSITION SENSOR “A” CIRCUIT (BANK 2)

### 1. OUTLINE OF DIAGNOSIS

NOTE:

For the detection standard, refer to DTC P0340. <Ref. to GD(H6DO)-134, DTC P0340 CAMSHAFT POSITION SENSOR “A” CIRCUIT (BANK 1 OR SINGLE SENSOR), Diagnostic Trouble Code (DTC) Detecting Criteria.>

# Diagnostic Trouble Code (DTC) Detecting Criteria

## GENERAL DESCRIPTION

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### CT:DTC P0351 IGNITION COIL A PRIMARY/SECONDARY CIRCUIT

#### 1. OUTLINE OF DIAGNOSIS

Based on the self-diagnostic result of the ignition coil driving IC, judge the ignition coil driving circuit as normal or abnormal.

The ignition coil driving IC detects “no ignition” status as a malfunction.

#### 2. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Battery voltage	$\geq 10.9\text{ V}$
Elapsed time after starting the engine	$> 1\text{ s}$
Engine speed	$> 500\text{ rpm}$
Ignition energization time	$> 2000\text{ }\mu\text{s}$
Ignition status	Not during ignition cut

#### 3. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

#### 4. DIAGNOSTIC METHOD

##### • Abnormality Judgment

Judge as NG when the following conditions are established.

##### Judgment Value

Malfunction Criteria	Threshold Value
Ignition driving IC information	Malfunction

**Time Needed for Diagnosis:** 2500 ms

**Malfunction Indicator Light Illumination:** Illuminates as soon as a malfunction occurs.

##### • Normality Judgment

Judge as OK and clear the NG if the following conditions are established.

##### Judgment Value

Malfunction Criteria	Threshold Value
Ignition driving IC information	Normal

**Time Needed for Diagnosis:** Less than 1 second

## **CU:DTC P0352 IGNITION COIL B PRIMARY/SECONDARY CIRCUIT**

### **1. OUTLINE OF DIAGNOSIS**

**NOTE:**

For the detection standard, refer to DTC P0351. <Ref. to GD(H6DO)-136, DTC P0351 IGNITION COIL A PRIMARY/SECONDARY CIRCUIT, Diagnostic Trouble Code (DTC) Detecting Criteria.>

## **CV:DTC P0353 IGNITION COIL C PRIMARY/SECONDARY CIRCUIT**

### **1. OUTLINE OF DIAGNOSIS**

**NOTE:**

For the detection standard, refer to DTC P0351. <Ref. to GD(H6DO)-136, DTC P0351 IGNITION COIL A PRIMARY/SECONDARY CIRCUIT, Diagnostic Trouble Code (DTC) Detecting Criteria.>

## **CW:DTC P0354 IGNITION COIL D PRIMARY/SECONDARY CIRCUIT**

### **1. OUTLINE OF DIAGNOSIS**

**NOTE:**

For the detection standard, refer to DTC P0351. <Ref. to GD(H6DO)-136, DTC P0351 IGNITION COIL A PRIMARY/SECONDARY CIRCUIT, Diagnostic Trouble Code (DTC) Detecting Criteria.>

## **CX:DTC P0355 IGNITION COIL E PRIMARY/SECONDARY CIRCUIT**

### **1. OUTLINE OF DIAGNOSIS**

**NOTE:**

For the detection standard, refer to DTC P0351. <Ref. to GD(H6DO)-136, DTC P0351 IGNITION COIL A PRIMARY/SECONDARY CIRCUIT, Diagnostic Trouble Code (DTC) Detecting Criteria.>

## **CY:DTC P0356 IGNITION COIL F PRIMARY/SECONDARY CIRCUIT**

### **1. OUTLINE OF DIAGNOSIS**

**NOTE:**

For the detection standard, refer to DTC P0351. <Ref. to GD(H6DO)-136, DTC P0351 IGNITION COIL A PRIMARY/SECONDARY CIRCUIT, Diagnostic Trouble Code (DTC) Detecting Criteria.>

# Diagnostic Trouble Code (DTC) Detecting Criteria

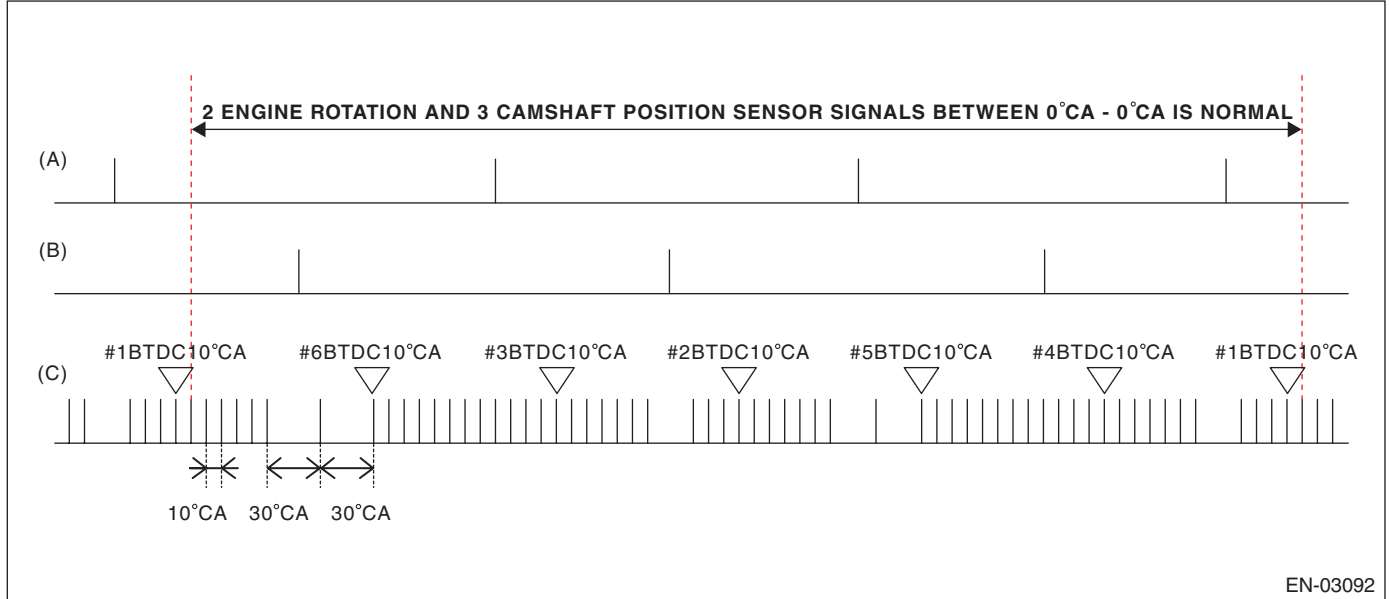
## GENERAL DESCRIPTION

### CZ:DTC P0365 CAMSHAFT POSITION SENSOR “B” CIRCUIT (BANK 1)

#### 1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit of the camshaft position sensor.  
Judge as NG when the number of camshaft signals remains abnormal.

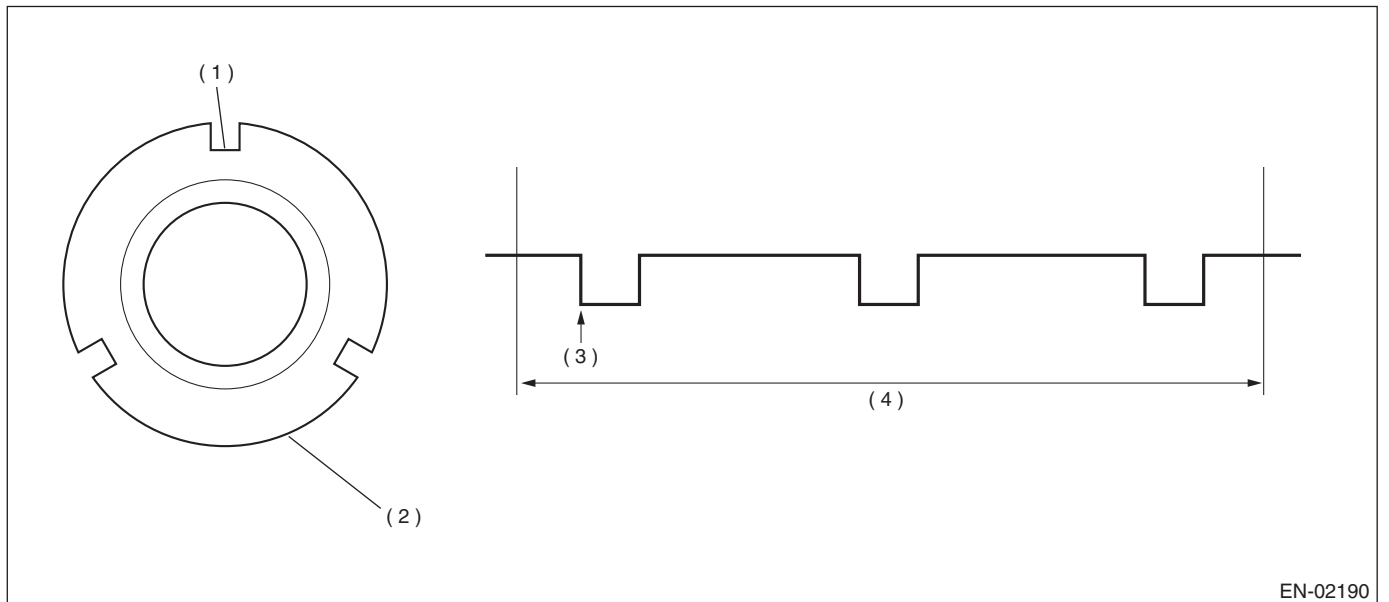
#### 2. COMPONENT DESCRIPTION



(A) Cam signal (RH)

(B) Cam signal (LH)

(C) Crankshaft signal



(1) Throttle

(3) Detecting point

(4) Camshaft one revolution (crankshaft two revolutions)

(2) Camshaft plate

#### 3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
Battery voltage	≥ 8 V



# Diagnostic Trouble Code (DTC) Detecting Criteria

GENERAL DESCRIPTION

## 4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

## 5. DIAGNOSTIC METHOD

### • Abnormality Judgment

Judge as NG when the condition where the number of camshaft position sensor signals are less than 3 time(s) during 2 engine revs. continues.

### Judgment Value

Malfunction Criteria	Threshold Value
Amount of camshaft sensor signal during 2 revs.	< 3 time(s)

**Time Needed for Diagnosis:** Two engine revolutions × 4 time(s)

**Malfunction Indicator Light Illumination:** Illuminates as soon as a malfunction occurs.

### • Normality Judgment

Judge as OK and clear the NG when the malfunction criteria below are met.

### Judgment Value

Malfunction Criteria	Threshold Value
Camshaft position sensor signal	≥ 3 time(s)

**Time Needed for Diagnosis:** Two engine revolutions

## DA:DTC P0390 CAMSHAFT POSITION SENSOR “B” CIRCUIT (BANK 2)

### 1. OUTLINE OF DIAGNOSIS

NOTE:

For the detection standard, refer to DTC P0365. <Ref. to GD(H6DO)-138, DTC P0365 CAMSHAFT POSITION SENSOR “B” CIRCUIT (BANK 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

# Diagnostic Trouble Code (DTC) Detecting Criteria

## GENERAL DESCRIPTION

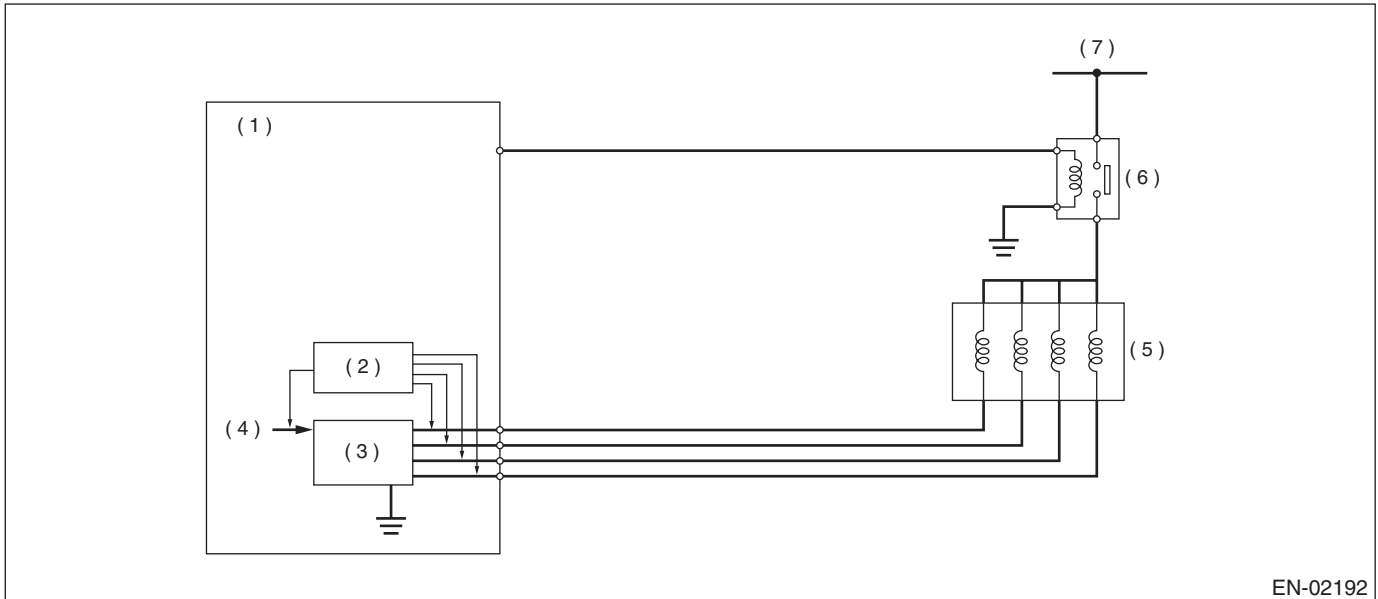
### DB:DTC P0400 EXHAUST GAS RECIRCULATION FLOW

#### 1. OUTLINE OF DIAGNOSIS

Detect EGR system malfunction.

Intake manifold pressure (negative pressure) is constant because the throttle valve is fully closed during deceleration fuel cut. At this time, when the EGR valve is opened/closed, the intake manifold pressure will change. EGR System OK/NG is judged by the range of this change.

#### 2. COMPONENT DESCRIPTION



- (1) ECM
- (2) Detecting circuit
- (3) Switching circuit

- (4) CPU
- (5) EGR valve

- (6) Main relay
- (7) Battery power supply

# Diagnostic Trouble Code (DTC) Detecting Criteria

GENERAL DESCRIPTION

## 3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
Elapsed time after starting the engine	≥ 40 s
Engine coolant temperature	≥ 75 °C(167 °F)
Engine speed	1200 rpm — 3250 rpm
Intake manifold pressure (absolute pressure)	< 46.7 kPa (350 mmHg, 13.8 inHg)
Ambient air temperature	≥ 5 °C(41 °F)
Throttle position	< 0.25 °
Battery voltage	≥ 10.9 V
Atmospheric pressure	≥ 75 kPa (563 mmHg, 22.2 inHg)
Vehicle speed	≥ 53 km/h (32.9 MPH)
Fuel shut-off function	In operation
Neutral switch	OFF
Elapsed time after neutral switch ON/OFF change	≥ Value from Map
No load change (A/C, power steering, lighting, rear defogger, heater fan and radiator fan)	≥ 5000 ms

### Map

Engine coolant temperature °C (°F)	-40 (-40)	-30 (-22)	-20 (-4)	-10 (14)	0 (32)	10 (50)	20 (68)	30 (86)
Elapsed time after neutral switch change msec	0	0	0	0	0	0	0	0

Engine coolant temperature °C (°F)	40 (104)	50 (122)	60 (140)	70 (158)	80 (176)	90 (194)	100 (212)	110 (230)
Elapsed time after neutral switch change msec	0	0	0	0	0	0	0	0

## 4. GENERAL DRIVING CYCLE

During deceleration fuel cut from 53 km/h (approx. 33 MPH) or more, perform diagnosis once. Be careful of vehicle speed and engine speed. (Diagnosis will not be completed if the vehicle speed and engine speed conditions become out of specification due to deceleration.)

## 5. DIAGNOSTIC METHOD

Measure the pressure values when the enable conditions are established, and perform diagnosis by calculating those results.

1. Label the intake manifold pressure value as PMOF1, which is observed when enable conditions are established, and set the EGR target step to 50 steps (nearly full open).
2. Label the intake manifold pressure value as PMON, which is observed after one second has passed since EGR target step was set to 50 steps (when the enable conditions were established), and set the EGR target step to 0.
3. Label the intake manifold pressure as PMOF2, which is observed after one second has passed since EGR target step was set to 0 (after two seconds have passed since the enable conditions were established).

### • Abnormality Judgment

Judge as NG when the following conditions are established.

### Judgment Value

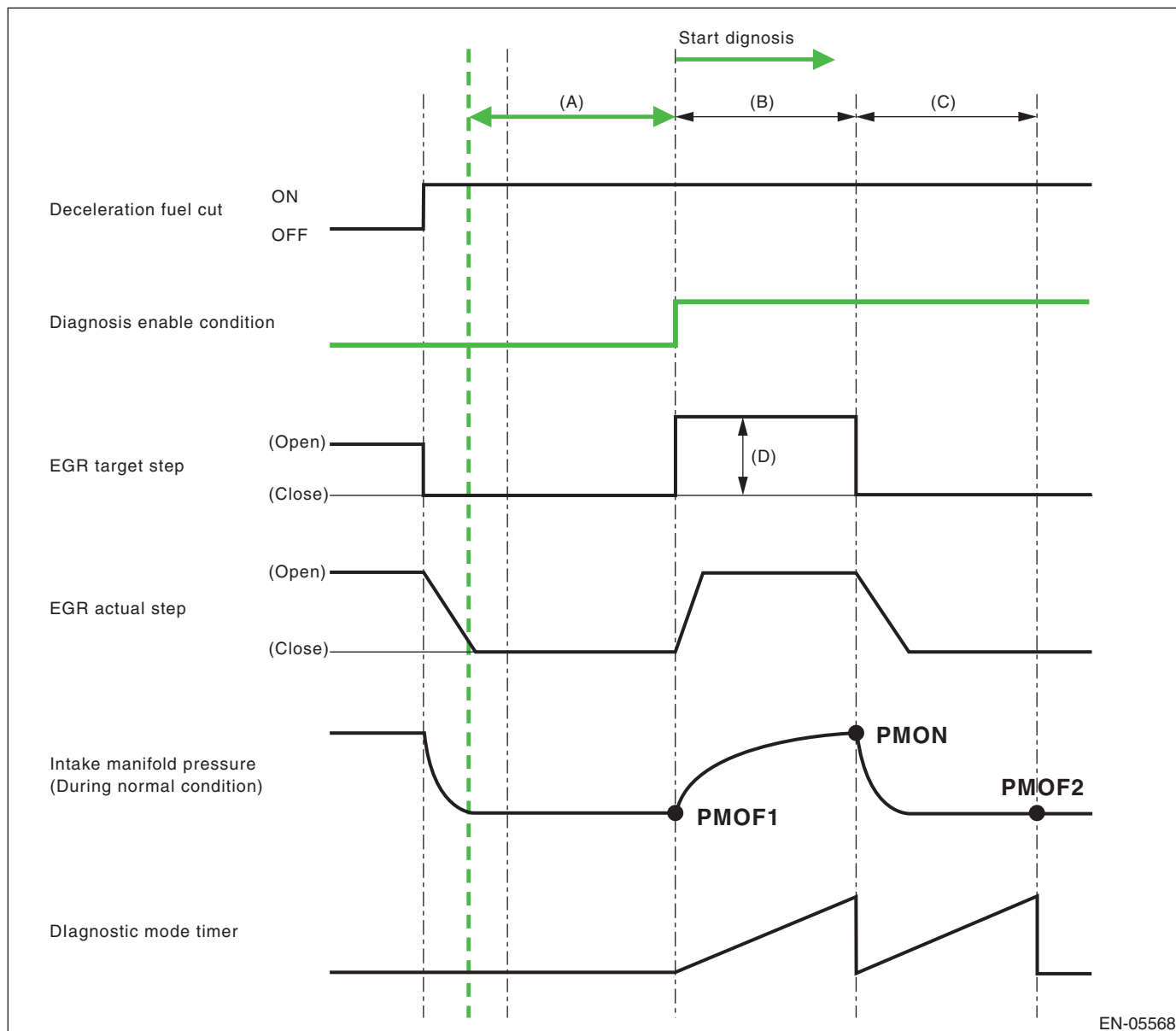
Malfunction Criteria	Threshold Value
PMON – (PMOF1 + PMOF2)/2	< 1.6 kPa (11.8 mmHg, 0.5 inHg)

**Time Needed for Diagnosis:** 1 time

# Diagnostic Trouble Code (DTC) Detecting Criteria

## GENERAL DESCRIPTION

**Malfunction Indicator Light Illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.



(A) 2000 ms

(B) 1500 ms

(C) 1500 ms

(D) 50 step(s)

### • Normality Judgment

Judge as OK and clear the NG if the following conditions are established.

#### Judgment Value

Malfunction Criteria	Threshold Value
$PMON - (PMOF1 + PMOF2)/2$	$\geq 1.6 \text{ kPa (11.8 mmHg, 0.5 inHg)}$

**Time Needed for Diagnosis:** 1 time

# Diagnostic Trouble Code (DTC) Detecting Criteria

GENERAL DESCRIPTION

## DC:DTC P0420 CATALYST SYSTEM EFFICIENCY BELOW THRESHOLD (BANK 1)

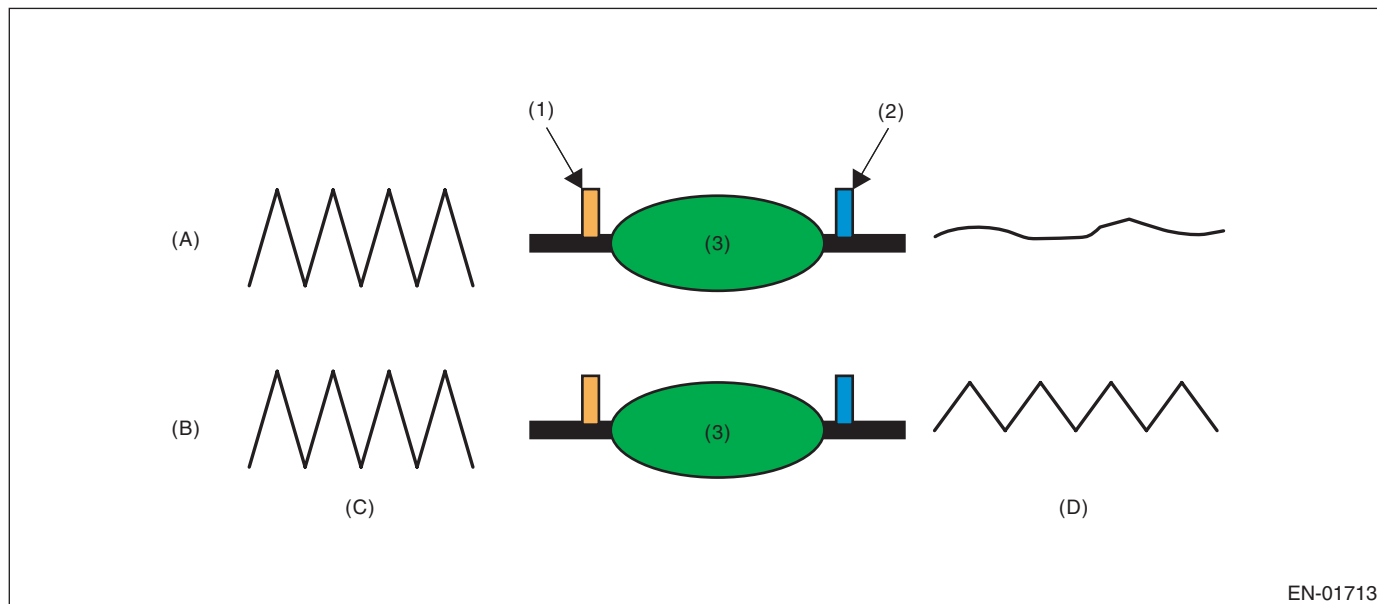
### 1. OUTLINE OF DIAGNOSIS

Detect the deterioration of the catalyst function.

Though the front oxygen sensor output would change slowly with a new catalyst, the sensor output with a deteriorated catalyst becomes high and the inversion time is shortened.

For this reason, the catalyst diagnosis is carried out by monitoring the front oxygen sensor output and comparing it with the front oxygen (A/F) sensor output.

### 2. COMPONENT DESCRIPTION



EN-01713

- (A) Normal  
 (B) Deterioration  
 (C) Output waveform from the front oxygen (A/F) sensor  
 (D) Output waveform from the front oxygen sensor

- (1) Front oxygen (A/F) sensor  
 (2) Front oxygen sensor  
 (3) Catalytic converter

### 3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
Battery voltage	≥ 10.9 V
Atmospheric pressure	≥ 75 kPa (563 mmHg, 22.2 inHg)
Engine coolant temperature	≥ 75 °C (167 °F)
Estimated catalyst temperature	≥ 540 °C (1004 °F)
Misfire detection every 200 rotations	< 65535 time(s)
Learning value of evaporation gas density	< 0.2
Sub feedback	In operation
Evaporative system diagnosis	Not in operation
Time of difference (< 0.10) between actual lambda and target lambda	≥ 1000 ms
Vehicle speed	> 60 km/h (37.3 MPH)
Amount of intake air	≥ 10 g/s (0.35 oz/s) and < 50 g/s (1.76 oz/s)
Engine load change every 0.5 engine revs.	< 0.02 g/rev (0 oz/rev)
Rear oxygen output change from 660 mV or less to 660 mV or more	Experienced after fuel cut
Elapsed time after starting the engine	≥ 220 s
Purge execution calculated time	≥ 5 s

# Diagnostic Trouble Code (DTC) Detecting Criteria

## GENERAL DESCRIPTION

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### 4. GENERAL DRIVING CYCLE

Perform the diagnosis only once at a constant 60 km/h (37.3 MPH) or higher.

### 5. DIAGNOSTIC METHOD

After establishing the execution conditions, calculate the front oxygen (A/F) sensor lambda deviation cumulative value per 32 milliseconds  $\times 4$  ( $\sum |(sglmd_n - sglmd_{n-1})|$ ) and rear oxygen sensor output voltage deviation cumulative value ( $\sum |(ro2sad_n - ro2sad_{n-1})|$ ), and when the front oxygen (A/F) sensor lambda deviation cumulative value ( $\sum |(sglmd_n - sglmd_{n-1})|$ ) becomes the predetermined value or more, calculate the diagnostic value.

#### • Abnormality Judgment

If the duration of time while the following conditions are met is within the time indicated, judge as NG.

#### Judgment Value

Malfunction Criteria	Threshold Value
$\sum  (ro2sad_n - ro2sad_{n-1})  / \sum  (sglmd_n - sglmd_{n-1}) $	> 18

**Time Needed for Diagnosis:** 30 — 55 seconds

**Malfunction Indicator Light Illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

#### • Normality Judgment

Judge as OK and clear the NG if the continuous time while the following conditions are established is within the predetermined time.

#### Judgment Value

Malfunction Criteria	Threshold Value
$\sum  (ro2sad_n - ro2sad_{n-1})  / \sum  (sglmd_n - sglmd_{n-1}) $	$\leq 18$

**Time Needed for Diagnosis:** 30 — 55 seconds

# Diagnostic Trouble Code (DTC) Detecting Criteria

GENERAL DESCRIPTION

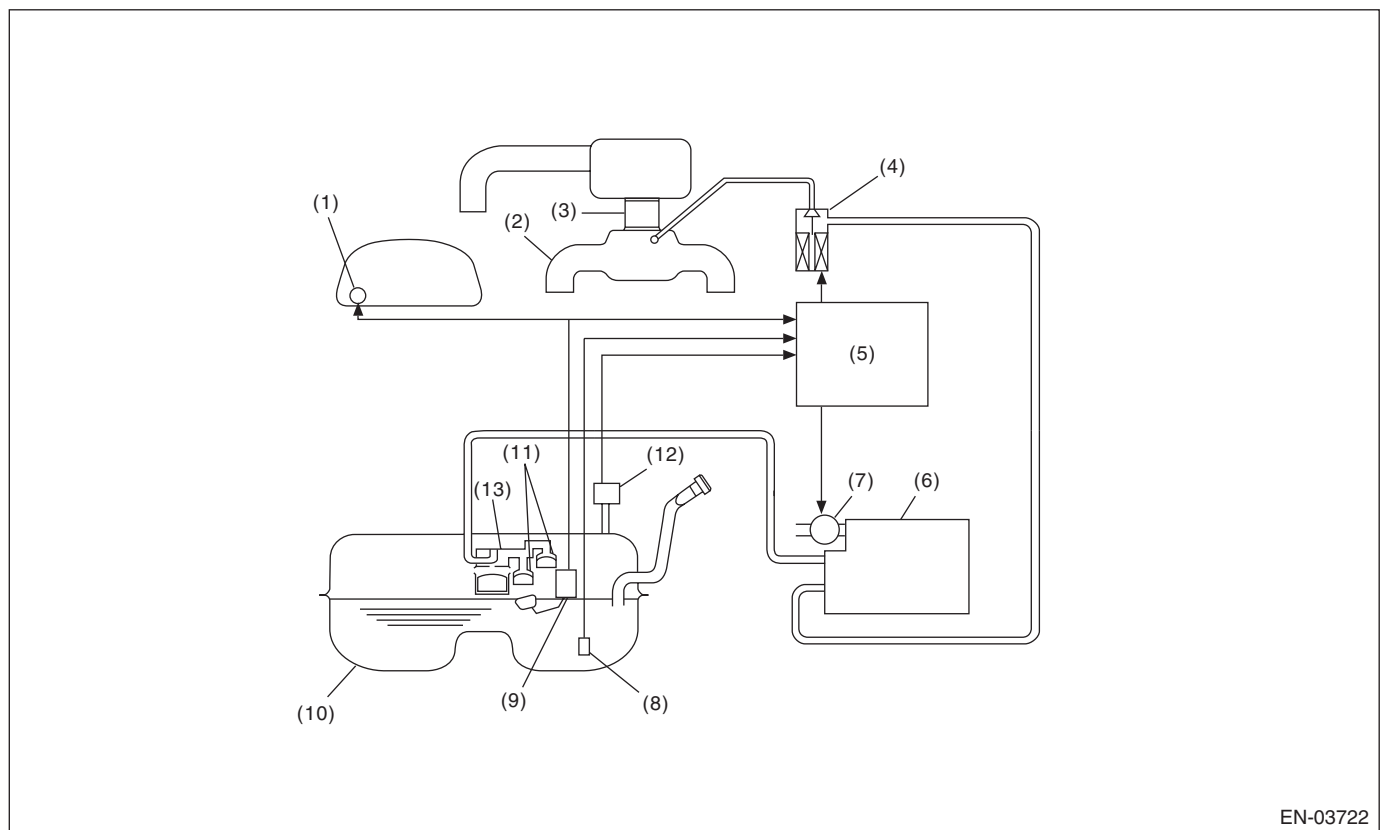
## DD:DTC P0442 EVAPORATIVE EMISSION CONTROL SYSTEM LEAK DETECTED (SMALL LEAK)

### 1. OUTLINE OF DIAGNOSIS

The evaporative system monitor detects leak up to 0.020 inch in the fuel tank and evaporative emissions system. If the fuel cap is not present or has not been correctly tightened after a refueling event, a malfunction is also detected. These malfunctions are detected by monitoring the fuel tank and system pressure during an intrusive pull-down pressure test. Pull down is accomplished via the purge valve while the engine is running. Monitors run during the first idle after engine start and while driving.

The diagnostic is classified into two monitors. The first monitor detects a 0.040 inch leak, fuel cap loose/off, and canister purge valve stuck open/close whilst the other monitor detects a 0.020 inch leak when the vehicle is moving or during the first idle. Failures, DTCs and monitor methods are as follows.

P0457	Fuel cap loose/off or CPC valve stuck open/close	Monitor 1
P0442	0.040 inch leak	Monitor 1
P0456	0.020 inch leak	Monitor 2



EN-03722

- |  |                             |                                |
|--|-----------------------------|--------------------------------|
| (1) Fuel gauge                               | (6) Canister                | (10) Fuel tank                 |
| (2) Intake manifold                          | (7) Drain valve (CCV)       | (11) Fuel cut valve            |
| (3) Throttle body                            | (8) Fuel temperature sensor | (12) Fuel tank pressure sensor |
| (4) Purge control solenoid valve (CPC valve) | (9) Fuel level sensor       | (13) Vent valve                |
| (5) Engine control module (ECM)              |                             |                                |

# Diagnostic Trouble Code (DTC) Detecting Criteria

## GENERAL DESCRIPTION

### Monitor 1

- **P0457 Fuel cap loose/off or CPC valve stuck open/close**
- **P0442 0.040 inch leak check**

This monitor detects CPC valve stuck open/close, fuel cap loose/off, and 0.040 inch leak in the evaporative emission system by monitoring the fuel tank system pressure an intrusive pull-down pressure test. The monitor consists of Modes Z, A, B, C and D. There are three judgment times for these malfunctions. CPC valve stuck open is performed in Mode Z, CPC valve stuck closed or fuel cap loose/off is in Mode B, 0.040 inch leak is in Mode D.

Mode	Description of each mode	Required time for each mode
Mode Z (Monitoring of CPC stuck open)	CPC valve: Closed CCV: Closed The system requires 3000 ms to measure the pressure difference. (1) Pressure difference < 0.6 kPa (4.5 mmHg, 0.2 inHg) → Judged as “Fail of CPC stuck open” <b>[P0457]</b> (2) Pressure difference ≥ 0.4 kPa (3 mmHg, 0.1 inHg) → Move to Mode A	3000 ms
Mode A (Estimation of Evap. Generation)	The system requires 10000 ms to measure the pressure increase (evpp1), and then move to Mode B.	10000 ms
Mode B (Negative Pressure Introduction/ Monitoring of Fuel cap off or CPC stuck close)	CPC valve: Open Negative pressure is introduced to the fuel tank. (1) Elapsed time in Mode B ≥ 10000 ms and (Minimum tank pressure) – (Initial tank pressure) > –0.5 kPa (–4 mmHg, –0.2 inHg) → Judged as “Fail of Fuel cap off or CPC stuck close” <b>[P0457]</b> (2) Elapsed time in Mode B ≥ 10000 ms + 25000 ms → Judged as “Fail of Fuel cap off or CPC stuck close” <b>[P0457]</b> (3) Fuel tank pressure ≤ –1.4 kPa (–10.5 mmHg, –0.4 inHg) → Move to Mode C	Average: 7 s (Depends on the tank condition)
Mode C (Keeping Negative Pressure / Pass in Mode C)	CPC valve: Closed When the tank pressure comes up to the target pressure (–1.3 kPa (–9.75 mmHg, –0.4 inHg)), the monitor moves to Mode D.  If the fuel tank pressure does not exceed the –1.3 kPa (–9.75 mmHg, –0.4 inHg) after 14000 ms, the system judges as “Pass in Mode C” and moves to “Final Judgment”.	Average: 7 s (Depends on the tank condition)
Mode D (Pressure Measurement / Pass Fail in Mode D)	The monitor requires 10000 ms to measure the pressure change (evpp2) and calculates the monitor value (evpp2 – 1.5 × evpp1), where Mode A (evpp1) is the generated vapor pressure. The calculated value (evpp2 – 1.5 × evpp1) is then compared to a calibrated threshold table as a function of fuel temperature and fuel level. The system judges as a “Pass/Fail in Mode D” and then moves to “Final Judgment”. (1) evpp2 – 1.5 × evpp1 > Fail Threshold (Map 1) → “Fail in Mode D” (2) evpp2 – 1.5 × evpp1 ≤ Pass Threshold (Map 1) → “Pass in Mode D”	10000 ms
Final Judgment (Pass / Fail)	The monitor is completed in the following order (1) Judged as “Fail in Mode D” → “Fail of 0.040 inch leak” <b>[P0442]</b> (2) Judged as “Pass in Mode C / Mode D” → “Pass of 0.040 inch leak”	0.128 s



# Diagnostic Trouble Code (DTC) Detecting Criteria

GENERAL DESCRIPTION

## Map 1 (Threshold value for 0.040 inch leak)

		Fuel temperature (°C (°F))				
		25 (77)	30 (86)	35 (95)	40 (104)	45 (113)
Fuel Level ℓ (US gal, Imp gal)	0 (0, 0)	0.3 (2.1, 0.1)	0.3 (2.2, 0.1)	0.3 (2.3, 0.1)	0.3 (2.35, 0.1)	0.3 (2.4, 0.1)
	10 (2.64, 2.2)	0.3 (2.1, 0.1)	0.3 (2.2, 0.1)	0.3 (2.3, 0.1)	0.3 (2.35, 0.1)	0.3 (2.4, 0.1)
	20 (5.28, 4.4)	0.3 (2.3, 0.1)	0.3 (2.4, 0.1)	0.3 (2.5, 0.1)	0.3 (2.6, 0.1)	0.4 (2.7, 0.1)
	30 (7.93, 6.6)	0.4 (2.9, 0.1)	0.4 (3.05, 0.1)	0.4 (3.15, 0.1)	0.4 (3.25, 0.1)	0.4 (3.35, 0.1)
	40 (10.57, 8.8)	0.4 (2.9, 0.1)	0.4 (3.15, 0.1)	0.4 (3.3, 0.1)	0.5 (3.4, 0.1)	0.5 (3.5, 0.1)
	50 (13.21, 11)	0.4 (3.2, 0.1)	0.4 (3.3, 0.1)	0.5 (3.5, 0.1)	0.5 (3.6, 0.1)	0.5 (3.7, 0.1)
	60 (15.85, 13.2)	0.4 (3.2, 0.1)	0.4 (3.3, 0.1)	0.5 (3.5, 0.1)	0.5 (3.6, 0.1)	0.5 (3.7, 0.1)
						kPa (mmHg, inHg)

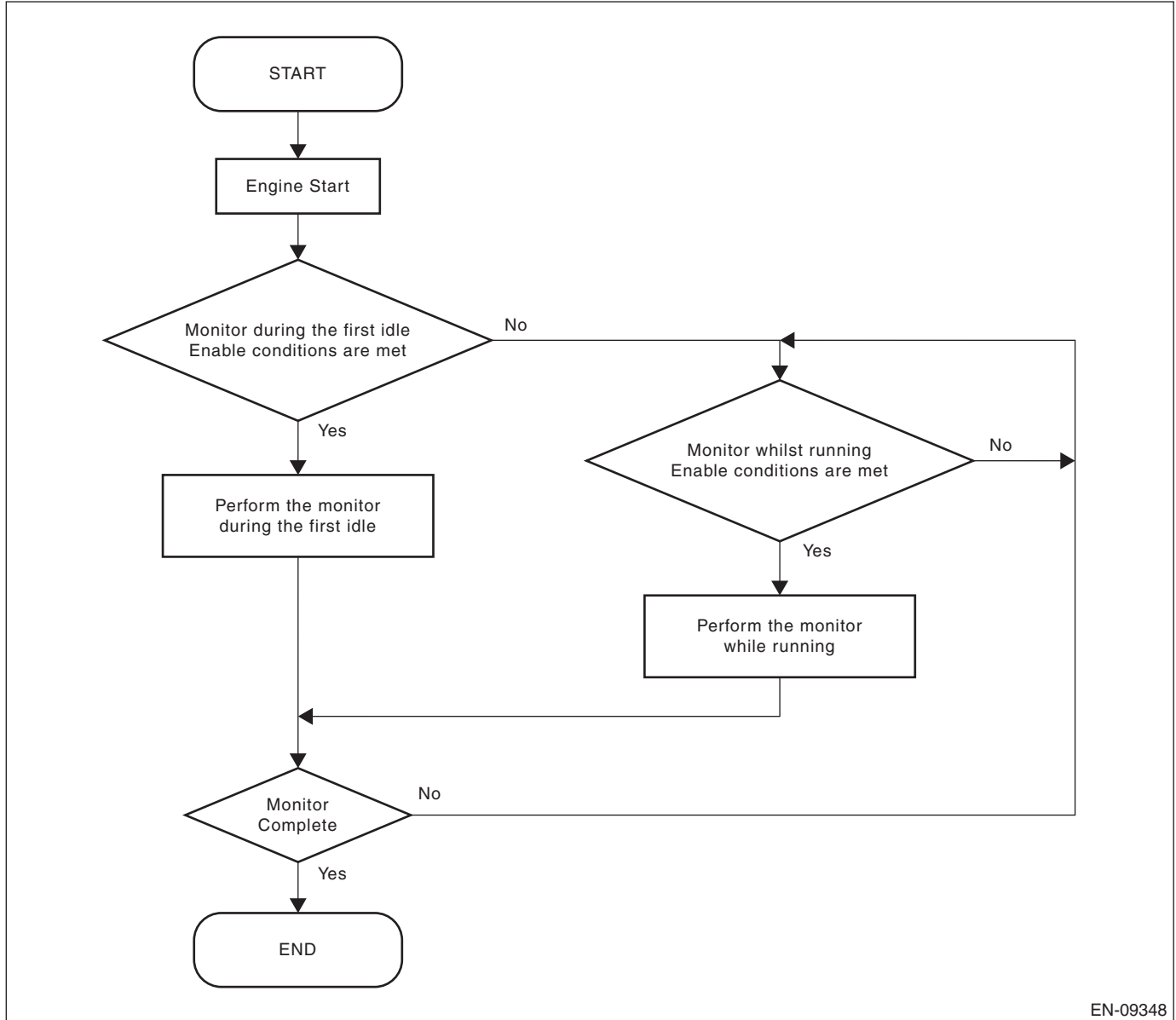
# Diagnostic Trouble Code (DTC) Detecting Criteria

## GENERAL DESCRIPTION

### Monitor 2

#### P0456 0.020 inch leak check

This monitor detects a very small leak (0.020 inch) in the evaporative emissions system by monitoring the fuel tank and system pressure during an intrusive pull-down pressure test. Pull down is accomplished via the purge valve while the engine is running. The monitor runs during the first idle after engine start and also while the vehicle is running.



EN-09348

# Diagnostic Trouble Code (DTC) Detecting Criteria

GENERAL DESCRIPTION

## Monitor 2 (first idle condition)

Mode	Description of each mode	Required time for each mode
Mode A (Estimation of Evap. Generation)	<p>CPC valve: Closed CCV: Closed</p> <p>Low vapor flag At the beginning of the monitor test when; → Fuel temperature is lower than Map 2 listed value → Intake air temperature is lower than Map 3 listed value The system sets "Low vapor flag = ON". Low vapor flag is used in Mode A, Mode C, and Mode D.</p> <p>The system measures the generated vapor pressure increase (<math>\Delta P1</math>) in the specific time period (*1), and then moves to Mode B. (*1) Low vapor flag OFF: 10000 ms, Low vapor flag ON: 128 ms</p>	<p>Low vapor flag OFF 10000 ms Low vapor flag ON 128 ms</p>
Mode B (Negative Pressure Introduction)	<p>CPC valve: Open</p> <p>Negative pressure is introduced to the fuel tank via engine manifold vacuum. When the fuel tank pressure reaches the target pressure (-1.3 kPa (-10 mmHg, -0.4 inHg)), the monitor moves to Mode C.</p>	<p>Average: 13 s (Depends on the tank condition)</p>
Mode C (Keeping Negative Pressure / Pass in Mode C)	<p>CPC valve: Closed</p> <p>After a calibrated time period (*2) has elapsed since the tank pressure comes up to the target pressure (-1.3 kPa (-10 mmHg, -0.4 inHg)), move to Mode D.</p> <p>If the fuel tank pressure does not exceed the target pressure (-1.3 kPa (-10 mmHg, -0.4 inHg)) after Map 4 (ms), the system is judged as "Pass in Mode C" and moves to "Final Judgment". (*2) Low vapor flag OFF: 10000 ms, Low vapor flag ON: 2000 ms</p>	<p>Low vapor flag OFF Average: 21 s Low vapor flag ON Average: 10 s (Depends on the tank condition)</p>
Mode D (Pressure Measurement / Fail or Pass in Mode D)	<p>The monitor requires 10000 ms to measure the pressure change (<math>\Delta P2</math>) and calculates the monitor value (<math>\Delta P2 - \Delta P1</math>), where Mode A (<math>\Delta P1</math>) is the generated vapor pressure. The calculated value (<math>\Delta P2 - \Delta P1</math>) is then compared to a calibrated threshold table as a function of fuel temperature and fuel level. The system judges as a "Pass/Fail in Mode D" and then moves to "Final Judgment".</p> <p>(1) <math>\Delta P2 - \Delta P1 &gt; \text{Fail Threshold} (*3) \rightarrow \text{"Fail in Mode D"}</math> (2) <math>\Delta P2 - \Delta P1 \leq \text{Pass Threshold} (*4) \rightarrow \text{"Pass in Mode D"}</math> (*3) Low vapor flag OFF: Map 5, Low vapor flag ON: Map 7 (*4) Low vapor flag OFF: Map 6, Low vapor flag ON: Map 8</p>	<p>10000 ms</p>
Final Judgment (Pass / Fail)	<p>The monitor is completed in the following order (1) Judged as "Fail in Mode D" → "Fail of 0.020 inch leak" <b>[P0456]</b> (2) Judged as "Pass in Mode C / Mode D" → "Pass of 0.020 inch leak"</p>	<p>0.128 s</p>

### Map 2 (Fuel temperature threshold for "Low vapor flag")

Fuel Level $\varnothing$ (US gal, Imp gal)	9.6 (2.54, 2.11)	32 (8.45, 7.04)	54.4 (14.37, 11.97)
Fuel temperature threshold °C (°F)	5 (41)	10 (50)	15 (59)

### Map 3 (intake air temperature threshold for "Low Vapor Flag")

Fuel Level $\varnothing$ (US gal, Imp gal)	9.6 (2.54, 2.11)	32 (8.45, 7.04)	54.4 (14.37, 11.97)
Intake air temperature threshold °C (°F)	5 (41)	10 (50)	15 (59)

# Diagnostic Trouble Code (DTC) Detecting Criteria

## GENERAL DESCRIPTION

### Map 4 (Period for judgment of Pass in Mode C)

Fuel Level ℓ (US gal, Imp gal)	9.6 (2.54, 2.11)	32 (8.45, 7.04)	46 (12.15, 10.12)	54.4 (14.37, 11.97)
Period for Pass in Mode C (ms)	31000	21000	13500	11000

### Map 5 (Threshold value for 0.020 inch leak in Mode D under normal condition)

		Fuel temperature (°C (°F))									
		0 (32)	10 (50)	15 (59)	20 (68)	25 (77)	30 (86)	35 (95)	40 (104)	45 (113)	50 (122)
Fuel Level ℓ (US gal, Imp gal)	9.6 (2.54, 2.11)	0.1 (0.700, 0)	0.1 (0.700, 0)	0.1 (0.700, 0)	0.1 (0.700, 0)	0.1 (0.700, 0)	0.1 (0.900, 0)	0.1 (1.100, 0)	0.1 (1.100, 0)	0.1 (1.100, 0)	0.1 (1.100, 0)
	32 (8.45, 7.04)	0.1 (0.800, 0)	0.1 (0.800, 0)	0.1 (0.800, 0)	0.1 (0.800, 0)	0.1 (0.800, 0)	0.1 (1.000, 0)	0.2 (1.200, 0)	0.2 (1.200, 0)	0.2 (1.200, 0)	0.2 (1.200, 0)
	54.4 (14.37, 11.97)	0.1 (1.100, 0)	0.1 (1.100, 0)	0.1 (1.100, 0)	0.1 (1.100, 0)	0.1 (1.100, 0)	0.2 (1.250, 0)	0.2 (1.400, 0.1)	0.2 (1.400, 0.1)	0.2 (1.400, 0.1)	0.2 (1.400, 0.1)
kPa (mmHg, inHg)											

### Map 6 (Threshold value for Pass in Mode D under normal conditions)

		Fuel temperature (°C (°F))									
		0 (32)	10 (50)	15 (59)	20 (68)	25 (77)	30 (86)	35 (95)	40 (104)	45 (113)	50 (122)
Fuel Level ℓ (US gal, Imp gal)	9.6 (2.54, 2.11)	0.1 (0.600, 0)	0.1 (0.600, 0)	0.1 (0.600, 0)	0.1 (0.600, 0)	0.1 (0.600, 0)	0.1 (0.600, 0)	0.1 (0.600, 0)	0.1 (0.600, 0)	0.1 (0.600, 0)	0.1 (0.600, 0)
	32 (8.45, 7.04)	0.1 (0.700, 0)	0.1 (0.700, 0)	0.1 (0.700, 0)	0.1 (0.700, 0)	0.1 (0.700, 0)	0.1 (0.700, 0)	0.1 (0.700, 0)	0.1 (0.700, 0)	0.1 (0.700, 0)	0.1 (0.700, 0)
	54.4 (14.37, 11.97)	0.1 (1.000, 0)	0.1 (1.000, 0)	0.1 (1.000, 0)	0.1 (1.000, 0)	0.1 (1.000, 0)	0.1 (1.000, 0)	0.1 (1.000, 0)	0.1 (1.000, 0)	0.1 (1.000, 0)	0.1 (1.000, 0)
kPa (mmHg, inHg)											

### Map 7 (Threshold value for 0.020 inch leak in Mode D with under low vapor conditions)

		Fuel temperature (°C (°F))			
		0 (32)	10 (50)	15 (59)	20 (68)
Fuel Level ℓ (US gal, Imp gal)	9.6 (2.54, 2.11)	0.1 (0.80, 0)	0.1 (0.80, 0)	0.1 (0.80, 0)	0.1 (0.80, 0)
	32 (8.45, 7.04)	0.1 (0.90, 0)	0.1 (0.90, 0)	0.1 (0.90, 0)	0.1 (0.90, 0)
	54.4 (14.37, 11.97)	0.2 (1.2, 0)	0.2 (1.2, 0)	0.2 (1.2, 0)	0.2 (1.2, 0)
kPa (mmHg, inHg)					

### Map 8 (Threshold value for Pass in Mode D with under low vapor conditions)

		Fuel temperature (°C (°F))			
		0 (32)	10 (50)	15 (59)	20 (68)
Fuel Level ℓ (US gal, Imp gal)	9.6 (2.54, 2.11)	0.1 (0.70, 0)	0.1 (0.70, 0)	0.1 (0.70, 0)	0.1 (0.70, 0)
	32 (8.45, 7.04)	0.1 (0.8, 0)	0.1 (0.8, 0)	0.1 (0.8, 0)	0.1 (0.8, 0)
	54.4 (14.37, 11.97)	0.1 (1.1, 0)	0.1 (1.1, 0)	0.1 (1.1, 0)	0.1 (1.1, 0)
kPa (mmHg, inHg)					

# Diagnostic Trouble Code (DTC) Detecting Criteria

GENERAL DESCRIPTION

## Monitor 2 (vehicle running condition)

Mode	Description of each mode	Required time for each mode
Mode A-1 (Zero adjust)	CPC valve: Closed Fuel tank pressure is adjusted to zero. If the fuel tank pressure is close to the ambient pressure, the system waits 5000 ms for stabilization of the tank pressure prior to moving to Mode A-2.	Average: 7 s (Depends on the tank condition)
Mode A-2 (Estimation of Evap. Generation)	CCV: Closed The system requires 30000 ms to measure the pressure increase (P1), and then move to Mode B.	30000 ms
Mode B (Negative Pressure Introduction)	CPC valve: Open Negative pressure is introduced to the fuel tank via engine manifold vacuum. When the fuel tank pressure reaches the target pressure (-2 kPa (-15 mmHg, -0.6 inHg)), the monitor moves to Mode C.	Average: 22 s (Depends on the tank condition)
Mode C (Keeping Negative Pressure)	CPC valve: Closed When the tank pressure comes up to target pressure (-2 kPa (-15 mmHg, -0.6 inHg)) or the calibrated period (Map 9) has passed, move to Mode D.	Average: 5 s (Depends on the tank condition)
Mode D (Pressure Measurement / Pass Fail in Mode D)	The system calculates the integrated pressure change (ptepap1sum) which is compensated by "P1" (the generated vapor pressure), $ptepap1sum(n) = ptepap1sum(n-1) + ptepap1 - (-2 \text{ kPa } (-15 \text{ mmHg, } -0.6 \text{ inHg}))$ $ptepap1 = (\text{Fuel tank pressure}) - ("P1") / (\text{Mode A-2 time}) \times (\text{Elapsed time in Mode D})$ When the calibrated period (Map 10) has passed or the tank pressure reaches the Ambient pressure (0 kPa (0 mmHg, 0 inHg)), the system compares the monitor value (ptepap1sum) to a calibrated threshold table as a function of elapsed time in Mode D and fuel level. The system judges as "Pass/Fail in Mode D" and then moves to "Final Judgment". (1) $ptepap1sum > \text{Fail Threshold (Map 11)} \rightarrow \text{"Fail in Mode D"}$ (2) $ptepap1sum \leq \text{Pass Threshold (Map 12)} \rightarrow \text{"Pass in Mode D"}$	Average: 134 s (Depends on the tank condition)
Final Judgment (Pass / Fail)	The monitor is completed in the following order (1) Judged as "Fail in Mode D" → Fail of 0.020 inch leak <b>[P0456]</b> (2) Judged as "Pass in Mode D" → Pass of 0.020 inch leak	0.128 s

### Map 9 (Maximum time of Mode C)

Fuel Level $\varnothing$ (US gal, Imp gal)	9.6 (2.54, 2.11)	24.6 (6.5, 5.41)	39.3 (10.38, 8.65)	54.4 (14.37, 11.97)
Maximum time of Mode C (ms)	7500	6500	5500	5000

### Map 10 (Maximum time of Mode D)

Fuel Level $\varnothing$ (US gal, Imp gal)	9.6 (2.54, 2.11)	32 (8.45, 7.04)	54.4 (14.37, 11.97)
Maximum time of Mode D (ms)	210000	153000	92000

# Diagnostic Trouble Code (DTC) Detecting Criteria

## GENERAL DESCRIPTION

### Map 11 (Threshold value for 0.020 inch leak in Mode D)

		Elapsed time in Mode D (ms)							
		15104	30080	45056	60032	75008	89984	104960	119936
Fuel Level Q (US gal, Imp gal)	9.6 (2.54, 2.11)	12.9 (97, 3.8)	47.3 (355, 14)	100.2 (752, 29.6)	169.6 (1272, 50.1)	254.2 (1907, 75.1)	353.3 (2650, 104.3)	465.9 (3495, 137.6)	591 (4433, 174.5)
	32 (8.45, 7.04)	16.6 (125, 4.9)	60.4 (453, 17.9)	126.9 (952, 37.5)	213.8 (1604, 63.1)	319.1 (2394, 94.3)	441 (3308, 130.2)	577.8 (4334, 170.6)	727.9 (5461, 215)
	54.4 (14.37, 11.97)	20.3 (152, 6)	75.5 (567, 22.3)	160.4 (1203, 47.4)	271.9 (2039, 80.3)	406.3 (3048, 120)	560.3 (4203, 165.5)	730.1 (5477, 215.6)	912 (6841, 269.3)
kPa (mmHg, inHg)									

		Elapsed time in Mode D (ms)							
		135040	150016	164992	179968	194944	209920	225024	
Fuel Level Q (US gal, Imp gal)	9.6 (2.54, 2.11)	728.8 (5468, 215.3)	876.1 (6573, 258.8)	1033.1 (7750, 305.1)	1198.9 (8994, 354.1)	1372.7 (10298, 405.4)	1553.5 (11654, 458.8)	1741.9 (13067, 514.5)	
	32 (8.45, 7.04)	891.2 (6686, 263.2)	1063.2 (7976, 314)	1243.7 (9330, 367.3)	1431.6 (10740, 422.8)	1625 (12191, 480)	1823.1 (13676, 538.4)	2026.1 (15200, 598.4)	
	54.4 (14.37, 11.97)	1104 (8282, 326.1)	1299.9 (9752, 383.9)	1498.8 (11244, 442.7)	1699.1 (12747, 501.8)	1900.1 (14254, 561.2)	2101.7 (15767, 620.7)	2305.2 (17293, 680.8)	
kPa (mmHg, inHg)									

### Map 12 (Threshold value for Pass in Mode D)

		Elapsed time in Mode D (ms)							
		15104	30080	45056	60032	75008	89984	104960	119936
Fuel Level Q (US gal, Imp gal)	9.6 (2.54, 2.11)	10 (75, 3)	36.8 (276, 10.9)	77.9 (585, 23)	131.9 (989, 38.9)	197.7 (1483, 58.4)	274.8 (2061, 81.2)	362.4 (2718, 107)	459.6 (3448, 135.8)
	32 (8.45, 7.04)	12.9 (97, 3.8)	47 (353, 13.9)	98.7 (741, 29.2)	166.3 (1247, 49.1)	248.2 (1862, 73.3)	343 (2573, 101.3)	449.4 (3371, 132.7)	566.2 (4247, 167.2)
	54.4 (14.37, 11.97)	15.8 (119, 4.7)	58.8 (441, 17.4)	124.7 (936, 36.8)	211.4 (1586, 62.4)	316 (2371, 93.3)	435.8 (3269, 128.7)	567.9 (4260, 167.7)	709.3 (5321, 209.5)
kPa (mmHg, inHg)									

		Elapsed time in Mode D (ms)							
		135040	150016	164992	179968	194944	209920	225024	
Fuel Level Q (US gal, Imp gal)	9.6 (2.54, 2.11)	566.9 (4253, 167.4)	681.4 (5112, 201.3)	803.5 (6028, 237.3)	932.5 (6995, 275.4)	1067.7 (8009, 315.3)	1208.2 (9064, 356.9)	1354.8 (10163, 400.1)	
	32 (8.45, 7.04)	693.2 (5200, 204.7)	826.9 (6204, 244.2)	967.4 (7257, 285.7)	1113.5 (8353, 328.9)	1263.9 (9482, 373.3)	1417.9 (10637, 418.8)	1575.9 (11822, 465.4)	
	54.4 (14.37, 11.97)	858.7 (6442, 253.6)	1011 (7585, 298.6)	1165.8 (8745, 344.3)	1321.6 (9914, 390.3)	1477.9 (11087, 436.5)	1634.7 (12263, 482.8)	1792.9 (13450, 529.5)	
kPa (mmHg, inHg)									

# Diagnostic Trouble Code (DTC) Detecting Criteria

GENERAL DESCRIPTION

## 2. ENABLE CONDITION

### Monitor 1

Secondary Parameters	Enable Conditions
Battery voltage	≥ 10.9 V
Ambient pressure	≥ 75 kPa (563 mmHg, 22.2 inHg)
Fuel tank pressure	≥ -4 kPa (-30 mmHg, -1.2 inHg) and < 2.7 kPa (20 mmHg, 0.8 inHg)
Elapsed time after previous EVAP monitor was finished/canceled	≥ 230000 ms
Total time of canister purge operation	≥ 120000 ms
Learning value of EVAP concentration	< 0.08
Engine speed	≥ 1050 rpm and < 4000 rpm
Intake manifold vacuum (= ambient pressure – intake manifold pressure)	≥ 26.7 kPa (200 mmHg, 7.9 inHg)
Vehicle speed	≥ 32 km/h (19.9 MPH)
Closed loop air fuel ratio control	Active
Fuel temperature	< 45 °C (113 °F)
Intake air temperature	≥ -10 °C (14 °F)
Fuel level	≥ 9.6 ℓ (2.54 US gal, 2.11 Imp gal) and < 54.4 ℓ (14.37 US gal, 11.97 Imp gal)

### Monitor 2 (first idle condition)

Secondary Parameters	Enable Conditions
Battery voltage	≥ 10.9 V
Ambient pressure	≥ 75 kPa (563 mmHg, 22.2 inHg)
Soak time	≥ 18000 s
Accumulated intake air mass after engine start	≥ Map 13
Closed loop air fuel ratio control	Active
Fuel level	≥ 9.6 ℓ (2.54 US gal, 2.11 Imp gal) and < 54.4 ℓ (14.37 US gal, 11.97 Imp gal)
Fuel temperature	< 35 °C (95 °F)
Fuel tank pressure	≥ -0.7 kPa (-5.106 mmHg, -0.2 inHg) and < 0.7 kPa (5.106 mmHg, 0.2 inHg)
Adapted fuel tank pressure	≥ -0.3 kPa (-2.507 mmHg, -0.1 inHg) and < 0.3 kPa (2.507 mmHg, 0.1 inHg)
Engine speed	≥ 1000 rpm and < 2000 rpm
Intake manifold vacuum (= ambient pressure – intake manifold pressure)	≥ 13.3 kPa (100 mmHg, 3.9 inHg)
Vehicle speed	< 2 km/h (1.2 MPH)
Idle switch	ON
Intake air temperature	≥ -10 °C (14 °F)

# Diagnostic Trouble Code (DTC) Detecting Criteria

## GENERAL DESCRIPTION

### Monitor 2 (vehicle running condition)

Secondary Parameters	Enable Conditions
Battery voltage	≥ 10.9 V
Ambient pressure	≥ 75 kPa (563 mmHg, 22.2 inHg)
Elapsed time after previous EVAP monitor was finished/canceled	≥ 60000 ms
Total time of canister purge operation	≥ 120000 ms
Fuel temperature	< 55 °C (131 °F)
Fuel level	≥ 9.6 ℓ (2.54 US gal, 2.11 Imp gal) and < 54.4 ℓ (14.37 US gal, 11.97 Imp gal)
Intake air temperature	≥ -10 °C (14 °F)
Vehicle speed	≥ 30 km/h (18.6 MPH)
All conditions below are satisfied	≥ 5000 ms
• Fuel tank pressure	≥ -0.7 kPa (-5 mmHg, -0.2 inHg) and < 0.4 kPa (2.9 mmHg, 0.1 inHg)
• Engine speed	≥ 1050 rpm and < 4000 rpm
• Intake manifold vacuum (= ambient pressure – intake manifold pressure)	≥ 8 kPa (60 mmHg, 2.4 inHg)
• Closed loop air fuel ratio control	Active
• Short term fuel trim	> 0.9
• Fuel level with large smoothing coefficient – Fuel level with small smoothing coefficient	< Map 14
• Learning value of EVAP density	< 0.08

### Map 13 (Accumulated intake air mass after engine start)

Engine coolant temperature at start °C (°F)	-10 (14)	0 (32)	10 (50)	20 (68)	30 (86)	40 (104)	50 (122)	60 (140)	70 (158)
Accumulated intake air mass after engine start g (oz)	450 (15.87)	450 (15.87)	450 (15.87)	430 (15.17)	380 (13.4)	290 (10.23)	230 (8.11)	180 (6.35)	180 (6.35)

### Map 14 (Threshold value the fuel slosh detection)

Fuel Level ℓ (US gal, Imp gal)	0 (0, 0)	10 (2.64, 2.2)	20 (5.28, 4.4)	30 (7.93, 6.6)	40 (10.57, 8.8)	50 (13.21, 11)	60 (15.85, 13.2)
Fuel level change for detection of fuel slosh ℓ (US gal, Imp gal)	6.5 (1.72, 1.43)	6.5 (1.72, 1.43)	6.5 (1.72, 1.43)	6.5 (1.72, 1.43)	6.5 (1.72, 1.43)	7 (1.85, 1.54)	8 (2.11, 1.76)



# Diagnostic Trouble Code (DTC) Detecting Criteria

GENERAL DESCRIPTION

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## 3. GENERAL DRIVING CYCLE

### Monitor 1

Perform the diagnosis when the cumulative time of canister purge after engine start becomes 120 seconds or more, at a vehicle speed of 32 km/h (20 MPH) or more.

If judgment cannot be made, repeat the diagnosis after a predetermined interval has passed.

### Monitor 2 (first idle condition)

Perform the diagnosis only once at the fast idle (the idling before starting to move) after soaking of 5 hours or more, in conditions that A/F feedback has been executed and catalytic converter has been warmed up (approx. 25 seconds after engine start).

If judgment cannot be made, or the diagnosis cannot be performed at fast idle, do not repeat the diagnosis in this driving cycle.

### Monitor 2 (vehicle running condition)

Perform this procedure only when the diagnosis cannot be completed at fast idle.

Perform the diagnosis when the cumulative time of canister purge after engine start becomes 120 seconds or more, at a vehicle speed of 30 km/h (18.6 MPH) or more.

If judgment cannot be made, repeat the diagnosis after a predetermined interval has passed.

# Diagnostic Trouble Code (DTC) Detecting Criteria

## GENERAL DESCRIPTION

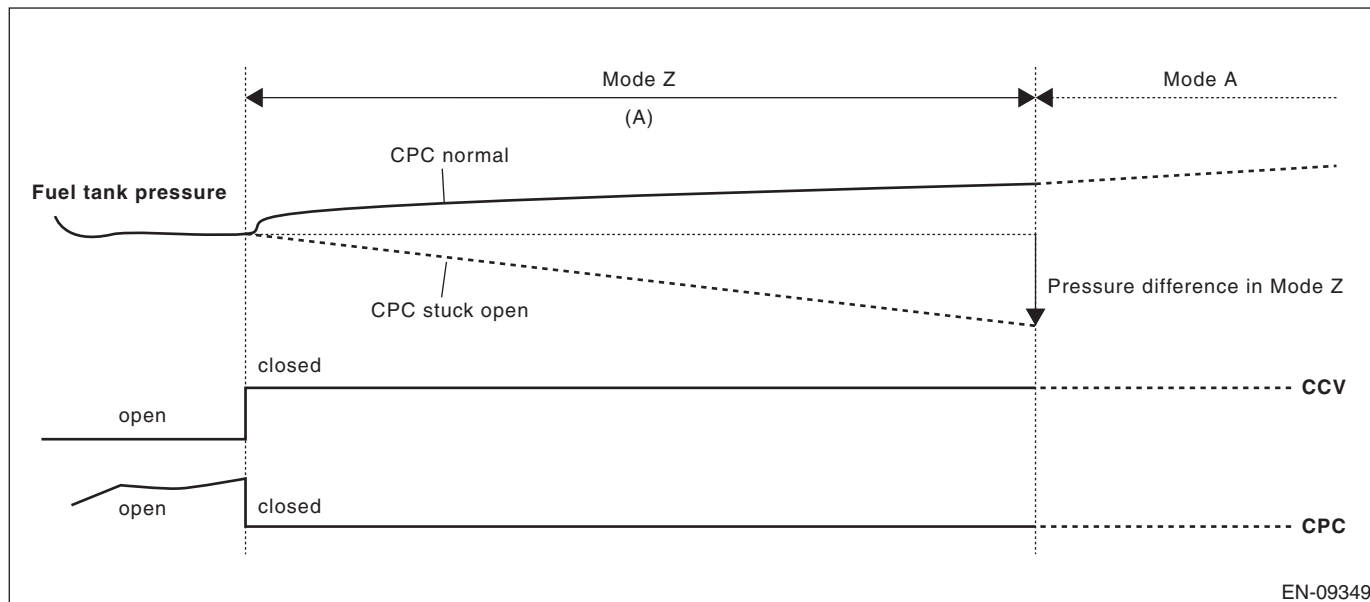
### 4. DIAGNOSTIC METHOD

#### • Monitor 1

#### • CPC valve stuck open

At the beginning of the Monitor 1, system performs CPC valve stuck open monitor in Mode Z. CPC valve and CCV are closed and the fuel tank pressure is monitored. The pressure transition over a calibrated time is then used to determine if the CPC valve is stuck open.

#### CPC valve stuck open test at Mode Z of Monitor 1



(A) 3000 ms

#### Judgment

- Pressure difference in Mode Z  $< 0.6$  kPa (4.5 mmHg, 0.2 inHg) → Fail [CPC valve stuck open]: **P0457**
- Pressure difference in Mode Z  $\geq 0.4$  kPa (3 mmHg, 0.1 inHg) → Pass → move to **Mode A**

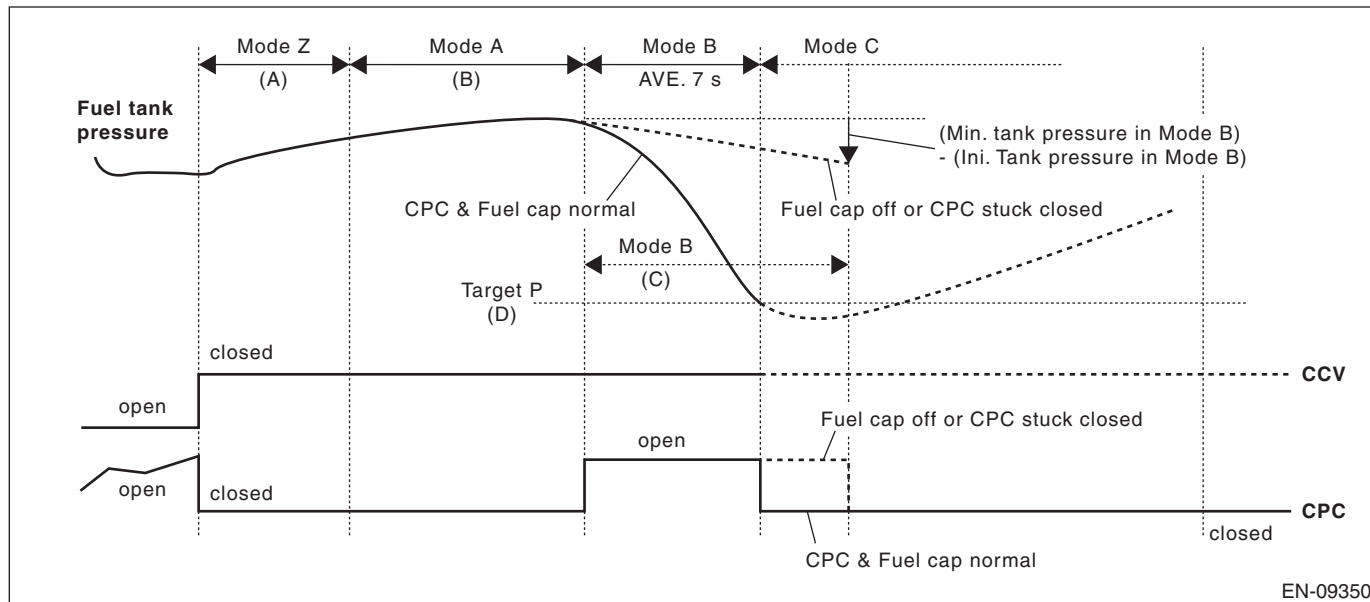
#### • Fuel cap loose/off and CPC valve stuck close

Fuel cap loose/off and CPC valve stuck close monitor is performed in Mode B of Monitor 1. The engine lowers the fuel tank pressure using intake manifold vacuum via the operation of the CPC valve. The pressure transition over a calibrated time is then used to determine if the Fuel cap loose/off or CPC valve stuck closed.

# Diagnostic Trouble Code (DTC) Detecting Criteria

GENERAL DESCRIPTION

## Fuel cap off or CPC stuck close at Mode B of Monitor 1

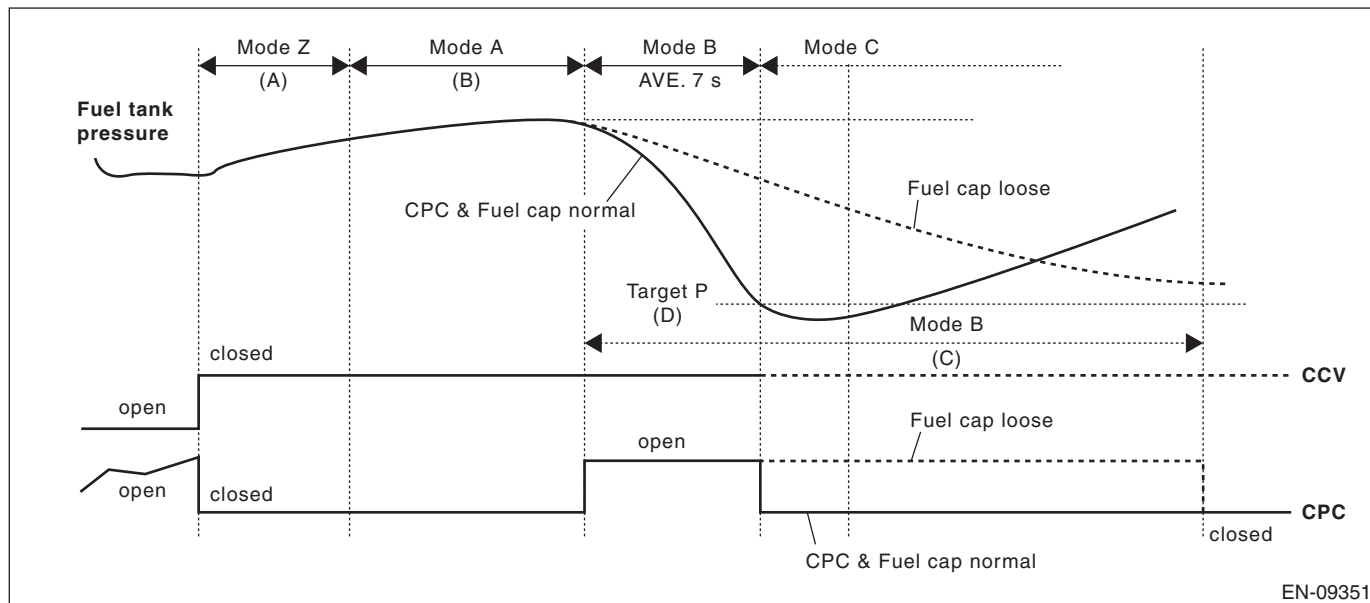


- (A) 3000 ms
- (B) 10000 ms
- (C) 10000 ms
- (D) -1.4 kPa (-10.5 mmHg, -0.4 inHg)

### Judgment

- Elapsed time in Mode B  $\geq$  10000 ms and (Minimum tank pressure in Mode B) - (Initial tank pressure in Mode B)  $>$  -0.5 kPa (-4 mmHg, -0.2 inHg)  $\rightarrow$  Fail [Fuel cap off or CPC valve stuck close]: **P0457**
- Fuel tank pressure  $\leq$  -1.4 kPa (-10.5 mmHg, -0.4 inHg)  $\rightarrow$  Pass  $\rightarrow$  move to **Mode C**

## Fuel cap loose at Mode B of Monitor 1



- (A) 3000 ms
- (B) 10000 ms
- (C) 10000 ms + 25000 ms
- (D) -1.4 kPa (-10.5 mmHg, -0.4 inHg)

### Judgment

- Elapsed time in Mode B  $\geq$  10000 ms + 25000 ms  $\rightarrow$  Fail [Fuel cap loose]: **P0457**
- Fuel tank pressure  $\leq$  -1.4 kPa (-10.5 mmHg, -0.4 inHg)  $\rightarrow$  Pass  $\rightarrow$  move to **Mode C**

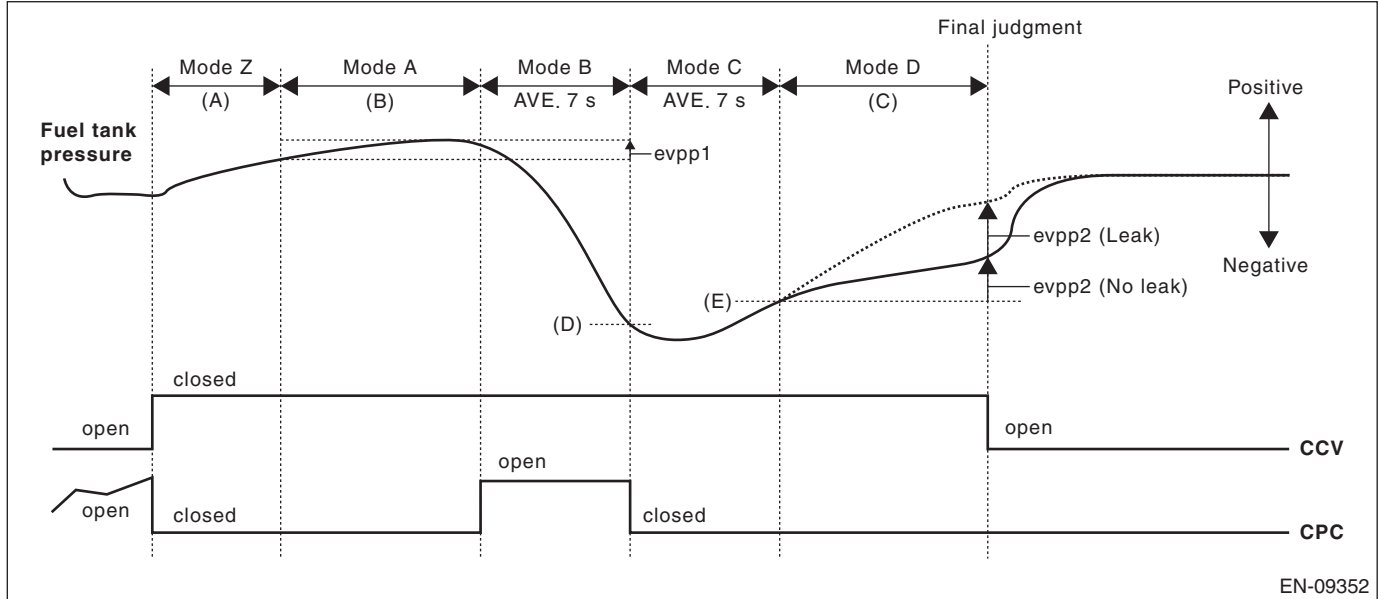
# Diagnostic Trouble Code (DTC) Detecting Criteria

## GENERAL DESCRIPTION

### • 0.040 inch leak check

0.040 inch evaporative leak monitor is executed through Mode A to Mode D of Monitor 1. The engine lowers the fuel tank pressure using intake manifold vacuum via the canister purge operation during engine running. Once the tank pressure reaches a calibrated target (below atmospheric pressure) the purge valve is closed and the fuel tank pressure is monitored. The pressure transition over a calibrated time period is then used to determine if the fuel tank system has a leak.

### 0.040 inch EVAP monitor test



EN-09352

- (A) 3000 ms
- (B) 10000 ms
- (C) 10000 ms
- (D) -1.4 kPa (-10.5 mmHg, -0.4 inHg)
- (E) -1.3 kPa (-9.75 mmHg, -0.4 inHg)

### Judgment

- $evpp2 - 1.5 \times evpp1 > \text{Map } 1 \rightarrow \text{Fail [0.040 inch Leak]: P0442}$
- $evpp2 - 1.5 \times evpp1 \leq \text{Map } 1 \rightarrow \text{Pass [No Leak]}$

# Diagnostic Trouble Code (DTC) Detecting Criteria

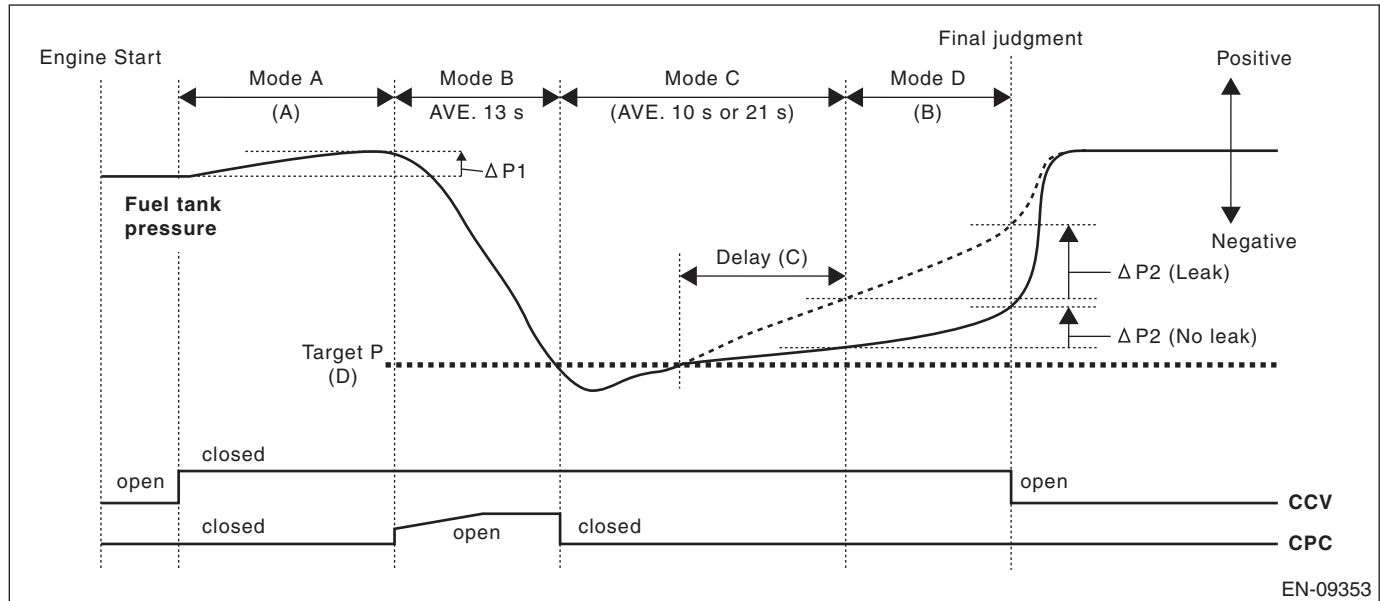
GENERAL DESCRIPTION

## • Monitor 2 (first idle condition)

### 0.020 inch leak check at first idle condition

An intrusive evaporative leak monitor test is run following the first engine start after a calibrated engine off soak period. The engine lowers the fuel tank pressure using intake manifold vacuum via the purge valve operation during engine idle. Once the tank pressure reaches a calibrated target (below atmospheric pressure) the purge valve is closed and the fuel tank pressure is monitored. The pressure transition over a calibrated time period is then used to determine if the fuel tank system has a leak.

### Intrusive EVAP Monitor test at first Idle



(A) 128 ms or 10000 ms

(B) 10000 ms

(C) 2000 ms or 10000 ms

(D) -1.3 kPa (-10 mmHg, -0.4 inHg)

### Judgment

- $\Delta P2 - \Delta P1 > \text{Map 5 or Map 7} \rightarrow \text{Fail [0.020 inch Leak]: P0456}$
- $\Delta P2 - \Delta P1 \leq \text{Map 6 or Map 8} \rightarrow \text{Pass [No Leak]}$

# Diagnostic Trouble Code (DTC) Detecting Criteria

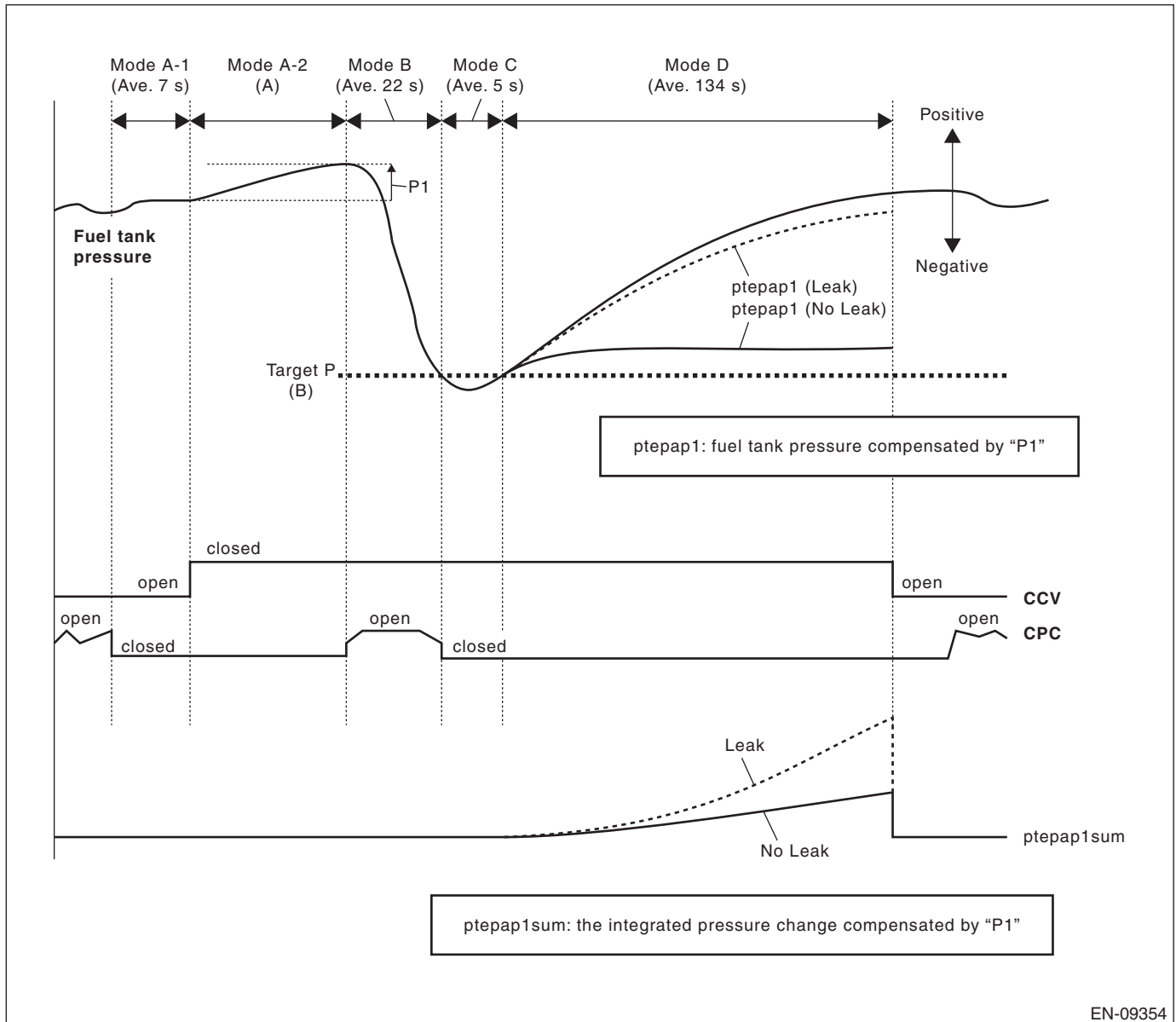
## GENERAL DESCRIPTION

### • Monitor 2 (vehicle running condition)

#### 0.020 inch Monitor during Vehicle Running (moving) Conditions

While the vehicle is vehicle running, the diagnostic intrusively pulls-down the fuel tank pressure using manifold vacuum via the purge valve. Once the tank pressure reaches a calibrated target (below atmospheric pressure) the purge valve is closed and the fuel tank pressure is monitored. The pressure transition over a calibrated time period is then used to determine if the fuel tank system has a leak.

#### Intrusive EVAP Monitor Test (Vehicle Running)



(A) 30000 ms

(B) -2 kPa (-15 mmHg, -0.6 inHg)

#### Judgment

- $ptepap1sum > \text{Map } 11 \rightarrow \text{Fail [0.020 inch Leak]: P0456}$
- $ptepap1sum \leq \text{Map } 12 \rightarrow \text{Pass [No Leak]}$

# Diagnostic Trouble Code (DTC) Detecting Criteria

GENERAL DESCRIPTION

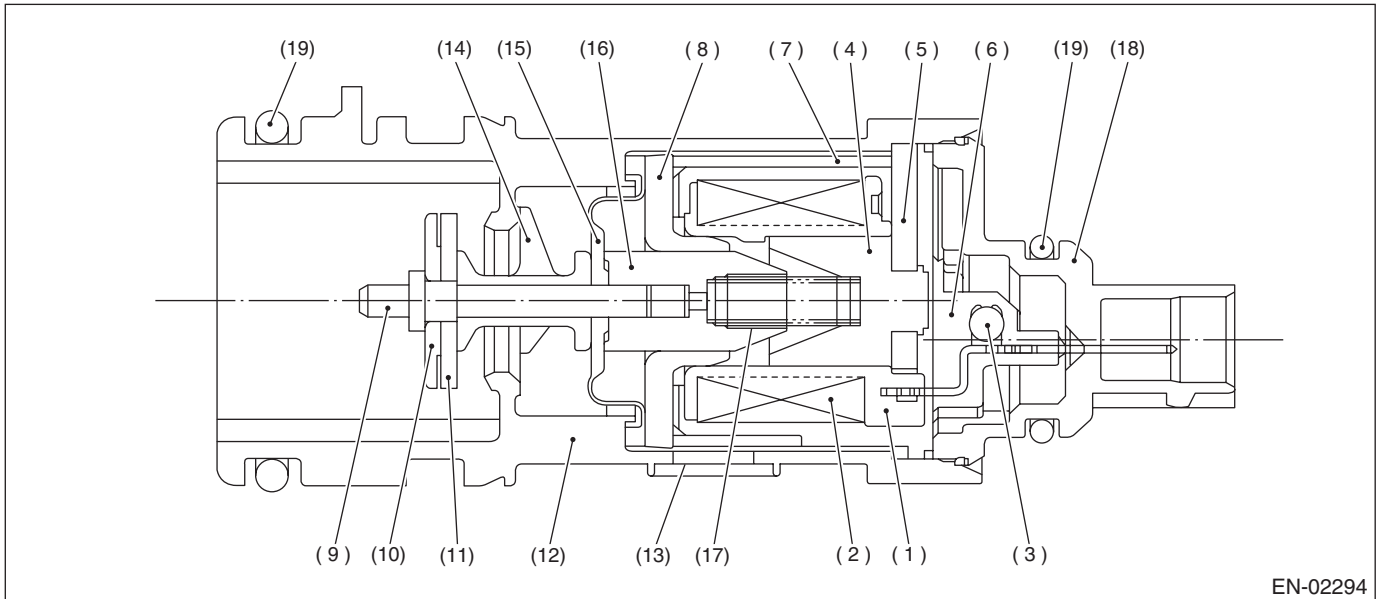
## DE:DTC P0447 EVAPORATIVE EMISSION CONTROL SYSTEM VENT CONTROL CIRCUIT OPEN

### 1. OUTLINE OF DIAGNOSIS

Detect open or short circuit of the drain valve.

Judge as NG when the ECM output level differs from the actual terminal level.

### 2. COMPONENT DESCRIPTION



EN-02294

- |                 |                    |                   |
|-----------------|--------------------|-------------------|
| (1) Bobbin      | (8) Magnetic plate | (15) Diaphragm    |
| (2) Coil        | (9) Shaft          | (16) Movable core |
| (3) Diode       | (10) Plate         | (17) Spring       |
| (4) Stator core | (11) Valve         | (18) Cover        |
| (5) End plate   | (12) Housing       | (19) O-ring       |
| (6) Body        | (13) Filter        |                   |
| (7) Yoke        | (14) Retainer      |                   |

### 3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
None	

### 4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

# Diagnostic Trouble Code (DTC) Detecting Criteria

## GENERAL DESCRIPTION

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### 5. DIAGNOSTIC METHOD

#### • Abnormality Judgment

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

#### Judgment Value

Malfunction Criteria	Threshold Value
Battery voltage	$\geq 10.9$ V
Elapsed time after starting the engine	$\geq 1$ second
Terminal output voltage when ECM outputs OFF signal	Low

**Time Needed for Diagnosis:** 2500 ms

**Malfunction Indicator Light Illumination:** Illuminates as soon as a malfunction occurs.

#### • Normality Judgment

Judge as OK and clear the NG if the continuous time while the following conditions are established is more than the predetermined time.

#### Judgment Value

Malfunction Criteria	Threshold Value
Battery voltage	$\geq 10.9$ V
Elapsed time after starting the engine	$\geq 1$ second
Terminal output voltage when ECM outputs OFF signal	High

**Time Needed for Diagnosis:** Less than 1 second



# Diagnostic Trouble Code (DTC) Detecting Criteria

GENERAL DESCRIPTION

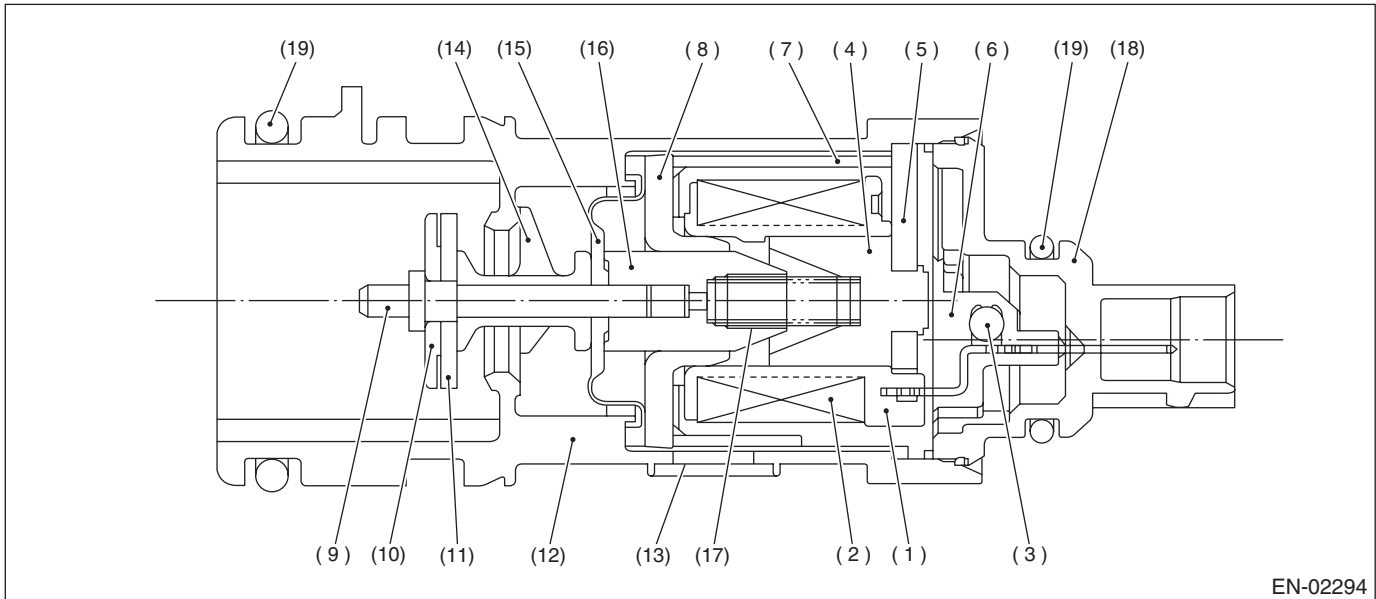
## DF:DTC P0448 EVAPORATIVE EMISSION CONTROL SYSTEM VENT CONTROL CIRCUIT SHORTED

### 1. OUTLINE OF DIAGNOSIS

Detect open or short circuit of the drain valve.

Judge as NG when the ECM output level differs from the actual terminal level.

### 2. COMPONENT DESCRIPTION



- |                 |                    |                   |
|-----------------|--------------------|-------------------|
| (1) Bobbin      | (8) Magnetic plate | (15) Diaphragm    |
| (2) Coil        | (9) Shaft          | (16) Movable core |
| (3) Diode       | (10) Plate         | (17) Spring       |
| (4) Stator core | (11) Valve         | (18) Cover        |
| (5) End plate   | (12) Housing       | (19) O-ring       |
| (6) Body        | (13) Filter        |                   |
| (7) Yoke        | (14) Retainer      |                   |

### 3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
None	

### 4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

# Diagnostic Trouble Code (DTC) Detecting Criteria

## GENERAL DESCRIPTION

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### 5. DIAGNOSTIC METHOD

#### • Abnormality Judgment

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

#### Judgment Value

Malfunction Criteria	Threshold Value
Battery voltage	$\geq 10.9$ V
Elapsed time after starting the engine	$\geq 1$ second
Terminal output voltage when ECM outputs ON signal	High

**Time Needed for Diagnosis:** 2500 ms

**Malfunction Indicator Light Illumination:** Illuminates as soon as a malfunction occurs.

#### • Normality Judgment

Judge as OK and clear the NG if the continuous time while the following conditions are established is more than the predetermined time.

#### Judgment Value

Malfunction Criteria	Threshold Value
Battery voltage	$\geq 10.9$ V
Elapsed time after starting the engine	$\geq 1$ second
Terminal output voltage when ECM outputs ON signal	Low

**Time Needed for Diagnosis:** Less than 1 second

## DG:DTC P0451 EVAPORATIVE EMISSION CONTROL SYSTEM PRESSURE SENSOR

### 1. OUTLINE OF DIAGNOSIS

Detect malfunctions of tank pressure sensor output property by the following two diagnoses.

- **DRIFT DIAGNOSIS**

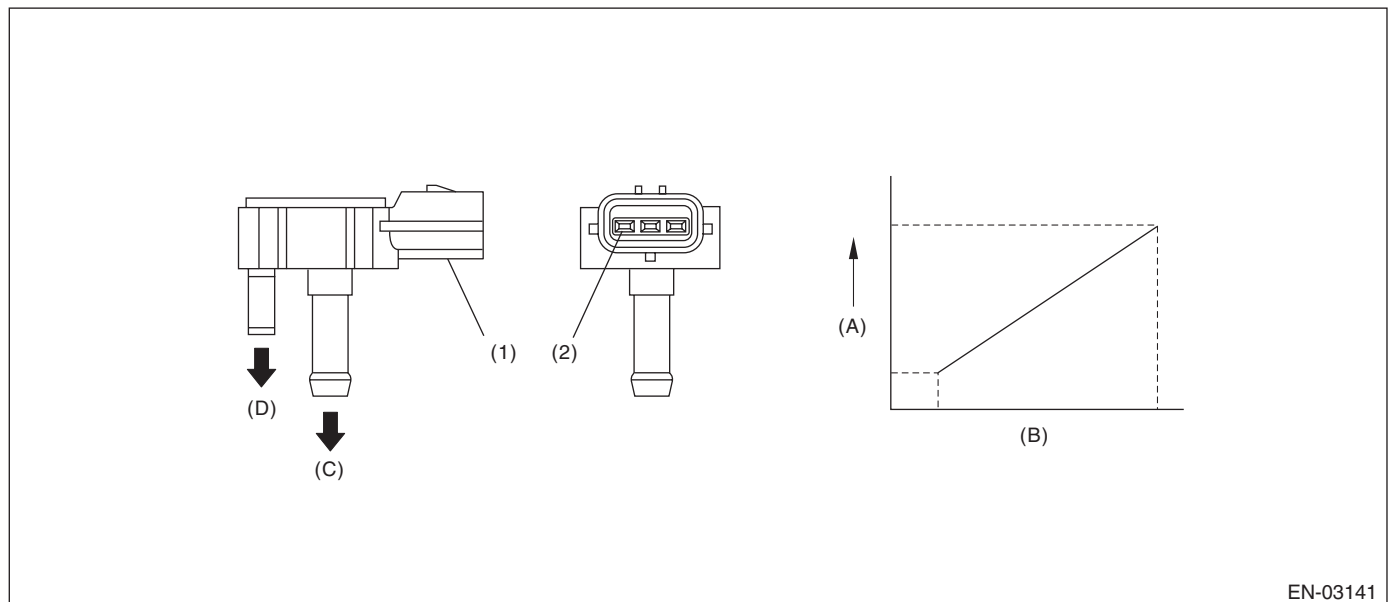
To detect drift malfunction and offset malfunction of tank pressure sensor, activate ECM in the predetermined soaking time after turning the ignition switch OFF, and check that the tank pressure sensor input value is equivalent to the barometric pressure.

For vehicles equipped with pressure control valve, be sure to open the pressure control valve when performing the diagnosis, because the pressure inside the tank increases if the ambient temperature rises during soaking.

- **Stuck Diagnosis**

When there is no pressure variation, which should have occurred in the tank considering the operation status, judge as NG.

### 2. COMPONENT DESCRIPTION



EN-03141

(A) Output voltage  
(D) To atmosphere

(B) Input voltage

(C) To fuel tank

(1) Connector

(2) Terminals

# Diagnostic Trouble Code (DTC) Detecting Criteria

## GENERAL DESCRIPTION

### 3. ENABLE CONDITION

#### <DRIFT DIAGNOSIS>

Secondary Parameters	Enable Conditions
Soaking time	≥ 3600 s × 2 time(s)
Ignition switch	OFF
Battery voltage	≥ 10.9 V
Atmospheric pressure	≥ 75 kPa (563 mmHg, 22.2 inHg)
Fuel temperature	< 55 °C (131 °F)
Intake air temperature	> -10 °C (14 °F)
	and
	< 55 °C (131 °F)
Cumulative amount of purge during previous driving cycle	≥ Value from Map
Fuel level when the ignition switch is OFF	≥ 9.6 ℓ (2.54 US gal, 2.11 Imp gal)
	and
	< 54.4 ℓ (14.37 US gal, 11.97 Imp gal)

#### Map

Ambient air temperature °C (°F)	25 (77)	35 (95)	40 (104)	45 (113)
Cumulative amount of purge during previous driving cycle g (oz)	0 (0)	0 (0)	0 (0)	0 (0)

#### <Stuck Diagnosis>

Secondary Parameters	Enable Conditions
Elapsed time after starting the engine	≥ 60 s
Fuel level	≥ 9.6 ℓ (2.54 US gal, 2.11 Imp gal)
Fuel temperature	< 55 °C (131 °F)
Battery voltage	≥ 10.9 V
Atmospheric pressure	≥ 75 kPa (563 mmHg, 22.2 inHg)

### 4. GENERAL DRIVING CYCLE

#### <DRIFT DIAGNOSIS>

Perform the diagnosis only once when 3600 s × 2 time(s) has passed after the ignition switch is OFF.

#### <Stuck Diagnosis>

- Perform the diagnosis continuously after 60 s have passed since the engine started.
- Pay attention to the fuel level and temperature.

### 5. DIAGNOSTIC METHOD

#### <DRIFT DIAGNOSIS>

#### Abnormality Judgment

Judge as NG when one of the following conditions is established.

#### Judgment Value

Malfunction Criteria	Threshold Value
Tank pressure sensor learning value	≥ 0.7 kPa (5.106 mmHg, 0.2 inHg) or < -0.7 kPa (-5.106 mmHg, -0.2 inHg)
Tank pressure sensor measured value – Tank pressure sensor learning value	≥ 0.3 kPa (2.507 mmHg, 0.1 inHg) or < -0.3 kPa (-2.507 mmHg, -0.1 inHg)

**Time Needed for Diagnosis:** 10 seconds

# Diagnostic Trouble Code (DTC) Detecting Criteria

GENERAL DESCRIPTION

**Malfunction Indicator Light Illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

## Normality Judgment

Judge as OK and clear the NG if the following conditions are established.

## Judgment Value

Malfunction Criteria	Threshold Value
Tank pressure sensor learning value	< 0.7 kPa (5.106 mmHg, 0.2 inHg) and ≥ -0.7 kPa (-5.106 mmHg, -0.2 inHg)
Tank pressure sensor measured value – Tank pressure sensor learning value	< 0.3 kPa (2.507 mmHg, 0.1 inHg) and ≥ -0.3 kPa (-2.507 mmHg, -0.1 inHg)

**Time Needed for Diagnosis:** 10 seconds

## <Stuck Diagnosis>

## Abnormality Judgment

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

## Judgment Value

Malfunction Criteria	Threshold Value
Number of times that the difference between the Max. fuel level every 60 s and Min. fuel level every 60 s is 2 ℓ (0.53 US gal, 0.44 Imp gal) or more (with enable condition established)	≥ 16 time(s)
Maximum – Minimum tank pressure (with enable condition completed)	< 0 kPa (0.375 mmHg, 0 inHg)
Maximum – Minimum fuel temperature (with enable condition completed)	≥ 7 °C (12.6°F)

If the difference between the Max. fuel level every 60 s and Min. fuel level every 60 s is less than 2 ℓ (0.53 US gal, 0.44 Imp gal), extend 60 s and make judgment with the Max. and Min. values for the fuel level in 60 s × 2. If there is no difference after the extension of 60 s, continue further to 60 s × 3, 60 s × 4, 60 s × 5. If the difference between the Max. fuel level every 60 s and Min. fuel level every 60 s is 2 ℓ (0.53 US gal, 0.44 Imp gal) or more, the diagnosis counter counts up.

**Time Needed for Diagnosis:** 60 s × 16 time(s) or more

**Malfunction Indicator Light Illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

## Normality Judgment

Judge as OK and clear the NG if the continuous time while the following conditions are established is more than the predetermined time.

## Judgment Value

Malfunction Criteria	Threshold Value
Maximum – Minimum tank pressure	≥ 0 kPa (0.375 mmHg, 0 inHg)

**Time Needed for Diagnosis:** Less than 1 second

# Diagnostic Trouble Code (DTC) Detecting Criteria

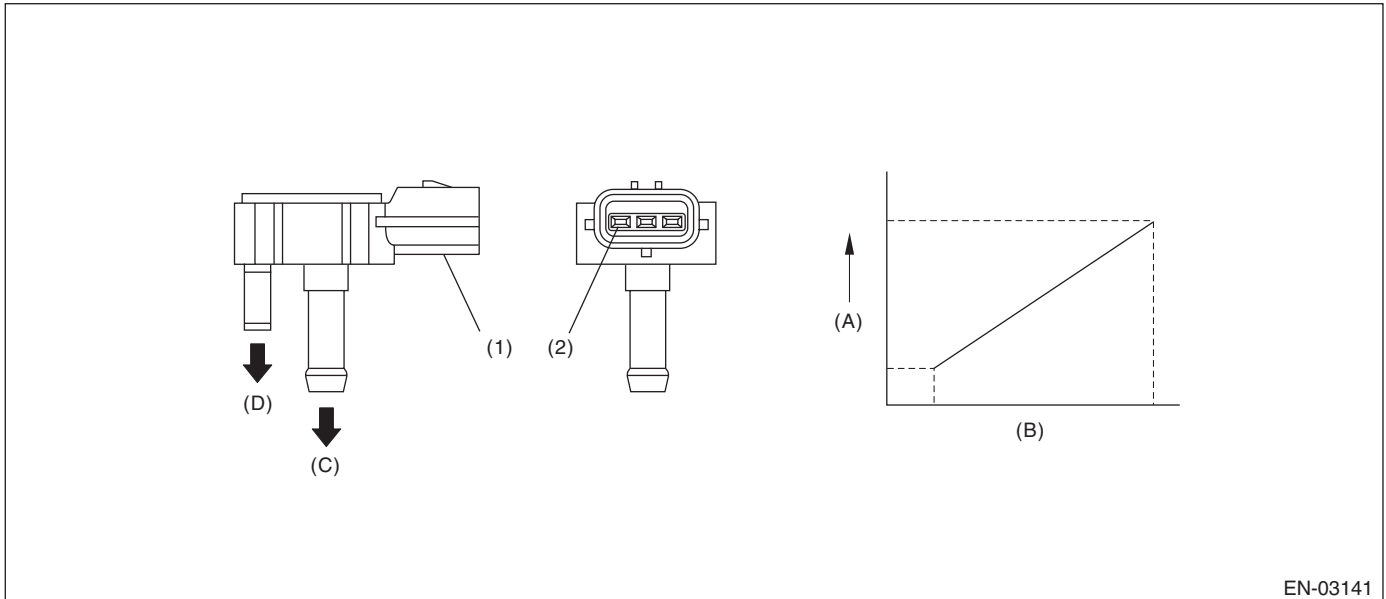
## GENERAL DESCRIPTION

### DH:DTC P0452 EVAPORATIVE EMISSION CONTROL SYSTEM PRESSURE SENSOR LOW INPUT

#### 1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit of the fuel tank pressure sensor.  
Judge as NG if out of specification.

#### 2. COMPONENT DESCRIPTION



EN-03141

(A) Output voltage  
(D) To atmosphere

(B) Input voltage

(C) To fuel tank

(1) Connector

(2) Terminals

#### 3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
None	

#### 4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

# Diagnostic Trouble Code (DTC) Detecting Criteria

GENERAL DESCRIPTION

## 5. DIAGNOSTIC METHOD

### • Abnormality Judgment

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

#### Judgment Value

Malfunction Criteria	Threshold Value
Fuel tank pressure	< -7.4 kPa (-55.6 mmHg, -2.2 inHg)
Battery voltage	≥ 10.9 V

**Time Needed for Diagnosis:** 15000 ms

**Malfunction Indicator Light Illumination:** Illuminates as soon as a malfunction occurs.

### • Normality Judgment

Judge as OK and clear the NG if the continuous time while the following conditions are established is more than the predetermined time.

#### Judgment Value

Malfunction Criteria	Threshold Value
Fuel tank pressure	≥ -7.4 kPa (-55.6 mmHg, -2.2 inHg)
Battery voltage	≥ 10.9 V

**Time Needed for Diagnosis:** Less than 1 second

# Diagnostic Trouble Code (DTC) Detecting Criteria

## GENERAL DESCRIPTION

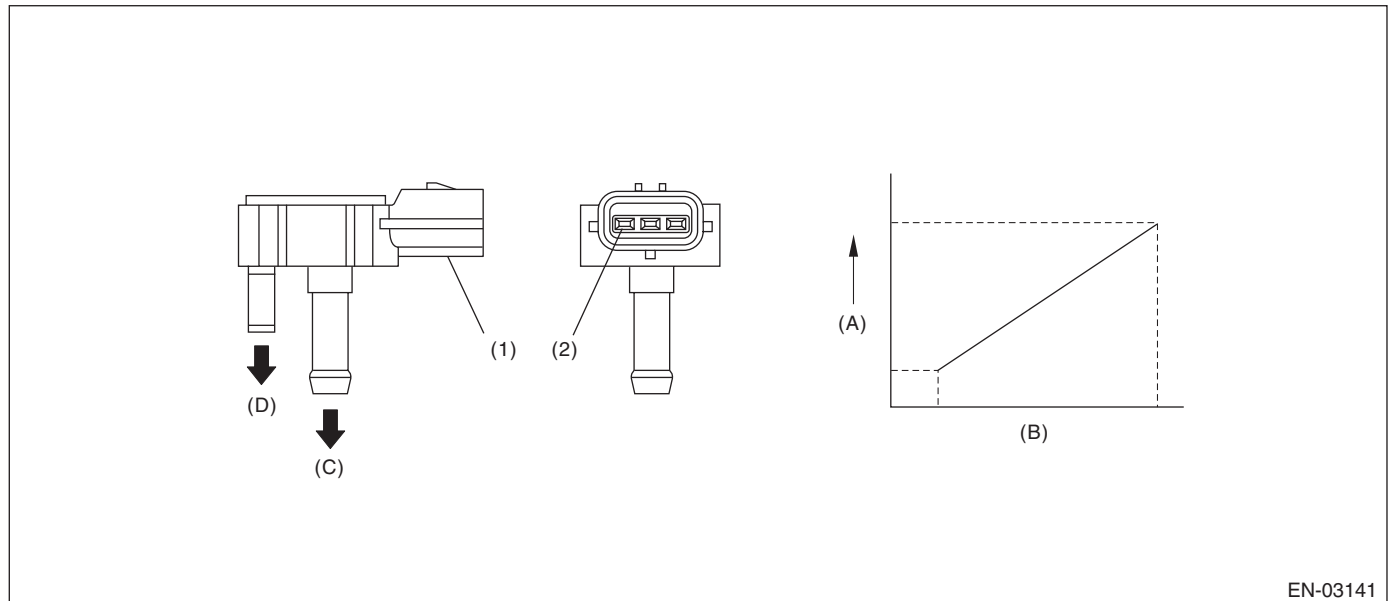
### DI: DTC P0453 EVAPORATIVE EMISSION CONTROL SYSTEM PRESSURE SENSOR HIGH INPUT

#### 1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit of the fuel tank pressure sensor.

Judge as NG if out of specification.

#### 2. COMPONENT DESCRIPTION



EN-03141

(A) Output voltage

(B) Input voltage

(C) To fuel tank

(D) To atmosphere

(1) Connector

(2) Terminals

#### 3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
Time needed for all secondary parameters to be in enable conditions	$\geq 5000$ ms
Vehicle speed	$\geq 2$ km/h (1.2 MPH)
All conditions of EVAP canister purge	Completed
Learning value of evaporation gas concentration (left and right)	$< 0.08$
Main feedback compensation coefficient (left and right)	$\geq 0.9$
Battery voltage	$\geq 10.9$ V

#### 4. GENERAL DRIVING CYCLE

Perform the diagnosis when purging enable conditions are met without idling.



# Diagnostic Trouble Code (DTC) Detecting Criteria

GENERAL DESCRIPTION

## 5. DIAGNOSTIC METHOD

### • Abnormality Judgment

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

#### Judgment Value

Malfunction Criteria	Threshold Value
Fuel tank pressure	≥ 7.9 kPa (59.6 mmHg, 2.3 inHg)
Fuel temperature	< 55 °C (131 °F)
Atmospheric pressure	≥ 75 kPa (563 mmHg, 22.2 inHg)

**Time Needed for Diagnosis:** 15000 ms

**Malfunction Indicator Light Illumination:** Illuminates as soon as a malfunction occurs.

### • Normality Judgment

Judge as OK and clear the NG if the continuous time while the following conditions are established is more than the predetermined time.

#### Judgment Value

Malfunction Criteria	Threshold Value
Fuel tank pressure	< 7.9 kPa (59.6 mmHg, 2.3 inHg)

**Time Needed for Diagnosis:** Less than 1 second

## DJ:DTC P0456 EVAPORATIVE EMISSION CONTROL SYSTEM LEAK DETECTED (VERY SMALL LEAK)

### 1. OUTLINE OF DIAGNOSIS

NOTE:

For the detection standard, refer to DTC P0442. <Ref. to GD(H6DO)-145, DTC P0442 EVAPORATIVE EMISSION CONTROL SYSTEM LEAK DETECTED (SMALL LEAK), Diagnostic Trouble Code (DTC) Detecting Criteria.>

## DK:DTC P0457 EVAPORATIVE EMISSION CONTROL SYSTEM LEAK DETECTED (FUEL CAP LOOSE/OFF)

### 1. OUTLINE OF DIAGNOSIS

For the detection standard, refer to DTC P0442. <Ref. to GD(H6DO)-145, DTC P0442 EVAPORATIVE EMISSION CONTROL SYSTEM LEAK DETECTED (SMALL LEAK), Diagnostic Trouble Code (DTC) Detecting Criteria.>

# Diagnostic Trouble Code (DTC) Detecting Criteria

## GENERAL DESCRIPTION

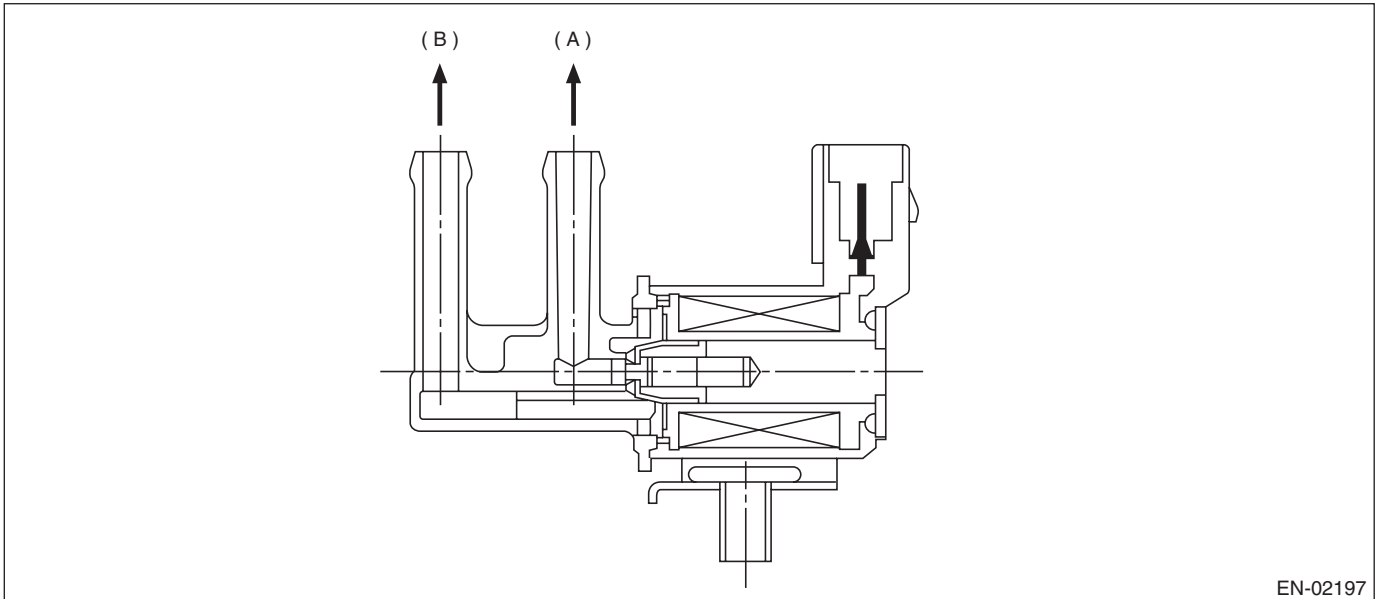
### DL:DTC P0458 EVAPORATIVE EMISSION SYSTEM PURGE CONTROL VALVE CIRCUIT LOW

#### 1. OUTLINE OF DIAGNOSIS

Detect open or short circuit of the purge control solenoid valve.

Judge as NG when the ECM output level differs from the actual terminal level.

#### 2. COMPONENT DESCRIPTION



EN-02197

(A) To canister

(B) To intake manifold

#### 3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
Battery voltage	$\geq 10.9 \text{ V}$
Elapsed time after starting the engine	$\geq 1 \text{ second}$

#### 4. GENERAL DRIVING CYCLE

Always perform the diagnosis after starting the engine.

# Diagnostic Trouble Code (DTC) Detecting Criteria

GENERAL DESCRIPTION

## 5. DIAGNOSTIC METHOD

### • Abnormality Judgment

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

#### Judgment Value

Malfunction Criteria	Threshold Value
Duty ratio of "ON"	< 0.75
Terminal output voltage	Low

**Time Needed for Diagnosis:** 2500 ms

**Malfunction Indicator Light Illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

### • Normality Judgment

Judge as OK and clear the NG if the continuous time while the following conditions are established is more than the predetermined time.

#### Judgment Value

Malfunction Criteria	Threshold Value
Terminal output voltage	High

**Time Needed for Diagnosis:** Less than 1 second

# Diagnostic Trouble Code (DTC) Detecting Criteria

## GENERAL DESCRIPTION

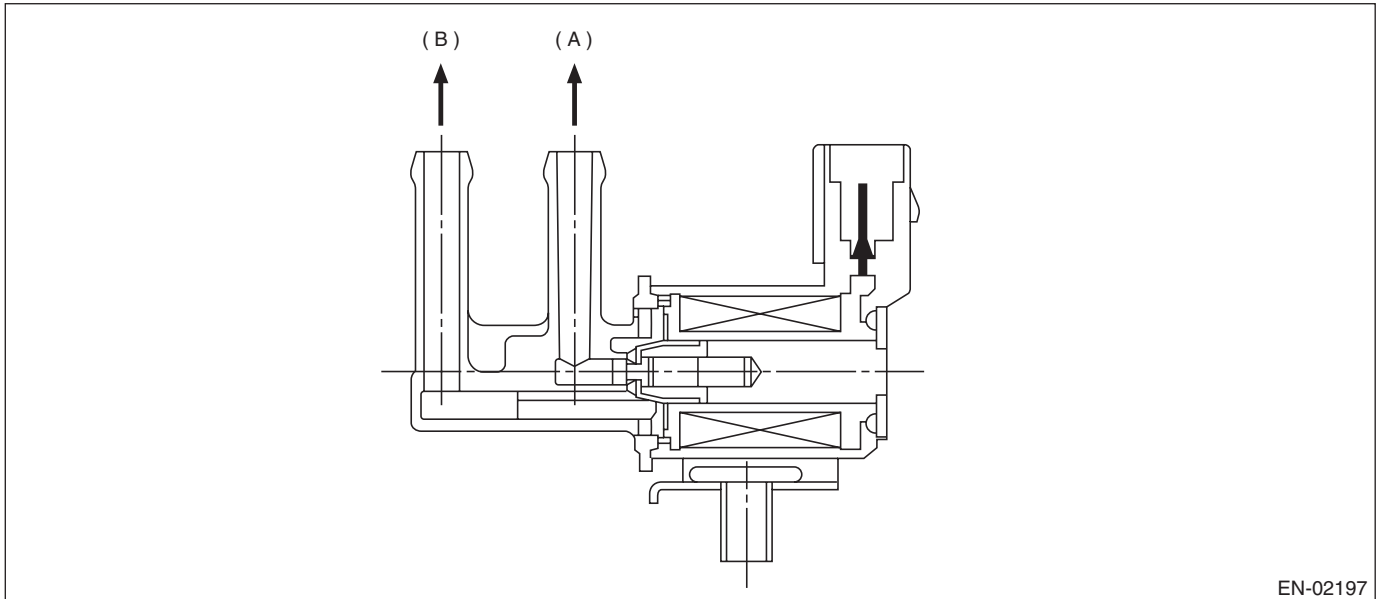
### DM:DTC P0459 EVAPORATIVE EMISSION SYSTEM PURGE CONTROL VALVE CIRCUIT HIGH

#### 1. OUTLINE OF DIAGNOSIS

Detect open or short circuit of the purge control solenoid valve.

Judge as NG when the ECM output level differs from the actual terminal level.

#### 2. COMPONENT DESCRIPTION



(A) To canister

(B) To intake manifold

#### 3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
Battery voltage	$\geq 10.9 \text{ V}$
Elapsed time after starting the engine	$\geq 1 \text{ second}$

#### 4. GENERAL DRIVING CYCLE

Always perform the diagnosis after starting the engine.

# Diagnostic Trouble Code (DTC) Detecting Criteria

GENERAL DESCRIPTION

## 5. DIAGNOSTIC METHOD

### • Abnormality Judgment

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

#### Judgment Value

Malfunction Criteria	Threshold Value
Duty ratio of "ON"	$\geq 0.25$
Terminal output voltage	High

**Time Needed for Diagnosis:** 2500 ms

**Malfunction Indicator Light Illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

### • Normality Judgment

Judge as OK and clear the NG if the continuous time while the following conditions are established is more than the predetermined time.

#### Judgment Value

Malfunction Criteria	Threshold Value
Terminal output voltage	Low

**Time Needed for Diagnosis:** Less than 1 second

# Diagnostic Trouble Code (DTC) Detecting Criteria

## GENERAL DESCRIPTION

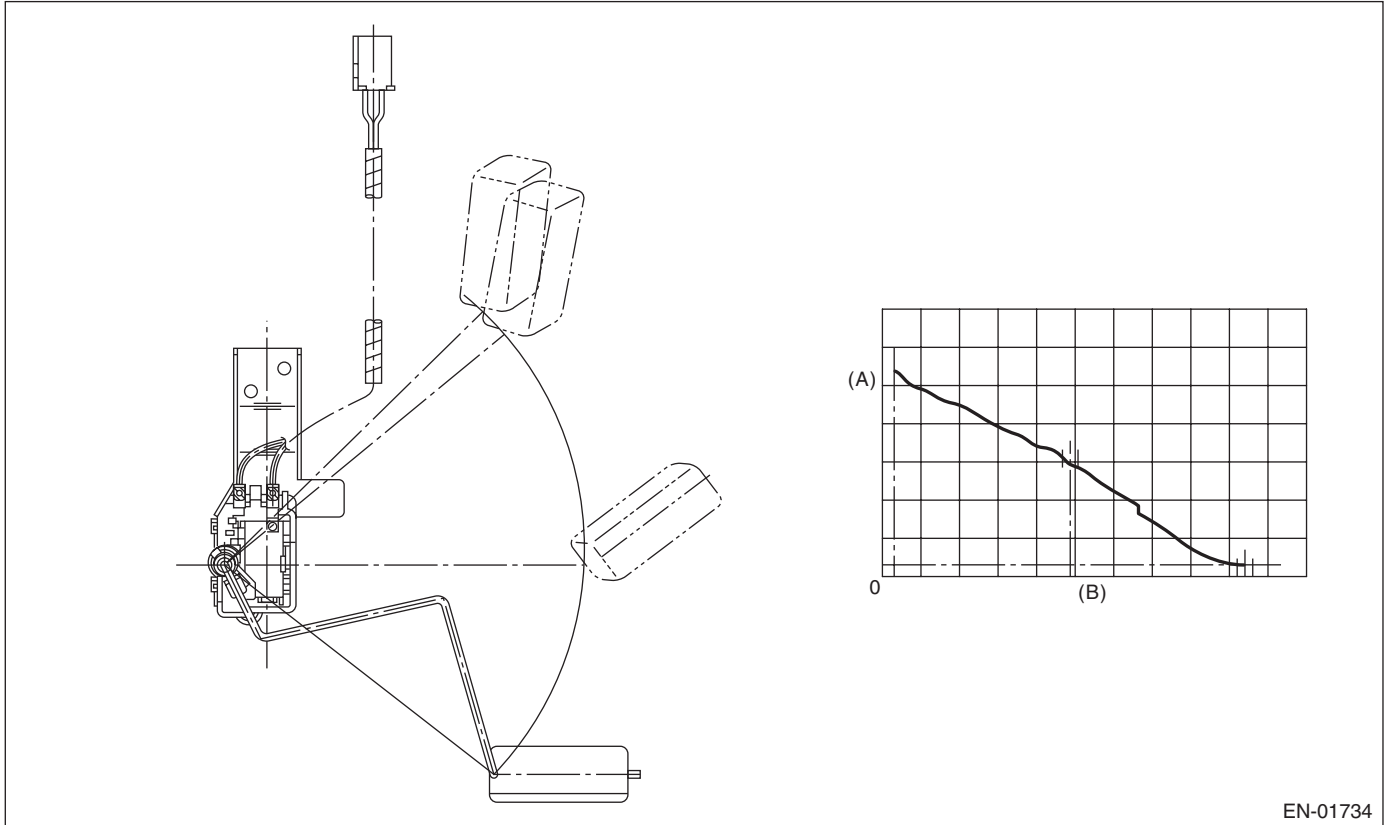
### DN:DTC P0461 FUEL LEVEL SENSOR "A" CIRCUIT RANGE/PERFORMANCE

#### 1. OUTLINE OF DIAGNOSIS

Detect malfunctions of the fuel level sensor output property.

If the fuel level does not vary in a particular driving condition / engine condition where it should, judge as NG.

#### 2. COMPONENT DESCRIPTION



EN-01734

(A) Fuel level

(B) Resistance

#### 3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
None	

#### 4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

# Diagnostic Trouble Code (DTC) Detecting Criteria

GENERAL DESCRIPTION

## 5. DIAGNOSTIC METHOD

### • Abnormality Judgment

Judge as NG when the following conditions are established.

#### Judgment Value

Malfunction Criteria	Threshold Value
Accumulated amount of intake air	≥ 165375 g (5832.78 oz)
Max. – min. values of fuel level output	< 2.6 ℓ (0.69 US gal, 0.57 Imp gal)
Battery voltage	≥ 10.9 V
Engine speed	< 4000 rpm
Elapsed time after starting the engine	≥ 5000 ms

**Time Needed for Diagnosis:** Less than 1 second

**Malfunction Indicator Light Illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

### • Normality Judgment

Judge as OK and clear the NG if the following conditions are established.

#### Judgment Value

Malfunction Criteria	Threshold Value
Accumulated amount of intake air	≥ 165375 g (5832.78 oz)
Max. – min. values of fuel level output	≥ 2.6 ℓ (0.69 US gal, 0.57 Imp gal)
Battery voltage	≥ 10.9 V
Engine speed	< 4000 rpm
Elapsed time after starting the engine	≥ 5000 ms

**Time Needed for Diagnosis:** Less than 1 second

# Diagnostic Trouble Code (DTC) Detecting Criteria

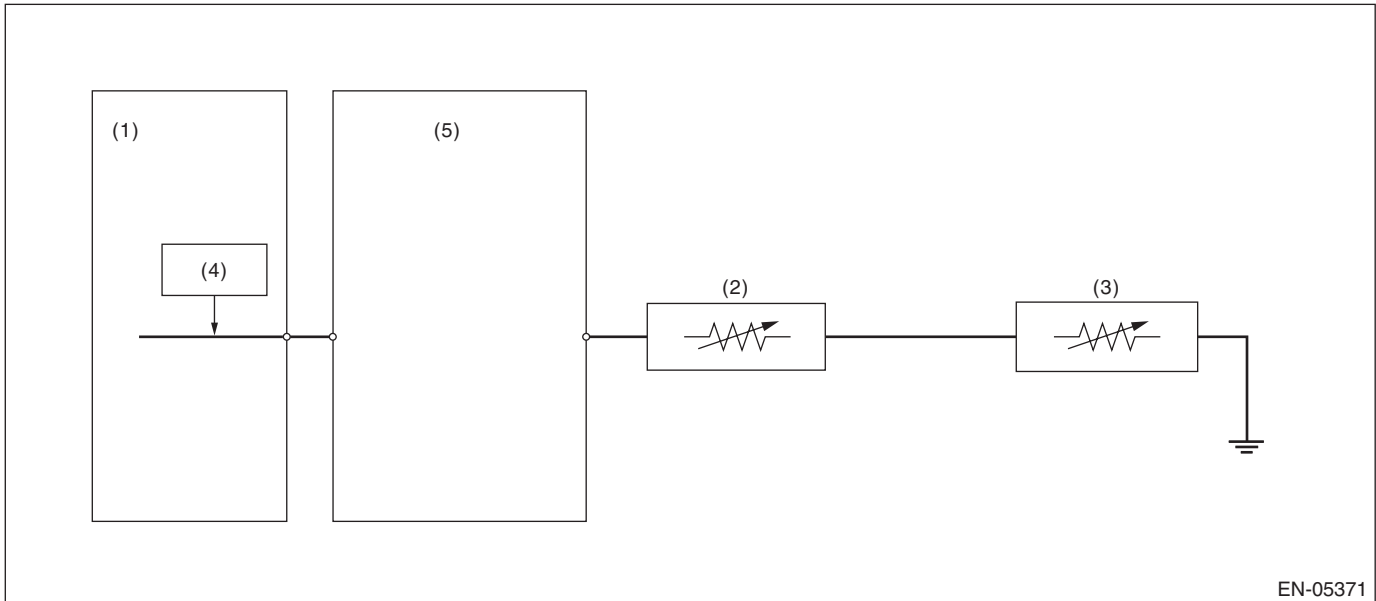
## GENERAL DESCRIPTION

### DO:DTC P0462 FUEL LEVEL SENSOR "A" CIRCUIT LOW

#### 1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit of fuel level sensor. Judge as NG if out of specification.

#### 2. COMPONENT DESCRIPTION



(1) Engine control module (ECM)

(3) Fuel sub level sensor

(4) Detecting circuit

(2) Fuel level sensor

(5) Body integrated unit

#### 3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
None	

#### 4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.



# Diagnostic Trouble Code (DTC) Detecting Criteria

GENERAL DESCRIPTION

## 5. DIAGNOSTIC METHOD

### • Abnormality Judgment

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

#### Judgment Value

Malfunction Criteria	Threshold Value
Battery voltage	$\geq 10.9$ V
Elapsed time after starting the engine	$\geq 3000$ ms
Output voltage	$< 0.173$ V

**Time Needed for Diagnosis:** 2500 ms

**Malfunction Indicator Light Illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

### • Normality Judgment

Judge as OK and clear the NG if the continuous time while the following conditions are established is more than the predetermined time.

#### Judgment Value

Malfunction Criteria	Threshold Value
Battery voltage	$\geq 10.9$ V
Elapsed time after starting the engine	$\geq 3000$ ms
Output voltage	$\geq 0.173$ V

**Time Needed for Diagnosis:** Less than 1 second

# Diagnostic Trouble Code (DTC) Detecting Criteria

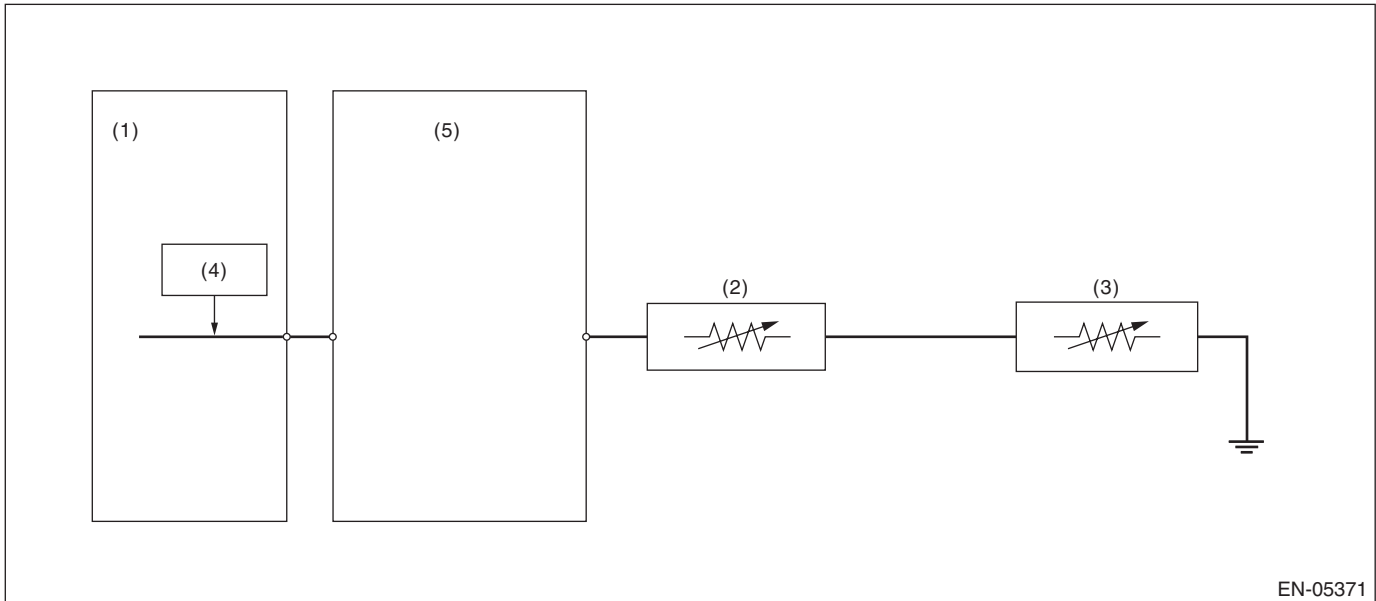
## GENERAL DESCRIPTION

### DP:DTC P0463 FUEL LEVEL SENSOR "A" CIRCUIT HIGH

#### 1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit of fuel level sensor. Judge as NG if out of specification.

#### 2. COMPONENT DESCRIPTION



(1) Engine control module (ECM)

(3) Fuel sub level sensor

(4) Detecting circuit

(2) Fuel level sensor

(5) Body integrated unit

#### 3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
None	

#### 4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

# Diagnostic Trouble Code (DTC) Detecting Criteria

GENERAL DESCRIPTION

## 5. DIAGNOSTIC METHOD

### • Abnormality Judgment

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

#### Judgment Value

Malfunction Criteria	Threshold Value
Battery voltage	$\geq 10.9$ V
Elapsed time after starting the engine	$\geq 3000$ ms
Output voltage	$\geq 7.212$ V

**Time Needed for Diagnosis:** 1000 ms

**Malfunction Indicator Light Illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

### • Normality Judgment

Judge as OK and clear the NG if the continuous time while the following conditions are established is more than the predetermined time.

#### Judgment Value

Malfunction Criteria	Threshold Value
Battery voltage	$\geq 10.9$ V
Elapsed time after starting the engine	$\geq 3000$ ms
Output voltage	$< 7.212$ V

**Time Needed for Diagnosis:** Less than 1 second

# Diagnostic Trouble Code (DTC) Detecting Criteria

## GENERAL DESCRIPTION

---

### DQ:DTC P0464 FUEL LEVEL SENSOR CIRCUIT INTERMITTENT

#### 1. OUTLINE OF DIAGNOSIS

Detect the unstable output faults from the fuel level sensor caused by noise. Judge as NG when the Max. value and cumulative value of output voltage variation of the fuel level sensor is larger than the threshold value.

#### 2. ENABLE CONDITION

Malfunction Criteria	Threshold Value
Engine speed	≥ 500 rpm
Elapsed time after starting the engine	≥ 1 s
Battery voltage	≥ 10.9 V
Idle switch	ON
Fuel level	≥ 9.6 ℓ (2.54 US gal, 2.11 Imp gal) and < 54.4 ℓ (14.37 US gal, 11.97 Imp gal)
Vehicle speed = 0 km/h (0 MPH)	≥ 10000 ms

#### 3. GENERAL DRIVING CYCLE

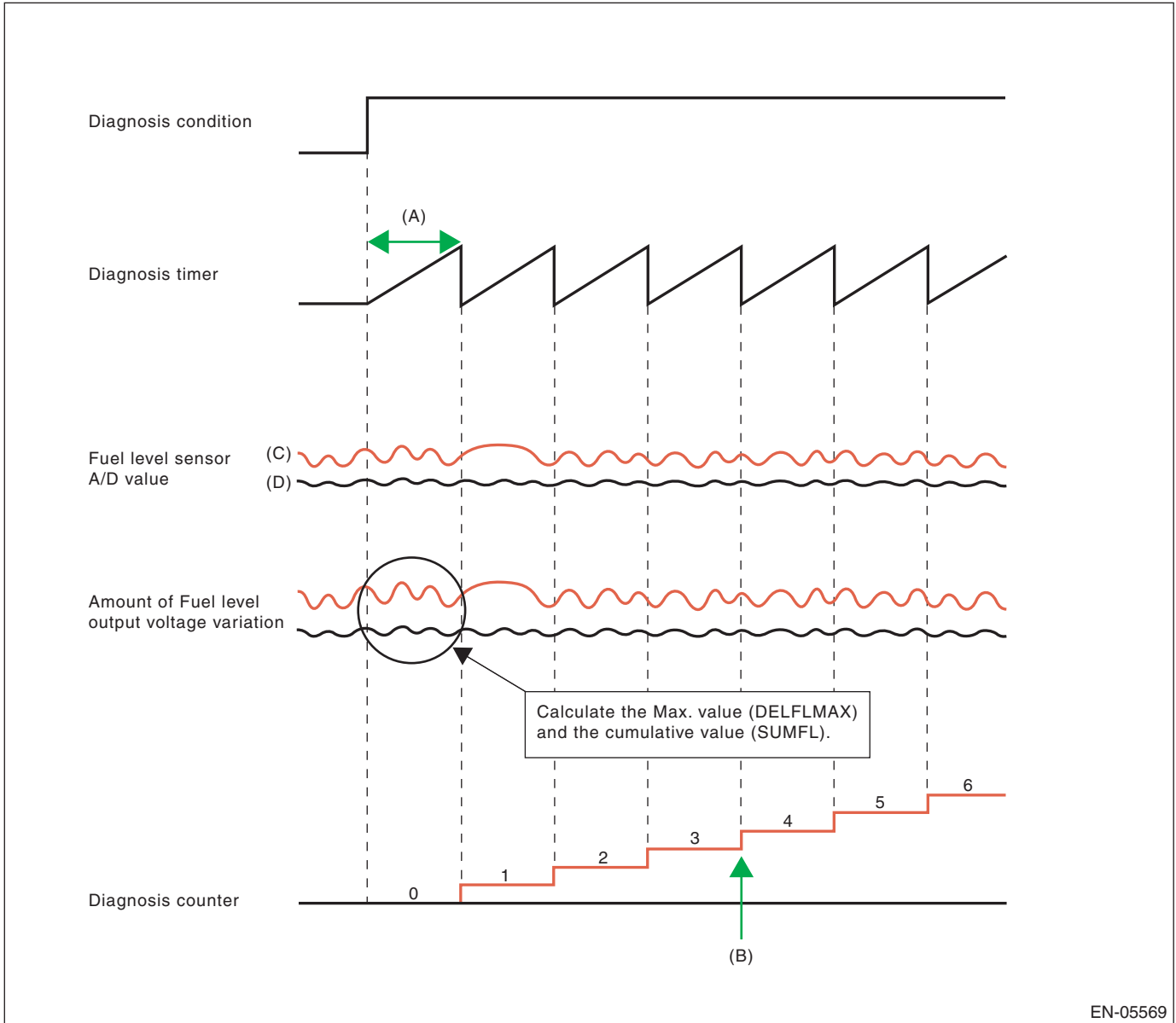
- Always perform the diagnosis continuously at idle speed.
- Pay attention to the fuel level.

# Diagnostic Trouble Code (DTC) Detecting Criteria

GENERAL DESCRIPTION

## 4. DIAGNOSTIC METHOD

Calculate the Max. value (DELFLMAX) and cumulative value (SUMFL) of output voltage variation of fuel level sensor during 12.2 seconds. Judge it normal when both max. and cumulative values are not over the threshold value. Otherwise, when either of them is over the threshold value, the diagnosis counter counts up. Judge as NG if the counter indicated 4 time(s).



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(A) 12288 ms

(B) NG at 4 time(s) counts

(C) Malfunction

(D) Normal

# Diagnostic Trouble Code (DTC) Detecting Criteria

## GENERAL DESCRIPTION

### • Abnormality Judgment

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

#### Judgment Value

Malfunction Criteria	Threshold Value
Integrated times of the condition reaching follows, DELFLMAX or SUMFL At this time, DELFLMAX: Maximum difference of sensor output for 12288 ms SUMFL: Integrated value of the sensor output deviation for12288 ms	$\geq 4$ time(s) $\geq$ Value from Map  $\geq 25.92$ V

#### Map

Fuel level ( ℓ , US gal, Imp gal)	0, 0, 0	10, 2.64, 2.2	20, 5.28, 4.4	30, 7.93, 6.6	40, 10.57, 8.8	50, 13.21, 11	60, 15.85, 13.2
Measured voltage (V)	0.27	0.27	0.426	0.582	0.738	0.894	0.894

The diagnosis counter does not count up when the following conditions are completed within 12288 ms.

Maximum value – minimum value of change of tank pressure during 12288 ms	$\geq 0$ kPa (0.375031 mmHg, 0 inHg)
Maximum value – minimum value of battery voltage during 12288 ms	$\geq 1.2$ V

**Time Needed for Diagnosis:** 12288 ms  $\times$  4 time(s)

**Malfunction Indicator Light Illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

### • Normality Judgment

Judge as OK and clear the NG if the continuous time while the following conditions are established is more than the predetermined time.

#### Judgment Value

Malfunction Criteria	Threshold Value
DELFLMAX SUMFL At this time, DELFLMAX: Maximum difference of sensor output for 12288 ms SUMFL: Integrated value of the sensor output deviation for12288 ms	$<$ Value from Map $< 25.92$ V

**Time Needed for Diagnosis:** 12288 ms

# Diagnostic Trouble Code (DTC) Detecting Criteria

GENERAL DESCRIPTION

## DR:DTC P0500 VEHICLE SPEED SENSOR "A"

### 1. OUTLINE OF DIAGNOSIS

Judge as NG when outside of the judgment value.

Judge NG when the received data from VDCCM&H/U is abnormal vehicle speed, and the vehicle speed data is impossible.

### 2. COMPONENT DESCRIPTION

Vehicle speed signals are taken in to the VDC control module and hydraulic control unit, and normal/erroneous data of the ABS wheel speed sensor is received by CAN communication from the VDC control module and hydraulic control unit.

### 3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
Battery voltage	≥ 10.9 V
Elapsed time after starting the engine	≥ 2000 ms

### 4. GENERAL DRIVING CYCLE

Always perform diagnosis more than 2000 ms after starting the engine.

### 5. DIAGNOSTIC METHOD

#### • Abnormality Judgment

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

#### Judgment Value

Malfunction Criteria	Threshold Value
Front ABS wheel speed sensor status	Malfunction
Either of the following is established	
Front left wheel speed	≥ 300 km/h (186.4 MPH)
Front right wheel speed	≥ 300 km/h (186.4 MPH)

**Time Needed for Diagnosis:** 2500 ms

**Malfunction Indicator Light Illumination:** Illuminates as soon as a malfunction occurs.

#### • Normality Judgment

Judge as OK and clear the NG if the continuous time while the following conditions are established is more than the predetermined time.

#### Judgment Value

Malfunction Criteria	Threshold Value
Front left wheel speed	> 0 km/h (0 MPH) and < 300 km/h (186.4 MPH)
Front right wheel speed	> 0 km/h (0 MPH) and < 300 km/h (186.4 MPH)

**Time Needed for Diagnosis:** 2500 ms

# Diagnostic Trouble Code (DTC) Detecting Criteria

## GENERAL DESCRIPTION

### DS:DTC P0506 IDLE AIR CONTROL SYSTEM RPM LOWER THAN EXPECTED

#### 1. OUTLINE OF DIAGNOSIS

Detect the malfunction that actual engine speed is not close to target engine speed during idling. Judge as NG when actual engine speed is not close to target engine speed during idling.

#### 2. ENABLE CONDITION

Secondary Parameters	Enable Conditions
Engine coolant temperature	$\geq 75\text{ }^{\circ}\text{C}$ (167 $^{\circ}\text{F}$ )
Battery voltage	$\geq 10.9\text{ V}$
Atmospheric pressure	$\geq 75\text{ kPa}$ (563 mmHg, 22.2 inHg)
Fuel level	$\geq 9.6\text{ }\ell$ (2.54 US gal, 2.11 Imp gal)
Elapsed time after starting the engine	$\geq 10.49\text{ s}$
Feedback of ISC	In operation
Lambda value (left and right)	$\geq 0.9$ and $< 1.1$
After switching air conditioner to ON/OFF	$\geq 5.1\text{ s}$
After intake manifold pressure changes by 4 kPa (30 mmHg, 1.2 inHg) or more.	$> 5.1\text{ s}$
Elapsed time after switching neutral position switch to ON/OFF	$> 5.1\text{ s}$
Vehicle speed	0 km/h (0 MPH)

#### 3. GENERAL DRIVING CYCLE

Perform the diagnosis continuously at idling after warming up engine.

#### 4. DIAGNOSTIC METHOD

##### • Abnormality Judgment

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

##### Judgment Value

Malfunction Criteria	Threshold Value
Actual engine speed – Targeted engine speed	$< -100\text{ rpm}$
Feedback compensation for ISC	Max.

**Time Needed for Diagnosis:** 10 s  $\times$  3 time(s)

**Malfunction Indicator Light Illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

##### • Normality Judgment

Judge as OK and clear the NG if the continuous time while the following conditions are established is more than the predetermined time.

##### Judgment Value

Malfunction Criteria	Threshold Value
Actual engine speed – Targeted engine speed	$\geq -100\text{ rpm}$

**Time Needed for Diagnosis:** 10 s



# Diagnostic Trouble Code (DTC) Detecting Criteria

GENERAL DESCRIPTION

## DT:DTC P0507 IDLE AIR CONTROL SYSTEM RPM HIGHER THAN EXPECTED

### 1. OUTLINE OF DIAGNOSIS

Detect the malfunction that actual engine speed is not close to target engine speed during idling. Judge as NG when actual engine speed is not close to target engine speed during idling.

### 2. ENABLE CONDITION

Secondary Parameters	Enable Conditions
Engine coolant temperature	≥ 75 °C (167 °F)
Battery voltage	≥ 10.9 V
Atmospheric pressure	≥ 75 kPa (563 mmHg, 22.2 inHg)
Fuel level	≥ 9.6 ℓ (2.54 US gal, 2.11 Imp gal)
Elapsed time after starting the engine	≥ 10.49 s
Feedback of ISC	In operation
Lambda value (left and right)	≥ 0.9 and < 1.1
After switching air conditioner to ON/ OFF	≥ 5.1 s
After intake manifold pressure changes by 4 kPa (30 mmHg, 1.2 inHg) or more.	> 5.1 s
Elapsed time after switching neutral position switch to ON/OFF	> 5.1 s
Vehicle speed	0 km/h (0 MPH)

### 3. GENERAL DRIVING CYCLE

Perform the diagnosis continuously at idling after warming up engine.

### 4. DIAGNOSTIC METHOD

#### • Abnormality Judgment

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

#### Judgment Value

Malfunction Criteria	Threshold Value
Actual – Target engine speed	≥ 200 rpm
Feedback compensation for ISC	Min.

**Time Needed for Diagnosis:** 10 s × 3 time(s)

**Malfunction Indicator Light Illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

#### • Normality Judgment

Judge as OK and clear the NG if the continuous time while the following conditions are established is more than the predetermined time.

#### Judgment Value

Malfunction Criteria	Threshold Value
Actual – Target engine speed	< 200 rpm

**Time Needed for Diagnosis:** 10 s

# Diagnostic Trouble Code (DTC) Detecting Criteria

## GENERAL DESCRIPTION

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### **DU:DTC P050A COLD START IDLE AIR CONTROL SYSTEM PERFORMANCE**

#### **1. OUTLINE OF DIAGNOSIS**

- **When cold, the abnormality in the control of target engine speed increase is detected. (P050A)**

Judge as NG if the exhaust gas temperature diagnosis or idle speed diagnosis is NG.

- Exhaust gas temperature diagnosis

Judge as NG when the estimated exhausted gas temperature in 14 seconds after the cold start is below the specified value.

- Idle speed diagnosis

Judge as NG when actual engine speed is not close to target engine speed at cold start.

- **Detect malfunctions of the catalyst advanced idling retard angle control. (P050B)**

Judge as NG when ECM is not controlling the angle properly during catalyst advanced idling retard angle control.

- Final ignition timing diagnosis

Judge as NG when actual retard amount is under the specified value at cold start.

# Diagnostic Trouble Code (DTC) Detecting Criteria

GENERAL DESCRIPTION

## 2. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
<b>&lt;Exhaust gas temperature diagnosis&gt;</b>	
Atmospheric pressure	≥ 75 kPa (563 mmHg, 22.2 inHg)
Battery voltage	> 10.9 V
Engine condition	In operation
Vehicle speed	≤ 2 km/h (1.2 MPH)
Elapsed time after gear position change (P ↔ D or N ↔ D)	≥ 3000 ms
ISC feedback	In operation
Throttle opening angle	< 0.37 °
Fuel property	Not extremely low volatility
Target retard amount	≥ 6 °CA
<b>&lt;Idle speed diagnosis&gt;</b>	
Atmospheric pressure	≥ 75 kPa (563 mmHg, 22.2 inHg)
Battery voltage	> 10.9 V
Engine condition	In operation
Vehicle speed	≤ 2 km/h (1.2 MPH)
Engine coolant temperature	≤ 60 °C (140 °F)
Intake air amount sum value	≤ Value of Map 1
Elapsed time after gear position change (P ↔ D or N ↔ D)	≥ 3000 ms
Throttle opening angle	< 0.37 °
Fuel property	Not extremely low volatility
Elapsed time after starting the engine	≥ 2000 ms
<b>&lt;Final ignition timing diagnosis&gt;</b>	
Atmospheric pressure	≥ 75 kPa (563 mmHg, 22.2 inHg)
Battery voltage	> 10.9 V
Engine condition	In operation
Vehicle speed	≤ 2 km/h (1.2 MPH)
Engine coolant temperature	≤ 60 °C (140 °F)
Intake air amount sum value	≤ Value of Map 2
Elapsed time after gear position change (P ↔ D or N ↔ D)	≥ 3000 ms
Throttle opening angle	< 0.37 °
Fuel property	Not extremely low volatility
Target retard amount	≥ Value from Map 3

### Map 1

Engine coolant temperature at engine starting °C (°F)	-40 (-40)	-30 (-22)	-20 (-4)	-10 (14)	0 (32)	10 (50)	20 (68)	30 (86)
Intake air amount sum value g (oz)	2300 (81.12)	2170 (76.54)	2040 (71.95)	1490 (52.55)	1070 (37.74)	780 (27.51)	630 (22.22)	560 (19.75)

Engine coolant temperature at engine starting °C (°F)	40 (104)	50 (122)	60 (140)	70 (158)	80 (176)	90 (194)	100 (212)	110 (230)
Intake air amount sum value g (oz)	520 (18.34)	460 (16.22)	360 (12.7)	360 (12.7)	360 (12.7)	360 (12.7)	360 (12.7)	360 (12.7)

# Diagnostic Trouble Code (DTC) Detecting Criteria

## GENERAL DESCRIPTION

### Map 2

Engine coolant temperature at engine starting °C (°F)	-40 (-40)	-30 (-22)	-20 (-4)	-10 (14)	0 (32)	10 (50)	20 (68)	30 (86)
Intake air amount sum value g (oz)	2300 (81.12)	2170 (76.54)	2040 (71.95)	1490 (52.55)	1070 (37.74)	780 (27.51)	630 (22.22)	560 (19.75)

Engine coolant temperature at engine starting °C (°F)	40 (104)	50 (122)	60 (140)	70 (158)	80 (176)	90 (194)	100 (212)	110 (230)
Intake air amount sum value g (oz)	520 (18.34)	460 (16.22)	360 (12.7)	360 (12.7)	360 (12.7)	360 (12.7)	360 (12.7)	360 (12.7)

### Map 3

Engine coolant temperature	-40 °C (-40 °F)	-30 °C (-22 °F)	-20 °C (-4 °F)	-10 °C (14 °F)	0 °C (32 °F)	10 °C (50 °F)	20 °C (68 °F)	30 °C (86 °F)	40 °C (104 °F)	50 °C (122 °F)	60 °C (140 °F)
Target retard amount	5 °CA	5 °CA	5 °CA	5 °CA	5 °CA	5 °CA	5 °CA	5 °CA	5 °CA	5 °CA	5 °CA

## 3. GENERAL DRIVING CYCLE

Perform the diagnosis at cold start.

## 4. DIAGNOSTIC METHOD

### • Exhaust gas temperature diagnosis

#### Abnormality Judgment

Calculate the estimated exhaust gas temperature when the diagnostic enable condition is established. Judge as NG when the following conditions are established.

#### Judgment Value

Malfunction Criteria	Threshold Value
Estimated exhaust gas temperature	< Value of Map 4

### Map 4

Engine coolant temperature at engine starting	-30 °C (-22 °F)	-20 °C (-4 °F)	-10 °C (14 °F)	0 °C (32 °F)	10 °C (50 °F)	20 °C (68 °F)	30 °C (86 °F)	40 °C (104 °F)	50 °C (122 °F)	60 °C (140 °F)
Threshold Value	200 °C (392 °F)	200 °C (392 °F)	200 °C (392 °F)	225 °C (437 °F)	225 °C (437 °F)	220 °C (428 °F)	210 °C (410 °F)	200 °C (392 °F)	190 °C (374 °F)	190 °C (374 °F)

**Time Needed for Diagnosis:** 14 seconds

**Malfunction Indicator Light Illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

#### Normality Judgment

Judge as OK and clear the NG if the following conditions are established.

#### Judgment Value

Malfunction Criteria	Threshold Value
Estimated exhaust gas temperature	≥ Value of Map 4

**Time Needed for Diagnosis:** Less than 1 second

# Diagnostic Trouble Code (DTC) Detecting Criteria

GENERAL DESCRIPTION

## • Idle speed diagnosis

### Abnormality Judgment

Judge as NG when the following conditions are established.

### Judgment Value

Malfunction Criteria	Threshold Value
Actual engine speed – Target engine speed	< – 125 rpm

**Time Needed for Diagnosis:** 5000 ms

**Malfunction Indicator Light Illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

### Normality Judgment

Judge as OK and clear the NG if the following conditions are established.

### Judgment Value

Malfunction Criteria	Threshold Value
Actual engine speed – Target engine speed	≥ – 125 rpm

**Time Needed for Diagnosis:** 5000 ms

## • Final ignition timing diagnosis

### Abnormality Judgment

Judge as NG when the following conditions are established.

### Judgment Value

Malfunction Criteria	Threshold Value
Final ignition timing – ignition timing during CSERS* *: Ignition timing during CSERS (Cold Start Emission Reduction Strategy) = Base ignition timing – retard amount	> Value of Map 5

## Map 5

Engine coolant temperature	–40 °C (–40 °F)	–30 °C (–22 °F)	–20 °C (–4 °F)	–10 °C (14 °F)	0 °C (32 °F)	10 °C (50 °F)	20 °C (68 °F)	30 °C (86 °F)	40 °C (104 °F)	50 °C (122 °F)	60 °C (140 °F)
Threshold Value	5 °CA	5 °CA	5 °CA	5 °CA	5 °CA	5 °CA	5 °CA	5 °CA	5 °CA	5 °CA	5 °CA

**Time Needed for Diagnosis:** 5000 ms

**Malfunction Indicator Light Illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

### Normality Judgment

Judge as OK and clear the NG if the following conditions are established.

### Judgment Value

Malfunction Criteria	Threshold Value
Final ignition timing – ignition timing during CSERS* *: Ignition timing during CSERS (Cold Start Emission Reduction Strategy) = Base ignition timing – retard amount	≤ Value of Map 5

**Time Needed for Diagnosis:** 5000 ms

## DV:DTC P050B COLD START IGNITION TIMING PERFORMANCE

### 1. OUTLINE OF DIAGNOSIS

NOTE:

For the detection standard, refer to DTC P050A. <Ref. to GD(H6DO)-188, DTC P050A COLD START IDLE AIR CONTROL SYSTEM PERFORMANCE, Diagnostic Trouble Code (DTC) Detecting Criteria.>

# Diagnostic Trouble Code (DTC) Detecting Criteria

## GENERAL DESCRIPTION

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### DW:DTC P0512 STARTER REQUEST CIRCUIT

#### 1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit of starter SW.

Judge as ON NG when the starter SW signal remains ON.

#### 2. ENABLE CONDITION

Secondary Parameters	Enable Conditions
None	

#### 3. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

#### 4. DIAGNOSTIC METHOD

##### • Abnormality Judgment

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

##### Judgment Value

Malfunction Criteria	Threshold Value
Engine condition	After engine starting
Starter OFF signal	Not detected
Battery voltage	$\geq 8\text{ V}$

**Time Needed for Diagnosis:** 30000 ms

**Malfunction Indicator Light Illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

##### • Normality Judgment

Judge as OK and clear the NG if the continuous time while the following conditions are established is more than the predetermined time.

##### Judgment Value

Malfunction Criteria	Threshold Value
Starter OFF signal	Detected
Battery voltage	$\geq 8\text{ V}$

**Time Needed for Diagnosis:** Less than 1 second

# Diagnostic Trouble Code (DTC) Detecting Criteria

GENERAL DESCRIPTION

## DX:DTC P0513 INCORRECT IMMOBILIZER KEY

### 1. OUTLINE OF DIAGNOSIS

DTC	Item	OUTLINE OF DIAGNOSIS
P0513	Incorrect Immobilizer Key	Incorrect immobilizer key (Use of unregistered key in body integrated unit)
P1570	Antenna	Faulty antenna
P1571	Reference Code Incompatibility	Reference code incompatibility between body integrated unit and ECM
P1572	IMM Circuit Failure (Except Antenna Circuit)	Communication failure between body integrated unit and ECM
P1574	Key Communication Failure	The body integrated unit to confirm the key (transponder) ID code has malfunction, of the transponder is faulty.
P1576	EGI Control Module EEPROM	ECM malfunctioning
P1577	IMM Control Module EEPROM	Body integrated unit malfunctioning
P1578	Meter Failure	Reference code incompatibility between combination meter and body integrated unit

### 2. ENABLE CONDITION

When starting the engine.

### 3. GENERAL DRIVING CYCLE

Perform the diagnosis only after starting the engine.

### 4. DIAGNOSTIC METHOD

Judge as NG when the conditions for the outline of the diagnosis of the top are established.

# Diagnostic Trouble Code (DTC) Detecting Criteria

## GENERAL DESCRIPTION

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### DY:DTC P0604 INTERNAL CONTROL MODULE RANDOM ACCESS MEMORY (RAM) ERROR

#### 1. OUTLINE OF DIAGNOSIS

Detect the malfunction of microcomputer (RAM).

When there is a problem in the CPU normal RAM, judge as NG.

If it is possible to write data to the whole area of RAM in the initial routine, and is possible to read the same data, it is judged as OK, and if not, NG.

#### 2. ENABLE CONDITION

Secondary Parameters	Enable Conditions
None	

Diagnosis with the initial routine.

#### 3. GENERAL DRIVING CYCLE

Perform the diagnosis as soon as the ignition switch is turned to ON.

#### 4. DIAGNOSTIC METHOD

##### • Abnormality Judgment

Judge as NG when the following conditions are established.

##### Judgment Value

Malfunction Criteria	Threshold Value
Write the specified value into the RAM.	The written value cannot be read.

**Time Needed for Diagnosis:** Less than 1 second

**Malfunction Indicator Light Illumination:** Illuminates as soon as a malfunction occurs.

##### • Normality Judgment

Judge as OK and clear the NG if the following conditions are established.

##### Judgment Value

Malfunction Criteria	Threshold Value
Write the specified value into the RAM.	The written value can be read.

**Time Needed for Diagnosis:** Less than 1 second



# Diagnostic Trouble Code (DTC) Detecting Criteria

GENERAL DESCRIPTION

## DZ:DTC P0605 INTERNAL CONTROL MODULE READ ONLY MEMORY (ROM) ERROR

### 1. OUTLINE OF DIAGNOSIS

Judge as NG when SUM value of ROM is outside the standard value.

### 2. ENABLE CONDITION

Secondary Parameters	Enable Conditions
Ignition switch	ON

### 3. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

### 4. DIAGNOSTIC METHOD

#### Abnormality Judgment

Judge as NG if the criteria below are met.

#### Judgment Value

Malfunction Criteria	Threshold Value
SUM value of ROM	Standard

**Time Needed for Diagnosis:** Undetermined

**Malfunction Indicator Light Illumination:** Illuminates as soon as a malfunction occurs.

# Diagnostic Trouble Code (DTC) Detecting Criteria

## GENERAL DESCRIPTION

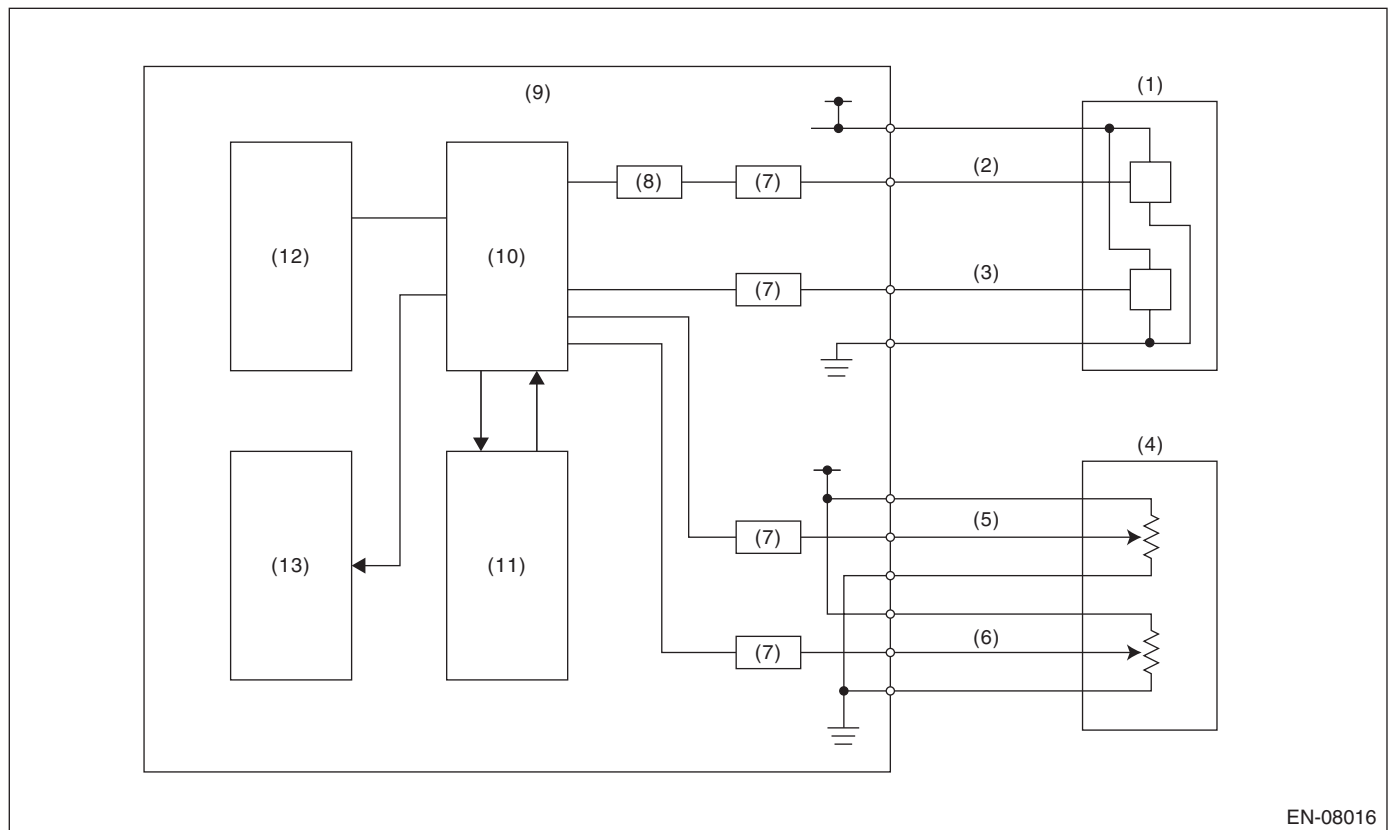
### EA:DTC P0607 THROTTLE CONTROL SYSTEM CIRCUIT RANGE/PERFORMANCE

#### 1. OUTLINE OF DIAGNOSIS

Judge as NG when any one of the followings is established.

- (1) If the monitoring IC operation is abnormal (monitoring IC malfunction).
- (2) If the input amplifier circuit of throttle position sensor 1 is abnormal (quadruple amplification problem).
- (3) If the CPU operation is abnormal (instruction/flow check).
- (4) If the A/D converter operation is abnormal (ADC malfunction).
- (5) If the EEPROM operation is abnormal (iEEPROM malfunction).
- (6) If the output IC operation is abnormal (output driver malfunction).

#### 2. COMPONENT DESCRIPTION



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- |   |   |                    |
|---|---|--------------------|
| (1) Throttle position sensor            | (6) Accelerator pedal position sensor 2 | (10) CPU           |
| (2) Throttle position sensor 1          | (7) I/F circuit                         | (11) Monitoring IC |
| (3) Throttle position sensor 2          | (8) Amplifier circuit                   | (12) EEPROM        |
| (4) Accelerator pedal position sensor   | (9) Engine control module (ECM)         | (13) Output IC     |
| (5) Accelerator pedal position sensor 1 |   |                    |

# Diagnostic Trouble Code (DTC) Detecting Criteria

GENERAL DESCRIPTION

## 3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
(1) Battery voltage	$\geq 6\text{ V}$
(2) Ignition switch	ON
(2) Battery voltage	$\geq 6\text{ V}$
(3) Ignition switch	ON
(3) ETC control	Permission
(4) Ignition switch	ON
(4) Battery voltage	$\geq 6\text{ V}$
(5) Starter switch	OFF
(5) Battery voltage	$> 6\text{ V}$
(6) Ignition switch	ON
(6) Battery voltage	$\geq 10.9\text{ V}$

## 4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

## 5. DIAGNOSTIC METHOD

Judge as OK and clear the NG when the malfunction criteria below are met.

### Judgment Value

Malfunction Criteria	Threshold Value
(1) Monitoring IC operation	The result and expected value match.
(2)   Throttle position sensor 1 opening angle – (Throttle position sensor 1 opening angle after passing amplifier/4)	$< 3^\circ$
(3) Main CPU calculation result	The result and expected value match.
(4)   standard voltage – read voltage value	$< 0.078125\text{ V}$
(5) EEPROM writing	Writing completed
(6) Communication between output ICs	Possible to communicate

### Time Needed for Diagnosis:

- (1): 200 ms
- (2): 24 ms
- (3): 192 ms
- (4): 200 ms
- (5): 48 ms
- (6): 2500 ms

**Malfunction Indicator Light Illumination:** Illuminates as soon as a malfunction occurs.

# Diagnostic Trouble Code (DTC) Detecting Criteria

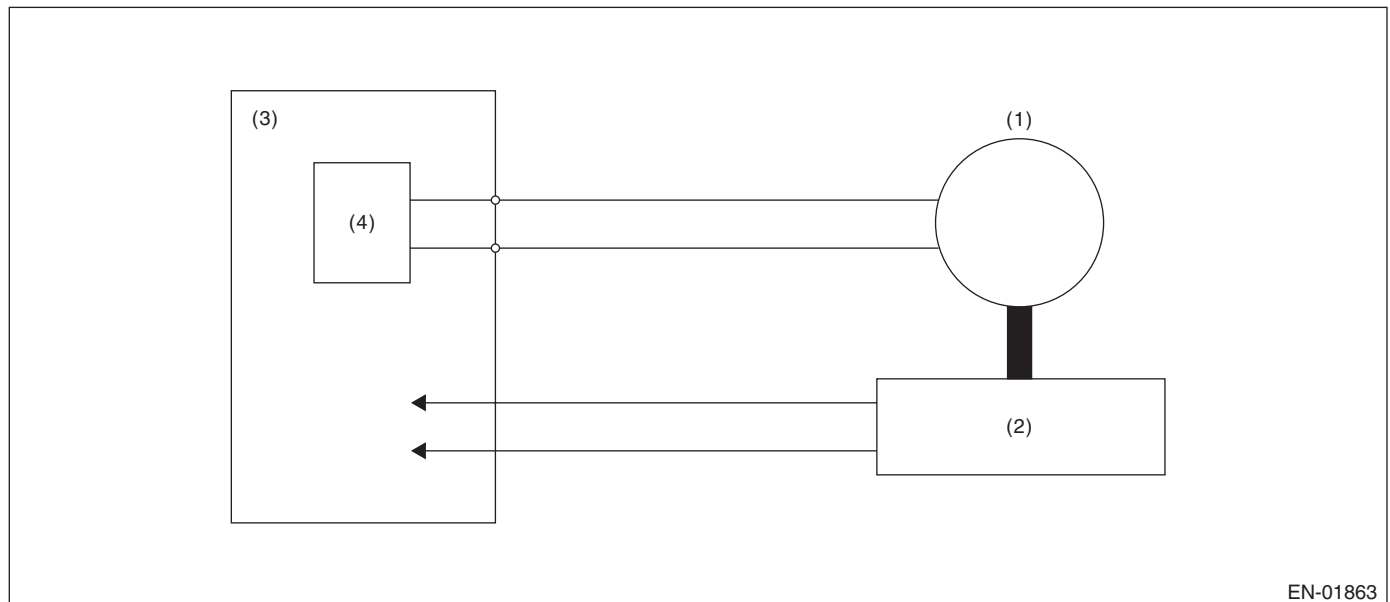
## GENERAL DESCRIPTION

### EB:DTC P0638 THROTTLE ACTUATOR CONTROL RANGE/PERFORMANCE (BANK 1)

#### 1. OUTLINE OF DIAGNOSIS

Judge as NG when the target opening angle and actual opening angle is mismatched or the current to motor is the specified duty or more for specified time continuously.

#### 2. COMPONENT DESCRIPTION



- (1) Motor  
 (2) Throttle position sensor  
 (3) Engine control module (ECM)  
 (4) Drive circuit

#### 3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
Ignition switch	ON
Normal operation of electronic throttle control	ON

#### 4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously when the electronic throttle control is operating.

#### 5. DIAGNOSTIC METHOD

Judge as OK and clear the NG when the malfunction criteria below are met.

##### Judgment Value

Malfunction Criteria	Threshold Value
Difference between target opening angle and actual opening angle	Within OK range of <b>Details of Judgment value</b>
Output duty to drive circuit	< 95 %

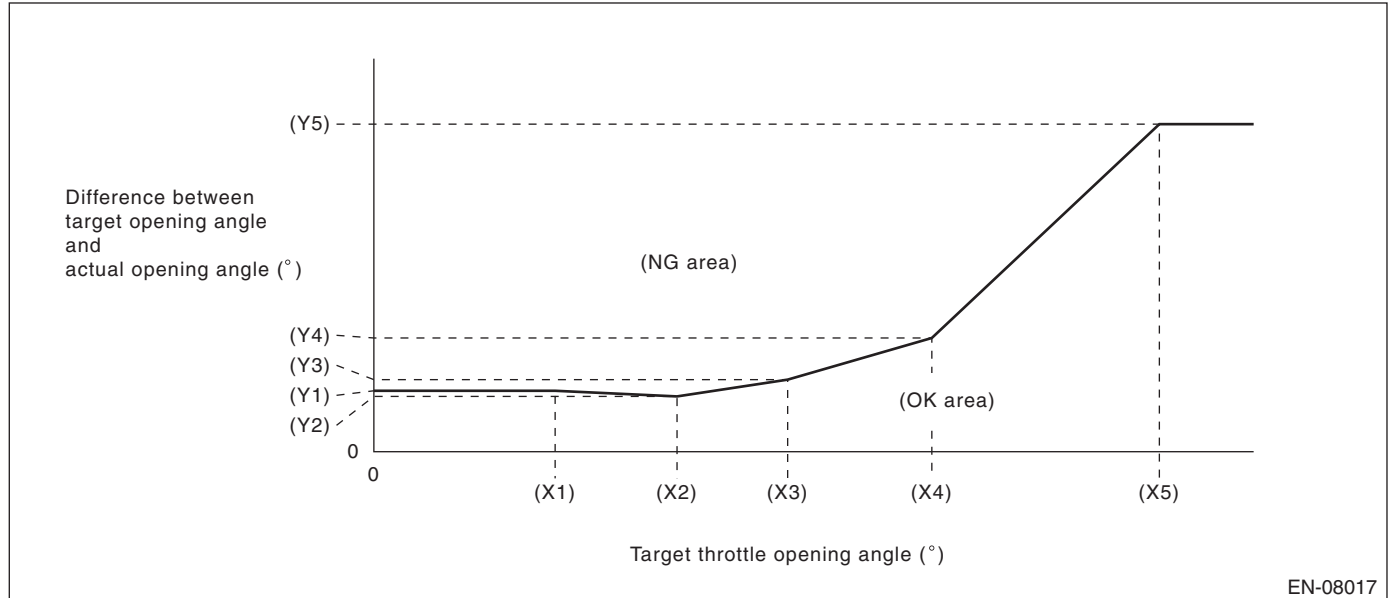
##### Time Needed for Diagnosis:

- Difference between target opening angle and actual opening angle:
  - NG judgment: See **Details of Judgment time**
  - OK judgment: 2000 ms
- Output duty to drive circuit: 2000 ms

# Diagnostic Trouble Code (DTC) Detecting Criteria

GENERAL DESCRIPTION

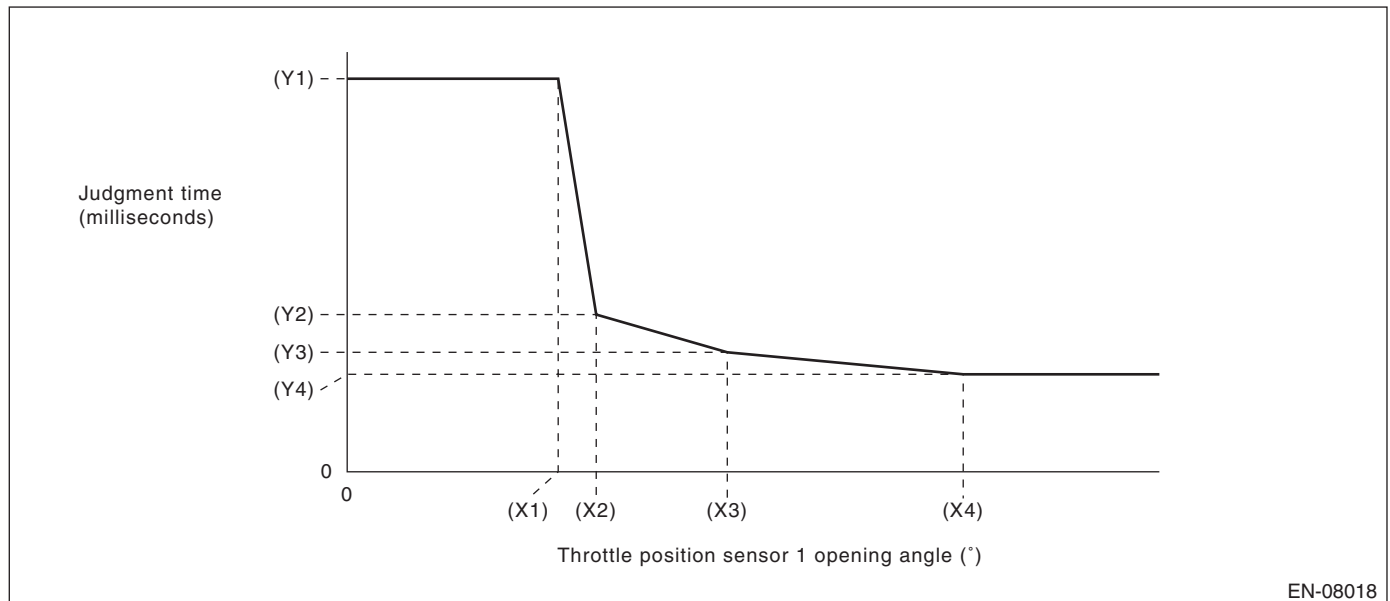
## Details of Judgment Value



EN-08017

(X1) 6.915 °	(X2) 11.565 °	(X3) 15.785 °
(X4) 21.285 °	(X5) 29.965 °	
(Y1) 4.65 °	(Y2) 4.22 °	(Y3) 5.5 °
(Y4) 8.68 °	(Y5) 25 °	

## Details of Judgment time



EN-08018

(X1) 8.049999237 °	(X2) 9.5 °	(X3) 14.5 °
(X4) 23.5 °		
(Y1) 1000 ms	(Y2) 400 ms	(Y3) 304 ms
(Y4) 248 ms		

### NOTE:

Judgment time when actual opening angle ≤ target opening angle is always 1000 milliseconds.

**Malfunction Indicator Light Illumination:** Illuminates as soon as a malfunction occurs.

# Diagnostic Trouble Code (DTC) Detecting Criteria

## GENERAL DESCRIPTION

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### EC:DTC P0700 TRANSMISSION CONTROL SYSTEM (MIL REQUEST)

#### 1. OUTLINE OF DIAGNOSIS

Judge as NG when there is CAN communication with the TCM and there is a MIL lighting request.

#### 2. ENABLE CONDITION

Secondary Parameters	Enable Conditions
None	

#### 3. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

#### 4. DIAGNOSTIC METHOD

##### • Abnormality Judgment

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

##### Judgment Value

Malfunction Criteria	Threshold Value
Battery voltage	$\geq 10.9$ V
MIL lighting request from TCM	Yes

**Time Needed for Diagnosis:** 2500 ms

**Malfunction Indicator Light Illumination:** Illuminates as soon as a malfunction occurs.

##### • Normality Judgment

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

##### Judgment Value

Malfunction Criteria	Threshold Value
Battery voltage	$\geq 10.9$ V
MIL lighting request from TCM	None

**Time Needed for Diagnosis:** Less than 1 second

# Diagnostic Trouble Code (DTC) Detecting Criteria

GENERAL DESCRIPTION

## ED:DTC P1152 O2 SENSOR CIRCUIT RANGE/PERFORMANCE (LOW) (BANK1 SENSOR1)

### 1. OUTLINE OF DIAGNOSIS

Detect that  $\lambda$  value remains low.

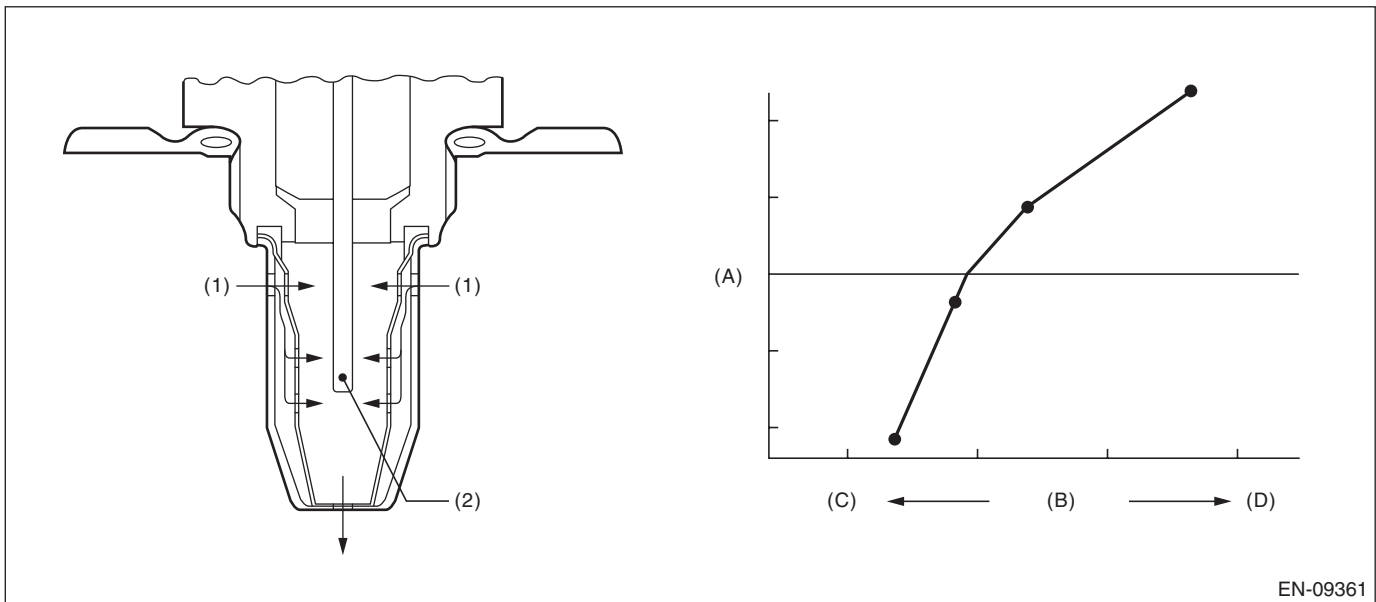
Judge as NG when lambda value is abnormal in accordance with  $\lambda$  value of front oxygen (A/F) sensor and running conditions such as vehicle speed, amount of intake air, engine coolant temperature, sub feedback control, etc.

$\lambda$  value = Actual air fuel ratio/Theoretical air fuel ratio

$\lambda > 1$ : Lean

$\lambda < 1$ : Rich

### 2. COMPONENT DESCRIPTION



EN-09361

(A) Electromotive force

(B) Air fuel ratio

(C) Lean

(D) Rich

(1) Exhaust gas

(2) ZrO<sub>2</sub>

# Diagnostic Trouble Code (DTC) Detecting Criteria

## GENERAL DESCRIPTION

### 3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
Time needed for all secondary parameters to be in enable conditions	$\geq 4096$ ms
Battery voltage	$\geq 10.9$ V
Atmospheric pressure	$\geq 75$ kPa (563 mmHg, 22.2 inHg)
Rear oxygen sensor sub feedback	Execution
Rear oxygen sensor output voltage – Feedback target voltage or	$-0.2$ V — $0.1$ V
Rear oxygen sensor sub feedback compensation coefficient or	On Min.
Rear oxygen sensor sub feedback compensation coefficient	On Max.
Elapsed time after starting the engine	$\geq 60000$ ms
Engine coolant temperature	$\geq 75$ °C (167 °F)
Vehicle speed	$\geq 20$ km/h (12.4 MPH)
Amount of intake air	$\geq 8$ g/s (0.28 oz/s)
Load change at 120°C	$< 0.02$ g/rev (0 oz/rev)
Front oxygen (A/F) sensor impedance	$0 \Omega$ — $50 \Omega$
Learning value of evaporation gas density	$< 0.2$
Total time of operating canister purge	$\geq 19.9$ s
Targeted lambda value load compensation coefficient	$-0.05$ — $0.050$

### 4. GENERAL DRIVING CYCLE

Perform diagnosis continuously at a constant speed of 20 km/h (12.4 MPH) or more after 60000 ms have passed since the engine started.

### 5. DIAGNOSTIC METHOD

#### • Abnormality Judgment

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

#### Judgment Value

Malfunction Criteria	Threshold Value
$\lambda$ value	$< 0.85$

**Time Needed for Diagnosis:** 10000 ms

**Malfunction Indicator Light Illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

#### • Normality Judgment

Judge as OK and clear the NG if the continuous time while the following conditions are established is more than the predetermined time.

#### Judgment Value

Malfunction Criteria	Threshold Value
$\lambda$ value	$\geq 0.85$

**Time Needed for Diagnosis:** Less than 1 second



## EE:DTC P1153 O2 SENSOR CIRCUIT RANGE/PERFORMANCE (HIGH) (BANK1 SENSOR1)

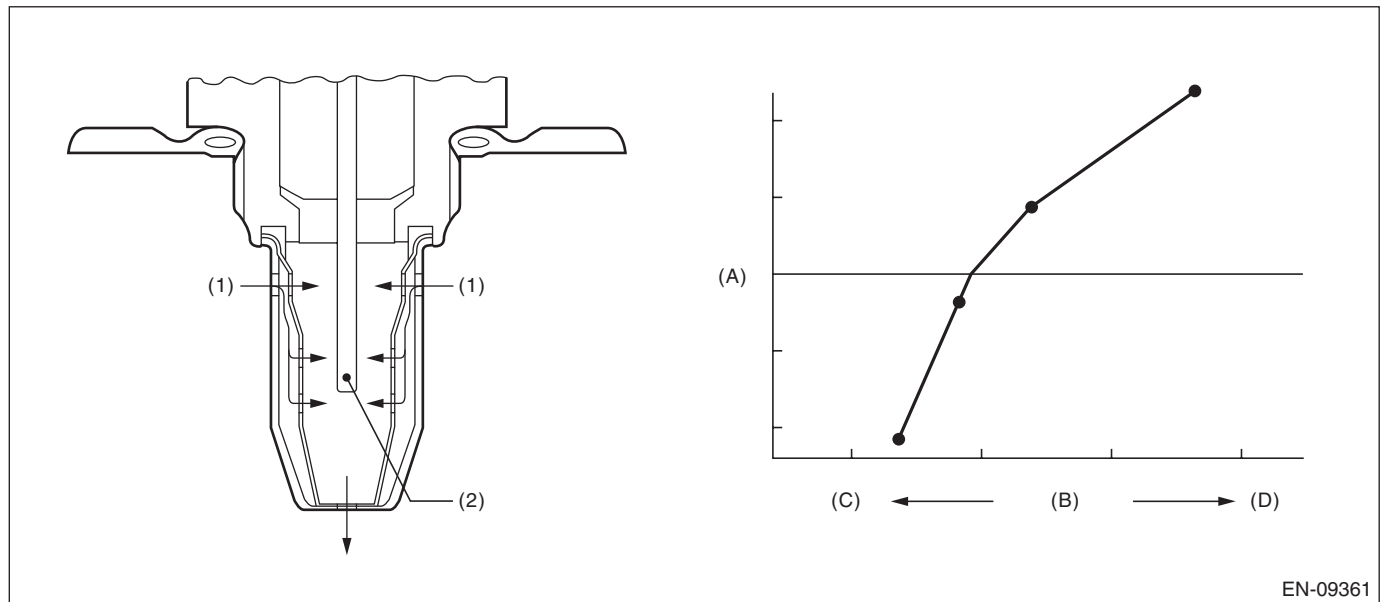
### 1. OUTLINE OF DIAGNOSIS

Detect that  $\lambda$  value remains high.

Judge as NG when lambda value is abnormal in accordance with  $\lambda$  value of front oxygen (A/F) sensor and running conditions such as vehicle speed, amount of intake air, engine coolant temperature, sub feedback control, etc.

$\lambda$  value = Actual air fuel ratio/Theoretical air fuel ratio  
 $\lambda > 1$ : Lean  
 $\lambda < 1$ : Rich

### 2. COMPONENT DESCRIPTION



EN-09361

(A) Electromotive force

(B) Air fuel ratio

(C) Lean

(D) Rich

(1) Exhaust gas

(2)  $ZrO_2$

# Diagnostic Trouble Code (DTC) Detecting Criteria

## GENERAL DESCRIPTION

### 3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
Time needed for all secondary parameters to be in enable conditions	$\geq 4096$ ms
Battery voltage	$\geq 10.9$ V
Atmospheric pressure	$\geq 75$ kPa (563 mmHg, 22.2 inHg)
Rear oxygen sensor sub feedback	Execution
Rear oxygen sensor output voltage – Feedback target voltage or Rear oxygen sensor sub feedback compensation coefficient or Rear oxygen sensor sub feedback compensation coefficient	$-0.2$ V — $0.1$ V On Min. On Max.
Elapsed time after starting the engine	$\geq 60000$ ms
Engine coolant temperature	$\geq 75$ °C (167 °F)
Vehicle speed	$\geq 20$ km/h (12.4 MPH)
Amount of intake air	$\geq 8$ g/s (0.28 oz/s)
Load change at 120°CA	$< 0.02$ g/rev (0 oz/rev)
Front oxygen (A/F) sensor impedance	$0 \Omega$ — $50 \Omega$
Learning value of evaporation gas density	$< 0.2$
Total time of operating canister purge	$\geq 19.9$ s
Targeted lambda value load compensation coefficient	$-0.05$ — $0.050$

### 4. GENERAL DRIVING CYCLE

Perform diagnosis continuously at a constant speed of 20 km/h (12.4 MPH) or more after 60000 ms have passed since the engine started.

### 5. DIAGNOSTIC METHOD

#### • Abnormality Judgment

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

#### Judgment Value

Malfunction Criteria	Threshold Value
$\lambda$ value	$> 1.15$

**Time Needed for Diagnosis:** 10000 ms

**Malfunction Indicator Light Illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

#### • Normality Judgment

Judge as OK and clear the NG if the continuous time while the following conditions are established is more than the predetermined time.

#### Judgment Value

Malfunction Criteria	Threshold Value
$\lambda$ value	$\leq 1.15$

**Time Needed for Diagnosis:** Less than 1 second

# Diagnostic Trouble Code (DTC) Detecting Criteria

GENERAL DESCRIPTION

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## **EF:DTC P1154 O2 SENSOR CIRCUIT RANGE/PERFORMANCE (LOW) (BANK 2 SENSOR 1)**

### **1. OUTLINE OF DIAGNOSIS**

**NOTE:**

For the detection standard, refer to DTC P1152. <Ref. to GD(H6DO)-201, DTC P1152 O2 SENSOR CIRCUIT RANGE/PERFORMANCE (LOW) (BANK1 SENSOR1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

## **EG:DTC P1155 O2 SENSOR CIRCUIT RANGE/PERFORMANCE (HIGH) (BANK 2 SENSOR 1)**

### **1. OUTLINE OF DIAGNOSIS**

**NOTE:**

For the detection standard, refer to DTC P1153. <Ref. to GD(H6DO)-203, DTC P1153 O2 SENSOR CIRCUIT RANGE/PERFORMANCE (HIGH) (BANK1 SENSOR1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

# Diagnostic Trouble Code (DTC) Detecting Criteria

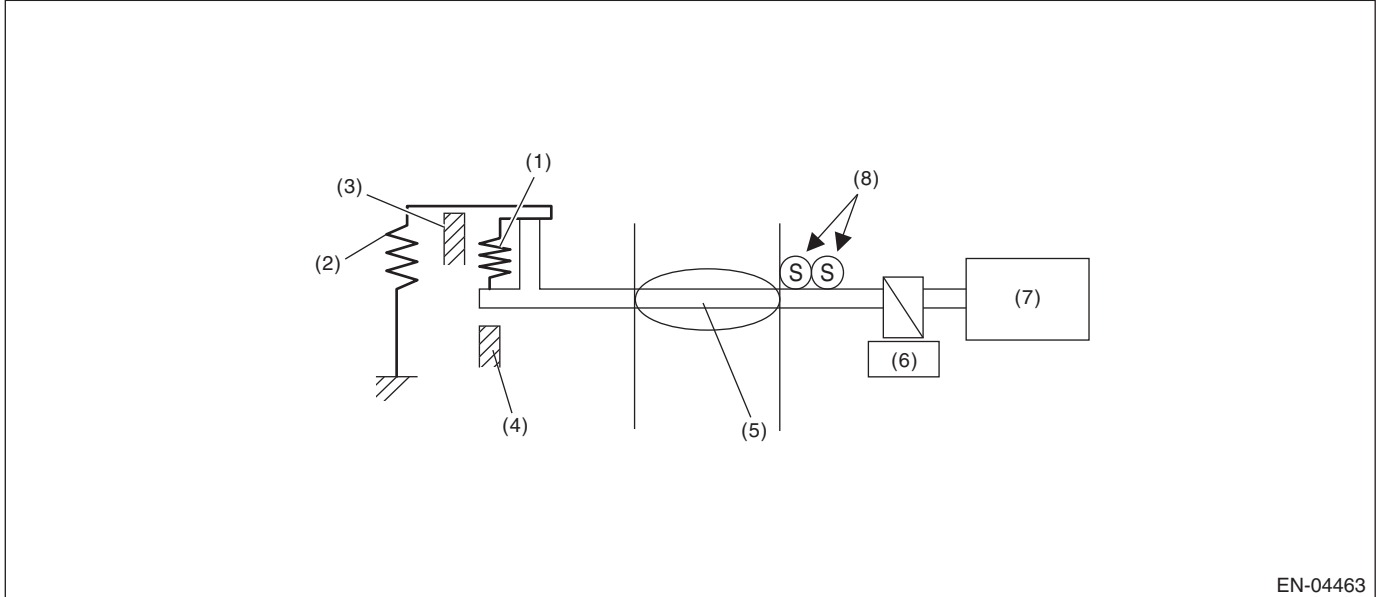
## GENERAL DESCRIPTION

### EH:DTC P1160 RETURN SPRING FAILURE

#### 1. OUTLINE OF DIAGNOSIS

Judge as NG when the valve is opened more than the default opening angle, but does not move to the close direction with the motor power stopped.

#### 2. COMPONENT DESCRIPTION



- |                          |                         |   |
|--------------------------|-------------------------|---|
| (1) Opener spring        | (4) Full closed stopper | (7) DC motor                              |
| (2) Return spring        | (5) Throttle valve      | (8) Main and sub throttle position sensor |
| (3) Intermediate stopper | (6) Gear                |   |

#### 3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
Battery voltage	$\geq 6\text{ V}$
Throttle position sensor	Normal

#### 4. GENERAL DRIVING CYCLE

- Ignition switch ON → OFF
- Ignition switch OFF → ON (Only after clearing memory)

# Diagnostic Trouble Code (DTC) Detecting Criteria

GENERAL DESCRIPTION

## 5. DIAGNOSTIC METHOD

### • Abnormality Judgment

Judge as NG when the following conditions are established.

#### Judgment Value

Malfunction Criteria	Threshold Value
Opening variation after continuity is set to OFF	$< 2^\circ$

**Time Needed for Diagnosis:** 24 ms

**Malfunction Indicator Light Illumination:** Illuminates as soon as a malfunction occurs.

### • Normality Judgment

Judge as OK and clear the NG if the following conditions are established.

#### Judgment Value

Malfunction Criteria	Threshold Value
Opening variation after continuity is set to OFF	$\geq 2^\circ$

**Time Needed for Diagnosis:** 3400 ms

# Diagnostic Trouble Code (DTC) Detecting Criteria

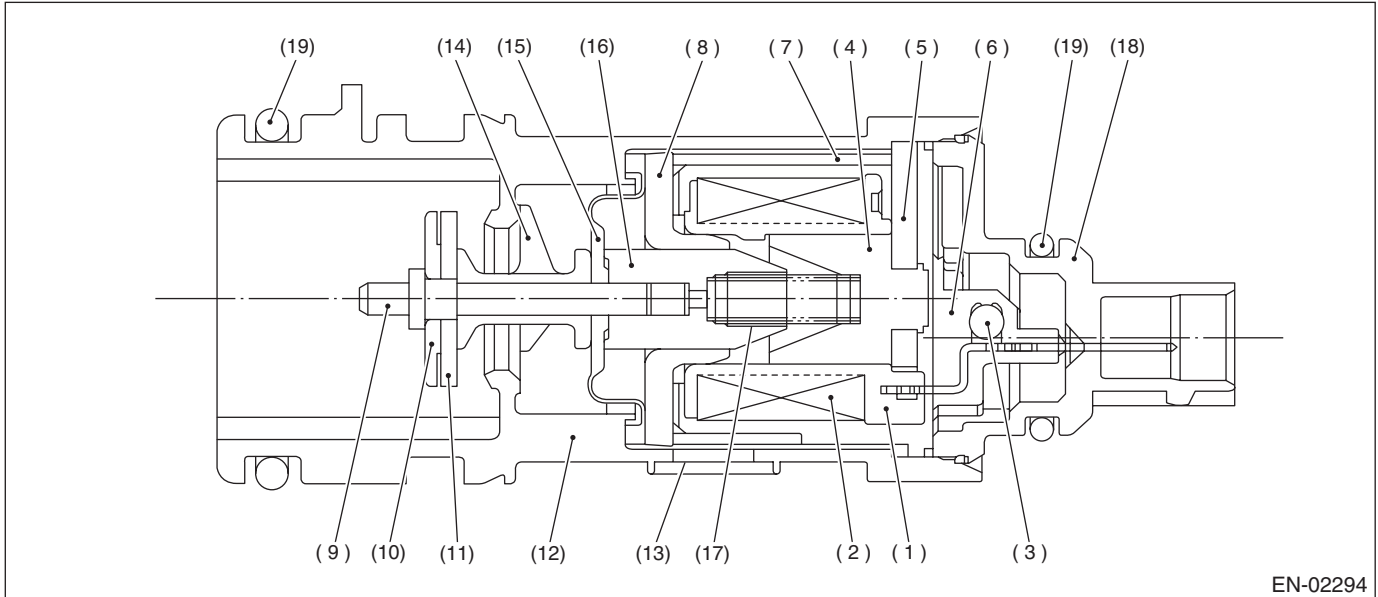
## GENERAL DESCRIPTION

### EI: DTC P1443 VENT CONTROL SOLENOID VALVE FUNCTION PROBLEM

#### 1. OUTLINE OF DIAGNOSIS

Detect the abnormal function (stuck closed) of the drain valve.  
Judge as NG when fuel tank pressure is low.

#### 2. COMPONENT DESCRIPTION



- |                 |                    |                   |
|-----------------|--------------------|-------------------|
| (1) Bobbin      | (8) Magnetic plate | (14) Retainer     |
| (2) Coil        | (9) Shaft          | (15) Diaphragm    |
| (3) Diode       | (10) Plate         | (16) Movable core |
| (4) Stator core | (11) Valve         | (17) Spring       |
| (5) End plate   | (12) Housing       | (18) Cover        |
| (6) Body        | (13) Filter        | (19) O-ring       |
| (7) Yoke        |                    |                   |

#### 3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
Drain valve	Open
Battery voltage	$\geq 10.9 \text{ V}$
Atmospheric pressure	$\geq 75 \text{ kPa}$ (563 mmHg, 22.2 inHg)
Tank pressure when starter is OFF → ON	$-0.7 \text{ kPa}$ ( $-5 \text{ mmHg}$ , $-0.2 \text{ inHg}$ ) and $0.4 \text{ kPa}$ (2.9 mmHg, 0.1 inHg)

#### 4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

# Diagnostic Trouble Code (DTC) Detecting Criteria

GENERAL DESCRIPTION

## 5. DIAGNOSTIC METHOD

### • Abnormality Judgment

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

#### Judgment Value

Malfunction Criteria	Threshold Value
Fuel tank pressure	$\leq -4$ kPa ( $-30$ mmHg, $-1.2$ inHg)

**Time Needed for Diagnosis:** 3000 ms

**Malfunction Indicator Light Illumination:** Illuminates as soon as a malfunction occurs.

### • Normality Judgment

Judge as OK and clear the NG if the continuous time while the following conditions are established is more than the predetermined time.

#### Judgment Value

Malfunction Criteria	Threshold Value
Fuel tank pressure	$> -4$ kPa ( $-30$ mmHg, $-1.2$ inHg)
Cumulative time when all the malfunction criteria below are met.	$\geq 30000$ ms
Purge control solenoid valve duty	Not = 0
Fuel temperature	$-10$ °C ( $14$ °F) — $70$ °C ( $158$ °F)
Intake manifold relative pressure	$\geq -26.7$ kPa ( $-200$ mmHg, $-7.9$ inHg)

**Time Needed for Diagnosis:** Less than 1 second

# Diagnostic Trouble Code (DTC) Detecting Criteria

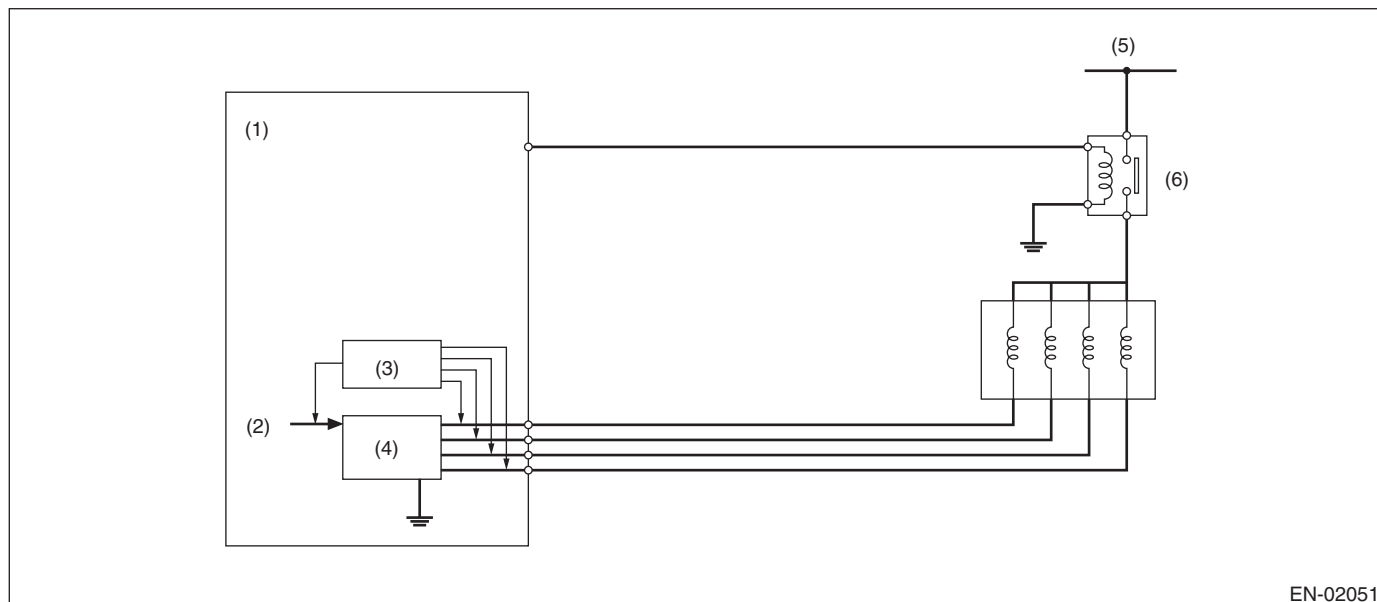
## GENERAL DESCRIPTION

### EJ: DTC P1492 EGR SOLENOID VALVE SIGNAL #1 CIRCUIT MALFUNCTION (LOW INPUT)

#### 1. OUTLINE OF DIAGNOSIS

- Detects open or short circuit of EGR.
- Judge as NG when the ECM output level differs from the actual terminal level.

#### 2. COMPONENT DESCRIPTION



EN-02051

- |                                 |                       |                     |
|---------------------------------|-----------------------|---------------------|
| (1) Engine control module (ECM) | (3) Detecting circuit | (5) Battery voltage |
| (2) Computer unit (CPU)         | (4) Switch circuit    | (6) Main relay      |

#### 3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
Elapsed time after starting the engine	≥ 1 second
EGR valve target position	> 0 step
Battery voltage	≥ 10.9 V

#### 4. GENERAL DRIVING CYCLE

Perform diagnosis continuously during EGR operation.

#### 5. DIAGNOSTIC METHOD

##### • Abnormality Judgment

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

##### Judgment Value

Malfunction Criteria	Threshold Value
Terminal voltage level when ECM outputs OFF signal	Low level
or	
Terminal voltage level when EGR operates	Low level

**Time Needed for Diagnosis:** 2500 ms

**Malfunction Indicator Light:** Illuminates as soon as a malfunction occurs.



# Diagnostic Trouble Code (DTC) Detecting Criteria

GENERAL DESCRIPTION

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## • Normality Judgment

Judge as OK and clear the NG if the continuous time while the following conditions are established is more than the predetermined time.

### Judgment Value

Malfunction Criteria	Threshold Value
Terminal voltage level when ECM outputs OFF signal	High level
Terminal voltage level when EGR operates	High level

**Time Needed for Diagnosis:** 256 ms

# Diagnostic Trouble Code (DTC) Detecting Criteria

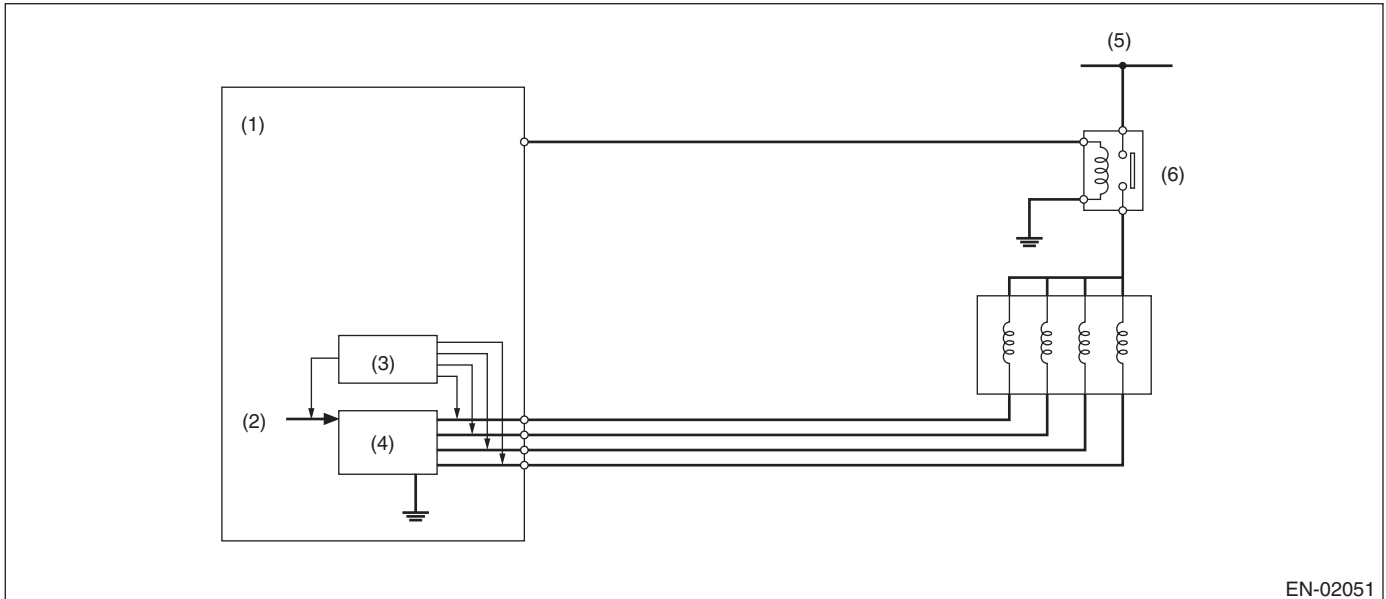
## GENERAL DESCRIPTION

### EK:DTC P1493 EGR SOLENOID VALVE SIGNAL #1 CIRCUIT MALFUNCTION (HIGH INPUT)

#### 1. OUTLINE OF DIAGNOSIS

- Detects open or short circuit of EGR.
- Judge as NG when the ECM output level differs from the actual terminal level.

#### 2. COMPONENT DESCRIPTION



- (1) Engine control module (ECM)      (3) Detecting circuit      (5) Battery voltage  
(2) Computer unit (CPU)      (4) Switch circuit      (6) Main relay

#### 3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
Elapsed time after starting the engine	≥ 1 second
EGR valve target position	> 0 step
Battery voltage	≥ 10.9 V

#### 4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

# Diagnostic Trouble Code (DTC) Detecting Criteria

GENERAL DESCRIPTION

## 5. DIAGNOSTIC METHOD

### • Abnormality Judgment

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

#### Judgment Value

Malfunction Criteria	Threshold Value
Terminal voltage level when ECM outputs ON signal or Terminal voltage level when EGR operates	High level

**Time Needed for Diagnosis:** 2500 ms

**Malfunction Indicator Light Illumination:** Illuminates as soon as a malfunction occurs.

### • Normality Judgment

Judge as OK and clear the NG if the continuous time while the following conditions are established is more than the predetermined time.

#### Judgment Value

Malfunction Criteria	Threshold Value
Terminal voltage level when ECM outputs ON signal	Low level
Terminal voltage level when EGR operates	Low level

**Time Needed for Diagnosis:** 256 ms

## Diagnostic Trouble Code (DTC) Detecting Criteria

### GENERAL DESCRIPTION

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#### **EL:DTC P1494 EGR SOLENOID VALVE SIGNAL #2 CIRCUIT MALFUNCTION (LOW INPUT)**

##### **1. OUTLINE OF DIAGNOSIS**

###### NOTE:

For the detection standard, refer to DTC P1492. <Ref. to GD(H6DO)-210, DTC P1492 EGR SOLENOID VALVE SIGNAL #1 CIRCUIT MALFUNCTION (LOW INPUT), Diagnostic Trouble Code (DTC) Detecting Criteria.>

#### **EM:DTC P1495 EGR SOLENOID VALVE SIGNAL #2 CIRCUIT MALFUNCTION (HIGH INPUT)**

##### **1. OUTLINE OF DIAGNOSIS**

###### NOTE:

For the detection standard, refer to DTC P1493. <Ref. to GD(H6DO)-212, DTC P1493 EGR SOLENOID VALVE SIGNAL #1 CIRCUIT MALFUNCTION (HIGH INPUT), Diagnostic Trouble Code (DTC) Detecting Criteria.>

#### **EN:DTC P1496 EGR SOLENOID VALVE SIGNAL #3 CIRCUIT MALFUNCTION (LOW INPUT)**

##### **1. OUTLINE OF DIAGNOSIS**

###### NOTE:

For the detection standard, refer to DTC P1492. <Ref. to GD(H6DO)-210, DTC P1492 EGR SOLENOID VALVE SIGNAL #1 CIRCUIT MALFUNCTION (LOW INPUT), Diagnostic Trouble Code (DTC) Detecting Criteria.>

#### **EO:DTC P1497 EGR SOLENOID VALVE SIGNAL #3 CIRCUIT MALFUNCTION (HIGH INPUT)**

##### **1. OUTLINE OF DIAGNOSIS**

###### NOTE:

For the detection standard, refer to DTC P1493. <Ref. to GD(H6DO)-212, DTC P1493 EGR SOLENOID VALVE SIGNAL #1 CIRCUIT MALFUNCTION (HIGH INPUT), Diagnostic Trouble Code (DTC) Detecting Criteria.>

#### **EP:DTC P1498 EGR SOLENOID VALVE SIGNAL #4 CIRCUIT MALFUNCTION (LOW INPUT)**

##### **1. OUTLINE OF DIAGNOSIS**

###### NOTE:

For the detection standard, refer to DTC P1492. <Ref. to GD(H6DO)-210, DTC P1492 EGR SOLENOID VALVE SIGNAL #1 CIRCUIT MALFUNCTION (LOW INPUT), Diagnostic Trouble Code (DTC) Detecting Criteria.>

#### **EQ:DTC P1499 EGR SOLENOID VALVE SIGNAL #4 CIRCUIT MALFUNCTION (HIGH INPUT)**

##### **1. OUTLINE OF DIAGNOSIS**

###### NOTE:

For the detection standard, refer to DTC P1493. <Ref. to GD(H6DO)-212, DTC P1493 EGR SOLENOID VALVE SIGNAL #1 CIRCUIT MALFUNCTION (HIGH INPUT), Diagnostic Trouble Code (DTC) Detecting Criteria.>

# Diagnostic Trouble Code (DTC) Detecting Criteria

GENERAL DESCRIPTION

## ER:DTC P1518 STARTER SWITCH CIRCUIT LOW INPUT

### 1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit of starter SW.

If the status becomes post engine start although the starter has not been turned to ON, judge as OFF NG.

### 2. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
None	

### 3. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

### 4. DIAGNOSTIC METHOD

#### • Abnormality Judgment

Judge as OFF NG when the following conditions are established.

#### Judgment Value

Malfunction Criteria	Threshold Value
Vehicle speed	< 1 km/h (0.6 MPH)
Starter ON signal	Not detected
Engine condition	Change from pre-start to post-start
Battery voltage	≥ 8 V

**Time Needed for Diagnosis:** Less than 1 second

**Malfunction Indicator Light Illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

#### • Normality Judgment

Judge as OFF OK and clear the NG if the following conditions are established.

#### Judgment Value

Malfunction Criteria	Threshold Value
Starter ON	Experienced
Starter ON diagnosis	No diagnosis experience
Battery voltage	≥ 8 V

**Time Needed for Diagnosis:** Less than 1 second

# Diagnostic Trouble Code (DTC) Detecting Criteria

## GENERAL DESCRIPTION

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### ES:DTC P1560 BACK-UP VOLTAGE CIRCUIT MALFUNCTION

#### 1. OUTLINE OF DIAGNOSIS

Detect the open/short circuit of back-up power supply circuit.  
Judge as NG when the backup power voltage is low.

#### 2. ENABLE CONDITION

Secondary Parameters	Enable Conditions
None	

#### 3. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

#### 4. DIAGNOSTIC METHOD

##### • Abnormality Judgment

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

##### Judgment Value

Malfunction Criteria	Threshold Value
Voltage of back-up power supply	Low
Battery voltage	$\geq 10.9$ V
Engine condition	After engine starting

**Time Needed for Diagnosis:** 2500 ms

**Malfunction Indicator Light Illumination:** Illuminates as soon as a malfunction occurs.

##### • Normality Judgment

Judge as OK and clear the NG if the continuous time while the following conditions are established is more than the predetermined time.

##### Judgment Value

Malfunction Criteria	Threshold Value
Voltage of back-up power supply	High
Battery voltage	$\geq 10.9$ V
Engine condition	After engine starting

**Time Needed for Diagnosis:** Less than 1 second

## **ET:DTC P1570 ANTENNA**

### **1. OUTLINE OF DIAGNOSIS**

**NOTE:**

For the detection standard, refer to DTC P0513. <Ref. to GD(H6DO)-193, DTC P0513 INCORRECT IMMOBILIZER KEY, Diagnostic Trouble Code (DTC) Detecting Criteria.>

## **EU:DTC P1571 REFERENCE CODE INCOMPATIBILITY**

### **1. OUTLINE OF DIAGNOSIS**

**NOTE:**

For the detection standard, refer to DTC P0513. <Ref. to GD(H6DO)-193, DTC P0513 INCORRECT IMMOBILIZER KEY, Diagnostic Trouble Code (DTC) Detecting Criteria.>

## **EV:DTC P1572 IMM CIRCUIT FAILURE (EXCEPT ANTENNA CIRCUIT)**

### **1. OUTLINE OF DIAGNOSIS**

**NOTE:**

For the detection standard, refer to DTC P0513. <Ref. to GD(H6DO)-193, DTC P0513 INCORRECT IMMOBILIZER KEY, Diagnostic Trouble Code (DTC) Detecting Criteria.>

## **EW:DTC P1574 KEY COMMUNICATION FAILURE**

### **1. OUTLINE OF DIAGNOSIS**

**NOTE:**

For the detection standard, refer to DTC P0513. <Ref. to GD(H6DO)-193, DTC P0513 INCORRECT IMMOBILIZER KEY, Diagnostic Trouble Code (DTC) Detecting Criteria.>

## **EX:DTC P1576 EGI CONTROL MODULE EEPROM**

### **1. OUTLINE OF DIAGNOSIS**

**NOTE:**

For the detection standard, refer to DTC P0513. <Ref. to GD(H6DO)-193, DTC P0513 INCORRECT IMMOBILIZER KEY, Diagnostic Trouble Code (DTC) Detecting Criteria.>

## **EY:DTC P1577 IMM CONTROL MODULE EEPROM**

### **1. OUTLINE OF DIAGNOSIS**

**NOTE:**

For the detection standard, refer to DTC P0513. <Ref. to GD(H6DO)-193, DTC P0513 INCORRECT IMMOBILIZER KEY, Diagnostic Trouble Code (DTC) Detecting Criteria.>

## **EZ:DTC P1578 METER FAILURE**

### **1. OUTLINE OF DIAGNOSIS**

**NOTE:**

For the detection standard, refer to DTC P0513. <Ref. to GD(H6DO)-193, DTC P0513 INCORRECT IMMOBILIZER KEY, Diagnostic Trouble Code (DTC) Detecting Criteria.>

# Diagnostic Trouble Code (DTC) Detecting Criteria

## GENERAL DESCRIPTION

### FA:DTC P2088 INTAKE CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT LOW (BANK 1)

#### 1. OUTLINE OF DIAGNOSIS

Detect open or short circuit of the oil flow control solenoid valve.  
Judge as NG when the current is small even though the duty signal is large.

#### 2. ENABLE CONDITION

Secondary Parameters	Enable Conditions
None	

#### 3. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

#### 4. DIAGNOSTIC METHOD

##### • Abnormality Judgment

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

##### Judgment Value

Malfunction Criteria	Threshold Value
Battery voltage	$\geq 10.9$ V
Oil flow control solenoid valve control duty	$\geq 99.61$ %
Oil control solenoid valve control present current	$< 0.306$ A

**Time Needed for Diagnosis:** 2000 ms

**Malfunction Indicator Light Illumination:** Illuminates as soon as a malfunction occurs.

##### • Normality Judgment

Judge as OK and clear the NG if the continuous time while the following conditions are established is more than the predetermined time.

##### Judgment Value

Malfunction Criteria	Threshold Value
Battery voltage	$\geq 10.9$ V
Target current value of the oil flow control solenoid valve	$\geq 0.14$ A
Target current value of the oil flow control solenoid valve – oil flow control solenoid valve control current value	$< 0.08$ A

**Time Needed for Diagnosis:** 2000 ms



# Diagnostic Trouble Code (DTC) Detecting Criteria

GENERAL DESCRIPTION

## FB:DTC P2089 INTAKE CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT HIGH (BANK 1)

### 1. OUTLINE OF DIAGNOSIS

Detect open or short circuit of oil flow control solenoid valve.

Judge as NG when the current is large even though the duty signal is small.

### 2. ENABLE CONDITION

Secondary Parameters	Enable Conditions
None	

### 3. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

### 4. DIAGNOSTIC METHOD

#### • Abnormality Judgment

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

#### Judgment Value

Malfunction Criteria	Threshold Value
Battery voltage	$\geq 10.9$ V
Oil flow control solenoid valve control duty	$< 0.39$ %
Oil control solenoid valve control present current	$\geq 0.306$ A

**Time Needed for Diagnosis:** 2000 ms

**Malfunction Indicator Light Illumination:** Illuminates as soon as a malfunction occurs.

#### • Normality Judgment

Judge as OK and clear the NG if the continuous time while the following conditions are established is more than the predetermined time.

#### Judgment Value

Malfunction Criteria	Threshold Value
Battery voltage	$\geq 10.9$ V
Target current value of the oil flow control solenoid valve – oil flow control solenoid valve control current value	$< 0.08$ A

**Time Needed for Diagnosis:** 2000 ms

# Diagnostic Trouble Code (DTC) Detecting Criteria

## GENERAL DESCRIPTION

### FC:DTC P2090 EXHAUST CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT LOW (BANK 1)

#### 1. OUTLINE OF DIAGNOSIS

Detect open circuit of the oil flow control solenoid valve.

Judge as open NG when the current is small even though the duty signal is large.

#### 2. ENABLE CONDITION

Secondary Parameters	Enable Conditions
None	

#### 3. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

#### 4. DIAGNOSTIC METHOD

##### • Abnormality Judgment

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

##### Judgment Value

Malfunction Criteria	Threshold Value
Battery voltage	$\geq 10.9$ V
Oil flow control solenoid valve control duty	$\geq 99.61$ %
Oil control solenoid valve control present current	$< 0.306$ A

**Time Needed for Diagnosis:** 2000 ms

**Malfunction Indicator Light Illumination:** Illuminates as soon as a malfunction occurs.

##### • Normality Judgment

Judge as OK and clear the NG if the continuous time while the following conditions are established is more than the predetermined time.

##### Judgment Value

Malfunction Criteria	Threshold Value
Battery voltage	$\geq 10.9$ V
Target current value of the oil flow control solenoid valve	$\geq 0.14$ A
Target current value of the oil flow control solenoid valve – Oil flow control solenoid valve control current value	$< 0.08$ A

**Time Needed for Diagnosis:** 2000 ms

# Diagnostic Trouble Code (DTC) Detecting Criteria

GENERAL DESCRIPTION

## FD:DTC P2091 EXHAUST CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT HIGH (BANK 1)

### 1. OUTLINE OF DIAGNOSIS

Detect short circuit of oil flow control solenoid valve.

Judge as short NG when the current is large even though the duty signal is small.

### 2. ENABLE CONDITION

Secondary Parameters	Enable Conditions
None	

### 3. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

### 4. DIAGNOSTIC METHOD

#### • Abnormality Judgment

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

#### Judgment Value

Malfunction Criteria	Threshold Value
Battery voltage	$\geq 10.9$ V
Oil flow control solenoid valve control duty	$< 0.39$ %
Oil control solenoid valve control present current	$\geq 0.306$ A

**Time Needed for Diagnosis:** 2000 ms

**Malfunction Indicator Light Illumination:** Illuminates as soon as a malfunction occurs.

#### • Normality Judgment

Judge as OK and clear the NG if the continuous time while the following conditions are established is more than the predetermined time.

#### Judgment Value

Malfunction Criteria	Threshold Value
Battery voltage	$\geq 10.9$ V
Target current value of the oil flow control solenoid valve – Oil flow control solenoid valve control current value	$< 0.08$ A

**Time Needed for Diagnosis:** 2000 ms

## Diagnostic Trouble Code (DTC) Detecting Criteria

### GENERAL DESCRIPTION

---

#### **FE:DTC P2092 INTAKE CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT LOW (BANK 2)**

##### **1. OUTLINE OF DIAGNOSIS**

###### NOTE:

For the detection standard, refer to DTC P2088. <Ref. to GD(H6DO)-218, DTC P2088 INTAKE CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT LOW (BANK 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

#### **FF:DTC P2093 INTAKE CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT HIGH (BANK 2)**

##### **1. OUTLINE OF DIAGNOSIS**

###### NOTE:

For the detection standard, refer to DTC P2089. <Ref. to GD(H6DO)-219, DTC P2089 INTAKE CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT HIGH (BANK 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

#### **FG:DTC P2094 EXHAUST CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT LOW (BANK 2)**

##### **1. OUTLINE OF DIAGNOSIS**

###### NOTE:

For the detection standard, refer to DTC P2090. <Ref. to GD(H6DO)-220, DTC P2090 EXHAUST CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT LOW (BANK 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

#### **FH:DTC P2095 EXHAUST CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT HIGH (BANK 2)**

##### **1. OUTLINE OF DIAGNOSIS**

###### NOTE:

For the detection standard, refer to DTC P2091. <Ref. to GD(H6DO)-221, DTC P2091 EXHAUST CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT HIGH (BANK 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

# Diagnostic Trouble Code (DTC) Detecting Criteria

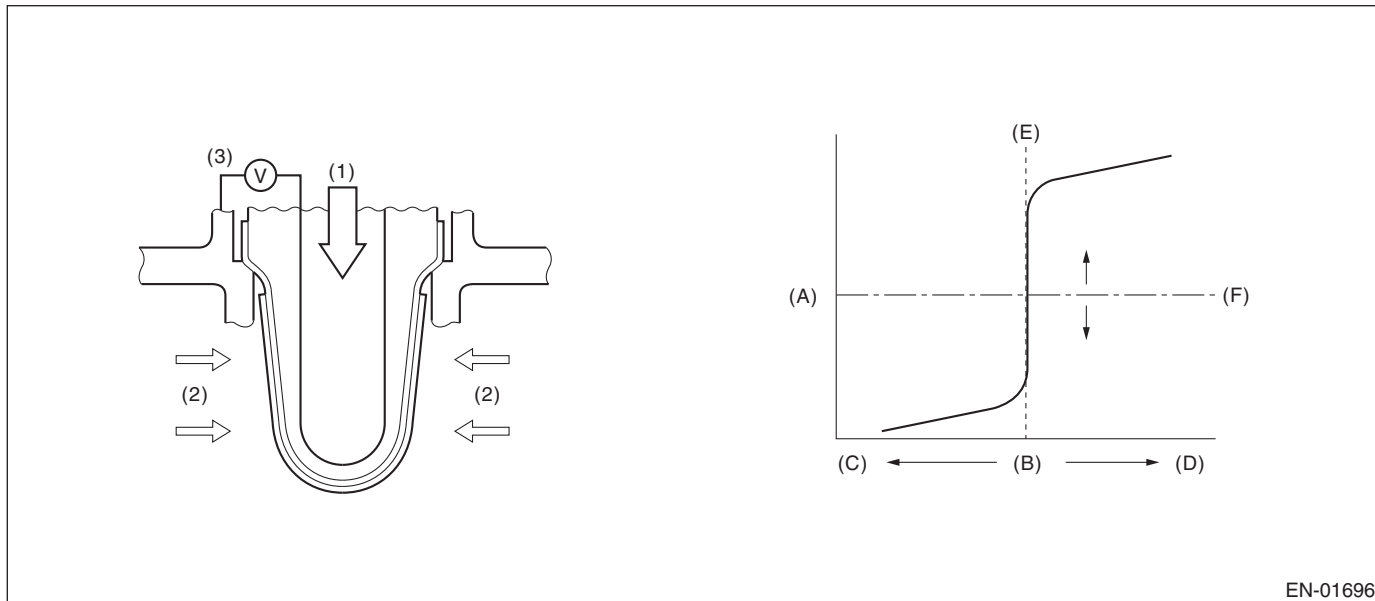
GENERAL DESCRIPTION

## FI: DTC P2096 POST CATALYST FUEL TRIM SYSTEM TOO LEAN (BANK 1)

### 1. OUTLINE OF DIAGNOSIS

Detect the malfunction of fuel system from the size of the sub feedback learning value.  
Control the sub feedback learning and judge as NG when the learning value is in the lean zone.

### 2. COMPONENT DESCRIPTION



- (A) Electromotive force
- (B) Air fuel ratio
- (C) Rich
- (D) Lean
- (E) Theoretical air fuel ratio
- (F) Comparative voltage
- (1) Atmosphere
- (2) Exhaust gas
- (3) Electromotive force

### 3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
Conditions for carrying out the sub feedback learning	Completed
Continuous time when all conditions are established.	$\geq 1$ s

### 4. GENERAL DRIVING CYCLE

Perform the diagnosis continuously when the vehicle is idling or running at a constant speed of 80 km/h (50 MPH) or more.

# Diagnostic Trouble Code (DTC) Detecting Criteria

## GENERAL DESCRIPTION

---

### 5. DIAGNOSTIC METHOD

#### • Abnormality Judgment

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

#### Judgment Value

Malfunction Criteria	Threshold Value
Sub feedback learning value	< -0.032

**Time Needed for Diagnosis:** 1 s × 1 time(s)

**Malfunction Indicator Light Illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

#### • Normality Judgment

Judge as OK and clear the NG if the continuous time while the following conditions are established is more than the predetermined time.

#### Judgment Value

Malfunction Criteria	Threshold Value
Sub feedback learning value	≥ -0.032 + 0

**Time Needed for Diagnosis:** 1 s

# Diagnostic Trouble Code (DTC) Detecting Criteria

GENERAL DESCRIPTION

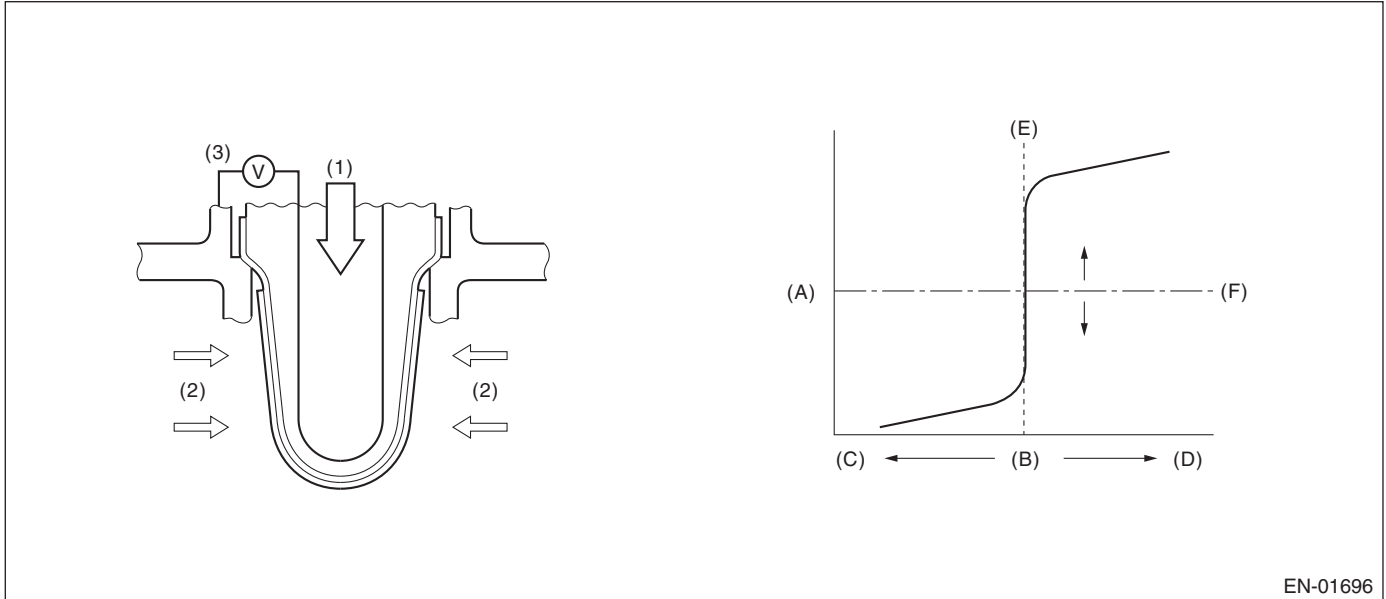
## FJ: DTC P2097 POST CATALYST FUEL TRIM SYSTEM TOO RICH (BANK 1)

### 1. OUTLINE OF DIAGNOSIS

Detect the malfunction of fuel system from the size of the sub feedback learning value.

Sub feedback learning is being performed. When the learning value goes to the rich side, judge as NG.

### 2. COMPONENT DESCRIPTION



EN-01696

- |                         |                                |                         |
|-------------------------|--------------------------------|-------------------------|
| (A) Electromotive force | (B) Air fuel ratio             | (C) Rich                |
| (D) Lean                | (E) Theoretical air fuel ratio | (F) Comparative voltage |
| (1) Atmosphere          | (2) Exhaust gas                | (3) Electromotive force |

### 3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
Conditions for carrying out the sub feedback learning	Completed
Continuous time when all conditions are established.	$\geq 1$ s

### 4. GENERAL DRIVING CYCLE

Perform the diagnosis continuously when the vehicle is idling or running at a constant speed of 80 km/h (50 MPH) or more.

# Diagnostic Trouble Code (DTC) Detecting Criteria

## GENERAL DESCRIPTION

---

### 5. DIAGNOSTIC METHOD

#### • Abnormality Judgment

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

#### Judgment Value

Malfunction Criteria	Threshold Value
Sub feedback learning value	$\geq 0.031$

**Time Needed for Diagnosis:** 1 s  $\times$  1 time(s)

**Malfunction Indicator Light Illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

#### • Normality Judgment

Judge as OK and clear the NG if the continuous time while the following conditions are established is more than the predetermined time.

#### Judgment Value

Malfunction Criteria	Threshold Value
Sub feedback learning value	$< 0.031 + 0$

**Time Needed for Diagnosis:** 1 s

## FK:DTC P2098 POST CATALYST FUEL TRIM SYSTEM TOO LEAN BANK 2

### 1. OUTLINE OF DIAGNOSIS

NOTE:

For the detection standard, refer to DTC P2096. <Ref. to GD(H6DO)-223, DTC P2096 POST CATALYST FUEL TRIM SYSTEM TOO LEAN (BANK 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

## FL:DTC P2099 POST CATALYST FUEL TRIM SYSTEM TOO RICH BANK 2

### 1. OUTLINE OF DIAGNOSIS

NOTE:

For the detection standard, refer to DTC P2097. <Ref. to GD(H6DO)-225, DTC P2097 POST CATALYST FUEL TRIM SYSTEM TOO RICH (BANK 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

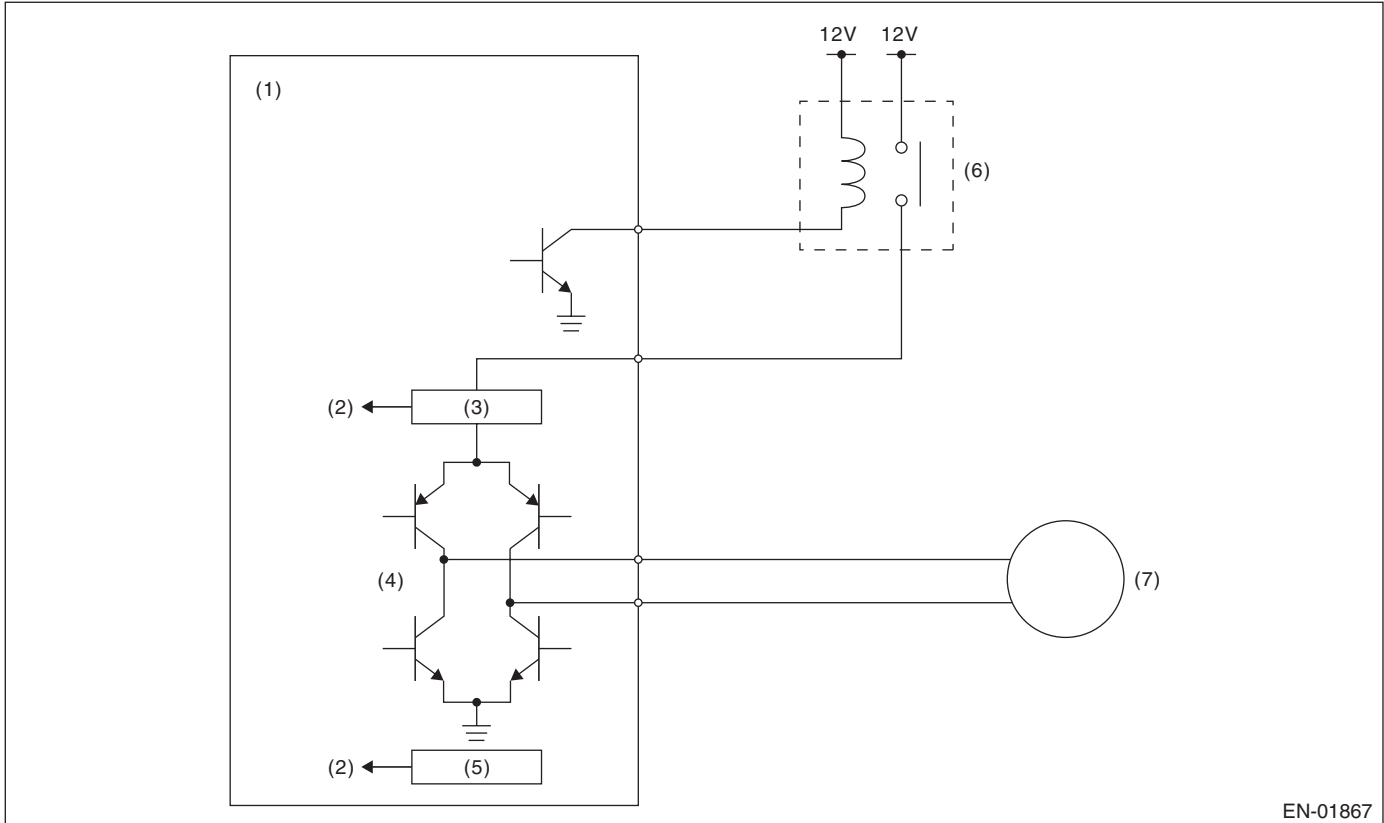


## FM:DTC P2101 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT RANGE/ PERFORMANCE

### 1. OUTLINE OF DIAGNOSIS

Judge as NG when the motor current becomes large or drive circuit is heated.

### 2. COMPONENT DESCRIPTION



EN-01867

- |                                   |                                   |                                       |
|-----------------------------------|-----------------------------------|---------------------------------------|
| (1) Engine control module (ECM)   | (4) Drive circuit                 | (6) Electronic throttle control relay |
| (2) Detecting circuit             | (5) Temperature detection circuit | (7) Motor                             |
| (3) Overcurrent detection circuit |                                   |                                       |

### 3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
Under control of electronic throttle control	ON
CPU communication line sub → main normal judgment	Normal

### 4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

# Diagnostic Trouble Code (DTC) Detecting Criteria

## GENERAL DESCRIPTION

---

### 5. DIAGNOSTIC METHOD

#### • Abnormality Judgment

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

#### Judgment Value

Malfunction Criteria	Threshold Value
Motor current or Drive circuit inner temperature	> 8 A  > 175°C (347°F)

**Time Needed for Diagnosis:** 512 ms

**Malfunction Indicator Light Illumination:** Illuminates as soon as a malfunction occurs.

#### • Normality Judgment

Judge as OK and clear the NG if the continuous time while the following conditions are established is more than the predetermined time.

#### Judgment Value

Malfunction Criteria	Threshold Value
Motor current Drive circuit inner temperature	$\leq$ 8 A $\leq$ 175°C (347°F)

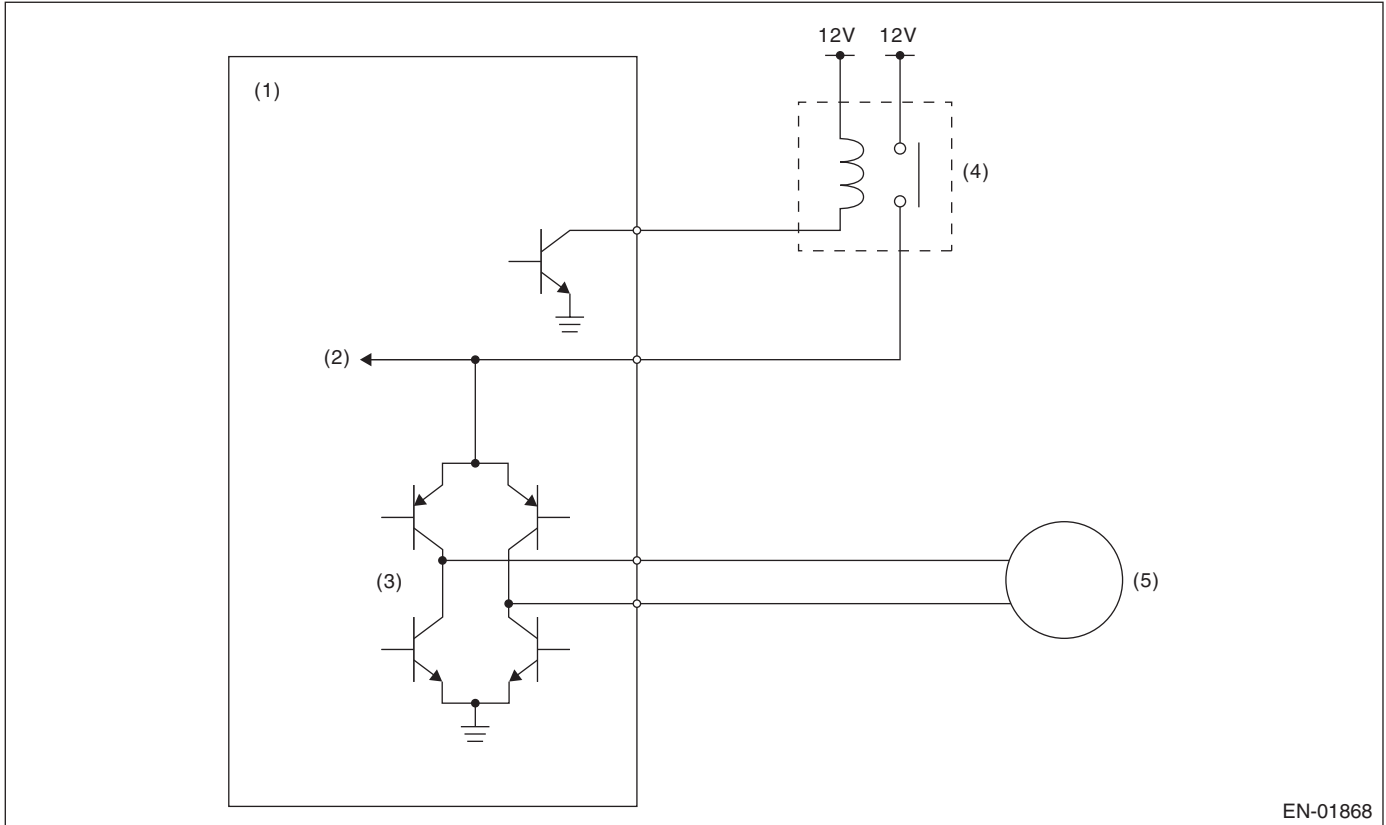
**Time Needed for Diagnosis:** 2000 ms

## FN:DTC P2102 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT LOW

### 1. OUTLINE OF DIAGNOSIS

Judge as NG when the electronic throttle control power is not supplied even when ECM sets the electronic throttle control relay to ON.

### 2. COMPONENT DESCRIPTION



EN-01868

- |                                 |                                       |           |
|---------------------------------|---------------------------------------|-----------|
| (1) Engine control module (ECM) | (3) Drive circuit                     | (5) Motor |
| (2) Voltage detection circuit   | (4) Electronic throttle control relay |           |

### 3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
Battery voltage	$\geq 11 \text{ V}$
Electronic throttle control relay output	ON

### 4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

# Diagnostic Trouble Code (DTC) Detecting Criteria

## GENERAL DESCRIPTION

---

### 5. DIAGNOSTIC METHOD

#### • Abnormality Judgment

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

#### Judgment Value

Malfunction Criteria	Threshold Value
Motor power voltage	$\leq 5\text{ V}$

**Time Needed for Diagnosis:** 352 ms

**Malfunction Indicator Light Illumination:** Illuminates as soon as a malfunction occurs.

#### • Normality Judgment

Judge as OK and clear the NG if the continuous time while the following conditions are established is more than the predetermined time.

#### Judgment Value

Malfunction Criteria	Threshold Value
Motor power voltage	$> 5\text{ V}$

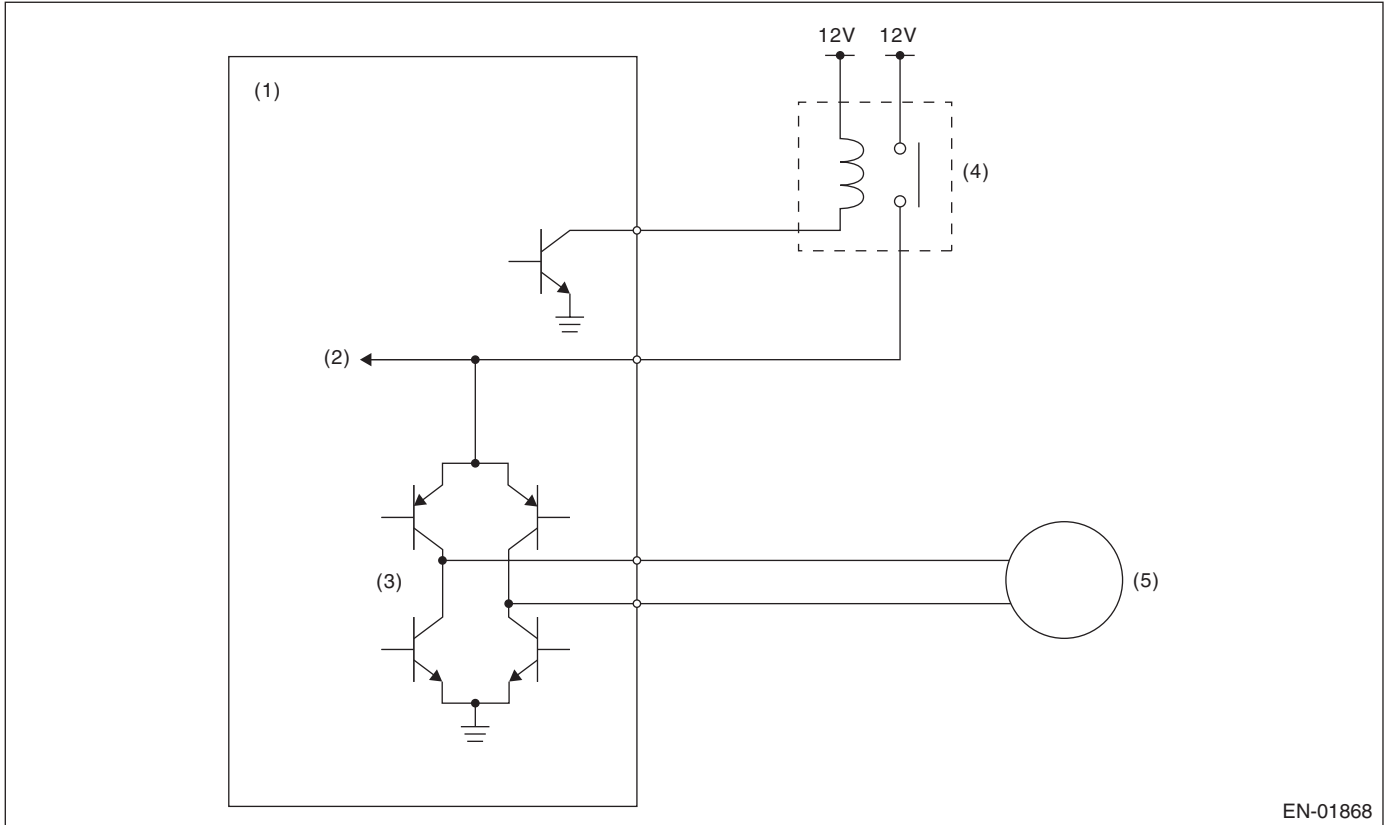
**Time Needed for Diagnosis:** 2000 ms

## FO:DTC P2103 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT HIGH

### 1. OUTLINE OF DIAGNOSIS

Judge as NG when the electronic throttle control power is supplied even when ECM sets the electronic throttle control relay to OFF.

### 2. COMPONENT DESCRIPTION



- |                                 |                                       |           |
|---------------------------------|---------------------------------------|-----------|
| (1) Engine control module (ECM) | (3) Drive circuit                     | (5) Motor |
| (2) Voltage detection circuit   | (4) Electronic throttle control relay |           |

### 3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
Battery voltage	$\geq 6\text{ V}$
Electronic throttle control relay output	OFF

### 4. GENERAL DRIVING CYCLE

- When ignition switch ON → OFF
- Ignition switch OFF → ON (Only after clearing memory)

# Diagnostic Trouble Code (DTC) Detecting Criteria

## GENERAL DESCRIPTION

---

### 5. DIAGNOSTIC METHOD

#### • Abnormality Judgment

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

#### Judgment Value

Malfunction Criteria	Threshold Value
Motor power voltage	$\geq 5$ V

**Time Needed for Diagnosis:** 600 ms

**Malfunction Indicator Light Illumination:** Illuminates as soon as a malfunction occurs.

#### • Normality Judgment

Judge as OK and clear the NG if the continuous time while the following conditions are established is more than the predetermined time.

#### Judgment Value

Malfunction Criteria	Threshold Value
Motor power voltage	$< 5$ V

**Time Needed for Diagnosis:** 400 ms

# Diagnostic Trouble Code (DTC) Detecting Criteria

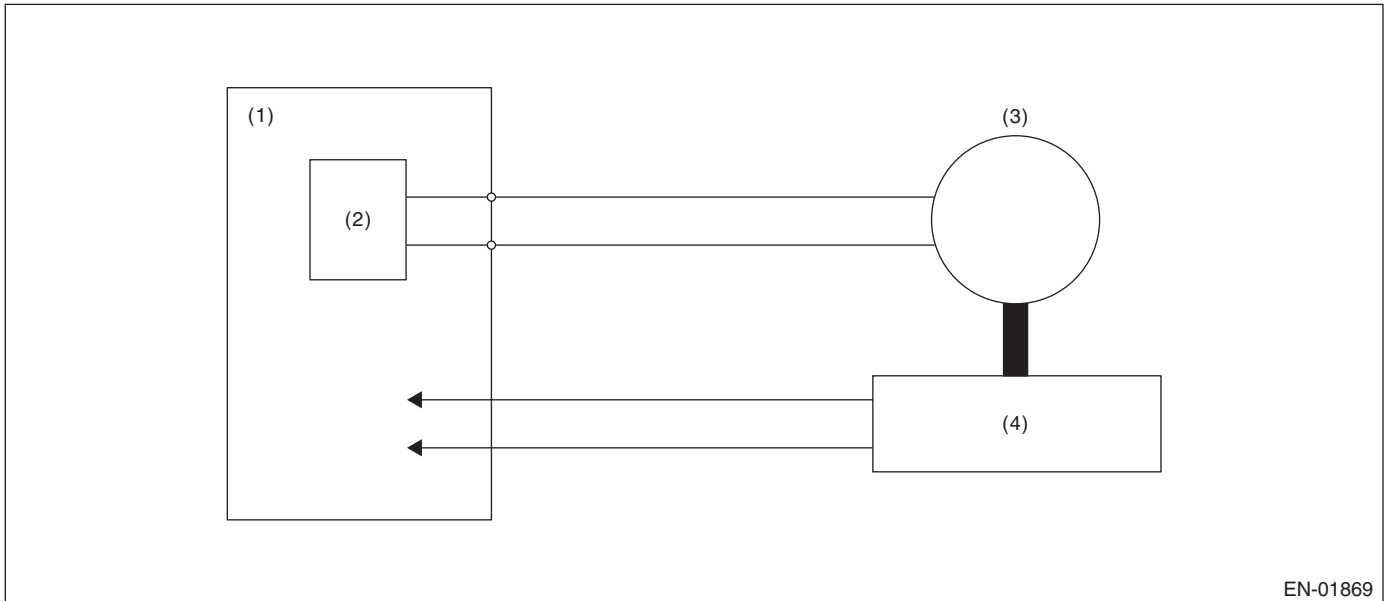
GENERAL DESCRIPTION

## FP:DTC P2109 THROTTLE/PEDAL POSITION SENSOR “A” MINIMUM STOP PERFORMANCE

### 1. OUTLINE OF DIAGNOSIS

Judge as NG when full close point learning cannot conducted or abnormal value is detected.

### 2. COMPONENT DESCRIPTION



(1) Engine control module (ECM)

(3) Motor

(4) Throttle position sensor

(2) Drive circuit

### 3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
Ignition switch	ON → OFF
Ignition switch (only after clear memory)	OFF → ON

### 4. GENERAL DRIVING CYCLE

Perform the diagnosis at full closed point learning.

# Diagnostic Trouble Code (DTC) Detecting Criteria

## GENERAL DESCRIPTION

---

### 5. DIAGNOSTIC METHOD

#### • Abnormality Judgment

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

#### Judgment Value

Malfunction Criteria	Threshold Value
Throttle sensor opening angle at full close point learning	< 9.884 ° or > 20.116 °
or	
Throttle opening angle when the ignition switch is ON – Throttle minimum stop position	< 0.887 °

**Time Needed for Diagnosis:** 8 ms — 80 ms

**Malfunction Indicator Light Illumination:** Illuminates as soon as a malfunction occurs.

#### • Normality Judgment

Judge as OK and clear the NG if the continuous time while the following conditions are established is more than the predetermined time.

#### Judgment Value

Malfunction Criteria	Threshold Value
Throttle sensor opening angle at full close point learning	≥ 9.884 ° and ≤ 20.116 °
Throttle opening angle when the ignition switch is ON – Throttle minimum stop position	≥ 0.887 °

**Time Needed for Diagnosis:** 8 ms

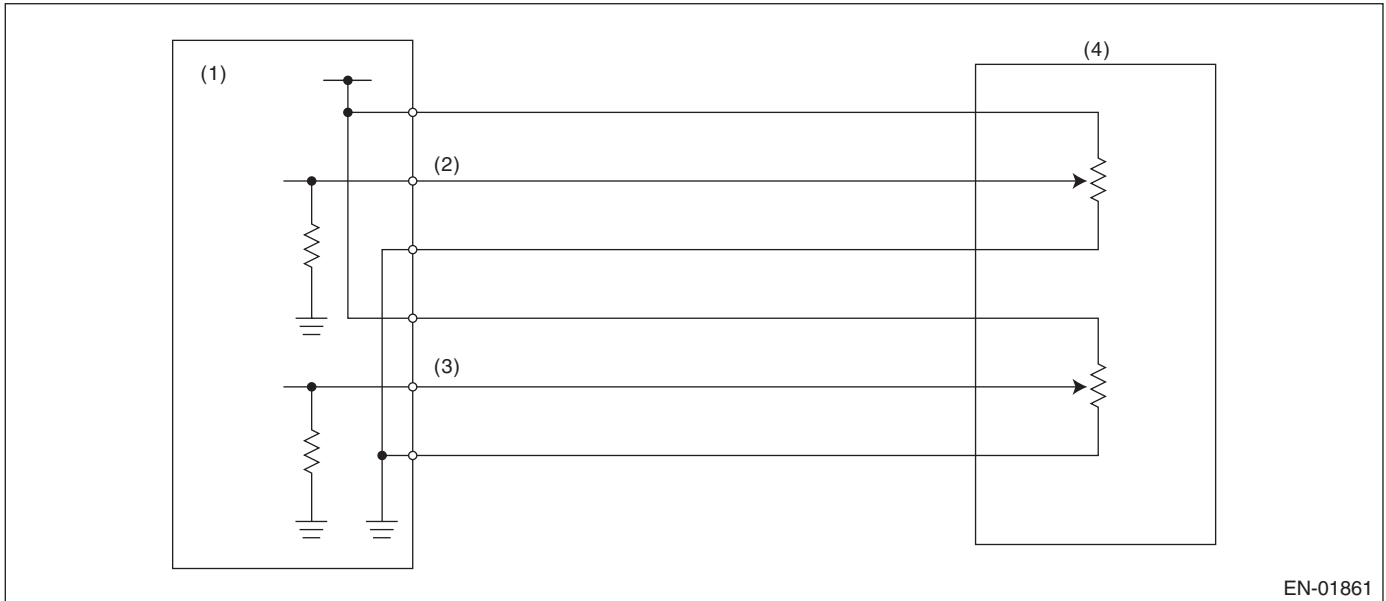


## FQ:DTC P2122 THROTTLE/PEDAL POSITION SENSOR/SWITCH “D” CIRCUIT LOW INPUT

### 1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit of accelerator pedal position sensor 1.  
 Judge as NG if out of specification.

### 2. COMPONENT DESCRIPTION



EN-01861

- |  |  |                                       |
|--|--|---------------------------------------|
| (1) Engine control module (ECM)                | (3) Accelerator pedal position sensor 2 signal | (4) Accelerator pedal position sensor |
| (2) Accelerator pedal position sensor 1 signal |  |                                       |

### 3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
Ignition switch	ON
Battery voltage	$\geq 6\text{ V}$

### 4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

# Diagnostic Trouble Code (DTC) Detecting Criteria

## GENERAL DESCRIPTION

---

### 5. DIAGNOSTIC METHOD

#### • Abnormality Judgment

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

#### Judgment Value

Malfunction Criteria	Threshold Value
Sensor 1 input voltage	< 0.295 V

**Time Needed for Diagnosis:** 100 ms

**Malfunction Indicator Light Illumination:** Illuminates as soon as a malfunction occurs.

#### • Normality Judgment

Judge as OK and clear the NG if the continuous time while the following conditions are established is more than the predetermined time.

#### Judgment Value

Malfunction Criteria	Threshold Value
Sensor 1 input voltage	$\geq 0.295$ V

**Time Needed for Diagnosis:** 100 ms

# Diagnostic Trouble Code (DTC) Detecting Criteria

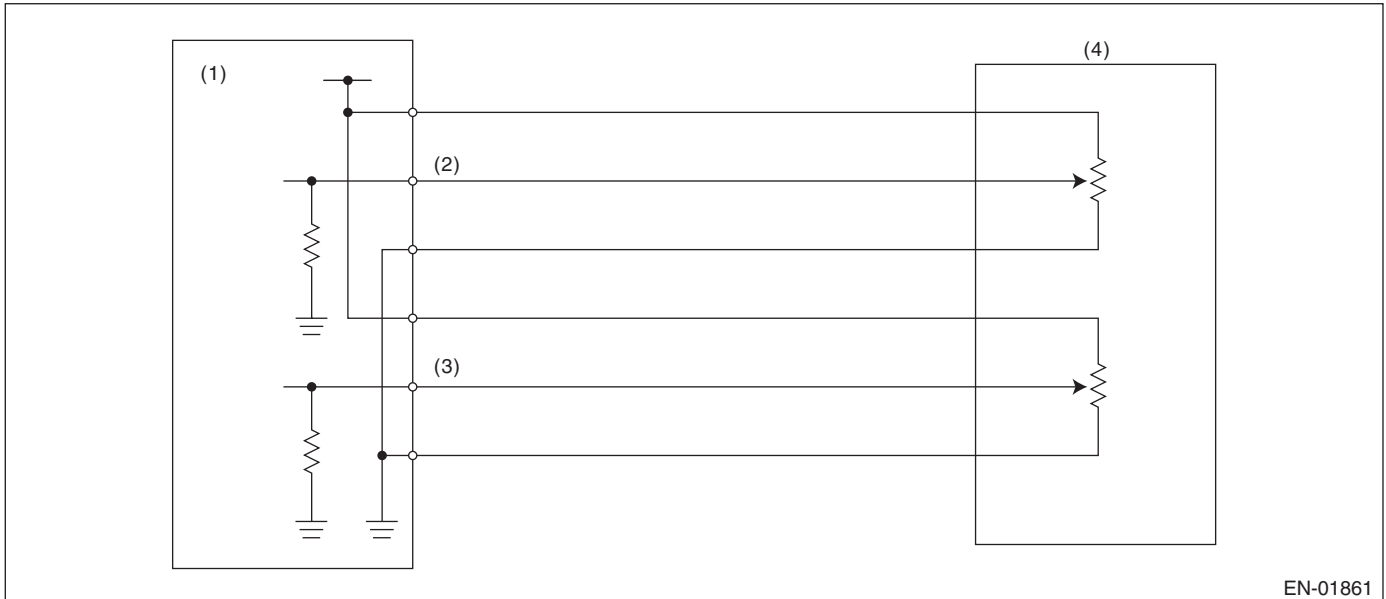
GENERAL DESCRIPTION

## FR:DTC P2123 THROTTLE/PEDAL POSITION SENSOR/SWITCH "D" CIRCUIT HIGH INPUT

### 1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit of accelerator pedal position sensor 1.  
Judge as NG if out of specification.

### 2. COMPONENT DESCRIPTION



- (1) Engine control module (ECM)      (3) Accelerator pedal position sensor 2 signal      (4) Accelerator pedal position sensor
- (2) Accelerator pedal position sensor 1 signal

### 3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
Ignition switch	ON
Battery voltage	$\geq 6 \text{ V}$

### 4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

# Diagnostic Trouble Code (DTC) Detecting Criteria

## GENERAL DESCRIPTION

---

### 5. DIAGNOSTIC METHOD

#### • Abnormality Judgment

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

#### Judgment Value

Malfunction Criteria	Threshold Value
Sensor 1 input voltage	$\geq 4.783$ V

**Time Needed for Diagnosis:** 32 ms

**Malfunction Indicator Light Illumination:** Illuminates as soon as a malfunction occurs.

#### • Normality Judgment

Judge as OK and clear the NG if the continuous time while the following conditions are established is more than the predetermined time.

#### Judgment Value

Malfunction Criteria	Threshold Value
Sensor 1 input voltage	$< 4.783$ V

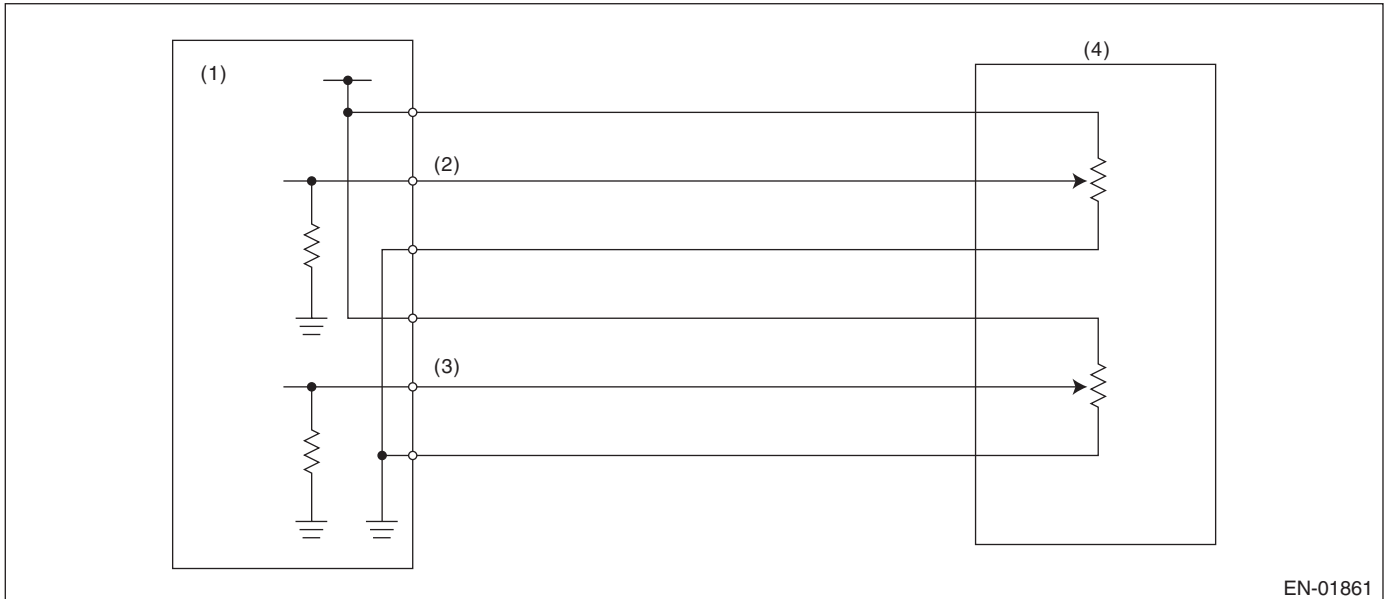
**Time Needed for Diagnosis:** 32 ms

## FS:DTC P2127 THROTTLE/PEDAL POSITION SENSOR/SWITCH “E” CIRCUIT LOW INPUT

### 1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit of accelerator pedal position sensor 2.  
Judge as NG if out of specification.

### 2. COMPONENT DESCRIPTION



EN-01861

- (1) Engine control module (ECM)
- (2) Accelerator pedal position sensor 1 signal
- (3) Accelerator pedal position sensor 2 signal
- (4) Accelerator pedal position sensor

### 3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
Ignition switch	ON
Battery voltage	≥ 6 V

### 4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

# Diagnostic Trouble Code (DTC) Detecting Criteria

## GENERAL DESCRIPTION

---

### 5. DIAGNOSTIC METHOD

#### • Abnormality Judgment

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

#### Judgment Value

Malfunction Criteria	Threshold Value
Sensor 2 input voltage	< 0.295 V

**Time Needed for Diagnosis:** 100 ms

**Malfunction Indicator Light Illumination:** Illuminates as soon as a malfunction occurs.

#### • Normality Judgment

Judge as OK and clear the NG if the continuous time while the following conditions are established is more than the predetermined time.

#### Judgment Value

Malfunction Criteria	Threshold Value
Sensor 2 input voltage	$\geq 0.295$ V

**Time Needed for Diagnosis:** 100 ms

# Diagnostic Trouble Code (DTC) Detecting Criteria

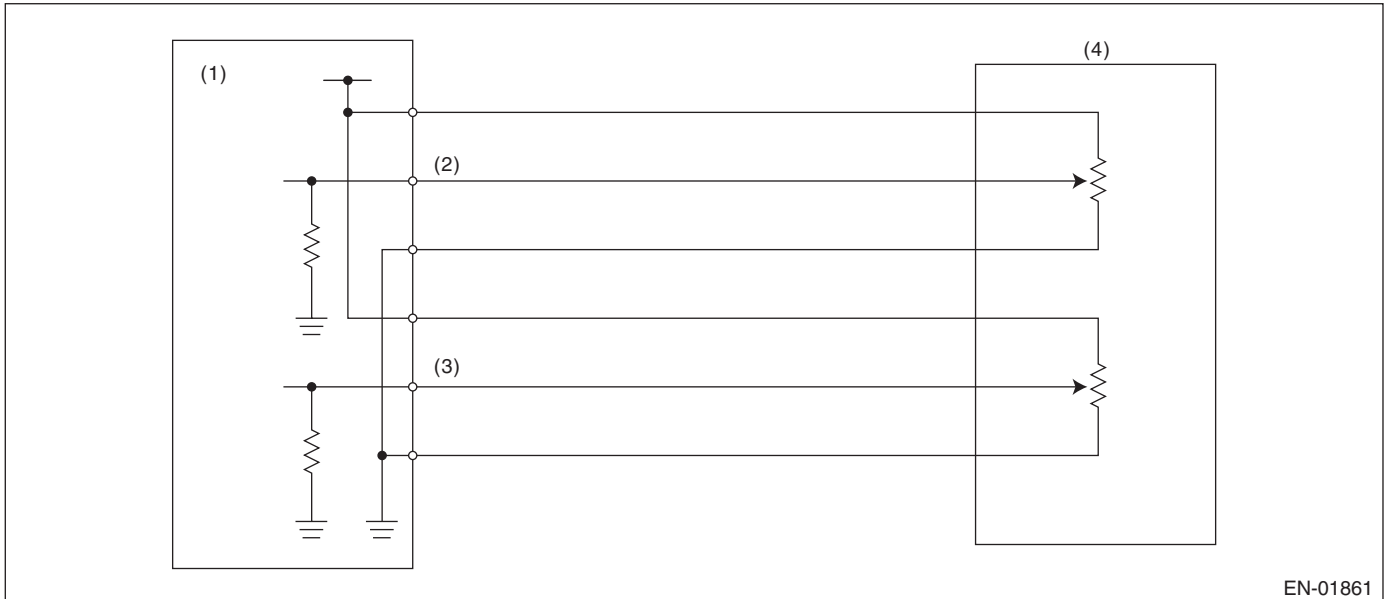
GENERAL DESCRIPTION

## FT:DTC P2128 THROTTLE/PEDAL POSITION SENSOR/SWITCH “E” CIRCUIT HIGH INPUT

### 1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit of accelerator pedal position sensor 2.  
Judge as NG if out of specification.

### 2. COMPONENT DESCRIPTION



EN-01861

- (1) Engine control module (ECM)      (3) Accelerator pedal position sensor 2 signal      (4) Accelerator pedal position sensor 3 signal  
(2) Accelerator pedal position sensor 1 signal

### 3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
Ignition switch	ON
Battery voltage	$\geq 6 \text{ V}$

### 4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

# Diagnostic Trouble Code (DTC) Detecting Criteria

## GENERAL DESCRIPTION

---

### 5. DIAGNOSTIC METHOD

#### • Abnormality Judgment

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

#### Judgment Value

Malfunction Criteria	Threshold Value
Sensor 2 input voltage	$\geq 4.783$ V

**Time Needed for Diagnosis:** 100 ms

**Malfunction Indicator Light Illumination:** Illuminates as soon as a malfunction occurs.

#### • Normality Judgment

Judge as OK and clear the NG if the continuous time while the following conditions are established is more than the predetermined time.

#### Judgment Value

Malfunction Criteria	Threshold Value
Sensor 2 input voltage	$< 4.783$ V

**Time Needed for Diagnosis:** 100 ms



# Diagnostic Trouble Code (DTC) Detecting Criteria

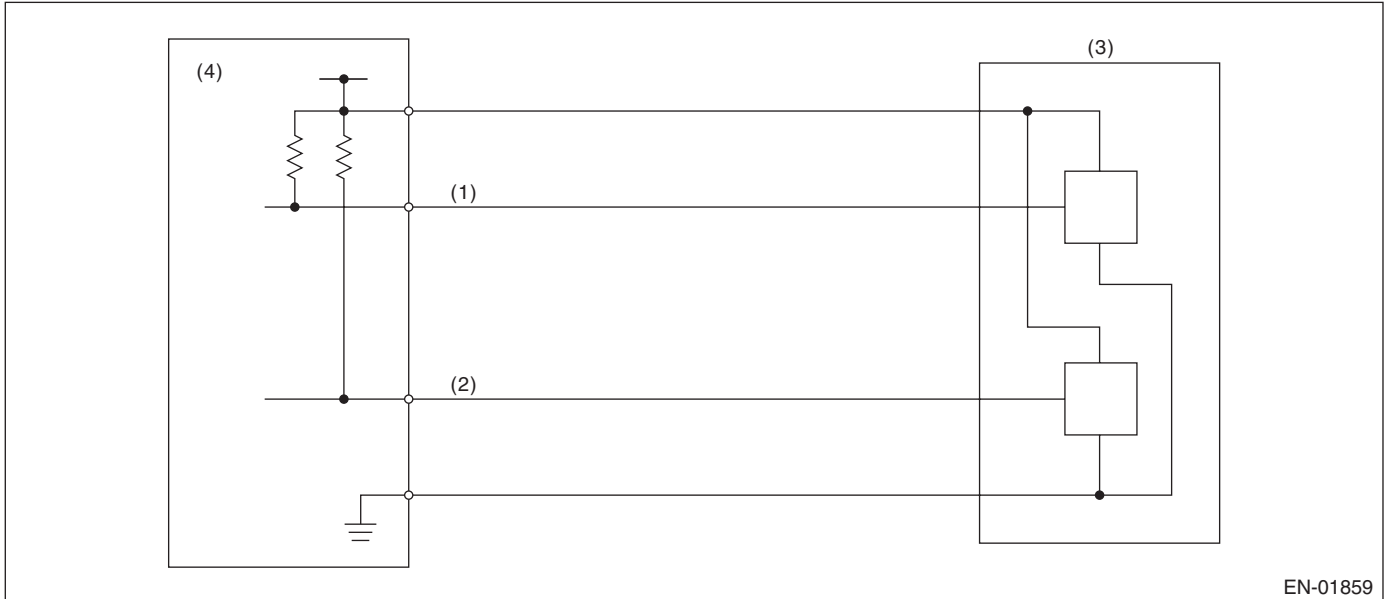
GENERAL DESCRIPTION

## FU:DTC P2135 THROTTLE/PEDAL POSITION SENSOR/SWITCH “A”/“B” VOLTAGE CORRELATION

### 1. OUTLINE OF DIAGNOSIS

Judge as NG when the signal level of throttle position sensor 1 is different from the throttle position sensor 2.

### 2. COMPONENT DESCRIPTION



(1) Throttle position sensor 1 signal  
(2) Throttle position sensor 2 signal

(3) Throttle position sensor

(4) Engine control module (ECM)

### 3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
Ignition switch	ON
Battery voltage	$\geq 6\text{ V}$

### 4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

# Diagnostic Trouble Code (DTC) Detecting Criteria

## GENERAL DESCRIPTION

### 5. DIAGNOSTIC METHOD

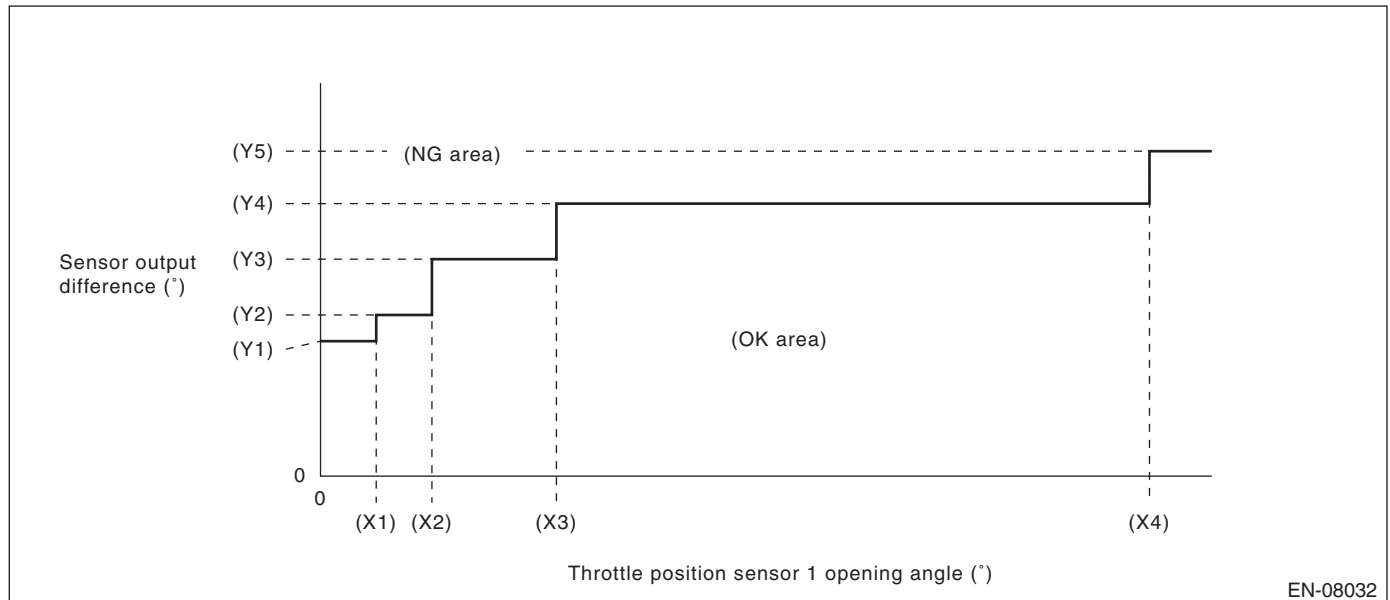
#### • Abnormality Judgment

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

#### Judgment Value

Malfunction Criteria	Threshold Value
Signal difference between two sensors	Within NG range of <b>Details of Judgment value</b>

#### Details of Judgment Value



(X1) 2.125 °  
(X4) 31.625 °

(X2) 4.25 °

(X3) 9 °

(Y1) 5.15 °  
(Y4) 10.4 °

(Y2) 6.15 °  
(Y5) 12.4 °

(Y3) 8.28 °

**Time Needed for Diagnosis:** 212 ms

**Malfunction Indicator Light Illumination:** Illuminates as soon as a malfunction occurs.

#### • Normality Judgment

Judge as OK and clear the NG if the continuous time while the following conditions are established is more than the predetermined time.

#### Judgment Value

Malfunction Criteria	Threshold Value
Signal difference between two sensors	Within OK range of <b>Details of Judgment value</b>

**Time Needed for Diagnosis:** 24 ms

# Diagnostic Trouble Code (DTC) Detecting Criteria

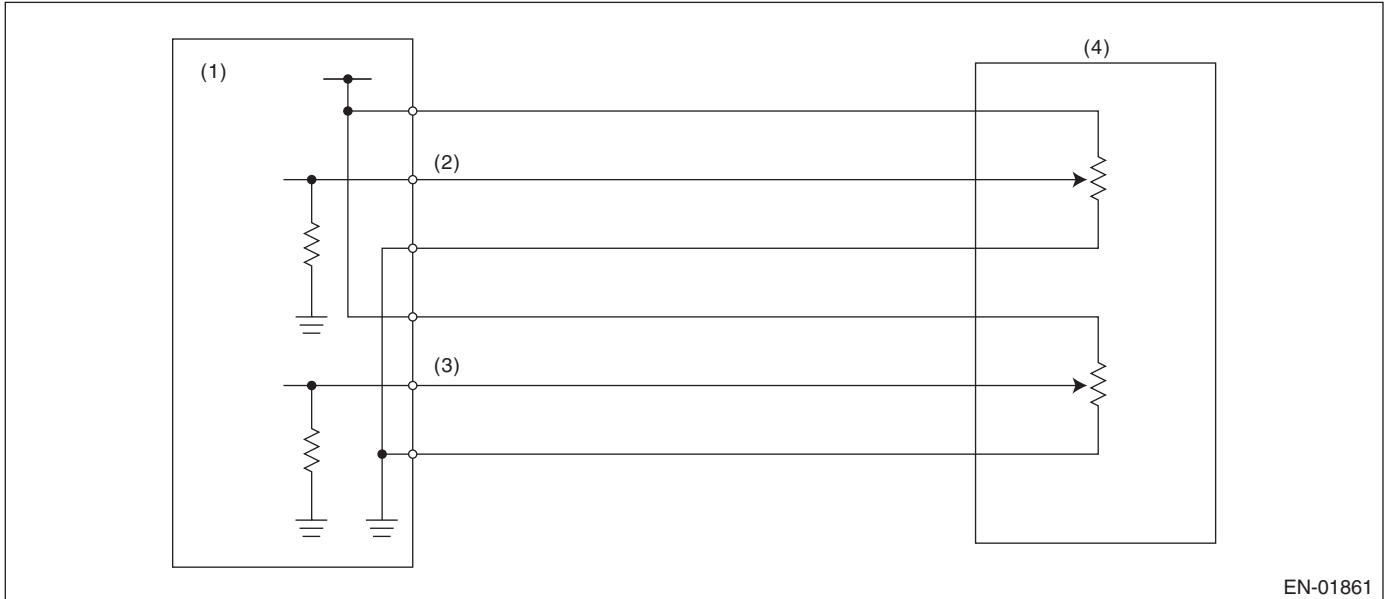
GENERAL DESCRIPTION

## FV:DTC P2138 THROTTLE/PEDAL POSITION SENSOR/SWITCH “D”/“E” VOLTAGE CORRELATION

### 1. OUTLINE OF DIAGNOSIS

Judge as NG when the signal level of throttle position sensor 1 is different from the throttle position sensor 2.

### 2. COMPONENT DESCRIPTION



- (1) Engine control module (ECM)      (3) Accelerator pedal position sensor 2 signal      (4) Accelerator pedal position sensor
- (2) Accelerator pedal position sensor 1 signal

### 3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
Ignition switch	ON
Battery voltage	$\geq 6 \text{ V}$

### 4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

# Diagnostic Trouble Code (DTC) Detecting Criteria

## GENERAL DESCRIPTION

### 5. DIAGNOSTIC METHOD

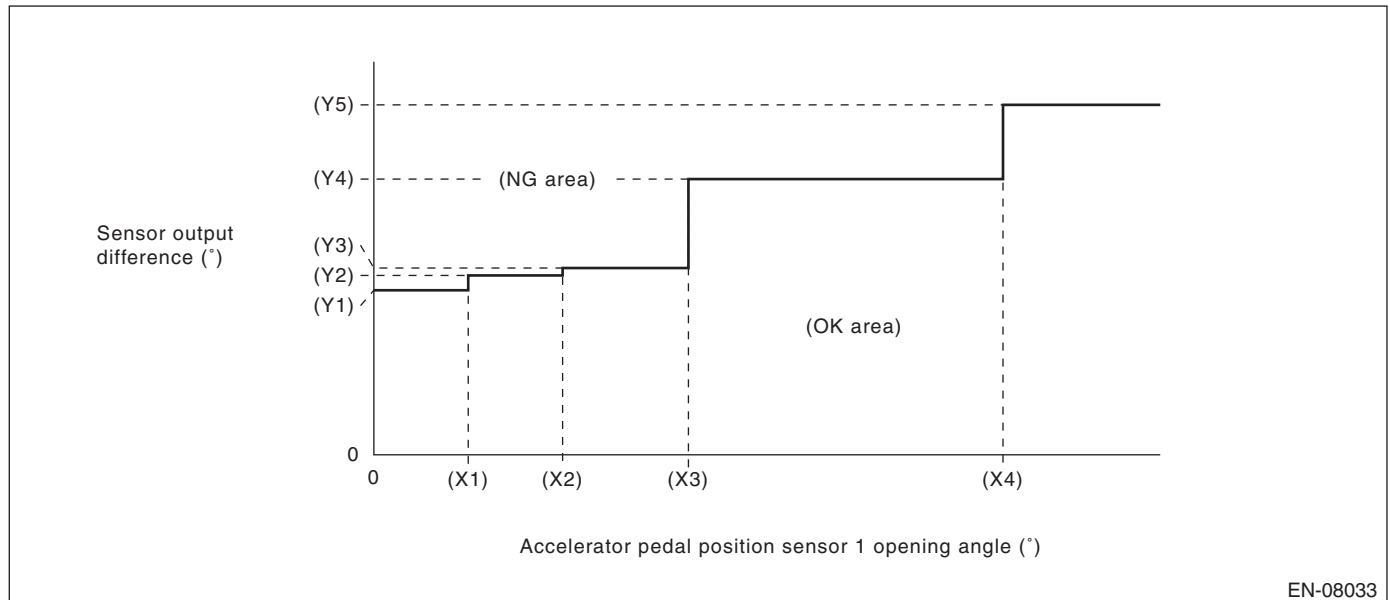
#### • Abnormality Judgment

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

#### Judgment Value

Malfunction Criteria	Threshold Value
Signal difference between two sensors	Within NG range of <b>Details of Judgment value</b>

#### Details of Judgment Value



(X1) 0.6 °  
(X4) 4 °

(X2) 1.2 °

(X3) 2 °

(Y1) 1.465 °  
(Y4) 2.455 °

(Y2) 1.597 °  
(Y5) 3.116 °

(Y3) 1.663 °

**Time Needed for Diagnosis:** 116 ms

**Malfunction Indicator Light Illumination:** Illuminates as soon as a malfunction occurs.

#### • Normality Judgment

Judge as OK and clear the NG if the continuous time while the following conditions are established is more than the predetermined time.

#### Judgment Value

Malfunction Criteria	Threshold Value
Signal difference between two sensors	Within OK range of <b>Details of Judgment value</b>

**Time Needed for Diagnosis:** 116 ms

# Diagnostic Trouble Code (DTC) Detecting Criteria

GENERAL DESCRIPTION

## FW:DTC P219A BANK 1 AIR-FUEL RATIO IMBALANCE

### 1. OUTLINE OF DIAGNOSIS

Detect malfunction of air fuel ratio deviation between cylinders from main feedback learning value, sub feedback learning value and engine speed variation.

### 2. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Battery voltage	> 10.9 V
Atmospheric pressure	> 75 kPa (563 mmHg, 22.2 inHg)
A/F main learning system	In operation
Engine speed	> 500 rpm
Engine coolant temperature	> 75 °C (167 °F)
Intake air temperature	< 70 °C (158 °F)
Engine load	> Value of Map 1
Engine load change	< 0.02 g/rev (0 oz/rev)
Evaporative system leak check	Not in operation
Cumulative time of canister purge after engine start	≥ 20.48 s
Learning value of EVAP conc.	< 0.07
Vehicle dynamic control or AT torque control	Not in operation
Intake manifold pressure change at 120°C	< Value of Map 2
Throttle position change during 16 milliseconds	< 20 °
Fuel shut-off function	Not in operation

#### Map 1

Engine speed (rpm)	Idling	700	1000	1500	2000	2500	3000	3500	4000	4500	5000
Measured value (g (oz)/rev)	na	0.357 (0.01)	0.25 (0.01)	0.25 (0.01)	0.317 (0.01)	0.326 (0.01)	0.337 (0.01)	0.397 (0.01)	0.439 (0.02)	0.454 (0.02)	0.454 (0.02)

#### Map 2

rpm	700	1000	1500	2000	2500	3000	3500	4000
kPa (mmHg, inHg)	20 (150, 5.9)	20 (150, 5.9)	20 (150, 5.9)	20 (150, 5.9)	20 (150, 5.9)	20 (150, 5.9)	20 (150, 5.9)	20 (150, 5.9)

rpm	4500	5000	5500	6000	6500	7000
kPa (mmHg, inHg)	20 (150, 5.9)	20 (150, 5.9)	20 (150, 5.9)	20 (150, 5.9)	20 (150, 5.9)	20 (150, 5.9)

### 3. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

# Diagnostic Trouble Code (DTC) Detecting Criteria

## GENERAL DESCRIPTION

### 4. DIAGNOSTIC METHOD

#### • Abnormality Judgment

Judge as NG when the following conditions are established.

#### Judgment Value

Malfunction Criteria	Threshold Value
<b>Rich</b>	
Main feedback learning value	< -0.01
Sub feedback learning value	< -0.03
When any one of the followings is established.	
• any one of the rich side misfire counters for each cylinder when in idling	> 20 time(s)
• total of the rich side misfire counters for each cylinder when in idling	> 255 time(s)
• any one of the rich side misfire counters for each cylinder when not in idling	> 20 time(s)
• total of the rich side misfire counters for each cylinder when not in idling	> 255 time(s)
<b>Lean</b>	
Main feedback learning value	> 0.01
Sub feedback learning value	< -0.012
When any one of the followings is established.	
• any one of the lean side misfire counters for each cylinder when in idling	> 20 time(s)
• total of the lean side misfire counters for each cylinder when in idling	> 255 time(s)
• any one of the lean side misfire counters for each cylinder when not in idling	> 20 time(s)
• total of the lean side misfire counters for each cylinder when not in idling	> 255 time(s)

**Time Needed for Diagnosis:** 1000 engine revs.

**Malfunction Indicator Light Illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

#### • Normality Judgment

Judge as OK and clear the NG if the following conditions are established.

#### Judgment Value

Malfunction Criteria	Threshold Value
<b>Rich</b>	
Main feedback learning value	$\geq -0.01$
or	
Sub feedback learning value	$\geq -0.03$
or	
All of the following conditions are established.	
• any one of the rich side misfire counters for each cylinder when in idling	$\leq 20$ time(s)
• total of the rich side misfire counters for each cylinder when in idling	$\leq 255$ time(s)
• any one of the rich side misfire counters for each cylinder when not in idling	$\leq 20$ time(s)
• total of the rich side misfire counters for each cylinder when not in idling	$\leq 255$ time(s)
<b>Lean</b>	
Main feedback learning value	$\leq 0.01$
or	
Sub feedback learning value	$\geq -0.012$
or	
All of the following conditions are established.	
• any one of the lean side misfire counters for each cylinder when in idling	$\leq 20$ time(s)
• total of the lean side misfire counters for each cylinder when in idling	$\leq 255$ time(s)
• any one of the lean side misfire counters for each cylinder when not in idling	$\leq 20$ time(s)
• total of the lean side misfire counters for each cylinder when not in idling	$\leq 255$ time(s)

**Time Needed for Diagnosis:** 1000 engine revs.

# Diagnostic Trouble Code (DTC) Detecting Criteria

GENERAL DESCRIPTION

---

## **FX:DTC P219B BANK 2 AIR-FUEL RATIO IMBALANCE**

### **1. OUTLINE OF DIAGNOSIS**

#### **NOTE:**

For the detection standard, refer to DTC P219A. <Ref. to GD(H6DO)-247, DTC P219A BANK 1 AIR-FUEL RATIO IMBALANCE, Diagnostic Trouble Code (DTC) Detecting Criteria.>

# Diagnostic Trouble Code (DTC) Detecting Criteria

## GENERAL DESCRIPTION

### FY:DTC P2227 BAROMETRIC PRESSURE CIRCUIT RANGE/PERFORMANCE

#### 1. OUTLINE OF DIAGNOSIS

Detect the malfunction of barometric pressure sensor output property.

Judge as NG when the barometric pressure sensor output is largely different from the intake manifold pressure at engine start.

#### 2. COMPONENT DESCRIPTION

The barometric pressure sensor is built into the ECM.

#### 3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
Engine speed	< 300 rpm
Vehicle speed	< 1 km/h (0.6 MPH)

#### 4. GENERAL DRIVING CYCLE

Perform the diagnosis once at ignition switch ON.

#### 5. DIAGNOSTIC METHOD

##### • Abnormality Judgment

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

##### Judgment Value

Malfunction Criteria	Threshold Value
Barometric pressure – Intake manifold pressure	≥ 26.7 kPa (200 mmHg, 7.9 inHg)
Intake manifold pressure at engine start – Intake manifold pressure	< 1.3 kPa (9.99 mmHg, 0.4 inHg)

**Time Needed for Diagnosis:** 328 ms

**Malfunction Indicator Light Illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

##### • Normality Judgment

Judge as OK and clear the NG if the continuous time while the following conditions are established is more than the predetermined time.

##### Judgment Value

Malfunction Criteria	Threshold Value
Barometric pressure – Intake manifold pressure	< 26.7 kPa (200 mmHg, 7.9 inHg)

**Time Needed for Diagnosis:** 262 ms



# Diagnostic Trouble Code (DTC) Detecting Criteria

GENERAL DESCRIPTION

## FZ: DTC P2228 BAROMETRIC PRESSURE CIRCUIT LOW

### 1. OUTLINE OF DIAGNOSIS

Detect the open/short circuit of the barometric pressure sensor.  
Judge as NG if out of specification.

### 2. COMPONENT DESCRIPTION

The barometric pressure sensor is built into the ECM.

### 3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
None	

### 4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

### 5. DIAGNOSTIC METHOD

#### • Abnormality Judgment

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

#### Judgment Value

Malfunction Criteria	Threshold Value
Output voltage	< 2.146 V

**Time Needed for Diagnosis:** 500 ms

**Malfunction Indicator Light Illumination:** Illuminates as soon as a malfunction occurs.

#### • Normality Judgment

Judge as OK and clear the NG if the continuous time while the following conditions are established is more than the predetermined time.

#### Judgment Value

Malfunction Criteria	Threshold Value
Output voltage	$\geq 2.146$ V

**Time Needed for Diagnosis:** Less than 1 second

# Diagnostic Trouble Code (DTC) Detecting Criteria

## GENERAL DESCRIPTION

---

### GA:DTC P2229 BAROMETRIC PRESSURE CIRCUIT HIGH

#### 1. OUTLINE OF DIAGNOSIS

Detect the open/short circuit of the barometric pressure sensor.  
Judge as NG if out of specification.

#### 2. COMPONENT DESCRIPTION

The barometric pressure sensor is built into the ECM.

#### 3. ENABLE CONDITION

Secondary Parameters	Enable Conditions
None	

#### 4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

#### 5. DIAGNOSTIC METHOD

##### • Abnormality Judgment

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

##### Judgment Value

Malfunction Criteria	Threshold Value
Output voltage	$\geq 3.875$ V

**Time Needed for Diagnosis:** 500 ms

**Malfunction Indicator Light Illumination:** Illuminates as soon as a malfunction occurs.

##### • Normality Judgment

Judge as OK and clear the NG if the continuous time while the following conditions are established is more than the predetermined time.

##### Judgment Value

Malfunction Criteria	Threshold Value
Output voltage	$< 3.875$ V

**Time Needed for Diagnosis:** Less than 1 second

# Diagnostic Trouble Code (DTC) Detecting Criteria

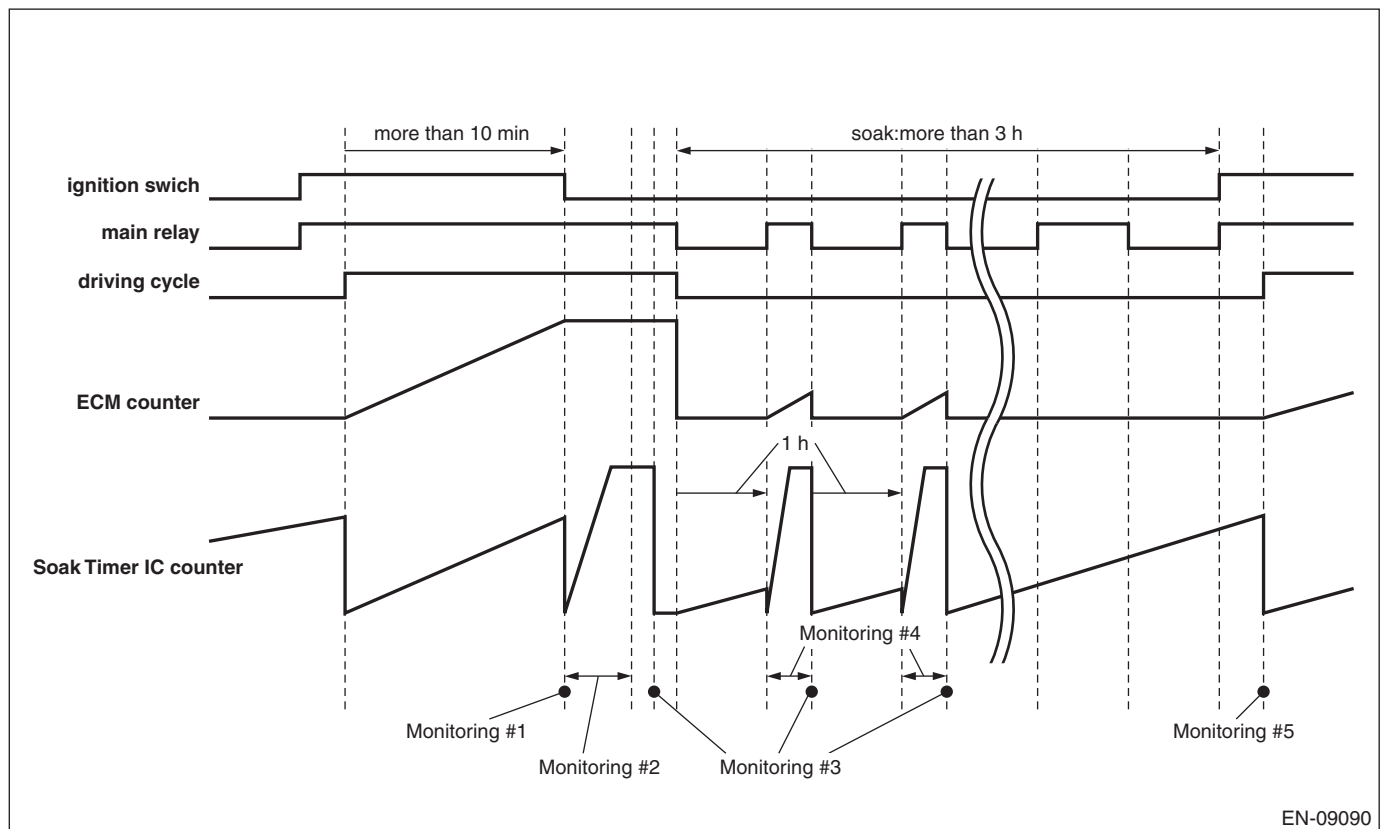
GENERAL DESCRIPTION

## GB:DTC P2610 ECM/PCM INTERNAL ENGINE OFF TIMER PERFORMANCE

### 1. OUTLINE OF DIAGNOSIS

Detect malfunction of soaking timer IC by the five diagnoses below.

Monitor Number	Explanation	Time required for diagnosis
Monitor #1 <Timer diagnosis>	Perform diagnosis of the soaking timer IC accuracy	196 ms
Monitor #2 <Full count diagnosis>	Perform diagnosis of the soaking timer IC counter function	4000 ms
Monitor #3 <Soaking timer IC setting diagnosis>	Perform diagnosis of communication between ECM and soaking timer IC	196 ms
Monitor #4 <Timer diagnosis (during soaking)>	Perform diagnosis of the soaking timer IC accuracy during soaking	3000 ms
Monitor #5 <Wake-up diagnosis>	Perform diagnosis of wake-up function	64 ms



EN-09090

### 2. COMPONENT DESCRIPTION

The soaking timer IC is built into the ECM.

# Diagnostic Trouble Code (DTC) Detecting Criteria

## GENERAL DESCRIPTION

### 3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
<Timer diagnosis>	
Battery voltage	$\geq 10.9 \text{ V}$
Ignition switch	OFF
Elapsed time after starting the engine	$> 600 \text{ s}$
< Full count diagnosis & soaking timer IC setting diagnosis>	
Battery voltage	$\geq 10.9 \text{ V}$
Ignition switch	OFF
<Timer diagnosis (during soaking)>	
Battery voltage	$\geq 10.9 \text{ V}$
Ignition switch	OFF
Number of wake-up	$< 2 \text{ time(s)}$
<Wake-up diagnosis>	
Ignition switch	ON
Wake-up activation time setting	Completed
Time in the soaking timer IC	$> 3600 \text{ s} \times 2 \text{ time(s)}$

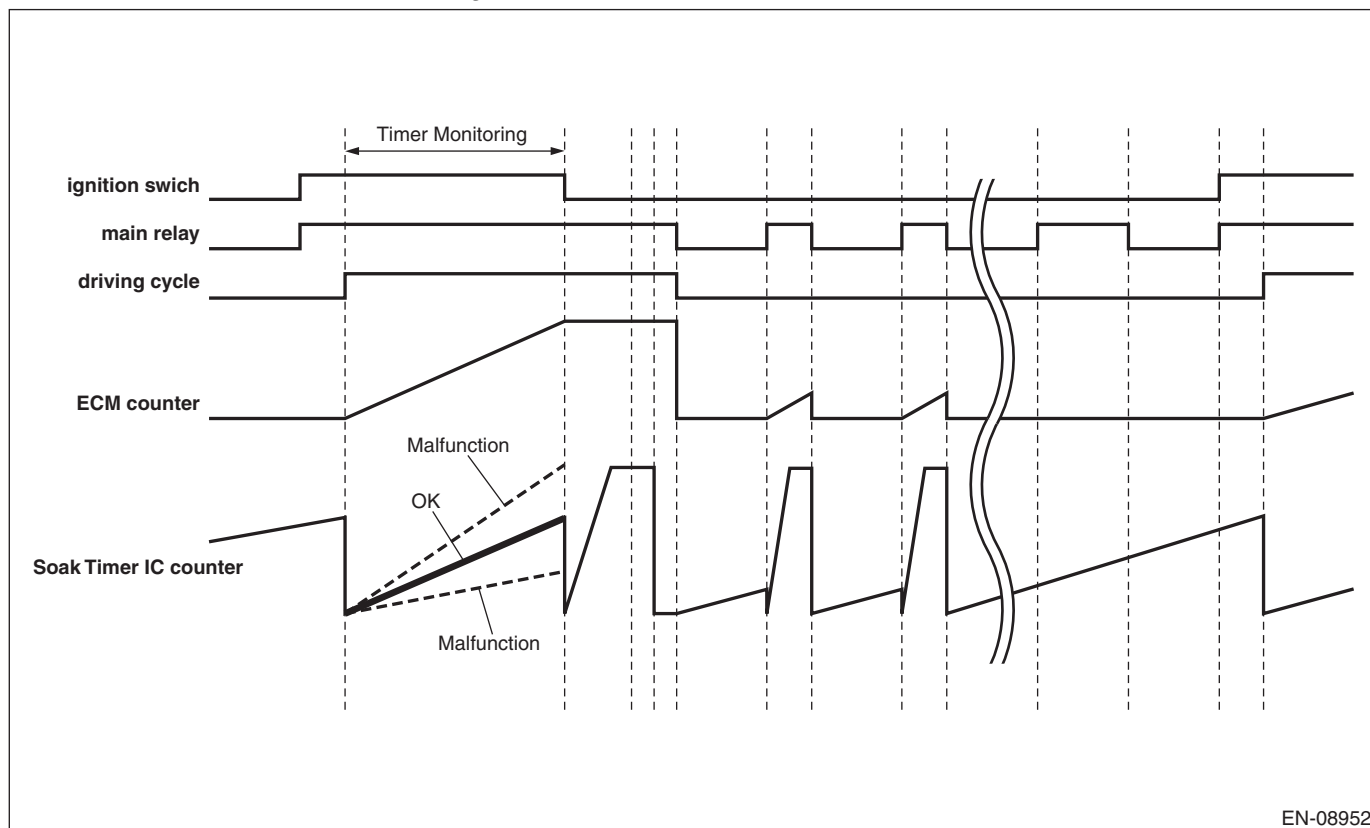
### 4. GENERAL DRIVING CYCLE

Perform the diagnosis only once when 10 minutes have passed after the engine start and the ignition switch is OFF, and also when the ignition switch is ON after the soaking of five hours or more.

### 5. DIAGNOSTIC METHOD

#### <Timer diagnosis>

Start the count up operation of counters in ECM and in soaking timer IC when the engine is started. Judge as timer malfunction if the difference between the counter in ECM and counter in soaking timer IC exceeds the allowable limit when the ignition switch is OFF.



EN-08952

# Diagnostic Trouble Code (DTC) Detecting Criteria

GENERAL DESCRIPTION

## • Abnormality Judgment

Judge as NG when the following conditions are established.

### Judgment Value

Malfunction Criteria	Threshold Value
$ \text{osoaktimcpu} - \text{osoaktimic}  / \text{osoaktimcpu}$	$> 0.24$
osoaktimcpu = Counter in ECM osoaktimic = Counter in soaking timer IC	

## • Normality Judgment

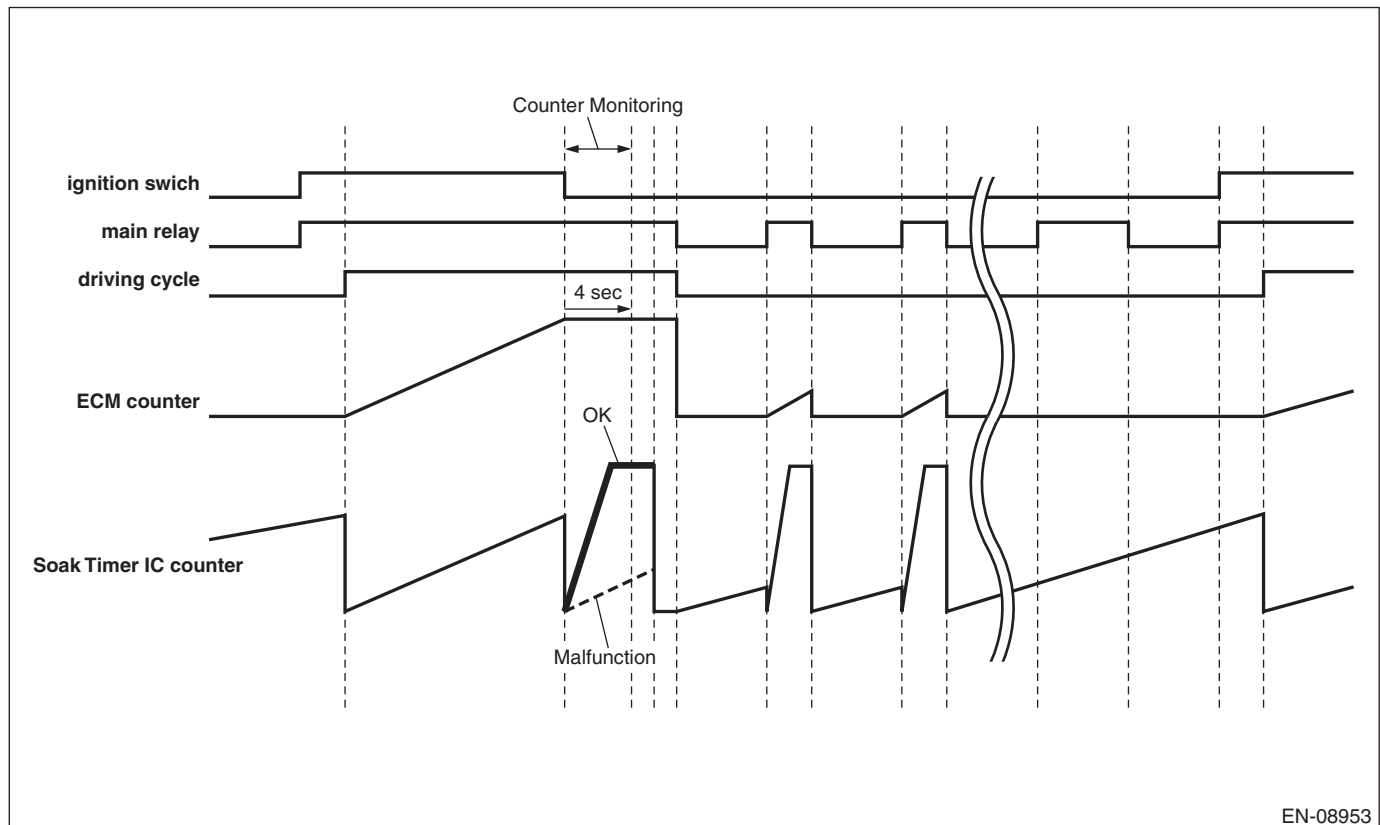
Judge as OK when the following conditions are established.

### Judgment Value

Malfunction Criteria	Threshold Value
$ \text{osoaktimcpu} - \text{osoaktimic}  / \text{osoaktimcpu}$	$\leq 0.24$

## <Full count diagnosis>

After the timer diagnosis is completed, reset the counter in soaking timer IC and start the count up operation. Judge as full count diagnosis malfunction if counter in soaking timer IC is not \$3FF (1023 count) after 4 seconds.



EN-08953

# Diagnostic Trouble Code (DTC) Detecting Criteria

## GENERAL DESCRIPTION

- **Abnormality Judgment**

Judge as NG when the following conditions are established.

### Judgment Value

Malfunction Criteria	Threshold Value
osoakfctnc	≠ \$3FF (1023 count)
osoakfctnc = Counter in soaking timer IC	

- **Normality Judgment**

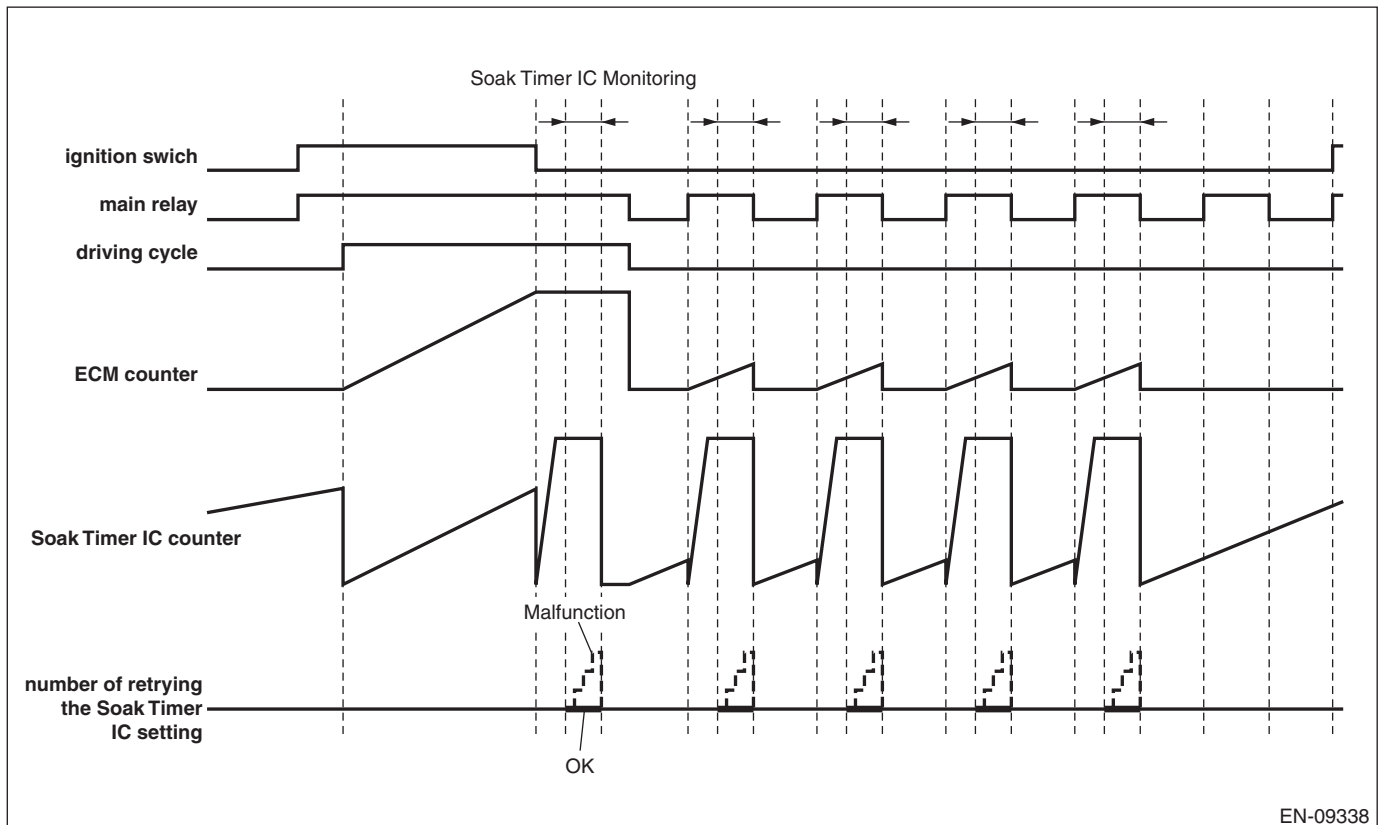
Judge as OK when the following conditions are established.

### Judgment Value

Malfunction Criteria	Threshold Value
osoakfctnc	= \$3FF (1023 count)

## <Soaking timer IC setting diagnosis>

When setting the activation setting time to soaking timer IC, compare the writing value to soaking timer IC with read out value. Judge as malfunction if the values do not match 3 times in a row.



EN-09338

- **Abnormality Judgment**

Judge as NG when the following conditions are established.

### Judgment Value

Malfunction Criteria	Threshold Value
Writing value and read out value when setting the soaking timer	Unmatch
Number of retrying the soaking timer setting	≥ 3 times

- **Normality Judgment**

Judge as OK when the following conditions are established.

### Judgment Value

Malfunction Criteria	Threshold Value
Writing value and read out value when setting the soaking timer	Match

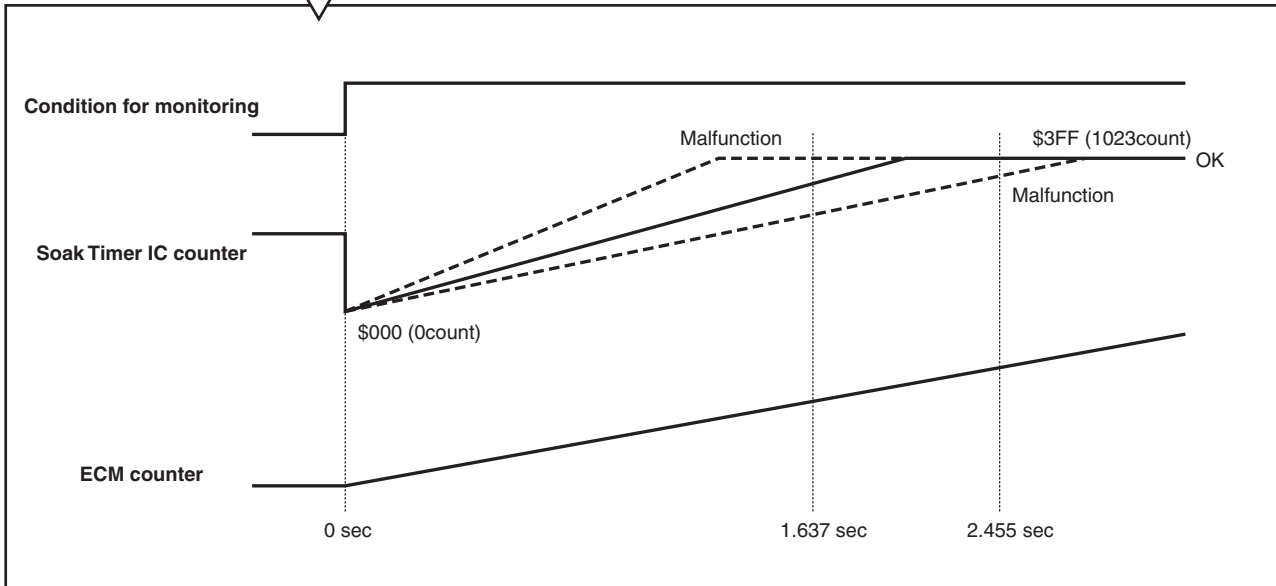
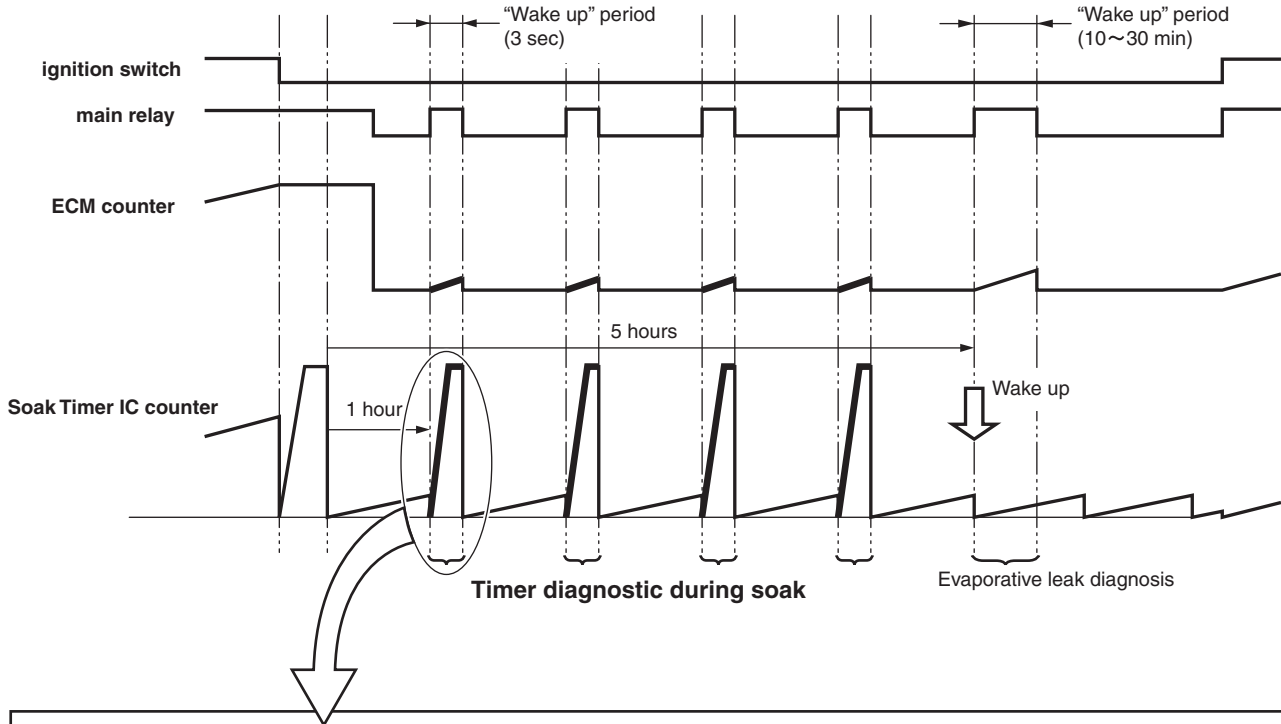
# Diagnostic Trouble Code (DTC) Detecting Criteria

GENERAL DESCRIPTION

## <Timer diagnosis (during soaking)>

Wake-up at the predetermined interval until five hours have passed after the ignition switch is OFF, and compare the counter in soaking timer IC with the counter in ECM.

Judge as malfunction if the counter in soaking timer IC is counted up to maximum value (1023 count) when the counter in ECM is 1637 ms, or if the counter in soaking timer IC is not counted up to maximum value (1023 count) when the counter in ECM is 2455 ms.



EN-08981

# Diagnostic Trouble Code (DTC) Detecting Criteria

## GENERAL DESCRIPTION

---

### • Abnormality Judgment

Judge as NG when the following conditions are established.

#### Judgment Value

Malfunction Criteria	Threshold Value
When any one of the followings is established.	
• All of the following conditions are established. Counter in ECM Counter in soaking timer IC	$\leq 1637$ ms $= \$3FF$ (1023 count)
• All of the following conditions are established. Counter in ECM Counter in soaking timer IC	$\geq 2455$ ms $\neq \$3FF$ (1023 count)

### • Normality Judgment

Judge as OK when the following conditions are established.

#### Judgment Value

Malfunction Criteria	Threshold Value
Following conditions are established.	
• All of the following conditions are established. Counter in ECM Counter in soaking timer IC	$\leq 1637$ ms $\neq \$3FF$ (1023 count)
• All of the following conditions are established. Counter in ECM Counter in soaking timer IC	$\geq 2455$ ms $= \$3FF$ (1023 count)

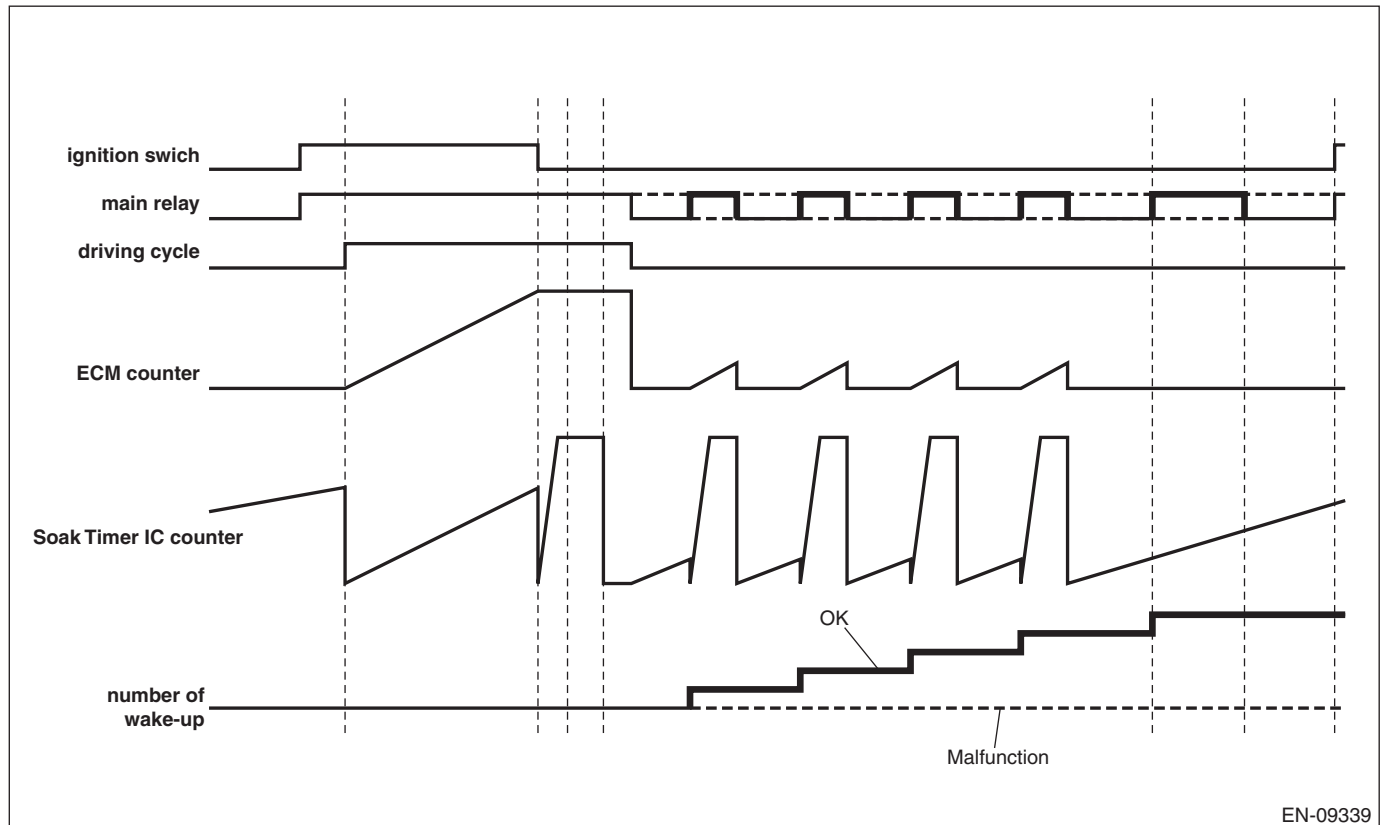


# Diagnostic Trouble Code (DTC) Detecting Criteria

GENERAL DESCRIPTION

## <Wake-up diagnosis>

Store the number of wake-up activation when the ECM wakes up by the soaking timer IC. Next time when the ignition switch is ON, if the number of wake-up activation does not reach the predetermined value even though the counter in soaking timer IC exceeds the activation setting time, judge as wake-up malfunction.



EN-09339

### • Abnormality Judgment

Judge as NG when the following conditions are established.

#### Judgment Value

Malfunction Criteria	Threshold Value
Number of wake-up	< 2 time(s)

### • Normality Judgment

Judge as OK when the following conditions are established.

#### Judgment Value

Malfunction Criteria	Threshold Value
Number of wake-up	$\geq 2$ time(s)

# Diagnostic Trouble Code (DTC) Detecting Criteria

## GENERAL DESCRIPTION

---

### • Abnormality Judgment

Judge as NG when the following conditions are established.

#### Judgment Value

Malfunction Criteria	Threshold Value
Ignition switch	ON
Driving cycle	Completed
When any one of the followings is established.	
• Timer diagnosis	NG
• Full count diagnosis	NG
• Soaking timer IC setting diagnosis	NG
• Timer diagnosis (during soaking)	NG
• Wake-up diagnosis	NG

**Time Needed for Diagnosis:** 18620 s (Approx. 5 hours)

**Malfunction Indicator Light Illumination:** Illuminates when malfunction occurs in 2 continuous driving cycles.

### • Normality Judgment

Judge as OK and clear the NG if the following conditions are established.

#### Judgment Value

Malfunction Criteria	Threshold Value
Ignition switch	ON
Driving cycle	Completed
All of the following conditions are established.	
• Timer diagnosis	OK
• Full count diagnosis	OK
• Soaking timer IC setting diagnosis	OK
• Timer diagnosis (during soaking)	OK
• Wake-up diagnosis	OK

**Time Needed for Diagnosis:** 18620 s (Approx. 5 hours)

# Diagnostic Trouble Code (DTC) Detecting Criteria

GENERAL DESCRIPTION

## GC:DTC U0073 CAN FAILURE, BUS 'OFF' DETECTION

### 1. OUTLINE OF DIAGNOSIS

Detect malfunction of CAN communication.

Judge as NG when CAN communication failure has occurred.

### 2. COMPONENT DESCRIPTION

*(Common Specifications)*

*CAN Protocol 2.0 B (Active)*

*Frame Format: 11 Bit ID Frame (Standard Frame)*

*Conforms to ISO11898*

*Communication Speed: 500 kbps*

### 3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
None	

### 4. GENERAL DRIVING CYCLE

Perform the diagnosis continuously after starting the engine.

### 5. DIAGNOSTIC METHOD

#### • Abnormality Judgment

Judge as NG when the following conditions are established.

#### Judgment Value

Malfunction Criteria	Threshold Value
Battery voltage	> 10.9 V
Starter switch	OFF
Engine	run
bus off flag or error warning flag	set (error)

**Time Needed for Diagnosis:** 436 ms

**Malfunction Indicator Light Illumination:** Illuminates as soon as a malfunction occurs.

#### • Normality Judgment

Judge as OK and clear the NG if the continuous time while the following conditions are established is more than the predetermined time.

#### Judgment Value

Malfunction Criteria	Threshold Value
Engine	run
bus off flag or error warning flag	clear (No error)

**Time Needed for Diagnosis:** 1000 ms

# Diagnostic Trouble Code (DTC) Detecting Criteria

## GENERAL DESCRIPTION

---

### GD:DTC U0101 CAN (TCU) DATA NOT LOADED

#### 1. OUTLINE OF DIAGNOSIS

Detect malfunction of CAN communication.

Judge as NG when CAN communication failure has occurred between TCM, VDC CM and body integrated unit.

#### 2. COMPONENT DESCRIPTION

*(Common Specifications)*

*CAN Protocol 2.0 B (Active)*

*Frame Format: 11 Bit ID Frame (Standard Frame)*

*Conforms to ISO11898*

*Communication Speed: 500 kbps*

#### 3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
None	

#### 4. GENERAL DRIVING CYCLE

Perform the diagnosis continuously after starting the engine.

#### 5. DIAGNOSTIC METHOD

##### • Abnormality Judgment

Judge as NG when the following conditions are established.

##### Judgment Value

Malfunction Criteria	Threshold Value
Battery voltage	> 10.9 V
Starter switch	OFF
Engine	run
ID received from control module connected to CAN	None during 500 milliseconds

**Time Needed for Diagnosis:** 500 ms

**Malfunction Indicator Light Illumination:** Illuminates as soon as a malfunction occurs.

##### • Normality Judgment

Judge as OK and clear the NG if the continuous time while the following conditions are established is more than the predetermined time.

##### Judgment Value

Malfunction Criteria	Threshold Value
Engine	run
ID received from control module connected to CAN	Yes

**Time Needed for Diagnosis:** 1000 ms

# Diagnostic Trouble Code (DTC) Detecting Criteria

GENERAL DESCRIPTION

---

## **GE:DTC U0122 CAN (VDC) DATA NOT LOADED**

### **1. OUTLINE OF DIAGNOSIS**

NOTE:

For the detection standard, refer to DTC U0101. <Ref. to GD(H6DO)-262, DTC U0101 CAN (TCU) DATA NOT LOADED, Diagnostic Trouble Code (DTC) Detecting Criteria.>

## **GF:DTC U0140 CAN (BCU) DATA NOT LOADED**

### **1. OUTLINE OF DIAGNOSIS**

NOTE:

For the detection standard, refer to DTC U0101. <Ref. to GD(H6DO)-262, DTC U0101 CAN (TCU) DATA NOT LOADED, Diagnostic Trouble Code (DTC) Detecting Criteria.>

# Diagnostic Trouble Code (DTC) Detecting Criteria

## GENERAL DESCRIPTION

---

### GG:DTC U0402 CAN (TCU) DATA ABNORMAL

#### 1. OUTLINE OF DIAGNOSIS

Detect malfunction of CAN communication.

Judge as NG when data received from TCM, VDC CM and body integrated unit is not normal.

#### 2. COMPONENT DESCRIPTION

*(Common Specifications)*

*CAN Protocol 2.0 B (Active)*

*Frame Format: 11 Bit ID Frame (Standard Frame)*

*Conforms to ISO11898*

*Communication Speed: 500 kbps*

#### 3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
None	

#### 4. GENERAL DRIVING CYCLE

Perform the diagnosis continuously after starting the engine.

#### 5. DIAGNOSTIC METHOD

##### • Abnormality Judgment

Judge as NG when the following conditions are established.

##### Judgment Value

Malfunction Criteria	Threshold Value
Battery voltage	> 10.9 V
Starter switch	OFF
Engine	run
Data updated from control module connected to CAN	None during 2000 milliseconds

**Time Needed for Diagnosis:** 2 seconds

**Malfunction Indicator Light Illumination:** Illuminates as soon as a malfunction occurs.

##### • Normality Judgment

Judge as OK and clear the NG if the continuous time while the following conditions are established is more than the predetermined time.

##### Judgment Value

Malfunction Criteria	Threshold Value
Engine	run
Data updated from control module connected to CAN	Yes

**Time Needed for Diagnosis:** 1000 ms

# Diagnostic Trouble Code (DTC) Detecting Criteria

GENERAL DESCRIPTION

---

## **GH:DTC U0416 CAN (VDC) DATA ABNORMAL**

### **1. OUTLINE OF DIAGNOSIS**

NOTE:

For the detection standard, refer to DTC U0402. <Ref. to GD(H6DO)-264, DTC U0402 CAN (TCU) DATA ABNORMAL, Diagnostic Trouble Code (DTC) Detecting Criteria.>

## **GI: DTC U0422 CAN (BCU) DATA ABNORMAL**

### **1. OUTLINE OF DIAGNOSIS**

NOTE:

For the detection standard, refer to DTC U0402. <Ref. to GD(H6DO)-264, DTC U0402 CAN (TCU) DATA ABNORMAL, Diagnostic Trouble Code (DTC) Detecting Criteria.>

# Diagnostic Trouble Code (DTC) Detecting Criteria

GENERAL DESCRIPTION

---



**TRANSMISSION SECTION**

<b>CONTROL SYSTEMS</b>	<b>CS</b>
<b>AUTOMATIC TRANSMISSION</b>	<b>5AT</b>
<b>AUTOMATIC TRANSMISSION (DIAGNOSTICS)</b>	<b>5AT(diag)</b>

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.



# CONTROL SYSTEMS

# CS

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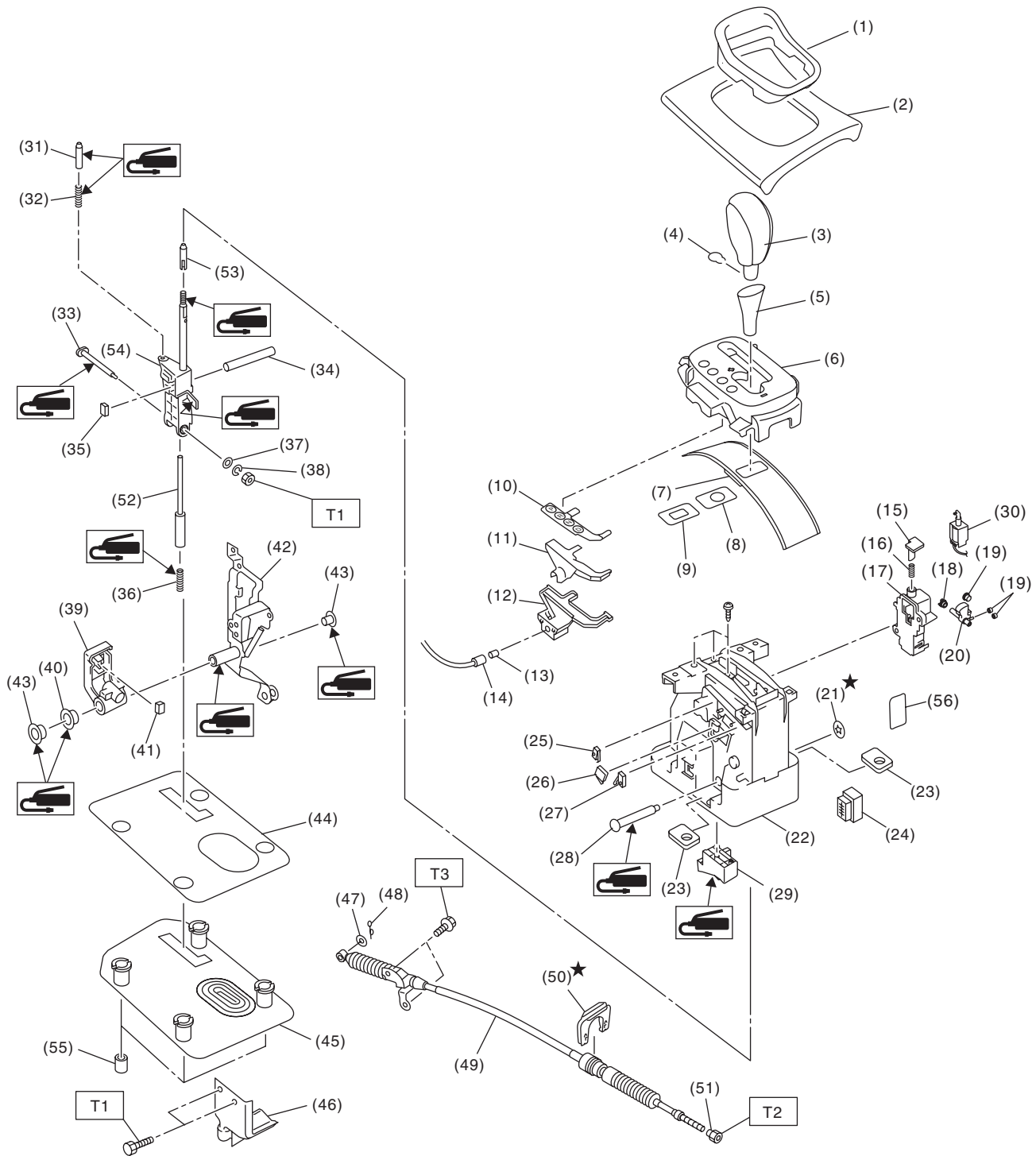
# General Description

CONTROL SYSTEMS

## 1. General Description

### A: COMPONENT

#### 1. AT SELECT LEVER



CS-00710

# General Description

CONTROL SYSTEMS

- |                         |                          |                         |
|-------------------------|--------------------------|-------------------------|
| (1) Ring indicator      | (22) Base ASSY           | (43) Bushing            |
| (2) Front cover         | (23) Spacer              | (44) Dust cover bracket |
| (3) Grip ASSY           | (24) Harness connector   | (45) Dust cover         |
| (4) Grip pin            | (25) Shift-up switch     | (46) Cable bracket      |
| (5) Grip cover          | (26) "P" range switch    | (47) Washer             |
| (6) Indicator ASSY      | (27) Shift-down switch   | (48) Cotter pin         |
| (7) Shift blind         | (28) Shaft               | (49) Select cable       |
| (8) Blind A             | (29) Detent check block  | (50) Clamp              |
| (9) Blind B             | (30) Shift lock solenoid | (51) Adjusting nut A    |
| (10) Position plate     | (31) Check sheet pole    | (52) Button rod         |
| (11) Plate light guide  | (32) Spring              | (53) Pusher             |
| (12) Valve case         | (33) Select shaft        | (54) Selector arm ASSY  |
| (13) Indicator bulb     | (34) Shift position pin  | (55) Spacer             |
| (14) Valve harness      | (35) Shift button switch | (56) Seat               |
| (15) Release rod        | (36) Spring              |                         |
| (16) Spring             | (37) Washer              |                         |
| (17) Lock lever bracket | (38) Spring washer       |                         |
| (18) Lock lever bushing | (39) Tube cross plate    |                         |
| (19) Bushing            | (40) Bushing             |                         |
| (20) Lock lever         | (41) Mode change switch  |                         |
| (21) Clamp              | (42) Arm ASSY            |                         |

---

**Tightening torque:N·m (kgf-m, ft-lb)**

**T1: 5.1 (0.5, 3.8)**

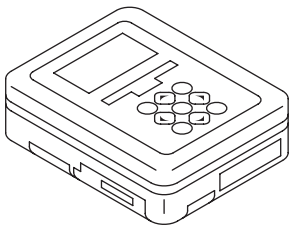
**T2: 7.5 (0.8, 5.5)**

**T3: 18 (1.8, 13.3)**

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## B: PREPARATION TOOL

### 1. SPECIAL TOOL

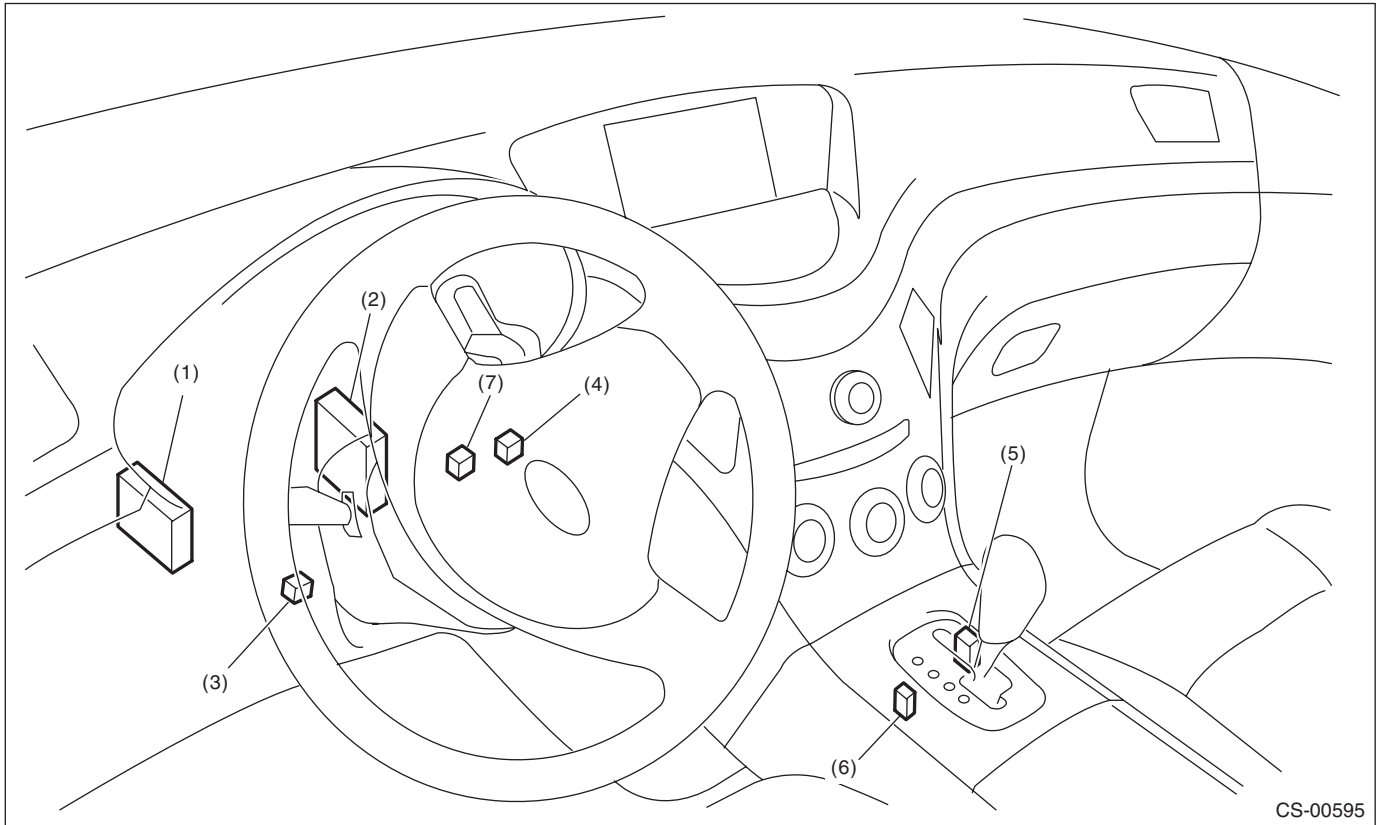
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>ST1B022XU0</p>	1B022XU0	SUBARU SELECT MONITOR III KIT	Troubleshooting for the electrical system.

#### **C: CAUTION**

- Wear appropriate work clothing, including a cap, protective goggles and protective shoes when performing any work.
- 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.
- Use SUBARU genuine fluid, grease etc. or equivalent. Do not mix fluid, grease, etc. of different grades or manufacturers.
- Be sure to tighten fasteners including bolts and nuts to the specified torque.
- Place shop jacks or rigid racks at the specified points.
- Apply grease onto sliding or revolving surfaces before installation.
- Before installing the O-ring or snap ring, apply a sufficient amount of fluid to avoid damage and deformation.
- Before securing a part in a vise, place cushioning material such as wood blocks, aluminum plate or cloth between the part and the vise.
- Before disconnecting electrical connectors, be sure to disconnect the negative terminal from battery.

## 2. AT Shift Lock Control System

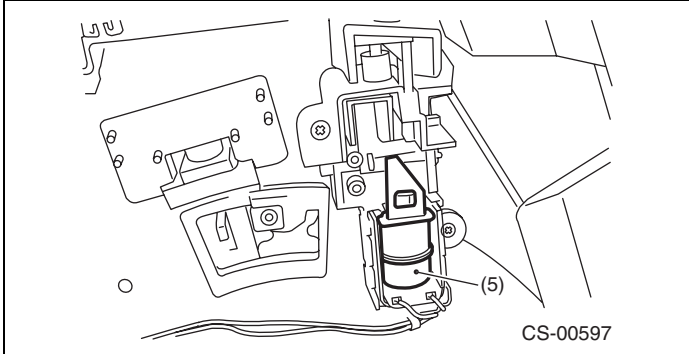
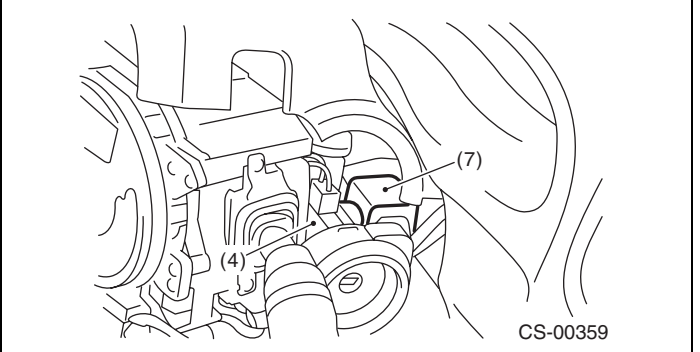
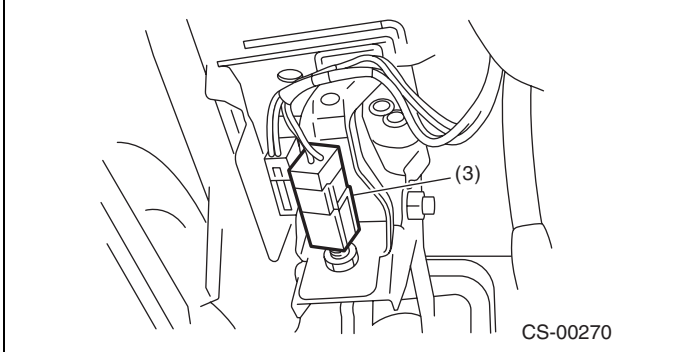
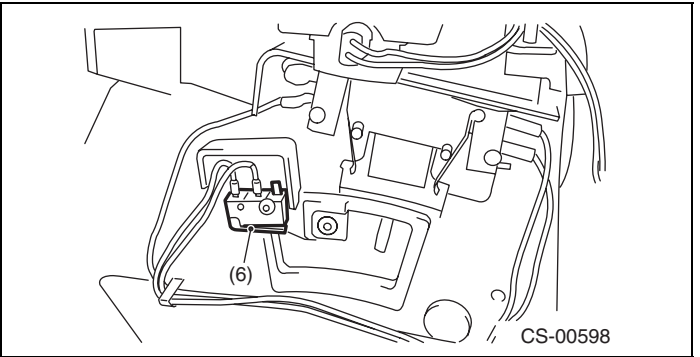
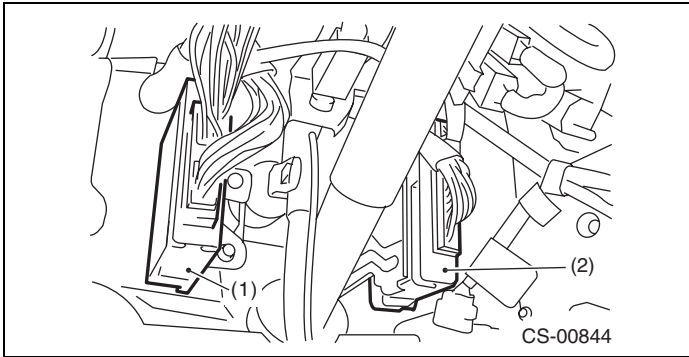
### A: LOCATION



- |                          |   |                       |
|--------------------------|---|-----------------------|
| (1) TCM ("P" range)      | (4) Key cylinder (with built-in key warning switch) | (6) "P" range switch  |
| (2) Body integrated unit | (5) Shift lock solenoid ASSY                        | (7) Key lock solenoid |
| (3) Stop light switch    |   |                       |

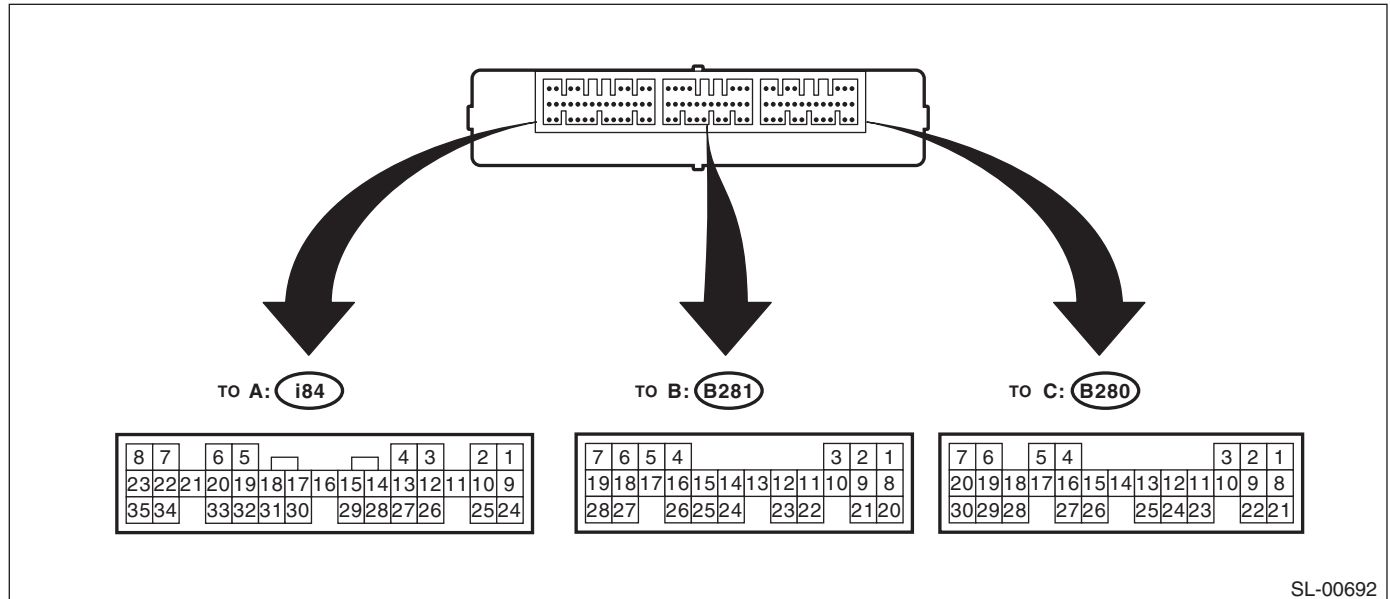
# AT Shift Lock Control System

## CONTROL SYSTEMS





## B: ELECTRICAL SPECIFICATION

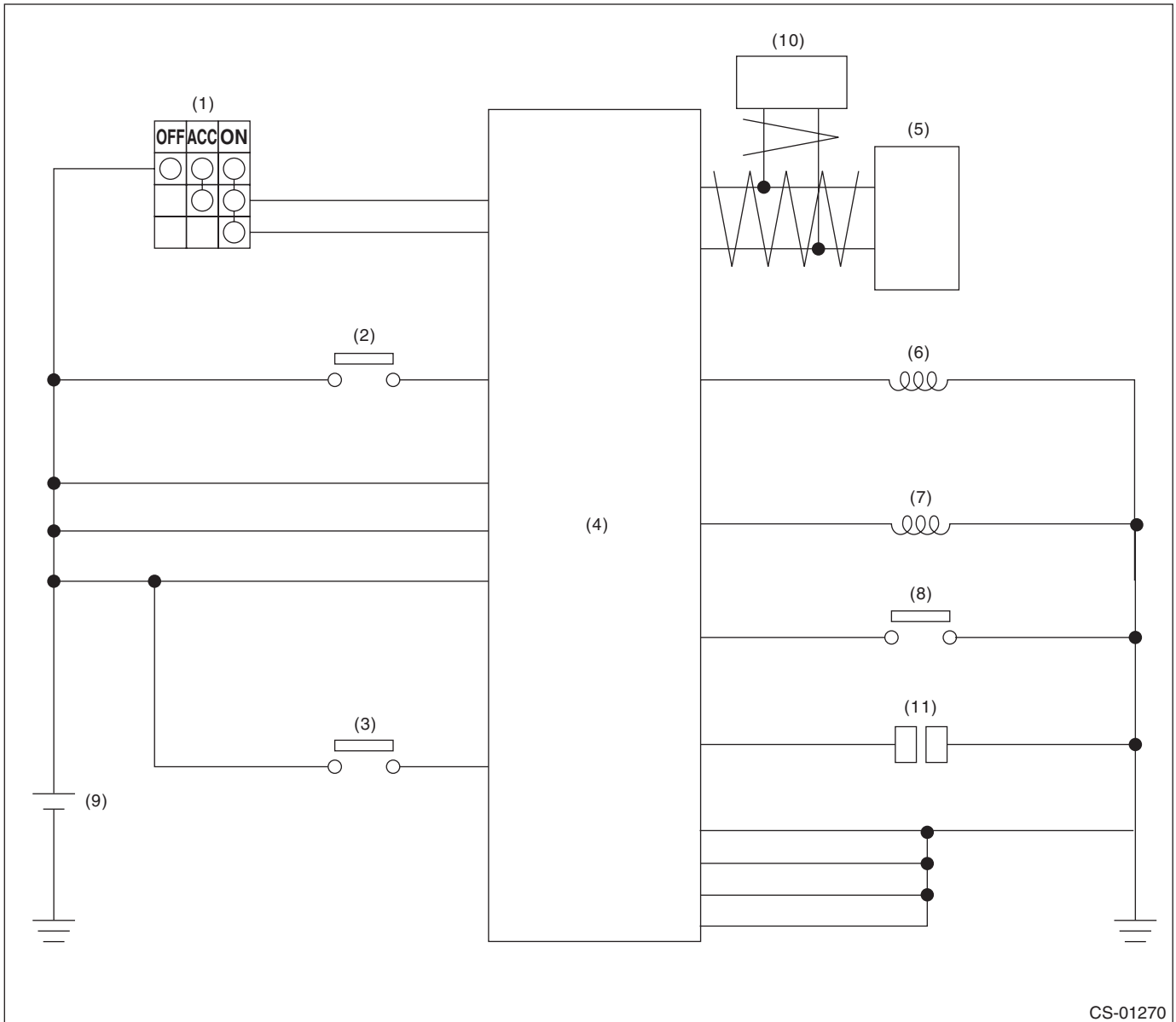


Item	To connector No.	Terminal No.	Input/Output signal
			Measured value and measuring conditions
Battery power supply	B281	1	9 — 16 V
	B280	7	
Ignition power supply	i84	1	10 — 15 V when ignition switch is at ON or START.
ACC power supply	i84	24	10 — 15 V when ignition switch is at ACC.
TCM ("P" range)	B280	20	Pulse signal
	B280	30	
Stop light switch	B281	23	9 — 16 V when stop light switch is ON. 0 V when stop light switch is OFF.
"P" range switch	B281	13	0 V when select lever is in "P" range. 9 — 16 V when select lever is in other positions than "P" range.
Shift lock solenoid signal	B280	6	8.5 — 16 V when shift lock is released. 0 V when shift lock is operating.
Key warning switch signal	B281	7	9 — 16 V when key is inserted. 0 V when key is removed.
Key lock solenoid signal	B280	5	7.5 — 16 V when ignition switch is turned ON, with select lever in "P" range and brake switch ON. 0 V at other conditions than above.
Ground	B280	22	—
	i84	21	
	B281	8	
		9	
Delivery (test) mode connector	i84	3	When the delivery (test) mode connector is disconnected: 9 — 16 V When the delivery (test) mode connector is connected: 0 V

# AT Shift Lock Control System

CONTROL SYSTEMS

## C: WIRING DIAGRAM



CS-01270

- |                          |                                   |                                     |
|--------------------------|-----------------------------------|-------------------------------------|
| (1) Ignition switch      | (5) TCM (shift range information) | (9) Battery                         |
| (2) Stop light switch    | (6) Key lock solenoid             | (10) VDC (vehicle speed signal)     |
| (3) Key warning switch   | (7) Shift lock solenoid           | (11) Delivery (test) mode connector |
| (4) Body integrated unit | (8) "P" range switch              |                                     |

## D: INSPECTION

### 1. SHIFT LOCK OPERATION

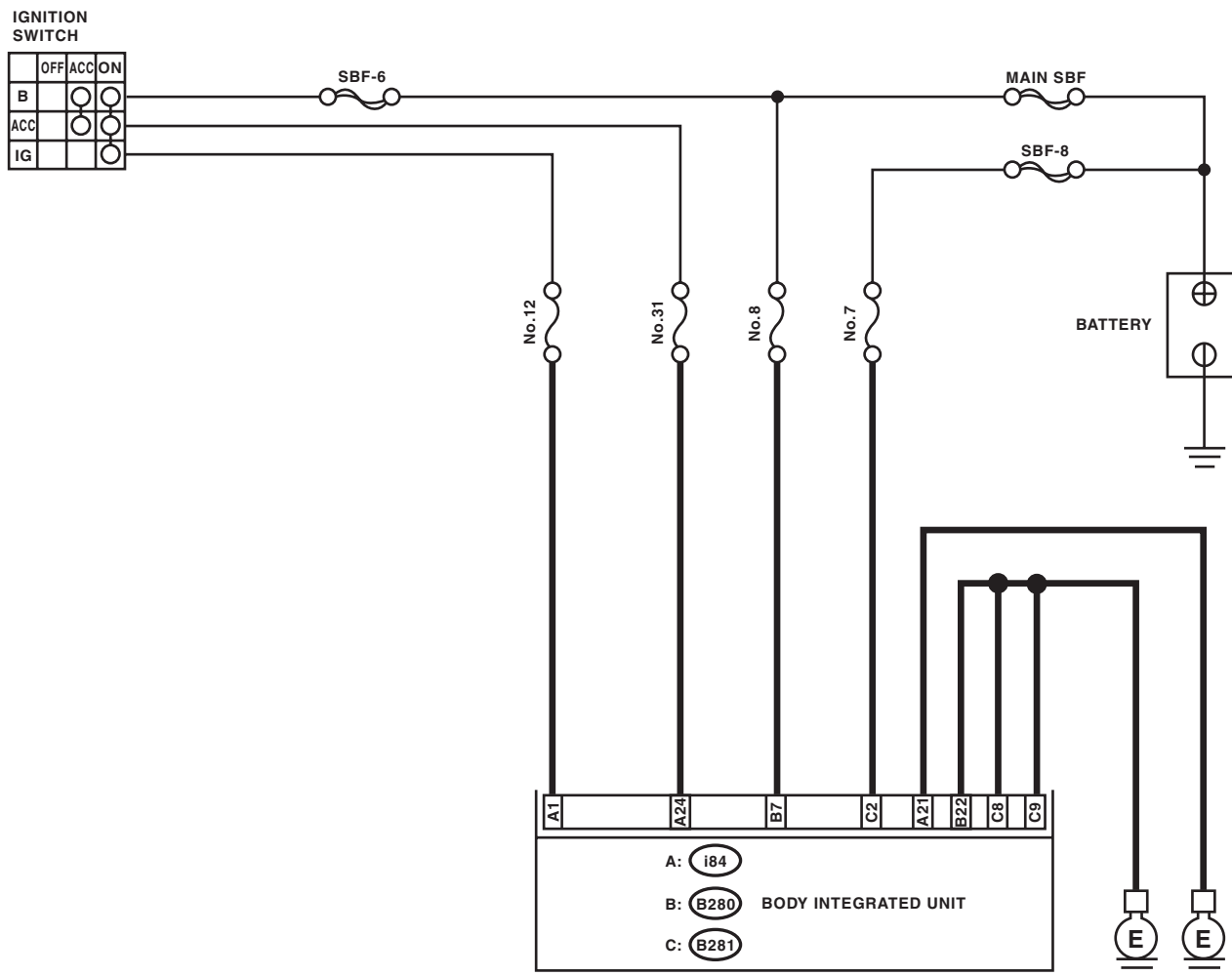
Step	Check	Yes	No
<b>1</b> <b>CHECK COMMUNICATION OF SUBARU SELECT MONITOR.</b> 1) Turn the ignition switch to ON. 2) Using the Subaru Select Monitor, check whether communication to all systems can be executed normally.	Is the system name displayed?	Go to step 2.	Perform the inspection following the diagnostic procedure in the LAN section. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>
<b>2</b> <b>CHECK SHIFT LOCK.</b> 1) Turn the ignition switch to ON. 2) Shift the select lever to "P" range.	While brake pedal is not depressed, is it possible to move the select lever from the "P" range to other ranges?	Perform the inspection of "SELECT LEVER CANNOT BE LOCKED OR RELEASED". <Ref. to CS-13, SELECT LEVER CANNOT BE LOCKED OR RELEASED, INSPECTION, AT Shift Lock Control System.>	Go to step 3.
<b>3</b> <b>CHECK SHIFT LOCK.</b>	While brake pedal is depressed, is it possible to move the select lever from the "P" range to other ranges?	Go to step 4.	Perform the inspection of "SELECT LEVER CANNOT BE LOCKED OR RELEASED". <Ref. to CS-13, SELECT LEVER CANNOT BE LOCKED OR RELEASED, INSPECTION, AT Shift Lock Control System.>
<b>4</b> <b>CHECK SHIFT LOCK.</b> Shift the select lever to "N" range.	Is it possible to move the select lever from the "N" range to the "P" range?	Go to step 5.	Perform the inspection of "SELECT LEVER CANNOT BE LOCKED OR RELEASED". <Ref. to CS-13, SELECT LEVER CANNOT BE LOCKED OR RELEASED, INSPECTION, AT Shift Lock Control System.>

# AT Shift Lock Control System

## CONTROL SYSTEMS

Step	Check	Yes	No
<b>5</b> <b>CHECK SHIFT LOCK.</b> 1) Shift the select lever to "N" range. 2) Turn the ignition switch to OFF.	While brake pedal is depressed, is it possible to move the select lever from the "N" range to the "P" range?	Go to step 6.	Perform the inspection of "SELECT LEVER CANNOT BE LOCKED OR RELEASED". <Ref. to CS-13, SELECT LEVER CANNOT BE LOCKED OR RELEASED, INSPECTION, AT Shift Lock Control System.>
<b>6</b> <b>CHECK KEY INTERLOCK.</b> 1) Turn the ignition switch to OFF. 2) Shift the select lever to other than "P" range.	Can the ignition key be removed?	Perform the inspection of "KEY INTERLOCK CANNOT BE LOCKED OR RELEASED". <Ref. to CS-16, KEY INTERLOCK DOES NOT LOCK OR RELEASE, INSPECTION, AT Shift Lock Control System.>	Go to step 7.
<b>7</b> <b>CHECK KEY INTERLOCK.</b> Shift the select lever to "P" range.	Can the ignition key be removed?	AT shift lock system is normal.	Perform the inspection of "KEY INTERLOCK CANNOT BE LOCKED OR RELEASED". <Ref. to CS-16, KEY INTERLOCK DOES NOT LOCK OR RELEASE, INSPECTION, AT Shift Lock Control System.>

## 2. BODY INTEGRATED UNIT POWER SUPPLY AND GROUND CIRCUIT



A: **i84**

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			

B: **B280**

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			

C: **B281**

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			

CS-00599

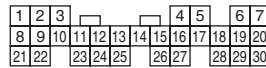
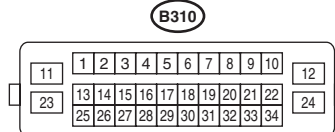
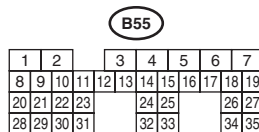
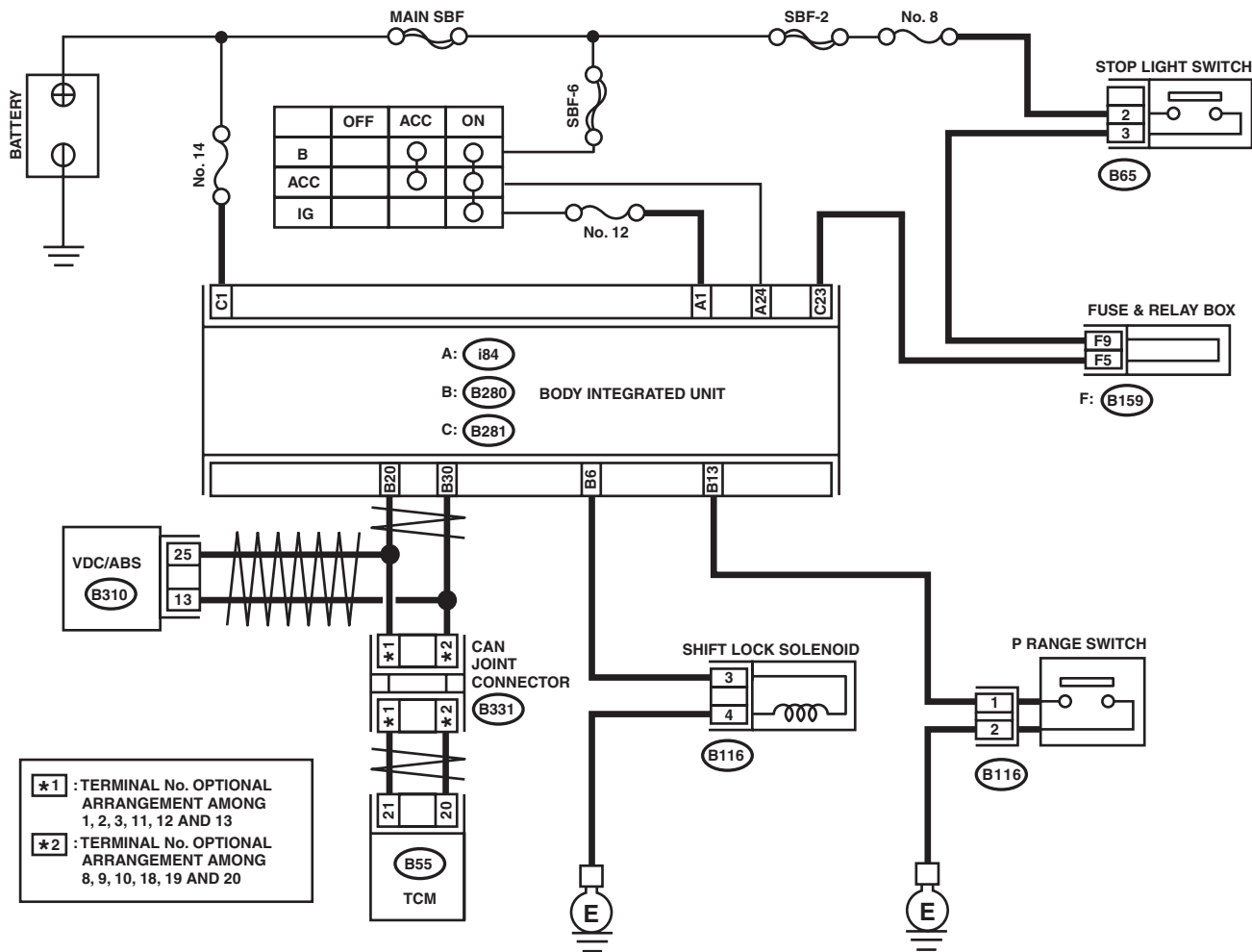
Step	Check	Yes	No	
1	<b>CHECK DTC OF BODY INTEGRATED UNIT.</b> Check DTC of body integrated unit. <Ref. to LAN(diag)-12, OPERATION, Subaru Select Monitor.>	Is the DTC of power line displayed on body integrated unit?	Repair or replace it according to the DTC.	Go to step 2.

# AT Shift Lock Control System

## CONTROL SYSTEMS

Step	Check	Yes	No
<b>2</b> <b>CHECK HARNESS CONNECTOR BETWEEN BODY INTEGRATED UNIT AND CHASSIS GROUND.</b> 1) Turn the ignition switch to ON. 2) Measure the voltage between body integrated unit and chassis ground. <b>Connector &amp; terminal</b> <i>(B280) No. 1 (+) — Chassis ground (-):</i> <i>(B280) No. 6 (+) — Chassis ground (-):</i> <i>(B280) No. 7 (+) — Chassis ground (-):</i> <i>(B279) No. 22 (+) — Chassis ground (-):</i> <i>(B281) No. 2 (+) — Chassis ground (-):</i>	Is the voltage 9 — 16 V?	Go to step 3.	Check harness for open circuit between the body integrated unit and the battery or a blown fuse.
<b>3</b> <b>CHECK HARNESS CONNECTOR BETWEEN BODY INTEGRATED UNIT AND CHASSIS GROUND.</b> 1) Turn the ignition switch to OFF. 2) Measure the harness resistance between the body integrated unit and chassis ground. <b>Connector &amp; terminal</b> <i>(i84) No. 28 — Chassis ground:</i> <i>(B279) No. 27 — Chassis ground:</i> <i>(B280) No. 17 — Chassis ground:</i> <i>(B281) No. 20 — Chassis ground:</i>	Is the resistance less than 1 $\Omega$ ?	Go to step 4.	Repair the open circuit of harness between the body integrated unit and chassis ground.
<b>4</b> <b>CHECK FOR POOR CONTACT.</b>	Is there poor contact of connector?	Repair the poor contact.	Check body integrated unit.

## 3. SELECT LEVER CANNOT BE LOCKED OR RELEASED



CS-01271

Step	Check	Yes	No
1	<b>CHECK BODY INTEGRATED UNIT POWER SUPPLY AND GROUND CIRCUIT.</b> <Ref. to CS-11, BODY INTEGRATED UNIT POWER SUPPLY AND GROUND CIRCUIT, INSPECTION, AT Shift Lock Control System.>	Is there an abnormal condition?	Follow the procedures to perform inspection and repair.
			Go to step 2.

# AT Shift Lock Control System

## CONTROL SYSTEMS

Step	Check	Yes	No
<b>2 CHECK CURRENT DATA.</b> 1) Connect the Subaru Select Monitor. 2) Shift the select lever to "P" range. 3) Turn the ignition switch to ON. 4) Display the current data display and display "P SW". <Ref. to LAN(diag)-12, OPERATION, Subaru Select Monitor.>	Is the display "ON" in the "P" range and "OFF" in ranges other than "P"?	Go to step 3.	Go to step 8.
<b>3 CHECK CURRENT DATA.</b> Display the current data display and display "Stop Light Switch". <Ref. to LAN(diag)-12, OPERATION, Subaru Select Monitor.>	Is "ON" displayed when the brake pedal is depressed and "OFF" displayed when the brake pedal is released?	Go to step 4.	Go to step 11.
<b>4 CHECK BODY INTEGRATED UNIT DTC.</b> Check the DTC of the body integrated unit when the brake pedal is pressed and when it is released. (Hold each condition for 5 seconds or more.)	Is there a DTC of a current malfunction?	Follow the DTC to perform inspection and repair.	Go to step 5.
<b>5 CHECK CURRENT DATA.</b> Select the current data display and display "Shift Lock Solenoid". <Ref. to LAN(diag)-12, OPERATION, Subaru Select Monitor.>	Is "ON" displayed when the brake pedal is depressed and "OFF" displayed when the brake pedal is released?	Go to step 6.	Replace the body integrated unit.
<b>6 CHECK CURRENT DATA.</b> Select the current data display and display "Shift Position". <Ref. to LAN(diag)-12, OPERATION, Subaru Select Monitor.>	Is the display "7" in the "P" range and other than "7" in ranges other than "P"?	Go to step 7.	Check the following items. <ul style="list-style-type: none"> <li>• Inhibitor switch</li> <li>• Harness between inhibitor switch and TCM</li> <li>• TCM input signal</li> <li>• TCM CAN communication</li> <li>• Body integrated unit CAN receive</li> </ul>
<b>7 CHECK CURRENT DATA.</b> 1) Select the current data display and display "Front Wheel Speed". <Ref. to LAN(diag)-12, OPERATION, Subaru Select Monitor.> 2) Start the engine. 3) Raise vehicle speed gradually up to approximately 20 km/h.	Is a figure equivalent to the speedometer being indicated?	Go to step 12.	Check the following items. <ul style="list-style-type: none"> <li>• Wheel speed sensor</li> <li>• VDC/ABS CAN communication</li> <li>• Body integrated unit CAN receive</li> </ul> Replace the wheel speed sensor, VDC/ABS, or body integrated unit, or both.
<b>8 CHECK HARNESS BETWEEN BODY INTEGRATED UNIT AND "P" RANGE SWITCH.</b> 1) Disconnect the connector from body integrated unit. 2) Disconnect the connector of "P" range switch. 3) Check for open circuit of harness, short circuit to battery or short circuit to ground between the body integrated unit and "P" range switch. <b>Connector &amp; terminal</b> <b>(B281) No. 4 — (B117) No. 1:</b>	Is the harness normal?	Repair or replace the harness between the body integrated unit and the "P" range switch.	Go to step 9.



# AT Shift Lock Control System

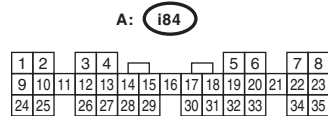
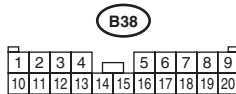
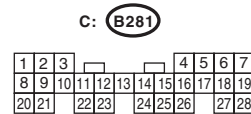
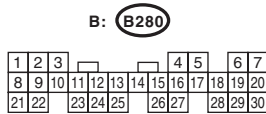
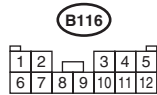
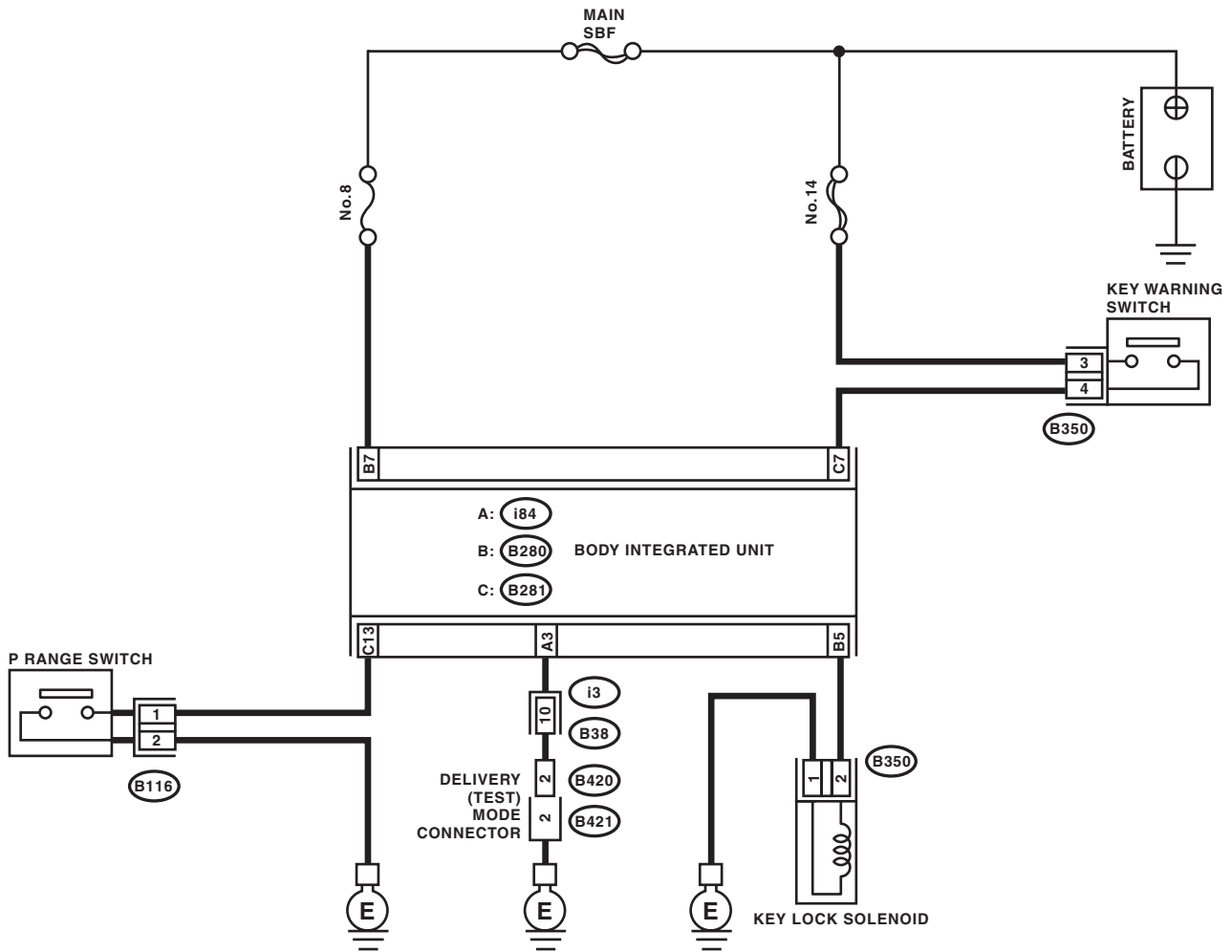
CONTROL SYSTEMS

Step	Check	Yes	No
<p><b>9</b>      <b>CHECK HARNESS BETWEEN “P” RANGE SWITCH AND CHASSIS GROUND.</b>                      Measure the resistance of harness between “P” range switch and chassis ground.  <i>Connector &amp; terminal</i>  <i>(B117) No. 2 — Chassis ground:</i></p>	Is it less than 10 Ω?	Go to step 10.	Repair the harness between the “P” range switch and chassis ground.
<p><b>10</b>      <b>CHECK “P” RANGE SWITCH.</b>                      Measure the resistance between “P” range switch connector terminals.  <i>Terminals</i>  <i>No. 2 — No. 1:</i></p>	Is it less than 10 Ω in the “P” range, and 1 MΩ or more in ranges other than “P”?	Replace the body integrated unit.	Replace the “P” range switch.
<p><b>11</b>      <b>CHECK STOP LIGHT SWITCH INPUT SIGNAL.</b>                      1) Disconnect the connector from body integrated unit.                      2) Measure the voltage between the body integrated unit connector terminal and chassis ground.  <i>Connector &amp; terminal</i>  <i>(B280) No. 2 (+) — Chassis ground (-):</i></p>	Is the voltage 9 V or more when the brake pedal is depressed, and less than approximately 1.5 V when not pressed?	Replace the body integrated unit.	Check the stop light system.
<p><b>12</b>      <b>CHECK SHIFT LOCK SOLENOID OPERATION.</b>                      Connect the battery to the shift lock solenoid unit connector terminal, and operate the solenoid.  <i>Terminals</i>  <i>No. 3 (+) — No. 4 (-):</i></p>	Does the shift lock solenoid operate normally?	Check the lock mechanism of the select lever body.	Replace the shift lock solenoid.

# AT Shift Lock Control System

## CONTROL SYSTEMS

### 4. KEY INTERLOCK DOES NOT LOCK OR RELEASE



CS-00847

Step	Check	Yes	No
1	<b>CHECK DELIVERY (TEST) MODE CONNECTOR.</b> Check that the delivery (test) mode connector is disconnected.	Go to step 2.	Disconnect the delivery (test) mode connector.

# AT Shift Lock Control System

CONTROL SYSTEMS

Step	Check	Yes	No
<b>2 CHECK BODY INTEGRATED UNIT POWER SUPPLY AND GROUND CIRCUIT.</b> <Ref. to CS-11, BODY INTEGRATED UNIT POWER SUPPLY AND GROUND CIRCUIT, INSPECTION, AT Shift Lock Control System.>	Is there any fault?	Follow the procedures to inspect and repair.	Go to step 3.
<b>3 CHECK CURRENT DATA.</b> 1) Connect the Subaru Select Monitor. 2) Shift the select lever to "P" range. 3) Turn the ignition switch to ON. 4) Select the current data display and display «P SW». <Ref. to LAN(diag)-12, OPERATION, Subaru Select Monitor.>	Is the display "ON" in the P range and "OFF" in ranges other than P?	Go to step 4.	Go to step 7.
<b>4 CHECK CURRENT DATA.</b> 1) Select the current data display and display the «key-lock warning SW». <Ref. to LAN(diag)-12, OPERATION, Subaru Select Monitor.> 2) Turn the ignition switch to OFF.	Does the display change from "ON" ↔ "OFF" when the key is inserted and removed?	Go to step 5.	Go to step 10.
<b>5 CHECK CURRENT DATA.</b> 1) Turn the ignition switch to ON. 2) Select the current data display and display «Key locking output». <Ref. to LAN(diag)-12, OPERATION, Subaru Select Monitor.>	Is the display "ON" in the P range and "OFF" in ranges other than P?	Go to step 12.	Go to step 6.
<b>6 CHECK DTC OF BODY INTEGRATED UNIT.</b> 1) Set the select lever to other than "P" range. 2) Check DTC of body integrated unit.	Is B1105 (key interlock circuit abnormal) a current malfunction?	Follow the DTC to perform inspection and repair.	Go to step 12.
<b>7 CHECK HARNESS BETWEEN BODY INTEGRATED UNIT AND "P" RANGE SWITCH.</b> 1) Disconnect the connector from body integrated unit. 2) Disconnect the connector of "P" range switch. 3) Check for open circuit of harness, short circuit to battery or short circuit to ground between the body integrated unit and "P" range switch. <b>Connector &amp; terminal</b> <b>(B281) No. 4 — (B117) No. 1:</b>	Is the harness normal?	Repair or replace the harness between the body integrated unit and the "P" range switch.	Go to step 8.
<b>8 CHECK HARNESS BETWEEN "P" RANGE SWITCH AND CHASSIS GROUND.</b> Measure the resistance of harness between "P" range switch and chassis ground. <b>Connector &amp; terminal</b> <b>(B117) No. 2 — Chassis ground:</b>	Is it less than 10 Ω?	Go to step 9.	Repair the harness between the "P" range switch and chassis ground.
<b>9 CHECK "P" RANGE SWITCH.</b> Measure the resistance between "P" range switch connector terminals. <b>Terminals</b> <b>No. 2 — No. 1:</b>	Is it less than 10 Ω in the "P" range, and 1 MΩ or more in ranges other than "P"?	Replace the body integrated unit.	Replace the "P" range switch.
<b>10 CHECK HARNESS BETWEEN BATTERY AND KEY WARNING SWITCH AND BODY INTEGRATED UNIT.</b> 1) Disconnect the connector from body integrated unit. 2) Measure the voltage between body integrated unit and chassis ground. <b>Connector &amp; terminal</b> <b>(B279) No. 2 (+) — Chassis ground (-):</b>	Is the display 9 V or more when the key is inserted, and less than 1.5 V with the key removed?	Replace the body integrated unit.	Check the following items. • Key warning switch • Harness/fuse • Ignition circuit

# AT Shift Lock Control System

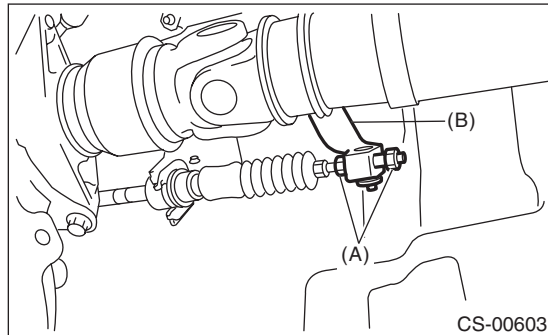
## CONTROL SYSTEMS

Step	Check	Yes	No
<b>11 CHECK DELIVERY (TEST) MODE CONNECTOR HARNESS.</b> 1) Disconnect the connector of body integrated unit. 2) Measure the resistance between body integrated unit connector and the delivery (test) mode connector. <b>Connector &amp; terminal</b> <b>(i84) No. 17 — (i1) No. 1:</b>	Is it less than 10 Ω?	Go to step 12.	Repair or replace the harness between the body integrated unit and delivery (test) mode connector.
<b>12 CHECK HARNESS BETWEEN BODY INTEGRATED UNIT AND KEY LOCK SOLENOID.</b> 1) Disconnect the connector from body integrated unit. 2) Disconnect the connector of key lock solenoid. 3) Check for open circuit of harness, short circuit to battery or short circuit to ground between the body integrated unit and key lock solenoid. <b>Connector &amp; terminal</b> <b>(B279) No. 11 — (B350) No. 2:</b>	Is the harness normal?	Repair or replace the harness between the body integrated unit and the key lock solenoid.	Go to step 13.
<b>13 CHECK HARNESS BETWEEN KEY LOCK SOLENOID AND CHASSIS GROUND.</b> Measure the resistance of harness between key lock solenoid and chassis ground. <b>Connector &amp; terminal</b> <b>(B350) No. 1 — Chassis ground:</b>	Is it less than 10 Ω?	Go to step 14.	Repair or replace the harness between the key lock solenoid and chassis ground.
<b>14 CHECK KEY LOCK SOLENOID OPERATION.</b> Connect the battery to the key lock solenoid connector terminal, and operate the solenoid. <b>Terminals</b> <b>No. 2 (+) — No. 1 (-):</b>	Does the key lock solenoid operate normally?	Go to step 15.	Replace the key lock solenoid.
<b>15 CHECK OUTPUT OF BODY INTEGRATED UNIT.</b> 1) Connect all connectors. 2) Insert the key. 3) Measure the voltage between body integrated unit and chassis ground. <b>Connector &amp; terminal</b> <b>(B279) No. 11 — Chassis ground:</b>	Is it 5 V or more in ranges other than “P”, and less than 1.5 V in the “P” range?	Check the lock mechanism of the steering lock body.	Replace the body integrated unit.

## 3. Select Lever

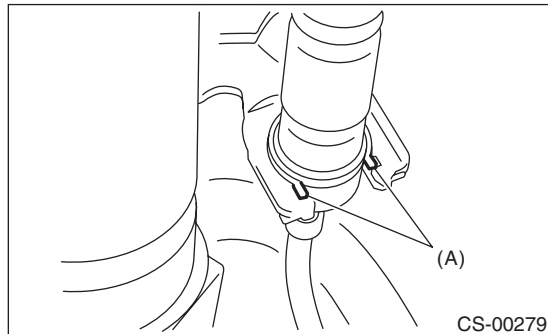
### A: REMOVAL

- 1) Set the vehicle on a lift.
- 2) Disconnect the ground cable from battery.
- 3) Shift the select lever to "N" range.
- 4) Lift up the vehicle.
- 5) Remove the rear exhaust pipe and muffler. <Ref. to EX(H6DO)-7, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H6DO)-9, REMOVAL, Muffler.>
- 6) Remove the heat shield cover.
- 7) Remove the cable from arm assembly.



- (A) Adjusting nut  
(B) Arm ASSY

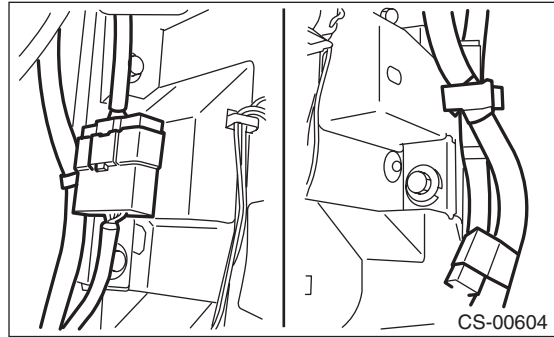
- 8) Raise the claw of clamp and remove the cable.



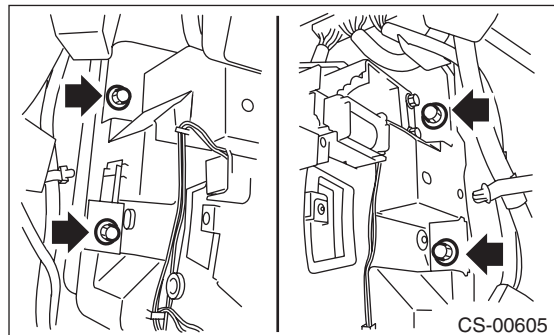
- (A) Claw

- 9) Lower the vehicle.
- 10) Remove the console box. <Ref. to EI-39, REMOVAL, Console Box.>
- 11) Remove the center console. <Ref. to EI-40, REMOVAL, Center Console.>

- 12) Remove all harnesses from the select lever.



- 13) Disconnect the connectors, and then remove the four bolts to take out the select lever assembly from vehicle body.

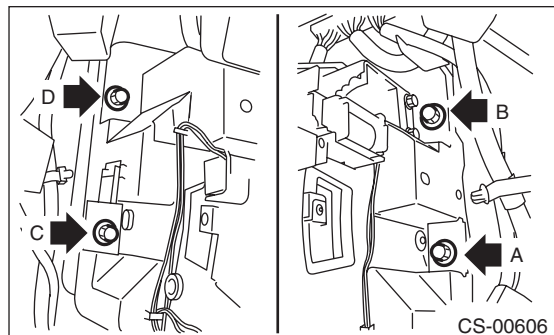


### B: INSTALLATION

- 1) Set the select lever to vehicle body.
- 2) Tighten the four bolts to install the select lever to vehicle body, and then connect the connector.
  - (1) Temporarily tighten the bolt A.
  - (2) Tighten the bolt B.
  - (3) Tighten the bolt A.
  - (4) Tighten the bolts C and D.

#### Tightening torque:

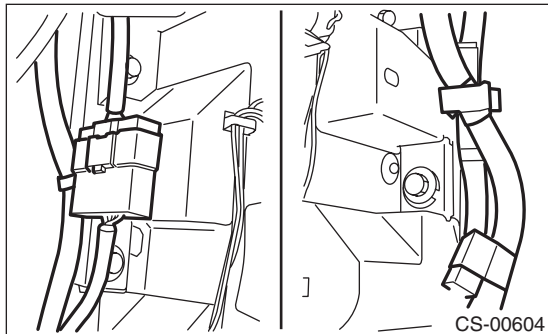
**18 N·m (1.8 kgf-m, 13.3 ft-lb)**



# Select Lever

## CONTROL SYSTEMS

3) Install the shift select cable onto select lever.



4) Install the center console. <Ref. to EI-40, INSTALLATION, Center Console.>

5) Install the console box. <Ref. to EI-39, INSTALLATION, Console Box.>

6) Shift the select lever to “N” range.

7) Lift up the vehicle.

8) Shift the range select lever to the “N” range.

9) Secure the cable to the bracket. <Ref. to CS-27, INSTALLATION, Select Cable.>

10) Adjust the select cable position. <Ref. to CS-28, ADJUSTMENT, Select Cable.>

11) After the completion of adjustment, confirm that the select lever operates properly at all range positions.

12) Install the heat shield cover.

13) Install the rear exhaust pipe and muffler. <Ref. to EX(H6DO)-7, INSTALLATION, Rear Exhaust Pipe.> <Ref. to EX(H6DO)-9, INSTALLATION, Muffler.>

14) Inspect the following items. When a malfunction is found in the inspection, adjust the select cable. <Ref. to CS-28, ADJUSTMENT, Select Cable.>

(1) Engine starts when the select lever is in “P” and “N” range, but not in other ranges.

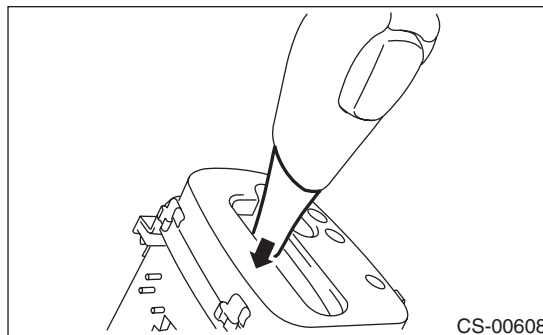
(2) Back-up light illuminates when the select lever is in the “R” range, but not in other ranges.

(3) Select lever and indicator positions are matched.

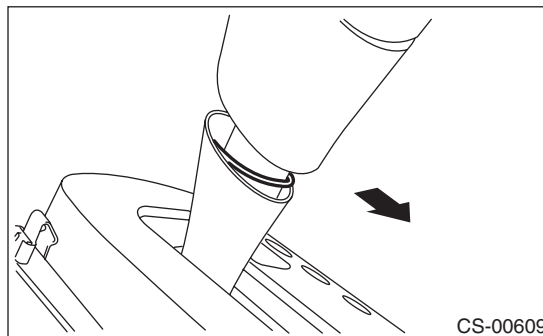
## C: DISASSEMBLY

1) Shift the select lever to “N” range.

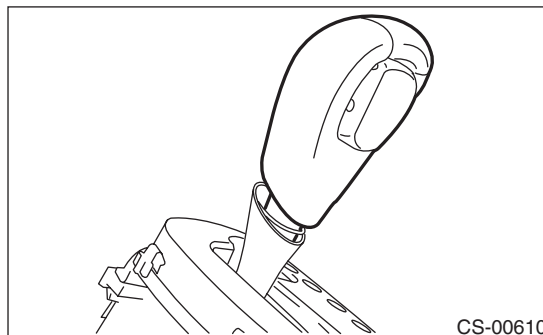
2) Lower the grip cover.



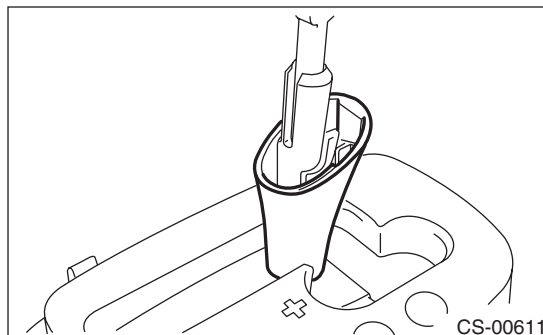
3) Remove the grip pin.



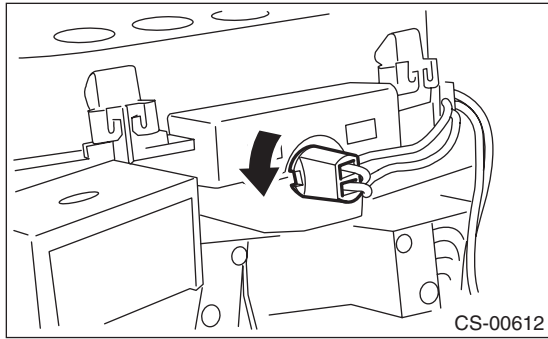
4) Remove the grip assembly.



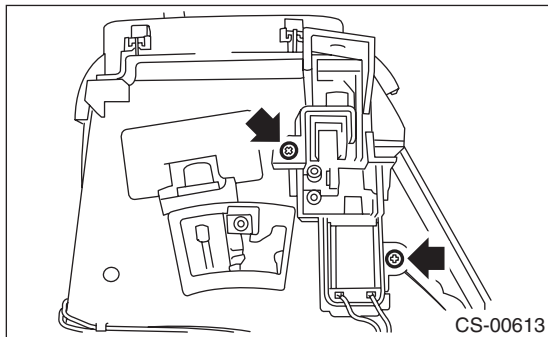
5) Remove the grip cover.



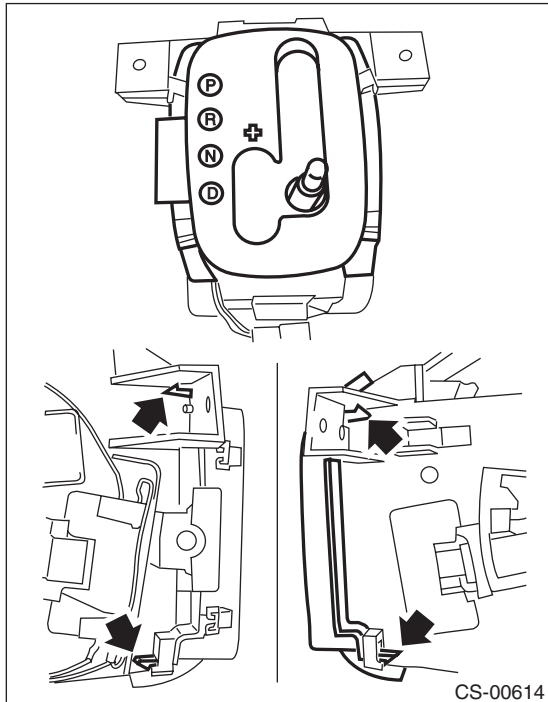
6) Remove the indicator light and then remove the bulb.



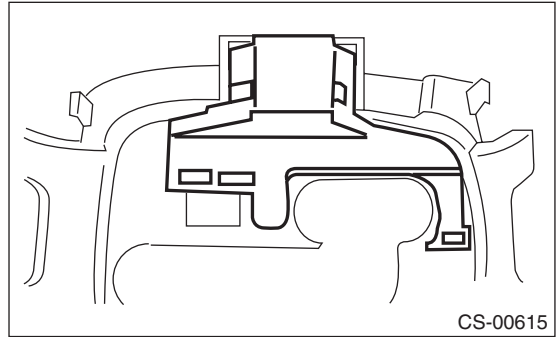
7) Remove the shift lock solenoid assembly.



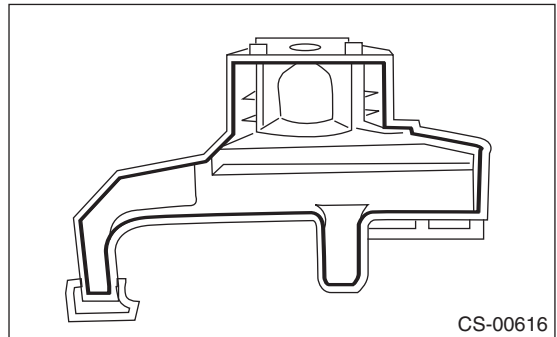
8) Remove the indicator assembly.



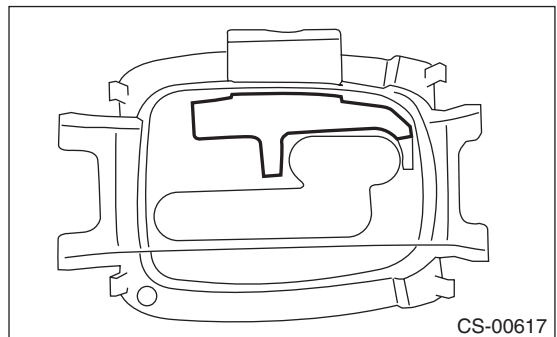
9) Remove the bulb case.



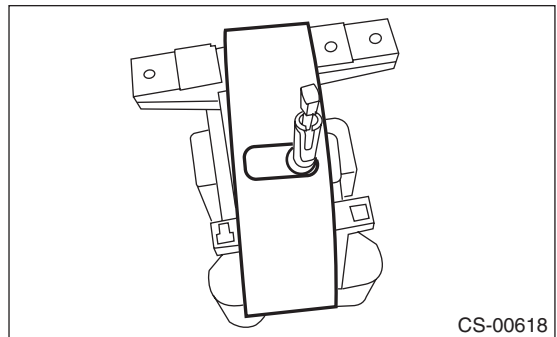
10) Remove the plate light guide.



11) Remove the position plate.



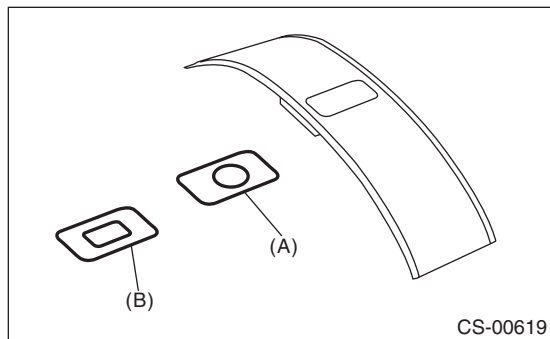
12) Remove the blind assembly.



# Select Lever

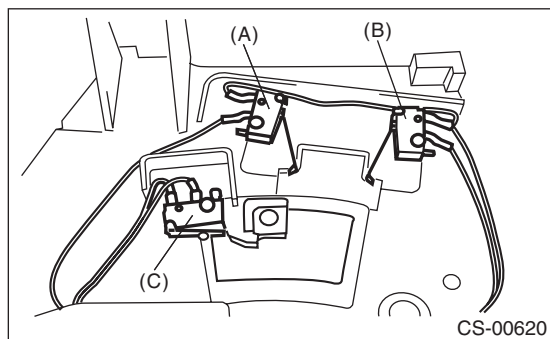
## CONTROL SYSTEMS

13) Remove blind A and B.



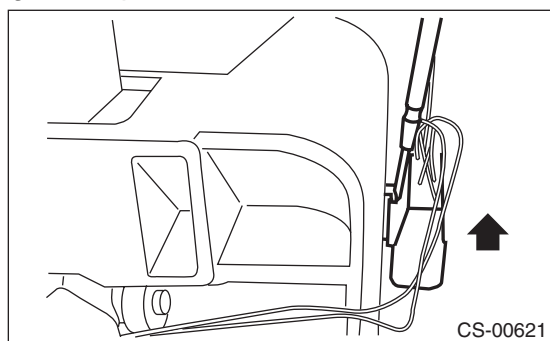
- (A) Blind A
- (B) Blind B

14) Remove the clip while being careful not to break the pin, and remove all switches.

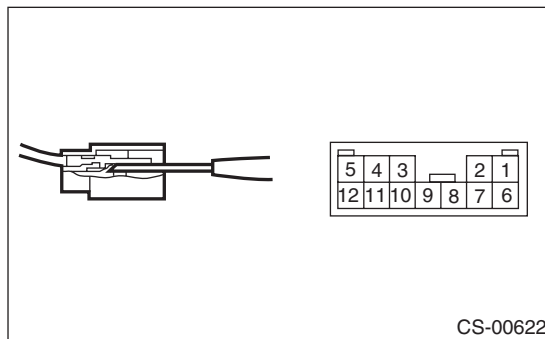


- (A) Shift-up switch
- (B) Shift-down switch
- (C) "P" range switch

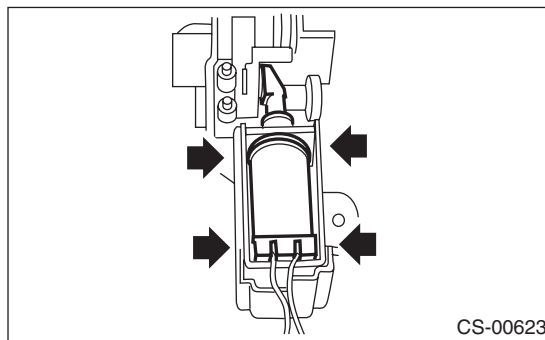
15) Remove the connector from the base assembly using a flat tip screwdriver.



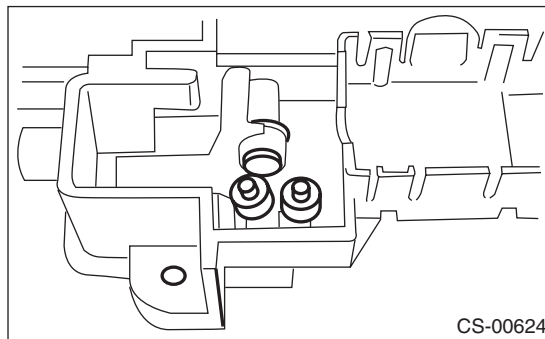
16) Remove all terminals from the connectors using a flat tip screwdriver.



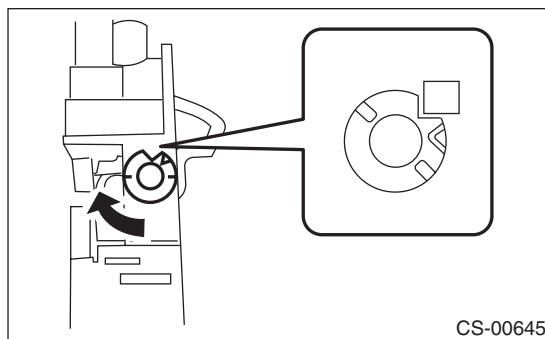
17) Remove the shift lock solenoid from the lock lever bracket.



18) Remove the bushing.

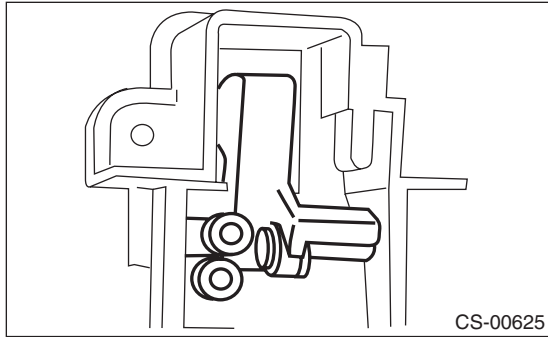


19) Remove the lock lever bushing.

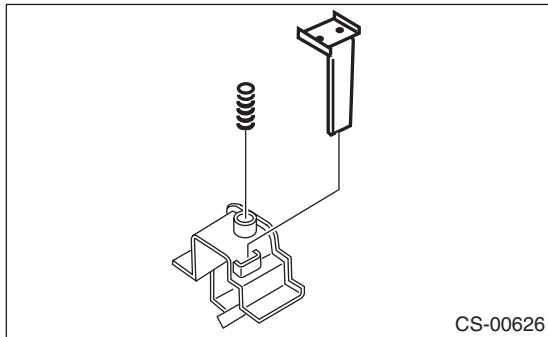




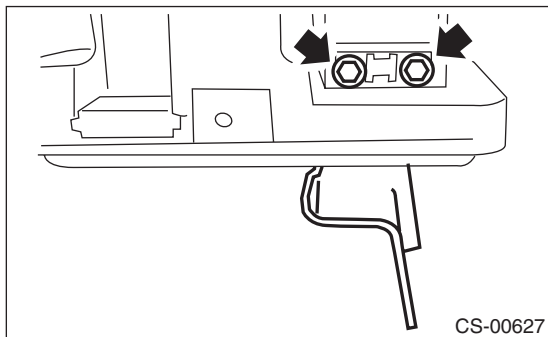
20) Remove the lock lever.



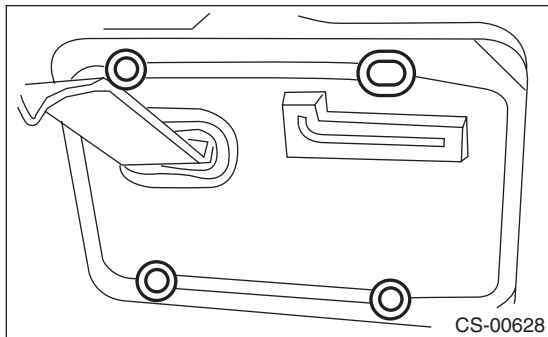
21) Remove the release rod and spring.



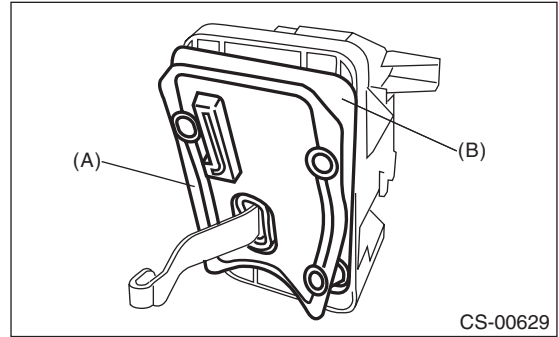
22) Remove the cable bracket.



23) Remove the spacer.

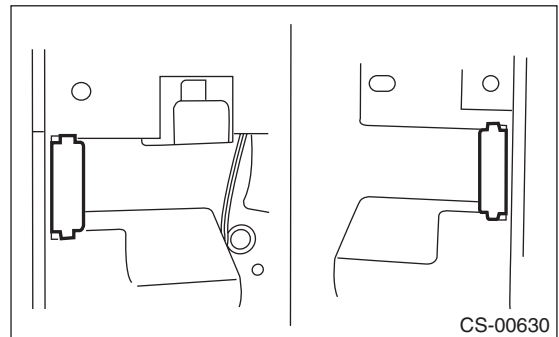


24) Remove the dust cover and dust cover bracket.

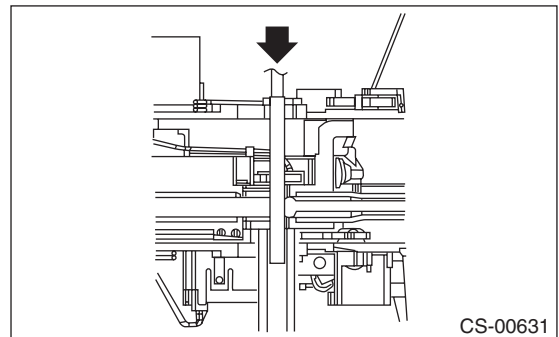


- (A) Dust cover
- (B) Dust cover bracket

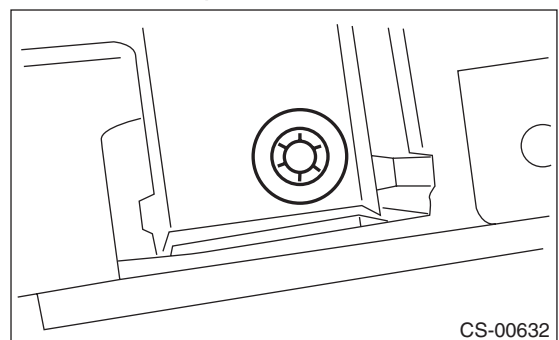
25) Remove the spacer.



26) Using a press, remove the shift position pin.



27) Remove the clips, then remove the shaft.

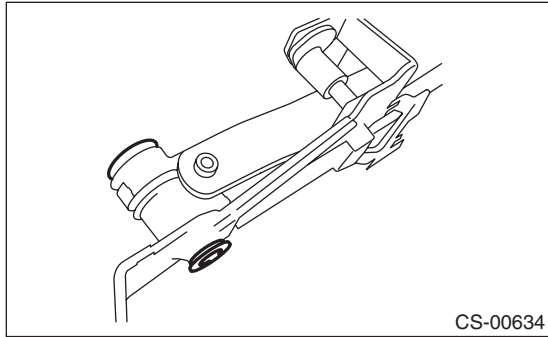


28) Remove the arm assembly.

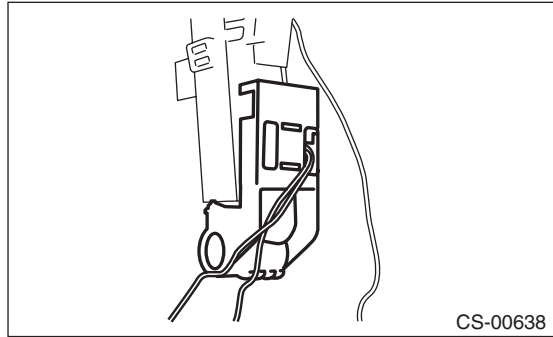
# Select Lever

## CONTROL SYSTEMS

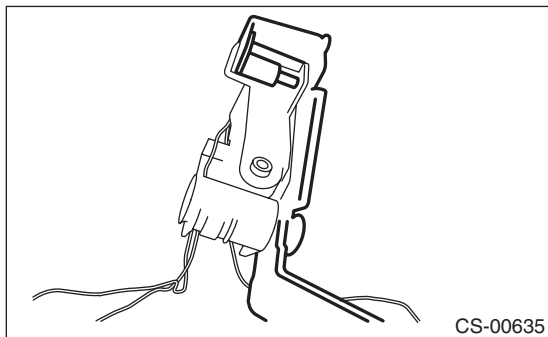
29) Remove the bushing.



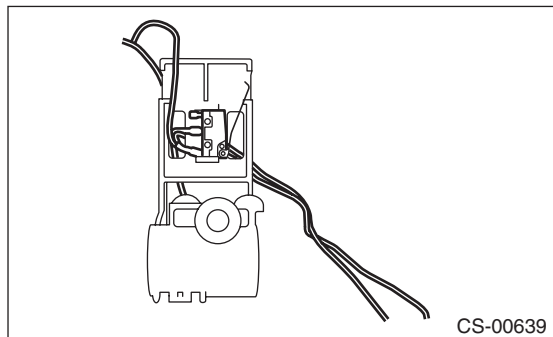
33) Remove the tube cross plate.



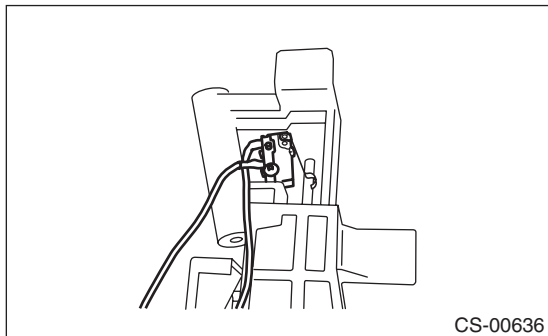
30) Remove the selector arm assembly.



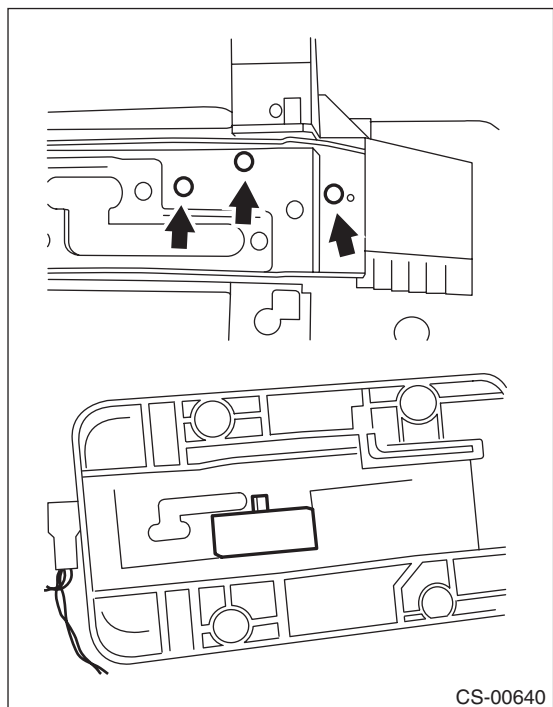
34) Remove the mode change switch.



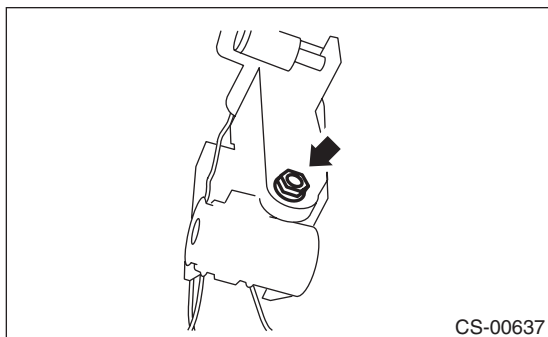
31) Remove the clip while being careful not to break the pin, then remove the shift button switch.



35) Remove the detent check block.



32) Remove the select shaft.

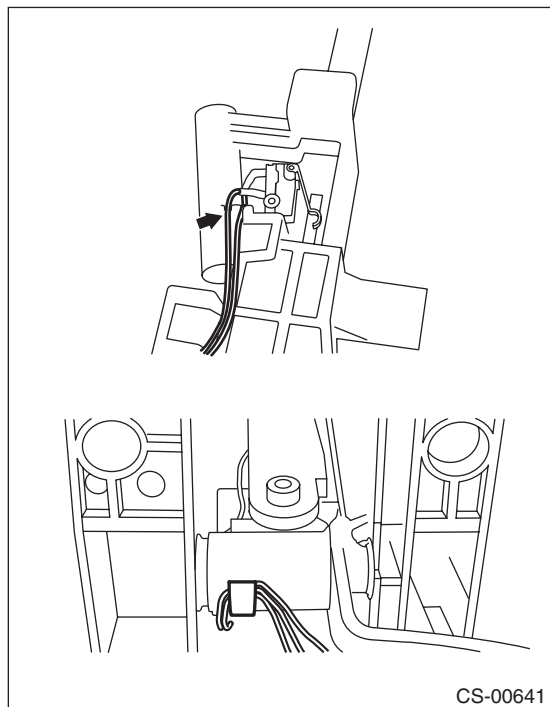


## D: ASSEMBLY

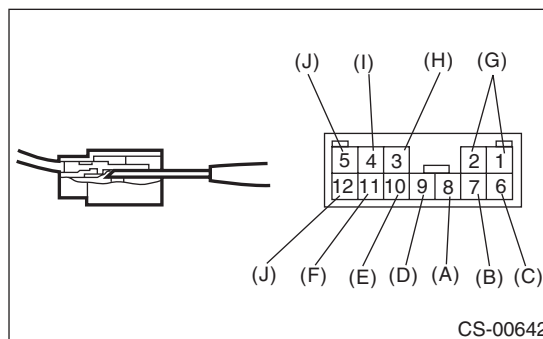
- 1) Clean all the parts before assembly.
- 2) Apply NIGTIGHT LYW No. 2 grease or equivalent to each part. <Ref. to CS-2, AT SELECT LEVER, COMPONENT, General Description.>
- 3) Assemble in the reverse order of disassembly.

### NOTE:

- Refer to “COMPONENT” for each tightening torque. <Ref. to CS-2, AT SELECT LEVER, COMPONENT, General Description.>
- When pressing in the shift position pin, insert from the left side of the vehicle.
- Affix the harness of the shift button switch and the mode change switch at the marked positions.



- Connect the terminals of all switches to the respective connectors.



- (A) Mode change switch (color code: Yellow)
- (B) Shift button switch (color code: Brown)
- (C) Mode change switch and shift button switch ground (color code: White)
- (D) Shift up switch (color code: Green)
- (E) Shift up switch (color code: Gray)
- (F) Shift up/down switch ground (color code: Blue)
- (G) “P” range switch (color code: Red)
- (H) Shift lock solenoid (color code: Blue)
- (I) Shift lock solenoid (color code: Black)
- (J) Indicator light (color code: Blue)

- 4) After completing installation, shift the select lever from the “P” range to the “D” range, then check whether or not the selection indicator in the combination meter and the select lever position matches. Also check whether the pointer and position mark matches, and what the operating force is.

## E: INSPECTION

- 1) Inspect the removed parts by comparing with new parts for deformation, damage and wear. Repair or replace if defective.
- 2) Confirm the select lever operating condition before assembly. Normal if it operates smoothly.

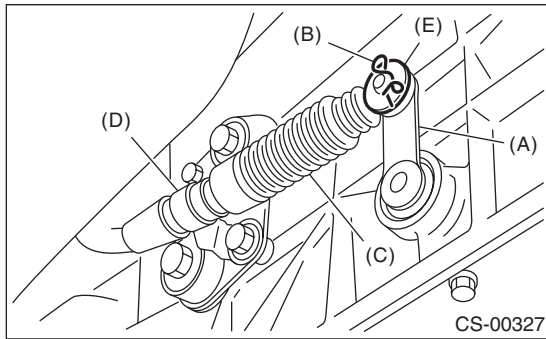
# Select Cable

## CONTROL SYSTEMS

### 4. Select Cable

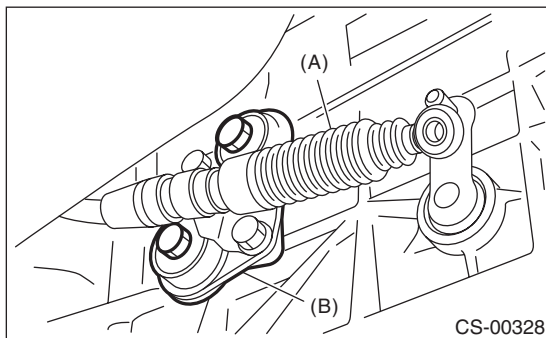
#### A: REMOVAL

- 1) Set the vehicle on a lift.
- 2) Shift the select lever to "N" range.
- 3) Disconnect the ground cable from battery.
- 4) Lift up the vehicle.
- 5) Remove the front exhaust pipe, rear exhaust pipe and muffler. <Ref. to EX(H6DO)-5, REMOVAL, Front Exhaust Pipe.> <Ref. to EX(H6DO)-7, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H6DO)-9, REMOVAL, Muffler.>
- 6) Remove the heat shield cover.
- 7) Remove the snap pin and washer from range select lever.



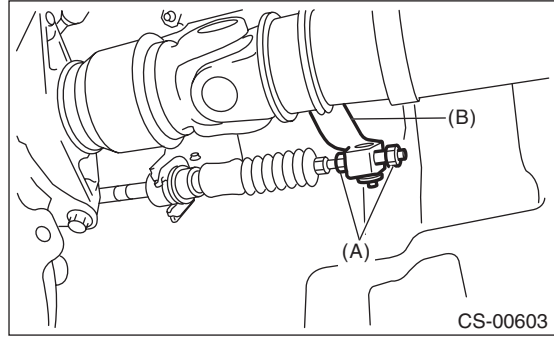
- (A) Range select lever
- (B) Snap pin
- (C) Select cable
- (D) Bracket
- (E) Washer

- 8) Remove the plate assembly from the transmission case.



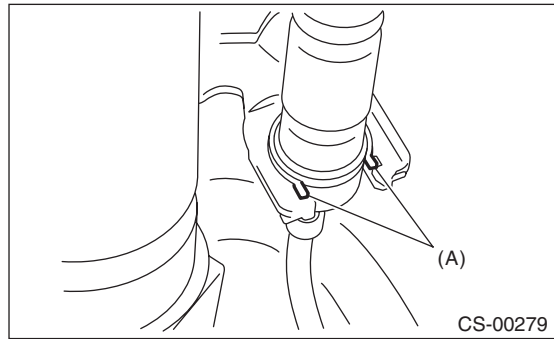
- (A) Select cable
- (B) Plate ASSY

- 9) Disconnect the cable from arm assembly.



- (A) Adjusting nut
- (B) Arm ASSY

- 10) Raise the pawl of clamp to remove the cable from bracket.



- (A) Claw

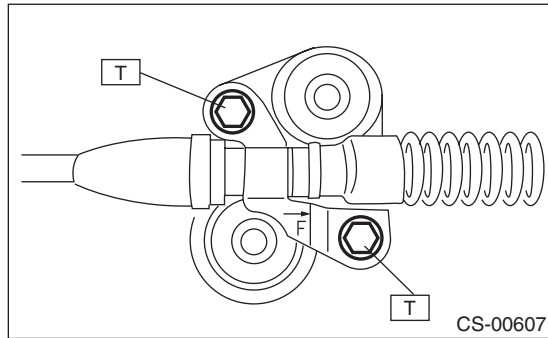
- 11) Remove the select cable from plate assembly.

## B: INSTALLATION

1) Install the select cable to plate assembly.

**Tightening torque:**

**T: 18 N·m (1.8 kgf-m, 13.3 ft-lb)**

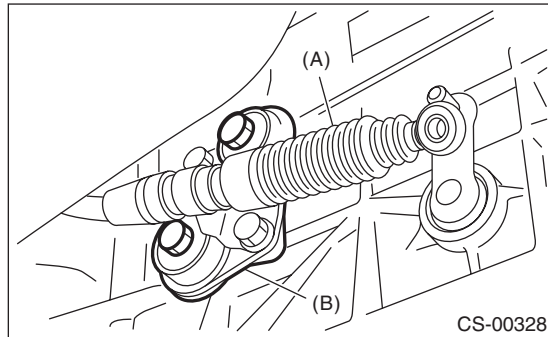


2) Install the select cable to range select lever.

3) Install the plate assembly to transmission.

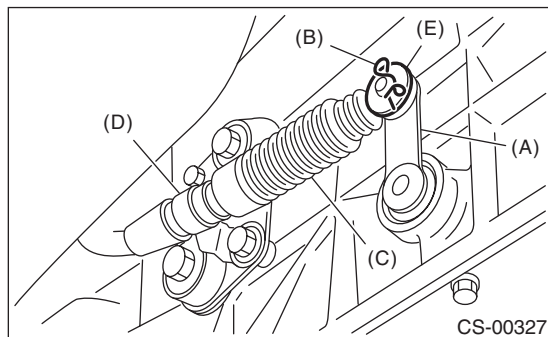
**Tightening torque:**

**24.5 N·m (2.5 kgf-m, 18.1 ft-lb)**



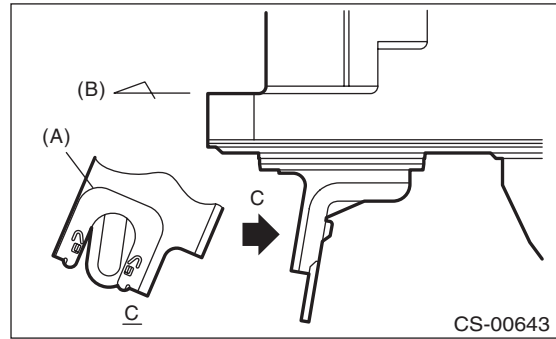
- (A) Select cable
- (B) Plate ASSY

4) Install the washer and snap pin to range select lever.



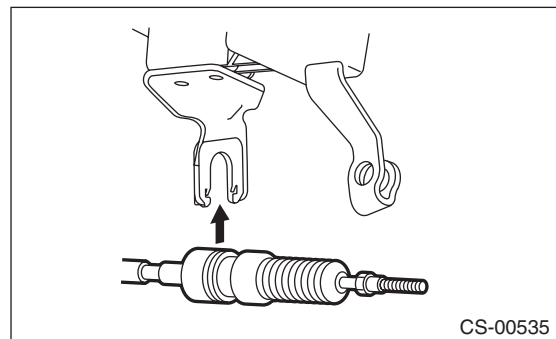
- (A) Range select lever
- (B) Snap pin
- (C) Select cable
- (D) Bracket
- (E) Washer

5) Install new clamp paying attention to the installing direction.



- (A) Clamp
- (B) Forward

6) Insert the tip of inner cable into connector hole of select lever, and fix the cable to bracket.



7) Shift the select lever to the "N" range, and then adjust the select cable position. <Ref. to CS-28, ADJUSTMENT, Select Cable.>

8) Install the heat shield cover.

9) Install the front exhaust pipe, rear exhaust pipe and muffler. <Ref. to EX(H6DO)-5, INSTALLATION, Front Exhaust Pipe.> <Ref. to EX(H6DO)-7, INSTALLATION, Rear Exhaust Pipe.> <Ref. to EX(H6DO)-9, INSTALLATION, Muffler.>

# Select Cable

## CONTROL SYSTEMS

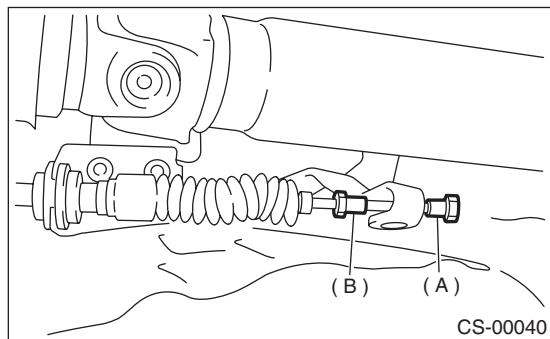
### C: INSPECTION

Check the removed cable and replace or adjust if damaged, rusty or malfunctioning.

- 1) Check the cable for smooth operation.
- 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 the select lever from "P" to "D" range. Check the existence of feel to contact the detents in each range. If the detents cannot be felt or the position pointer is improperly aligned, adjust the cable.
- 6) Check if the starter motor rotates when the select lever is set to "P" range.
- 7) Check the back-up light illumination when the select lever is in "R" range.
- 8) Check the parking lock operation when the select lever is in "P" range.
- 9) Check that the AT shift lock system operates normally.

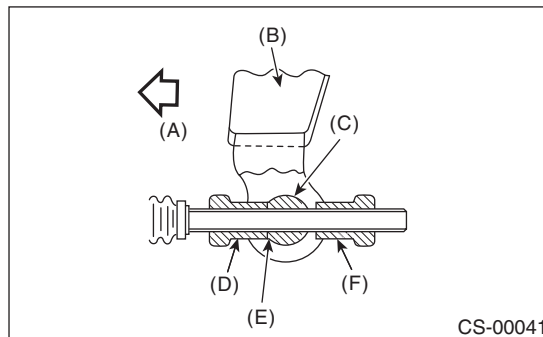
### D: ADJUSTMENT

- 1) Shift the select lever to "N" range.
- 2) Remove the rear exhaust pipe and muffler. <Ref. to EX(H6DO)-7, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H6DO)-9, REMOVAL, Muffler.>
- 3) Remove the heat shield cover.
- 4) Loosen the adjusting nuts on both sides.



- (A) Adjusting nut A  
(B) Adjusting nut B

- 5) With the select lever pushed towards the rear of the vehicle, turn the adjustment nut B until it just contacts the connector. Then loosen the nut for a half a turn.

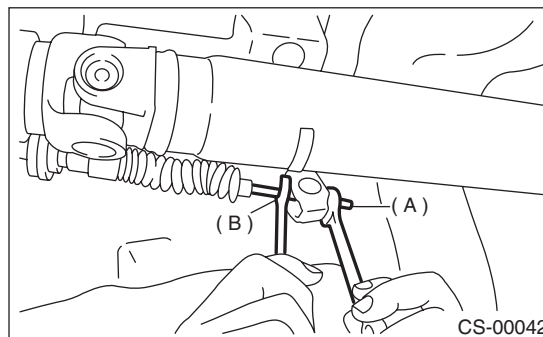


- (A) Forward side  
(B) Select lever  
(C) Connector  
(D) Adjusting nut B  
(E) Contact point  
(F) Adjusting nut A

- 6) Set a spanner wrench to adjusting nut B so that it does not rotate, and then tighten the adjusting nut A.

#### Tightening torque:

**7.5 N·m (0.8 kgf·m, 5.5 ft·lb)**



- (A) Adjusting nut A  
(B) Adjusting nut B

- 7) After the completion of adjustment, confirm that the select lever operates normally at all ranges.
- 8) Install in the reverse order of removal.

## 5. AT Shift Lock Solenoid and “P” Range Switch

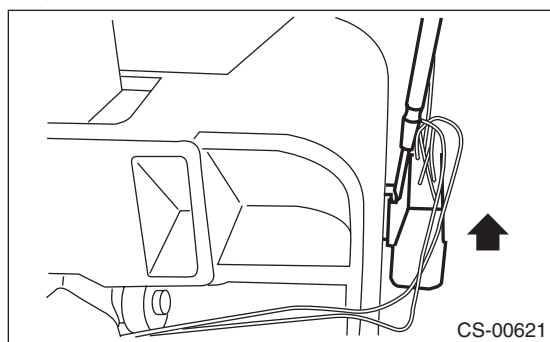
### A: REMOVAL

**NOTE:**

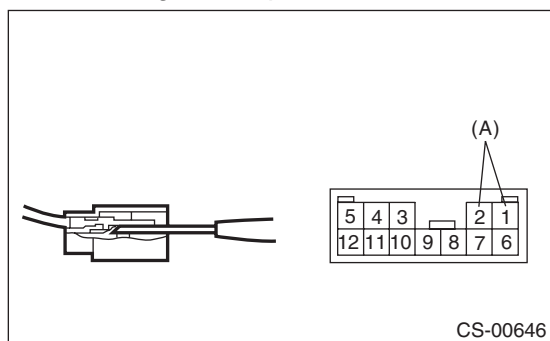
For removal of the mode change switch and the shift button switch, refer to the section on Select Levers. <Ref. to CS-20, DISASSEMBLY, Select Lever.>

#### 1. “P” RANGE SWITCH

- 1) Remove the console box. <Ref. to EI-39, REMOVAL, Console Box.>
- 2) Disconnect the connector.
- 3) Remove the connector from the base plate using a flat-tip screwdriver.

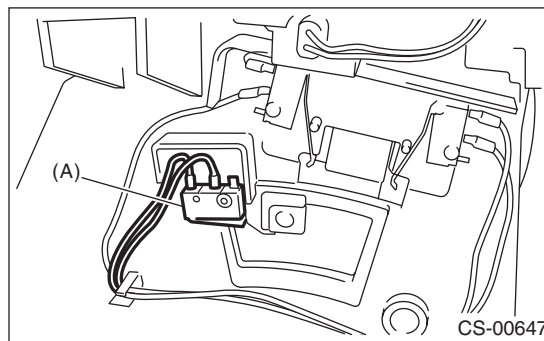


- 4) Disconnect the terminal of “P” range switch from connector, using a flat-tip screwdriver with thin tip.



(A) “P” range switch

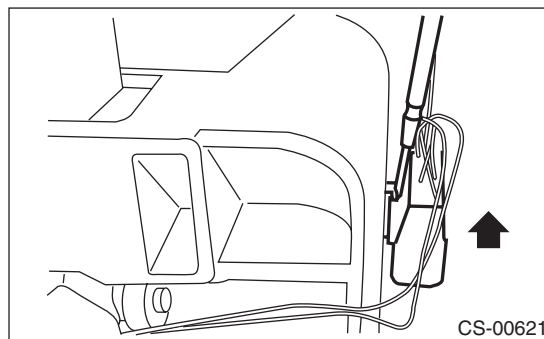
- 5) Remove the clip while being careful not to break the pin, then remove the P range switch.



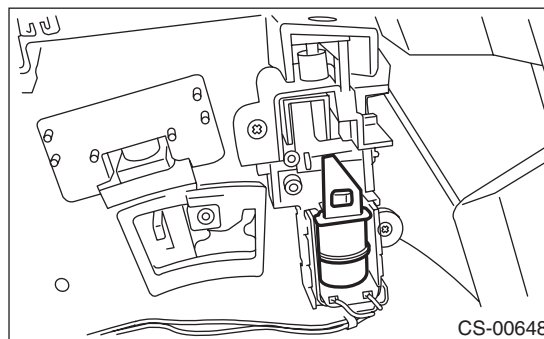
(A) “P” range switch

#### 2. AT SHIFT LOCK SOLENOID

- 1) Remove the console box. <Ref. to EI-39, REMOVAL, Console Box.>
- 2) Disconnect the connector.
- 3) Remove the connector from the base plate using a flat-tip screwdriver.



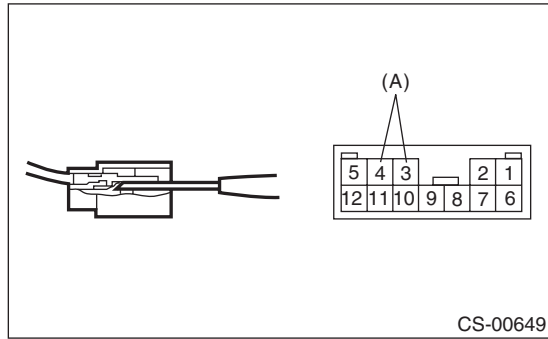
- 4) Remove the AT shift lock solenoid.



# AT Shift Lock Solenoid and “P” Range Switch

## CONTROL SYSTEMS

5) Disconnect the terminal of AT shift lock solenoid from the connector, using a flat-tip screwdriver.



(A) AT shift lock solenoid

## B: INSTALLATION

### NOTE:

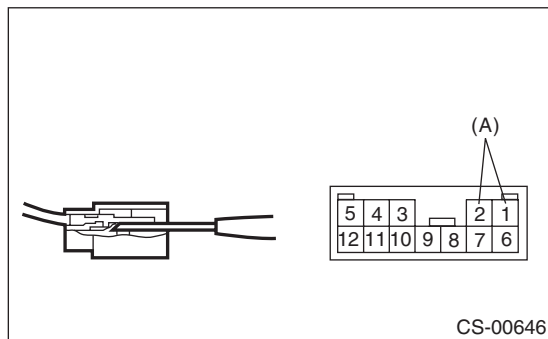
For installation of the mode change switch and the shift button switch, refer to the section on Select Levers. <Ref. to CS-25, ASSEMBLY, Select Lever.>

### 1. “P” RANGE SWITCH

Install in the reverse order of removal.

### NOTE:

Connect the “P” range switch terminal to connector.



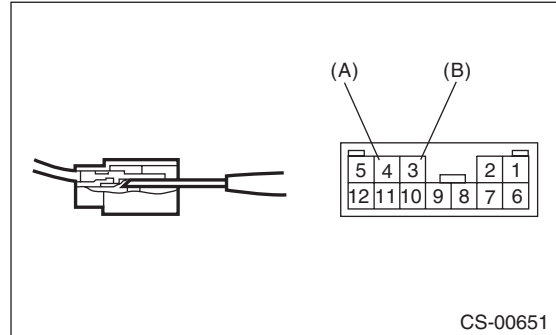
(A) “P” range switch (color code: Red)

### 2. AT SHIFT LOCK SOLENOID

Install in the reverse order of removal.

### NOTE:

Connect the AT shift lock solenoid switch terminal to connector.



(A) AT shift lock solenoid (color code: Black)

(B) AT shift lock solenoid (color code: Blue)



# AT Shift Lock Solenoid and “P” Range Switch

## C: INSPECTION

Step	Check	Yes	No
<b>1</b> <b>CHECK SHIFT LOCK SOLENOID.</b> Measure the resistance of shift lock solenoid connector terminals. <i>Terminals</i> <i>No. 4 — No. 3:</i>	Is the resistance between 19.8 — 24.2 $\Omega$ ?	Go to step 2.	Replace the shift lock solenoid.
<b>2</b> <b>CHECK SHIFT LOCK SOLENOID.</b> Connect the battery to shift lock solenoid connector terminal, and then operate the solenoid. <i>Terminals</i> <i>No. 3 (+) — No. 4 (-):</i>	Does the shift lock solenoid operate normally?	Go to step 3.	Replace the shift lock solenoid.
<b>3</b> <b>CHECK “P” RANGE SWITCH.</b> 1) Move the select lever to “P” range. 2) Measure the resistance between “P” range switch connector terminals. <i>Terminals</i> <i>No. 1 — No. 2:</i>	Is the resistance less than 1 $\Omega$ ?	Go to step 4.	Replace the “P” range switch.
<b>4</b> <b>CHECK “P” RANGE SWITCH.</b> 1) Set the select lever to other than “P” range. 2) Measure the resistance between “P” range switch connector terminals. <i>Terminals</i> <i>No. 1 — No. 2:</i>	Is the resistance 1 M $\Omega$ or more?	Normal	Replace the “P” range switch.

## 6. Body Integrated Unit

### A: NOTE

Refer to “Body Integrated Unit” for removal and installation procedure. <Ref. to SL-48, Body Integrated Unit.>

## 7. General Diagnostic Table

### A: INSPECTION

Symptom	Possible cause	Corrective action
Select lever	Starter does not run.	Adjust the select cable, or inspect circuit.
	Back-up light does not illuminate.	Adjust the select cable, or inspect circuit.
	AT shift lock system does not operate normally.	Adjust the select cable, or inspect circuit.
	Will not change to manual or sports mode.	Inspect the mode change switch and select lever, or inspect the circuit.
	Up-shift is not engaged at manual mode.	Check the shift-up switch and circuit.
	Down-shift is not engaged at manual mode.	Check the shift-down switch and circuit.

# General Diagnostic Table

CONTROL SYSTEMS

---

# AUTOMATIC TRANSMISSION

# 5AT

---

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# General Description

## AUTOMATIC TRANSMISSION

### 1. General Description

#### A: SPECIFICATION

##### 1. TORQUE CONVERTER CLUTCH

Type	Symmetric, 3 element, single stage, 2 phase torque converter
Stall torque ratio	1.8
Nominal diameter	246 mm (9.69 in)
Stall speed (at sea level)	2,100 — 2,600 rpm
One-way clutch	Sprag type one-way clutch

##### 2. OIL PUMP

Type	Internal gear fixed displacement pump	
Driving method	Driven by engine	
Number of teeth	Inner rotor	9
	Outer rotor	10

##### 3. TRANSMISSION CONTROL ELEMENT

Type	5-forward, 1-reverse, double-row planetary gears	
Multi-plate clutch	3 sets	
Multi-plate brake	3 sets	
One-way clutch (sprag type)	2 sets	

##### 4. TRANSMISSION GEAR RATIO

1st	3.540
2nd	2.264
3rd	1.471
4th	1.000
5th	0.834
Rev.	2.370

##### 5. PLANETARY GEAR AND PLATE

Number of front internal gear teeth	106
Number of front carrier teeth	28
Number of front sun gear teeth	50
Number of mid internal gear teeth	78
Number of mid carrier teeth	18
Number of mid sun gear teeth	42
Number of rear internal gear teeth	110
Number of rear carrier teeth	24
Number of rear sun gear teeth	62
Number of front brake drive plates	2
Number of input clutch drive plates	6
Number of high & low reverse clutch drive plates	4
Number of direct clutch drive plates	5
Number of reverse brake drive plates	5
Number of forward brake drive plates	5

##### 6. SELECTOR POSITION

P (Park)	Transmission is in neutral, output member is immovable, engine start is possible
R (Reverse)	Transmission in reverse for backing
N (Neutral)	Transmission is in neutral and engine start is possible
D (Drive)	Automatic gear change 1st ↔ 2nd ↔ 3rd ↔ 4th ↔ 5th
Manual mode (+)	Manual gear change 1st → 2nd → 3rd → 4th → 5th
Manual mode (-)	Manual gear change 1st ← 2nd ← 3rd ← 4th ← 5th
Control method	Wire cable type

##### 7. HYDRAULIC CONTROL AND LUBRICATION

Type	Electronic/hydraulic control [5 forward gear changes made by electronic signals of vehicle speed and accelerator (throttle) opening]
Fluid	Specified fluid: SUBARU ATF Recommended fluid : IDEMITSU ATF HP NOTE: Use of recommended fluid is permitted only when the specified fluid is not available in the local area.
Fluid capacity ℓ (US qt, Imp qt)	9.6 — 10.0 (10.1 — 10.6, 8.4 — 8.8)
Lubrication system	Forced feed lubrication with oil pump

## 8. COOLING AND HARNESS

Cooling system	Liquid-cooler incorporated in radiator
Transmission harness	20 + 8 poles

## 9. TRANSFER

Transfer type	Variable torque distribution (VTD)
Number of transfer clutch drives & driven plates	4
Reduction gear ratio	1.000 (41/41)

## 10.FINAL REDUCTION GEAR

Front final reduction gear ratio	3.583
----------------------------------	-------

## 11.RECOMMENDED GEAR OIL

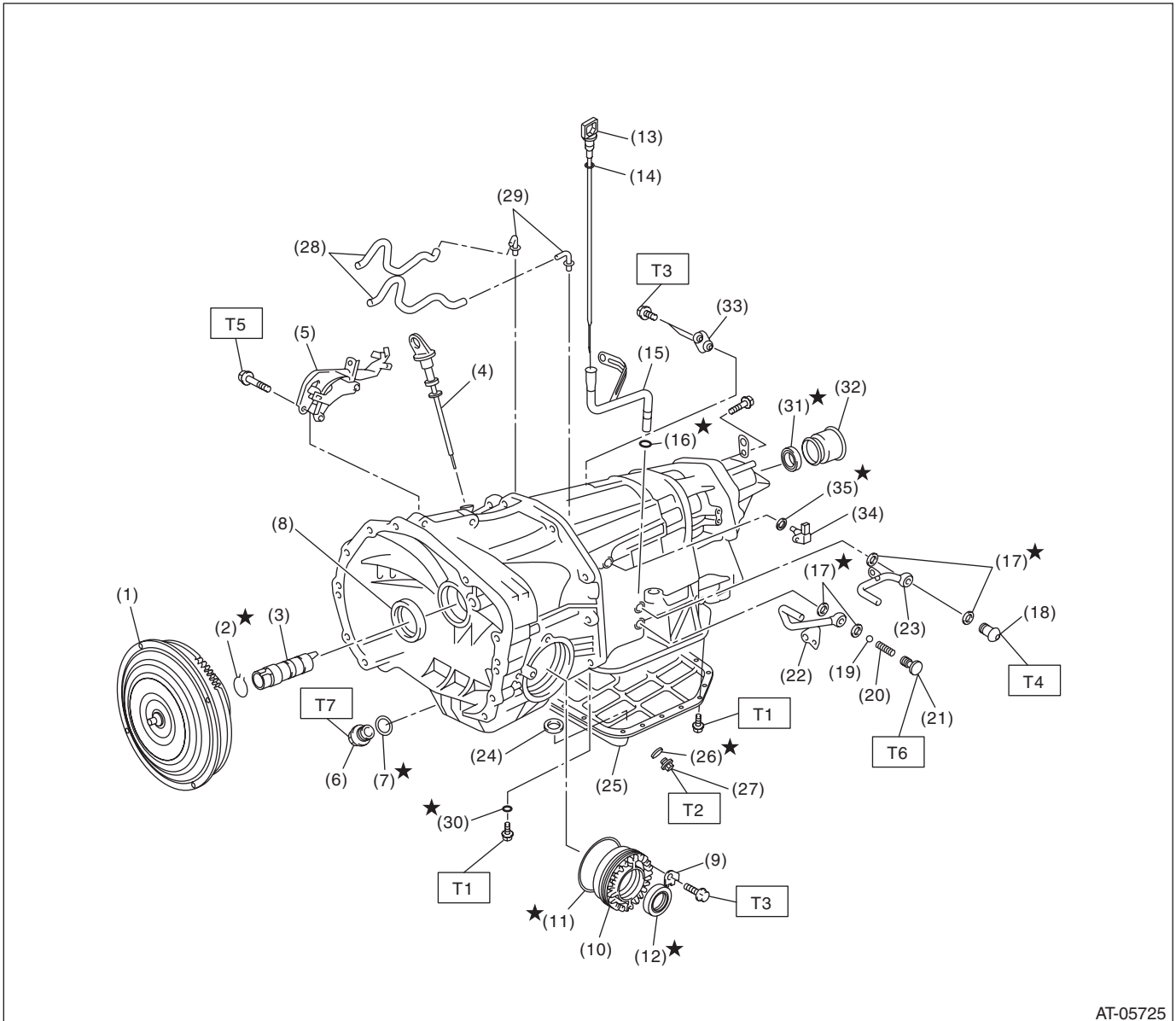
Lubrication oil	
Front differential gear oil capacity ℓ (US qt, Imp qt)	1.3 — 1.5 (1.4 — 1.6, 1.1 — 1.3)

# General Description

AUTOMATIC TRANSMISSION

## B: COMPONENT

### 1. TORQUE CONVERTER CLUTCH & TRANSMISSION ASSEMBLY





# General Description

AUTOMATIC TRANSMISSION

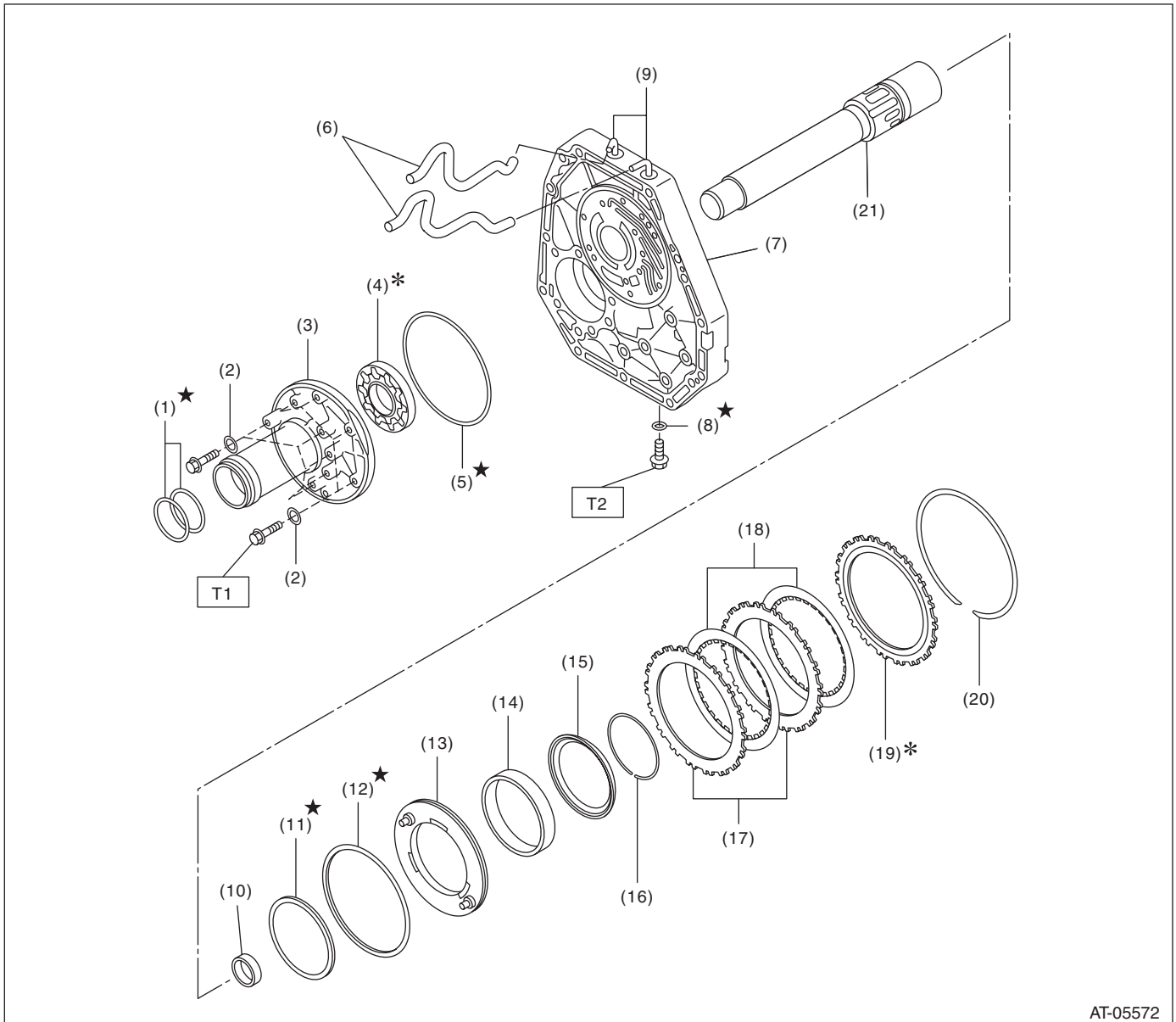
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(1) Torque converter ASSY	(16) O-ring	(31) Oil seal
(2) Circlip	(17) Gasket	(32) Dust cover
(3) Oil pump shaft	(18) Union screw	(33) Floating bracket
(4) Differential oil level gauge	(19) Ball	(34) Turbine speed sensor 1
(5) Pitching stopper bracket	(20) Spring	(35) O-ring
(6) Differential oil drain plug	(21) Union screw	
(7) Gasket	(22) ATF outlet pipe	<hr/> <b>Tightening torque:N·m (kgf-m, ft-lb)</b>
(8) Oil seal	(23) ATF inlet pipe	<b>T1: 5 (0.5, 3.7)</b>
(9) Lock plate	(24) Magnet	<b>T2: 20 (2.0, 14.8)</b>
(10) Side retainer	(25) Oil pan	<b>T3: 25 (2.5, 18.4)</b>
(11) O-ring	(26) Gasket	<b>T4: 40 (4.1, 29.5)</b>
(12) Oil seal	(27) ATF drain plug	<b>T5: 41 (4.2, 30.2)</b>
(13) ATF level gauge	(28) Breather hose	<b>T6: 45 (4.6, 33.2)</b>
(14) O-ring	(29) Nipple	<b>T7: 70 (7.1, 51.6)</b>
(15) Oil charge pipe	(30) O-ring	<hr/>

# General Description

## AUTOMATIC TRANSMISSION

### 2. OIL PUMP & FRONT BRAKE



AT-05572

- |                       |                         |                      |
|-----------------------|-------------------------|----------------------|
| (1) O-ring            | (10) Needle bearing     | (19) Retaining plate |
| (2) Washer            | (11) D-ring (Inner)     | (20) Snap ring       |
| (3) Oil pump housing  | (12) D-ring (Outer)     | (21) Stator shaft    |
| (4) Oil pump rotor    | (13) Front brake piston |                      |
| (5) O-ring            | (14) Return spring      |                      |
| (6) Air breather hose | (15) Retainer           |                      |
| (7) Oil pump cover    | (16) Snap ring          |                      |
| (8) O-ring            | (17) Driven plate       |                      |
| (9) Nipple            | (18) Drive plate        |                      |

**Tightening torque: N·m (kgf·m, ft·lb)**

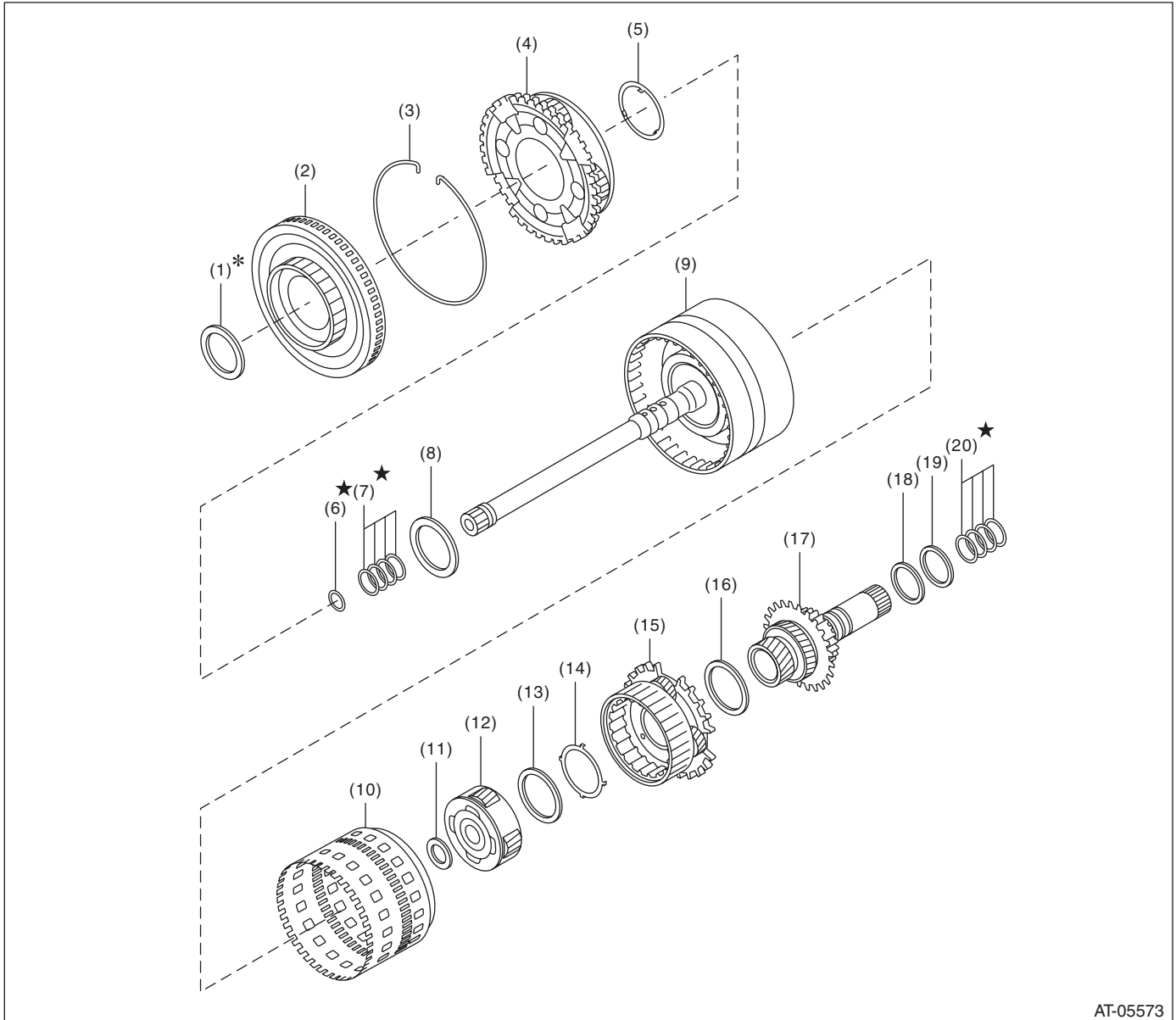
**T1: 10 (1.0, 7.4)**

**T2: 13 (1.3, 9.6)**

# General Description

AUTOMATIC TRANSMISSION

## 3. FRONT PLANETARY CARRIER AND MIDDLE & REAR PLANETARY CARRIER



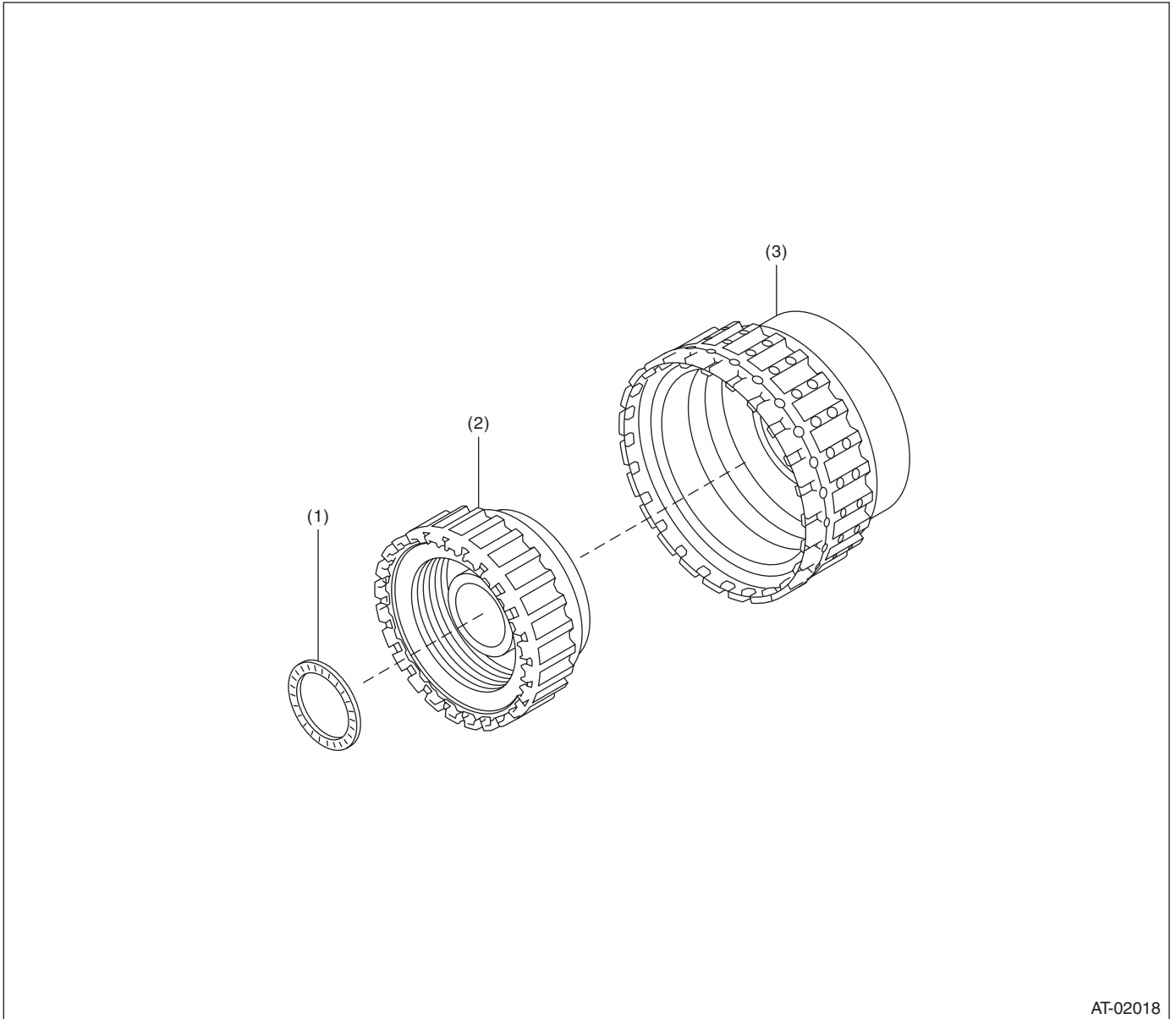
AT-05573

- |                         |                              |                                  |
|-------------------------|------------------------------|----------------------------------|
| (1) Thrust bearing      | (8) Thrust bearing           | (15) Rear carrier ASSY           |
| (2) Front sun gear ASSY | (9) Input clutch ASSY        | (16) Thrust bearing              |
| (3) Snap ring           | (10) Rear internal gear ASSY | (17) Middle & rear sun gear ASSY |
| (4) Front carrier ASSY  | (11) Thrust bearing          | (18) Washer                      |
| (5) Race bearing        | (12) Middle carrier ASSY     | (19) Thrust bearing              |
| (6) O-ring              | (13) Thrust bearing          | (20) Seal ring                   |
| (7) Seal ring           | (14) Race bearing            |                                  |

# General Description

AUTOMATIC TRANSMISSION

## 4. DIRECT CLUTCH AND HIGH & LOW REVERSE CLUTCH



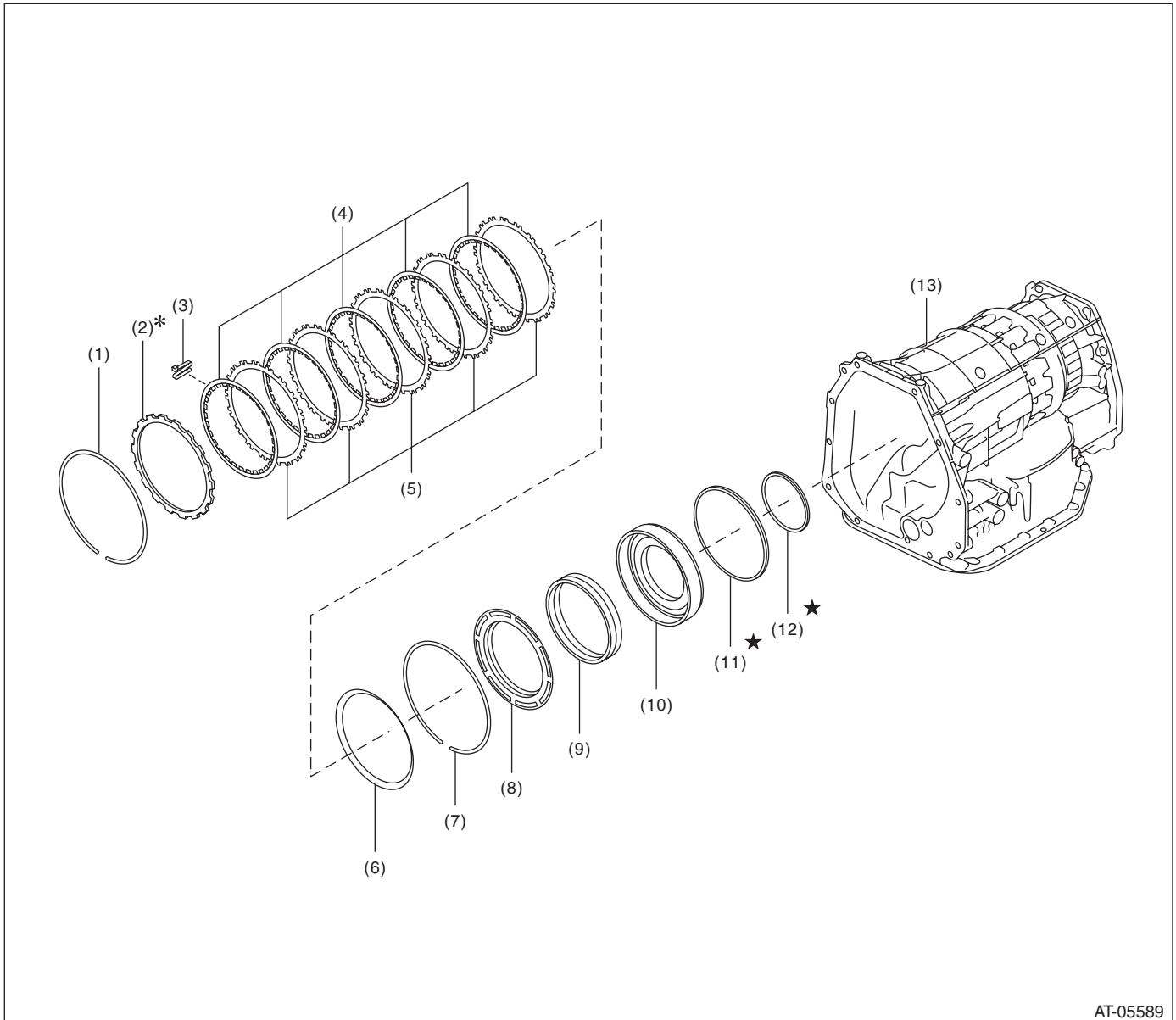
AT-02018

(1) Thrust bearing

(2) High & low reverse clutch ASSY

(3) Direct clutch ASSY

## 5. REVERSE BRAKE



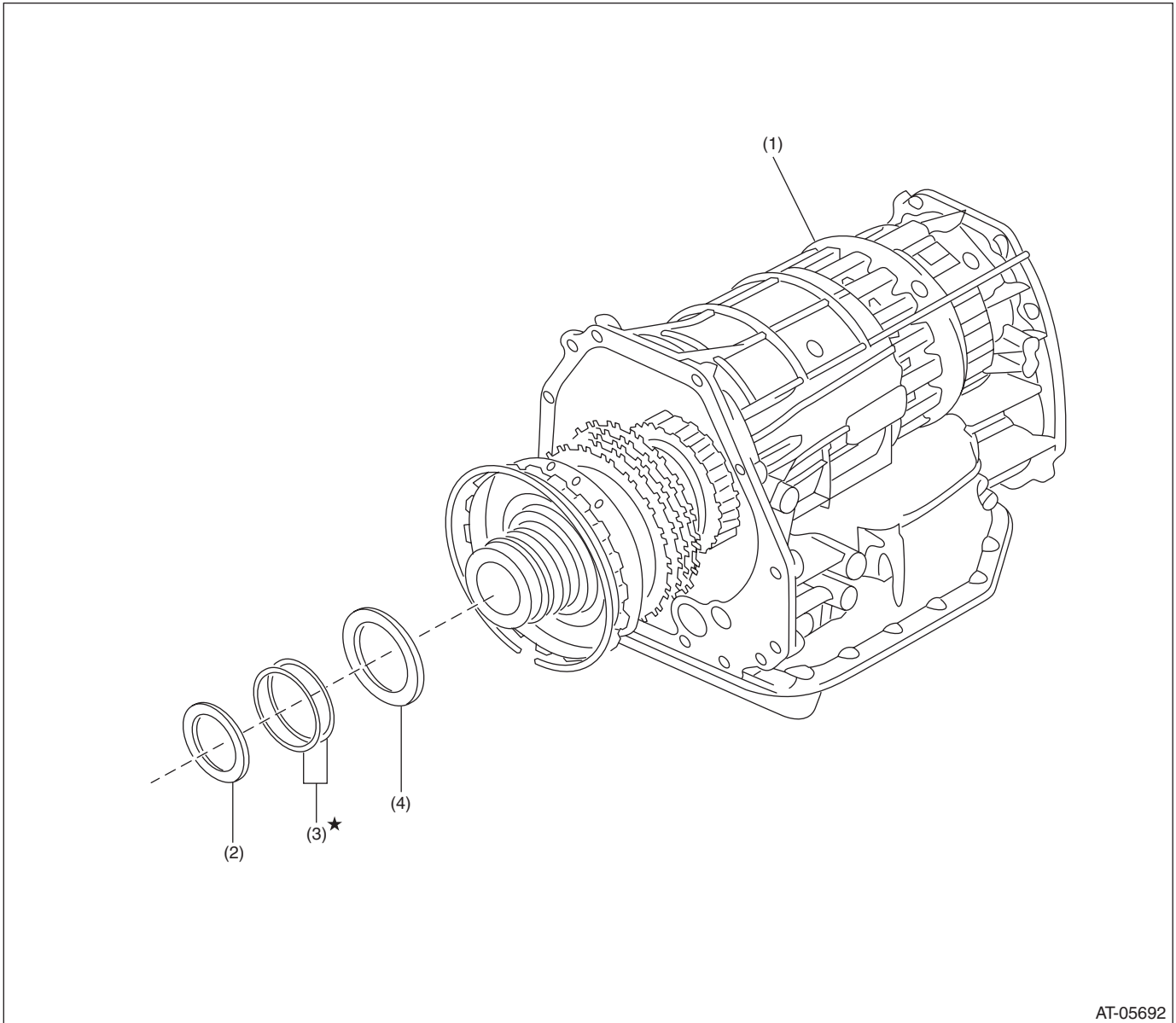
AT-05589

- |                     |                 |                           |
|---------------------|-----------------|---------------------------|
| (1) Snap ring       | (6) Dish plate  | (10) Reverse brake piston |
| (2) Retaining plate | (7) Snap ring   | (11) D-ring (outer)       |
| (3) Leaf spring     | (8) Retainer    | (12) D-ring (inner)       |
| (4) Drive plate     | (9) Leaf spring | (13) AT main case         |
| (5) Driven plate    |                 |                           |

# General Description

AUTOMATIC TRANSMISSION

## 6. SHORT AT ASSEMBLY

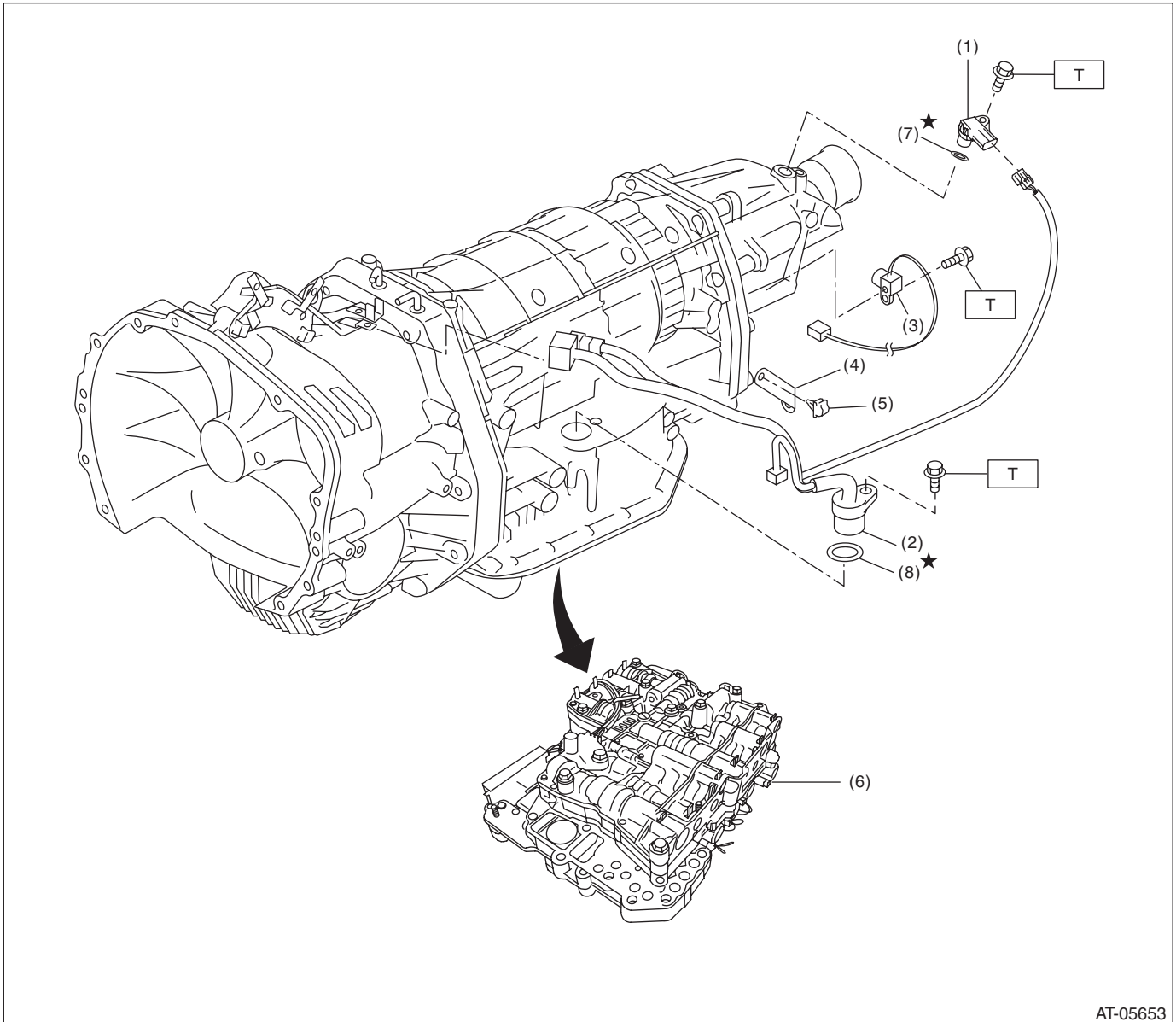


AT-05692

(1) Short AT ASSY (non-disassembly) (3) Seal ring  
(2) Thrust bearing

(4) Thrust bearing

## 7. CONTROL VALVE & TRANSMISSION HARNESS



AT-05653

- |                                |                        |
|--------------------------------|------------------------|
| (1) Rear vehicle speed sensor  | (5) Clip               |
| (2) Transmission harness ASSY  | (6) Control valve ASSY |
| (3) Front vehicle speed sensor | (7) O-ring             |
| (4) Harness bracket            | (8) O-ring             |

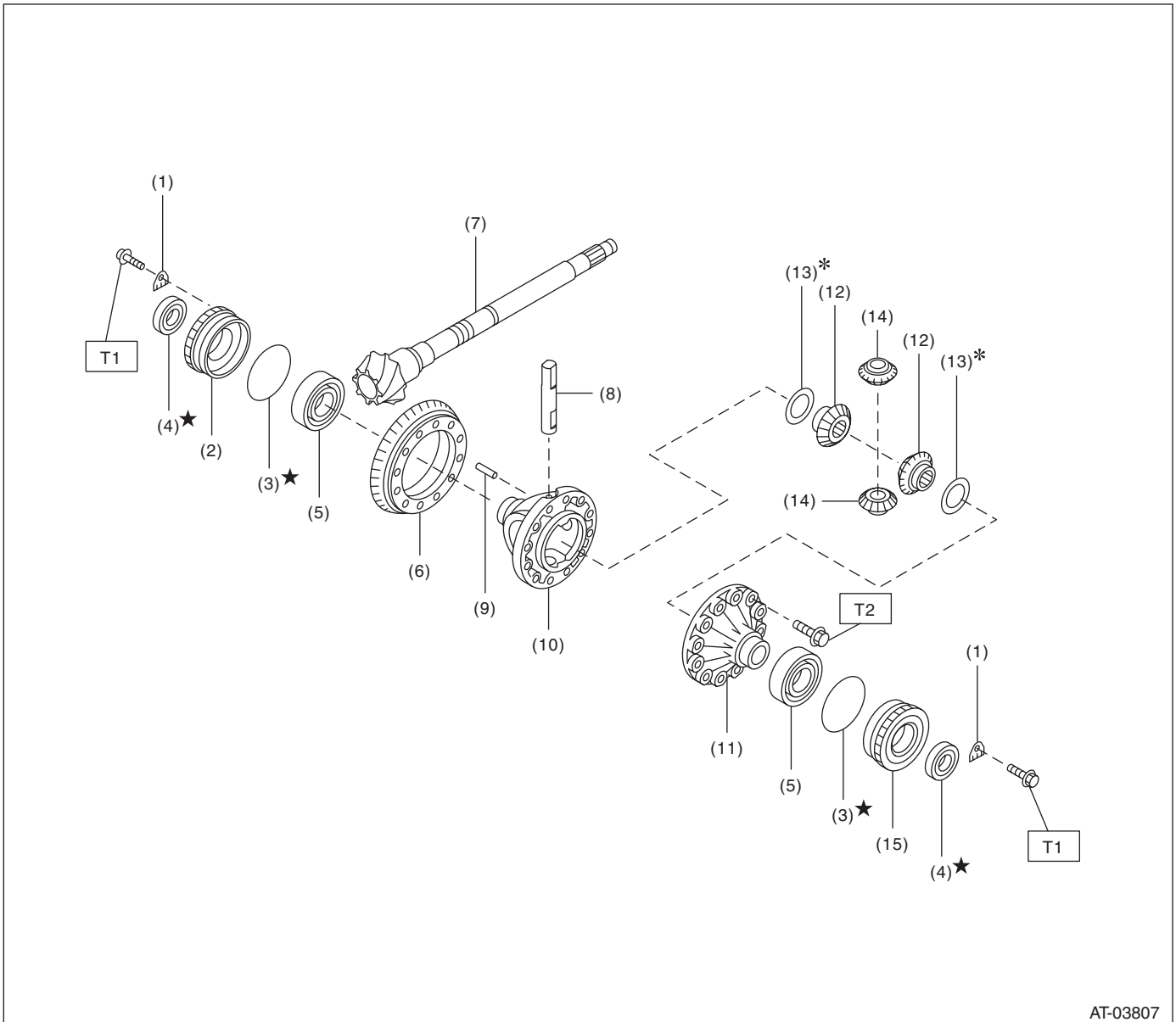
**Tightening torque: N·m (kgf-m, ft-lb)**

**T: 7 (0.7, 5.2)**

# General Description

## AUTOMATIC TRANSMISSION

### 8. DIFFERENTIAL GEAR



AT-03807

- |                                   |                                    |
|-----------------------------------|------------------------------------|
| (1) Lock plate                    | (9) Straight pin                   |
| (2) Differential side retainer RH | (10) Differential case RH          |
| (3) O-ring                        | (11) Differential case LH          |
| (4) Oil seal                      | (12) Differential bevel gear       |
| (5) Taper roller bearing          | (13) Washer                        |
| (6) Hypoid driven gear            | (14) Differential bevel pinion     |
| (7) Drive pinion shaft            | (15) Differential side retainer LH |
| (8) Pinion shaft                  |                                    |

**Tightening torque: N·m (kgf·m, ft·lb)**

**T1: 25 (2.5, 18.4)**

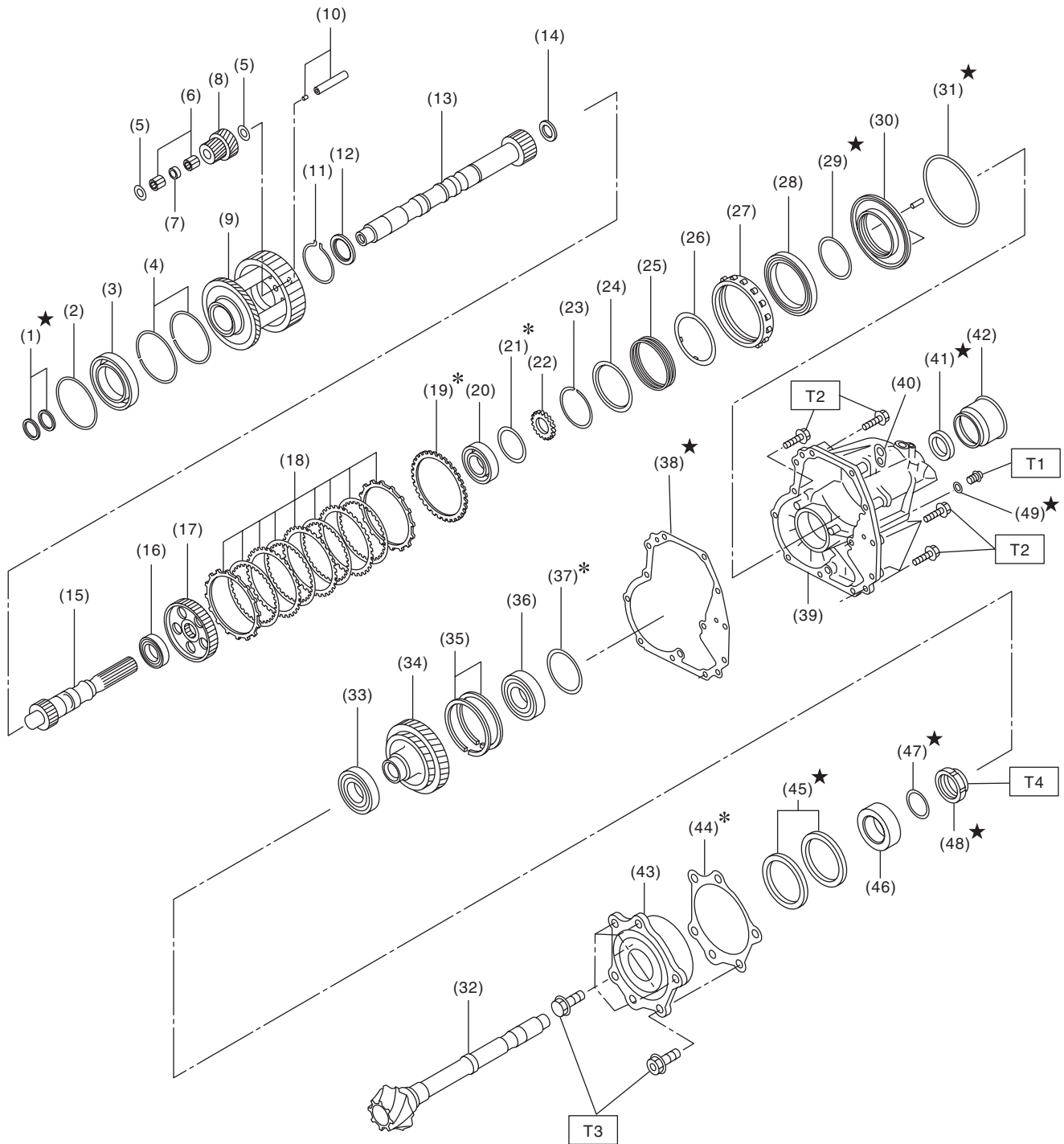
**T2: 70 (7.1, 51.6)**



# General Description

AUTOMATIC TRANSMISSION

## 9. TRANSFER CASE AND EXTENSION CASE & REDUCTION GEAR



AT-05726

# General Description

## AUTOMATIC TRANSMISSION

---

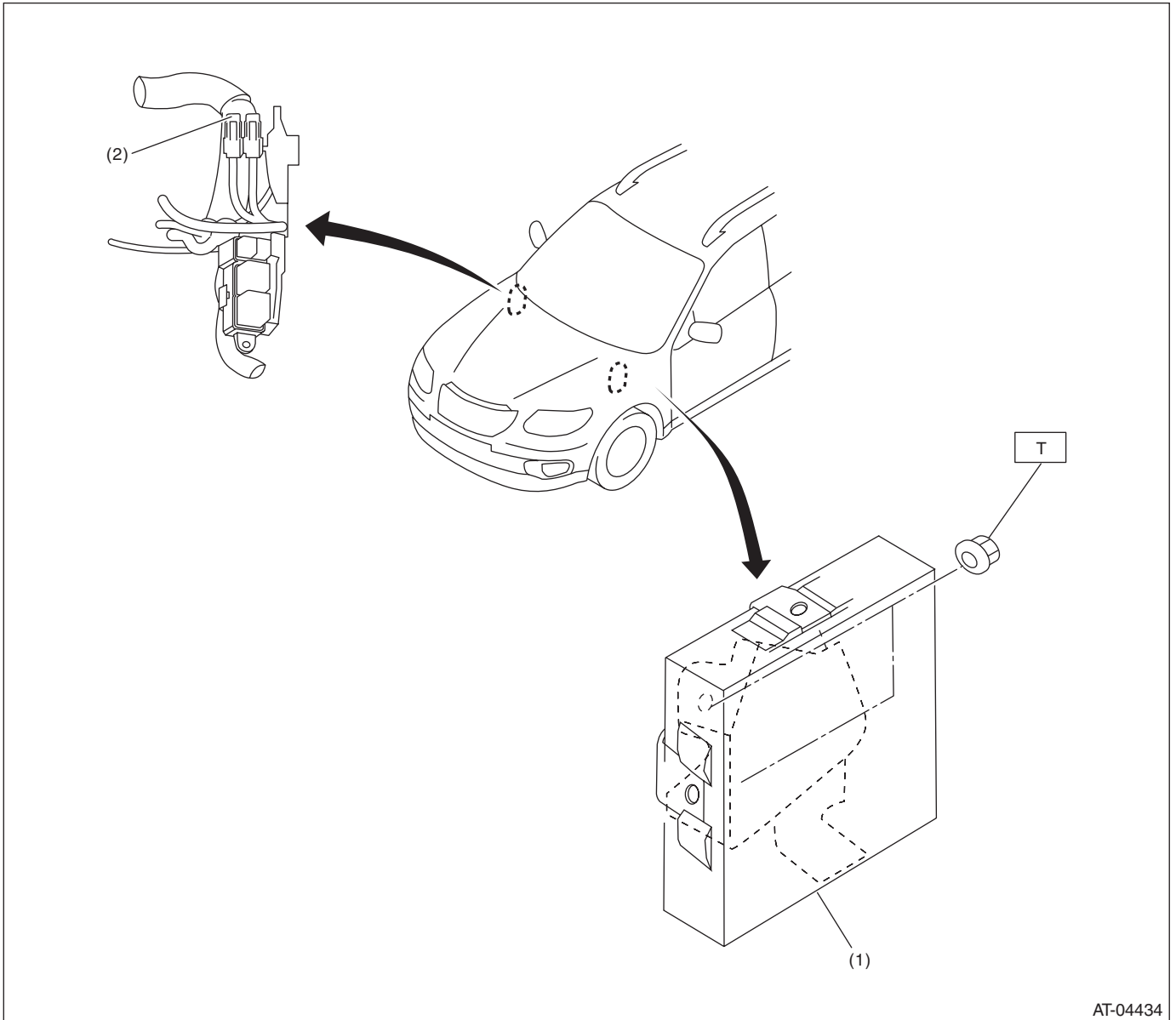
(1) Seal ring	(20) Ball bearing	(39) Extension case
(2) Reduction gear shim	(21) Rear drive shaft shim	(40) Transmission hanger
(3) Ball bearing	(22) Revolution gear	(41) Oil seal
(4) Snap ring	(23) Snap ring	(42) Dust cover
(5) Planetary pinion washer	(24) Clutch spring retainer	(43) Taper roller bearing
(6) Needle bearing	(25) Return spring	(44) Drive pinion shim
(7) Spacer	(26) Spring retainer	(45) Oil seal
(8) Pinion gear	(27) Pressure plate	(46) Drive pinion collar
(9) Planetary carrier ASSY	(28) Ball bearing	(47) O-ring
(10) Planetary pinion shaft ASSY	(29) O-ring	(48) Lock nut
(11) Snap ring	(30) Transfer clutch piston	(49) O-ring
(12) Thrust bearing	(31) D-ring	
(13) Intermediate shaft	(32) Drive pinion shaft	
(14) Thrust washer	(33) Ball bearing	
(15) Rear drive shaft	(34) Reduction driven gear	
(16) Ball bearing	(35) Snap ring	
(17) Transfer clutch hub	(36) Ball bearing	
(18) Transfer clutch plate	(37) Shim	
(19) Driven plate No. 3.	(38) Gasket	

---

**Tightening torque:N·m (kgf·m, ft·lb)****T1: 13 (1.3, 9.6)****T2: 25 (2.5, 18.4)****T3: 70 (7.1, 51.6)****T4: 116 (11.8, 85.6)**

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## 10. TRANSMISSION CONTROL MODULE



AT-04434

(1) Transmission control module (TCM)

(2) Relay

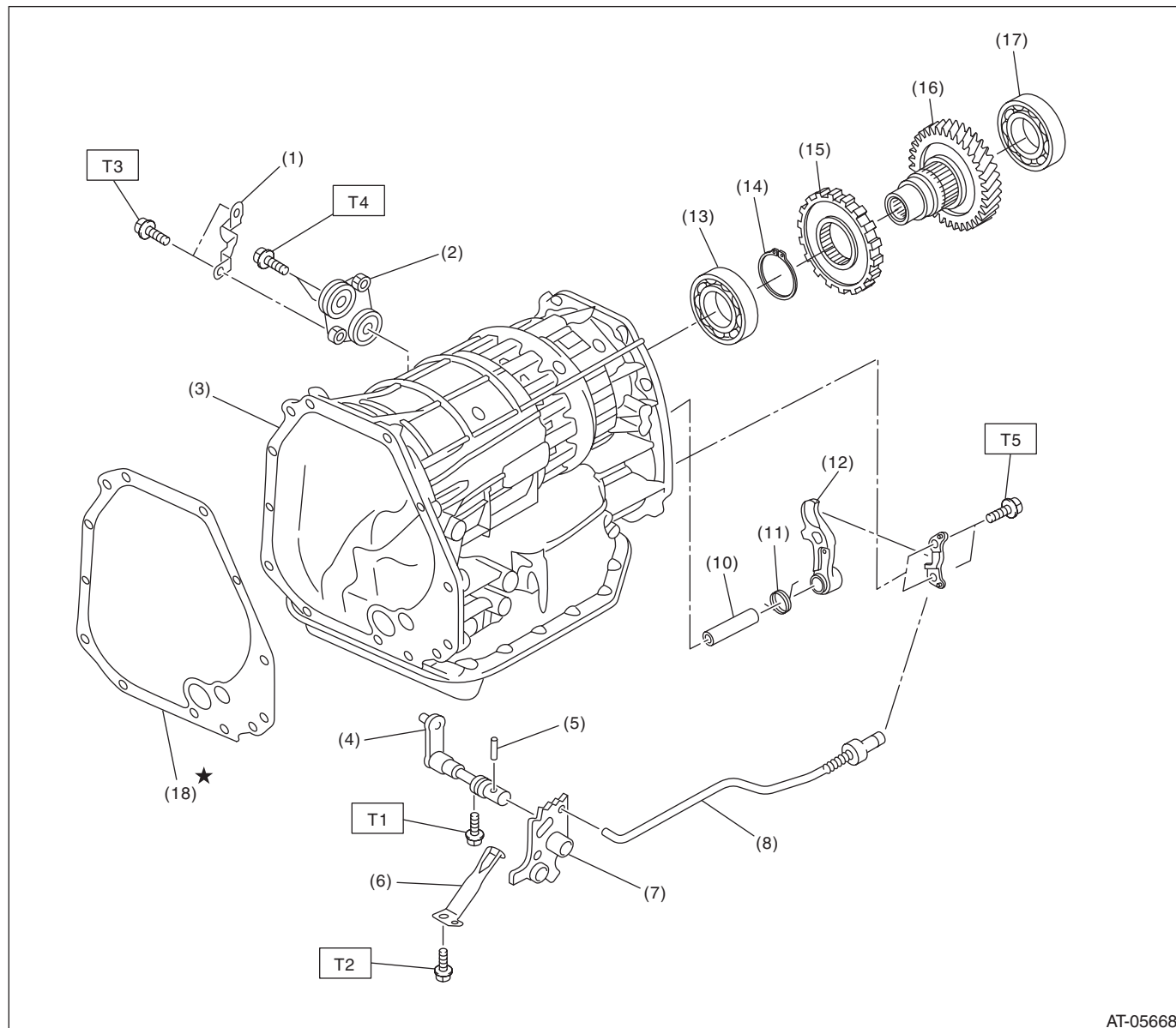
**Tightening torque: N·m (kgf·m, ft·lb)**

**T: 7.5 (0.8, 5.5)**

# General Description

AUTOMATIC TRANSMISSION

## 11. TRANSMISSION CONTROL DEVICE & PARKING SUPPORT



AT-05668

- |                              |                            |
|------------------------------|----------------------------|
| (1) Bracket                  | (10) Parking pawl shaft    |
| (2) Floating bracket         | (11) Return spring         |
| (3) AT main case             | (12) Parking pawl          |
| (4) Range select lever       | (13) Ball bearing          |
| (5) Straight pin             | (14) Snap ring             |
| (6) Detent spring            | (15) Parking gear          |
| (7) Manual plate             | (16) Reduction driven gear |
| (8) Parking rod              | (17) Ball bearing          |
| (9) Parking support actuator | (18) Gasket                |

**Tightening torque: N·m (kgf·m, ft·lb)**

**T1: 6 (0.6, 4.4)**

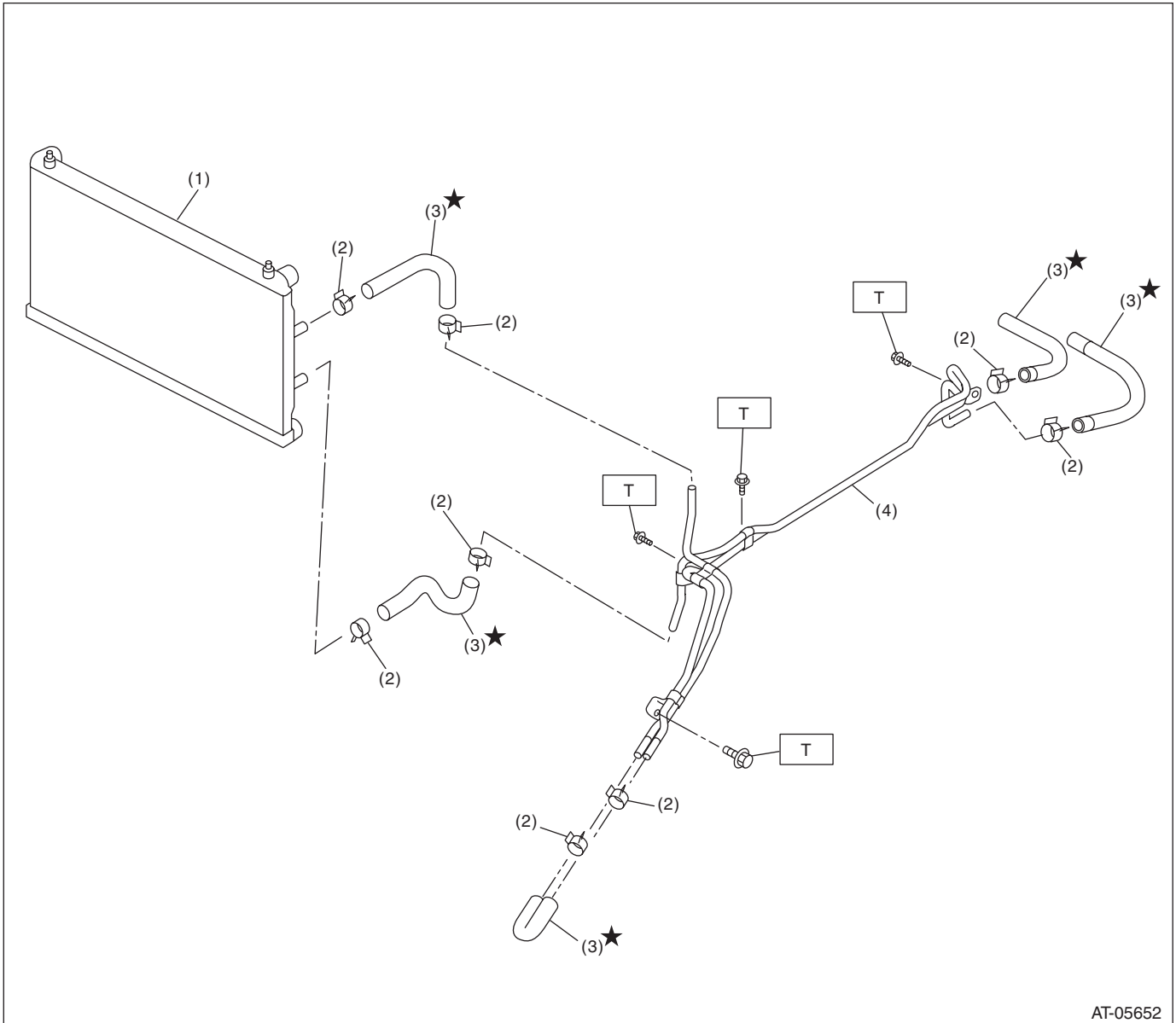
**T2: 7 (0.7, 5.2)**

**T3: 18 (1.8, 13.3)**

**T4: 25 (2.5, 18.4)**

**T5: <Ref. to 5AT-73, Parking Pawl.>**

## 12.OIL COOLER PIPE AND OIL COOLER



AT-05652

- |              |                     |
|--------------|---------------------|
| (1) Radiator | (3) ATF hose        |
| (2) Clip     | (4) ATF cooler pipe |

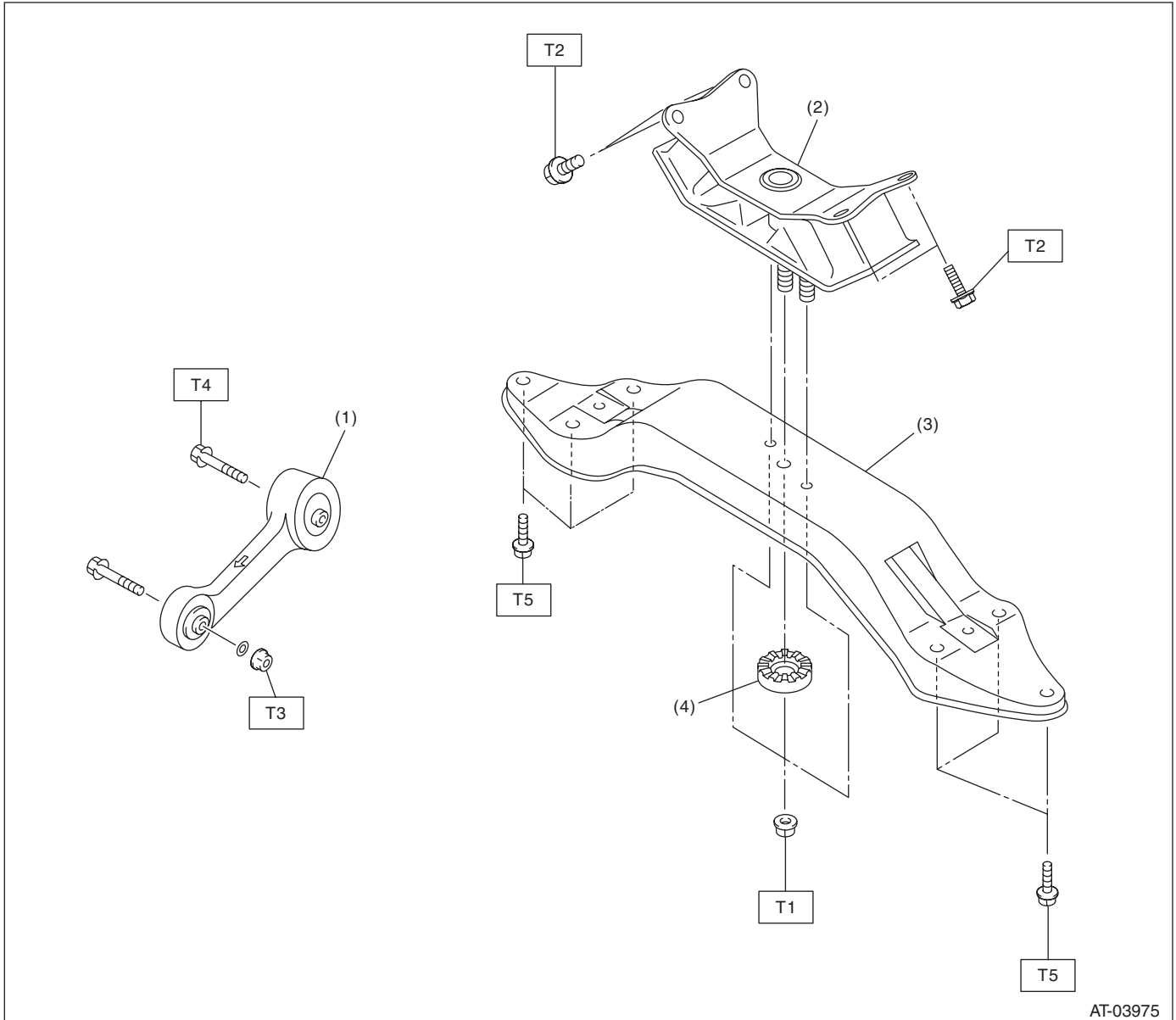
**Tightening torque: N·m (kgf·m, ft·lb)**

**T: 7.5 (0.8, 5.5)**

# General Description

AUTOMATIC TRANSMISSION

## 13. TRANSMISSION MOUNTING



- (1) Pitching stopper
- (2) Rear cushion rubber
- (3) Crossmember
- (4) Stopper

**Tightening torque: N·m (kgf·m, ft·lb)**

**T1: 35 (3.6, 25.8)**

**T2: 40 (4.1, 29.5)**

**T3: 50 (5.1, 36.9)**

**T4: 58 (5.9, 42.8)**

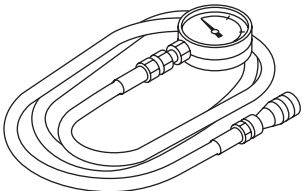
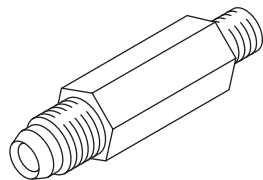
**T5: 75 (7.6, 55.3)**

## C: CAUTION

- Wear appropriate work clothing, including a cap, protective goggles and protective shoes when performing any work.
- Remove contamination including dirt and corrosion before removal, installation or disassembly.
- Keep the disassembled parts in order and protect them from dust and 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, disassembly and replacement.
- When disassembling the case and other light alloy parts, disassemble them by slightly tapping with a plastic hammer. Do not pry apart with screwdrivers or other tools.
- Vehicle components are extremely hot after driving. Be wary of receiving burns from heated parts.
- Use SUBARU genuine gear oil, grease or equivalent. Do not mix them of different grades or manufacturers.
- Be sure to tighten bolts and nuts to the specified torque.
- Place shop jacks or rigid racks at the specified points.
- Apply gear oil onto sliding or revolving surfaces before installation.
- Replace deformed or damaged snap rings with new parts.
- Before installing O-rings or oil seals, apply sufficient amount of ATF 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 cloth between the part and the vise.
- Avoid damaging the mating surface of the case.
- Before applying liquid gasket, completely remove the old liquid gasket.
- During disassembly or assembly, be sure to use nylon gloves or paper towels. Do not use cloth gloves or waste cloth.

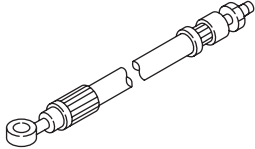
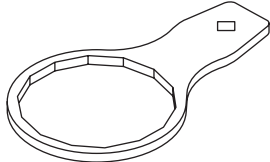
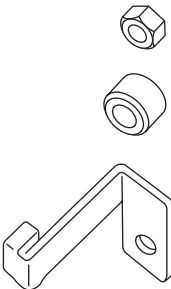
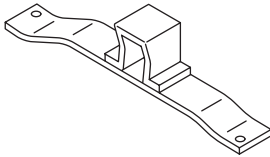
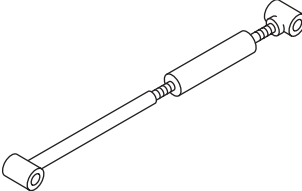
## D: PREPARATION TOOL

### 1. SPECIAL TOOL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498575400	498575400	OIL PRESSURE GAUGE ASSY	Used for measuring oil pressure.
 ST-498897200	498897200	OIL PRESSURE ADAPTER	Used together with oil pump cover installed on when measuring line pressure.

# General Description

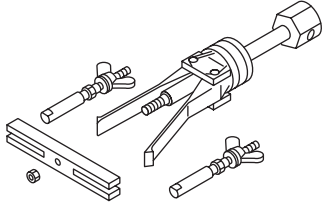
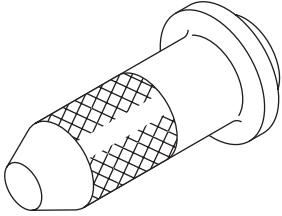
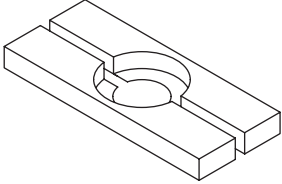
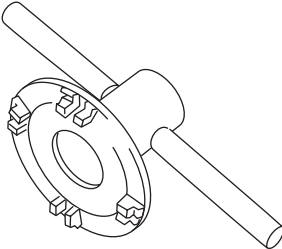
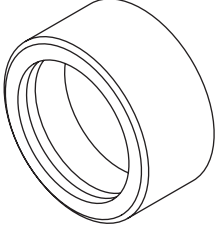
## AUTOMATIC TRANSMISSION

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p style="text-align: center;">ST-498897800</p>	498897800	OIL PRESSURE ADAPTER SET	Used for measuring transfer clutch pressure.
 <p style="text-align: center;">ST-498545400</p>	498545400	FILTER WRENCH	Used for removing and installing the ATF filter.
 <p style="text-align: center;">ST-498277200</p>	498277200	STOPPER SET	Used for preventing the torque converter assembly from falling when removing and installing the automatic transmission assembly.
 <p style="text-align: center;">ST41099AA010</p>	41099AA010	ENGINE SUPPORT BRACKET	Used for supporting engine.
 <p style="text-align: center;">ST41099AA020</p>	41099AA020	ENGINE SUPPORT	Used for supporting engine.



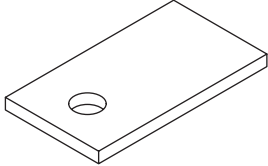
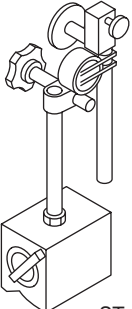
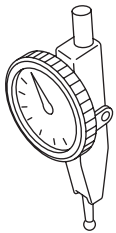
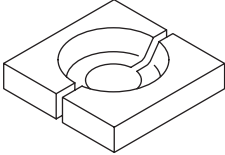
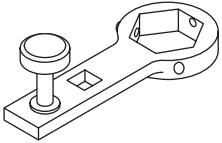
# General Description

AUTOMATIC TRANSMISSION

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>ST-398527700</p>	398527700	PULLER ASSY	<ul style="list-style-type: none"> <li>• Used for removing the extension case roller bearing.</li> <li>• Used for removing the extension oil seal.</li> <li>• Used for removing the front differential side retainer bearing outer race.</li> <li>• Used for removing the front differential side retainer oil seal.</li> </ul>
 <p>ST-498057300</p>	498057300	INSTALLER	Used for installing the extension oil seal.
 <p>ST-498077000</p>	498077000	REMOVER	Used for removing the differential taper roller bearing.
 <p>ST18630AA010</p>	18630AA010	WRENCH COMPL RETAINER	Used for removing and installing the differential side retainer.
 <p>ST-398487700</p>	398487700	DRIFT	Used for installing the front differential taper roller bearing.

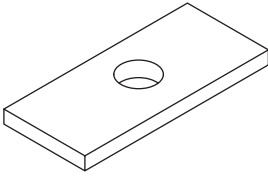
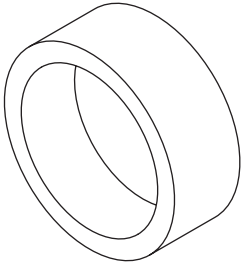
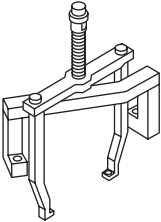
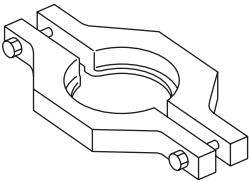
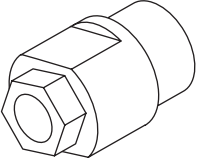
# General Description

## AUTOMATIC TRANSMISSION

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p style="text-align: center;">ST-498255400</p>	498255400	PLATE	Used for measuring the backlash of hypoid gear.
 <p style="text-align: center;">ST-498247001</p>	498247001	MAGNET BASE	<ul style="list-style-type: none"> <li>• Used for measuring the gear backlash.</li> <li>• Used together with DIAL GAUGE (498247100).</li> </ul>
 <p style="text-align: center;">ST-498247100</p>	498247100	DIAL GAUGE	<ul style="list-style-type: none"> <li>• Used for measuring the gear backlash.</li> <li>• Used together with MAGNET BASE (498247001).</li> </ul>
 <p style="text-align: center;">ST-498517000</p>	498517000	REPLACER	Used for removing the front roller bearing.
 <p style="text-align: center;">ST-499787700</p>	499787700	WRENCH	Used for removing and installing the drive pinion lock nut.

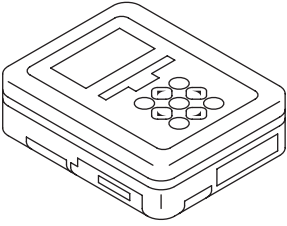
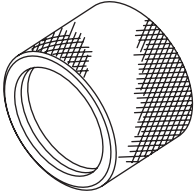
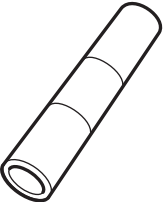
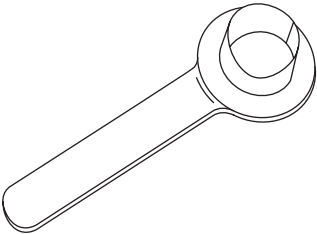
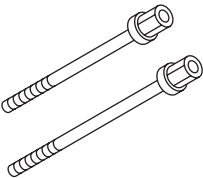
# General Description

AUTOMATIC TRANSMISSION

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>ST-398643600</p>	398643600	GAUGE	Used for measuring the total end play, extension end play and drive pinion height.
 <p>ST-398744300</p>	398744300	PISTON GUIDE	Used for measuring height from mating surface of the main case to pressure plate.
 <p>ST-499737100</p>	499737100	PULLER SET	Used for removing the reduction driven gear assembly.
 <p>ST-498077600</p>	498077600	REMOVER	Used for removing the ball bearing.
 <p>ST18667AA010</p>	18667AA010	HOLDER	<ul style="list-style-type: none"> <li>• Used for removing and installing the drive pinion lock nut.</li> <li>• Used as a handle to rotate gear when checking tooth contact.</li> </ul>

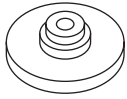
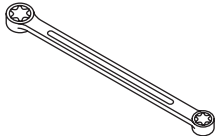
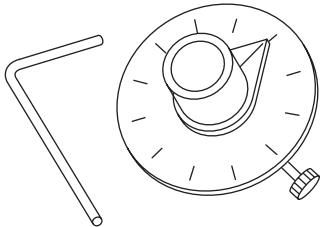
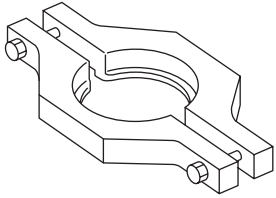
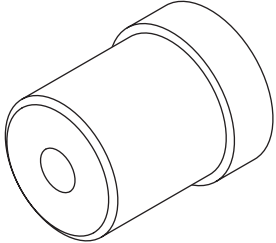
# General Description

## AUTOMATIC TRANSMISSION

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p style="text-align: center;">ST1B022XU0</p>	1B022XU0	SUBARU SELECT MONITOR III KIT	Used for troubleshooting the electrical system.
 <p style="text-align: center;">ST18675AA000</p>	18675AA000	DIFFERENTIAL SIDE OIL SEAL INSTALLER	Used for installing the differential side retainer oil seal.
 <p style="text-align: center;">ST18654AA000</p>	18654AA000	INSTALLER	Used for removing and installing the ball bearing.
 <p style="text-align: center;">ST28399SA010</p>	28399SA010	OIL SEAL PROTECTOR	Used for protecting oil seal when installing front drive shaft.
 <p style="text-align: center;">ST18763AA000</p>	18763AA000	COMPRESSOR SHAFT	Used for disassembling multi-plate clutch for shift transmission.

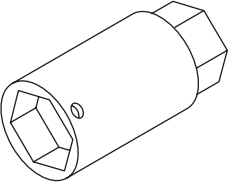
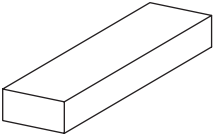
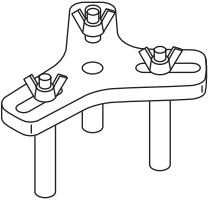
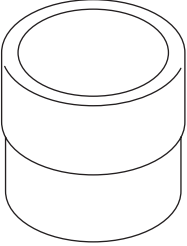
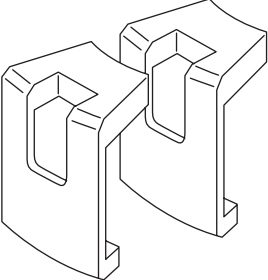
# General Description

AUTOMATIC TRANSMISSION

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>ST18765AA000</p>	18765AA000	COMPRESSOR SUPPORT	Used for disassembling multi-plate clutch for shift transmission.
 <p>ST18676AA020</p>	18676AA020	TORX® WRENCH	Used for disassembling torque converter case.
 <p>ST18854AA000</p>	18854AA000	ANGLE GAUGE	Used for tightening parking support.
 <p>ST-498077300</p>	498077300	REMOVER	Used for removing ball bearing of reduction driven gear.
 <p>ST-499587100</p>	499587100	OIL SEAL INSTALLER	Used for installing the oil seal.

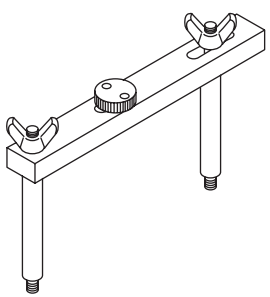
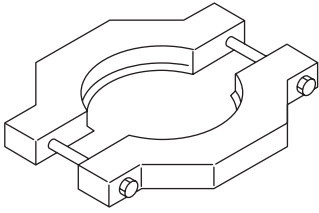
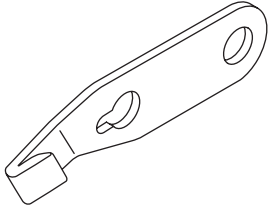
# General Description

## AUTOMATIC TRANSMISSION

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p style="text-align: center;">ST-499787500</p>	499787500	ADAPTER	Used for removing and installing drive pinion lock nut.
 <p style="text-align: center;">ST-499575400</p>	499575400	GAUGE	Used for measuring height of total end play.
 <p style="text-align: center;">ST18762AA000</p>	18762AA000	COMPRESSOR SPECIAL TOOL	Used for disassembling multi-plate clutch for shift transmission.
 <p style="text-align: center;">ST-499755602</p>	499755602	PRESS	Used for installing the parking gear.
 <p style="text-align: center;">ST18680AA010</p>	18680AA010	HOLDER GEAR	Used for removing reduction driven gear assembly. (2-piece set)

# General Description

AUTOMATIC TRANSMISSION

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>ST18766AA000</p>	18766AA000	SUPPORT PULLER	Used for removing reduction driven gear assembly.
 <p>ST18767AA000</p>	18767AA000	REMOVER	<ul style="list-style-type: none"> <li>• Used to pull out the parking gear.</li> <li>• Used to pull out the bearing from the VTD assembly.</li> </ul>
 <p>ST-498497100</p>	498497100	CRANKSHAFT STOPPER	Used for stopping the drive plate rotation when removing and installing the drive plate.

## 2. GENERAL TOOL

TOOL NAME	REMARKS
Depth gauge	Used for measuring the transmission end play.
Thickness gauge	Used for measuring clearance of the clutch, brake and oil pump.
Micrometer	Used for measuring thickness of the drive pinion.
Spring scale	Used for measuring the starting torque of the drive pinion.
Circuit tester	Used for measuring resistance and voltage.
TORX® T70	Used for removing and installing differential gear oil drain plug.
Snap ring pliers	Used for removing and installing each snap ring.

# Automatic Transmission Fluid

## AUTOMATIC TRANSMISSION

## 2. Automatic Transmission Fluid

### A: INSPECTION

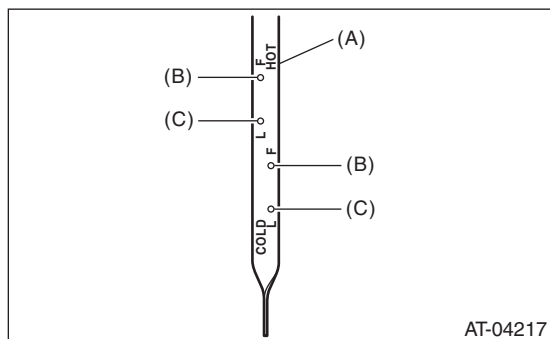
#### NOTE:

The level of ATF varies with fluid temperature. Pay attention to the ATF temperature when checking ATF level.

1) Raise the ATF temperature by driving a distance of 5 to 10 km (3 to 6 miles). Otherwise, idle the engine to raise ATF temperature to 70 — 80°C (158 — 176°F) on Subaru Select Monitor. <Ref. to 5AT(diag)-16, READ CURRENT DATA, OPERATION, Subaru Select Monitor.>

2) Park the vehicle on a level surface.

3) After selecting all positions (P, R, N, D), set the select lever in “P” range. Idle the engine for 1 or 2 minutes, and measure the ATF level.



- (A) ATF level gauge
- (B) Upper level
- (C) Lower level

4) Make sure that the ATF level is between upper and lower marks of the HOT side.

5) If the ATF level is below the lower mark, add recommended ATF until the fluid level is between upper and lower marks.

#### CAUTION:

- Be careful not to exceed the upper level.
- When the transmission is cold, be careful not to add ATF to the upper level on HOT side. **Overfilling of ATF may cause oil splashing.**

6) Raise the ATF temperature by driving a distance of 5 to 10 km (3 to 6 miles). Otherwise, idle the engine to raise ATF temperature to 70 — 80°C (158 — 176°F) on Subaru Select Monitor. <Ref. to 5AT(diag)-16, READ CURRENT DATA, OPERATION, Subaru Select Monitor.>

7) Check the ATF for leaks.

Visually check for leaks in the transmission. If there are leaks, replace the gasket, oil seal, plug or other parts.

### B: REPLACEMENT

- 1) Lift up the vehicle.
- 2) Remove the ATF drain plug to drain ATF.

#### CAUTION:

- Be careful not to spill differential gear oil on the exhaust pipe to prevent it from emitting smoke or causing a fire. If differential gear oil is spilled on the exhaust pipe, wipe it off completely.

- Directly after the vehicle has been running or the engine has been long idle running, the ATF is hot. Be careful not to burn yourself.

3) Check the ATF condition. <Ref. to 5AT-29, CONDITION CHECK, Automatic Transmission Fluid.>

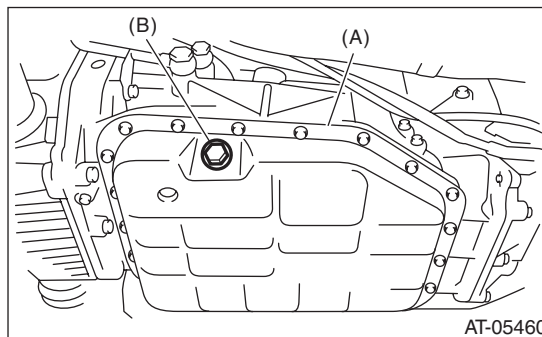
4) Tighten the ATF drain plug.

#### NOTE:

Use a new gasket.

#### Tightening torque:

**20 N·m (2.0 kgf·m, 14.8 ft·lb)**



- (A) Oil pan
- (B) ATF drain plug

5) Lower the vehicle.

6) Pour ATF from the oil charge pipe.

#### Specified fluid:

**SUBARU ATF**

#### Recommended fluid:

**IDEMITSU ATF HP**

#### NOTE:

Use of the recommended fluid is permitted only in regions where the specified fluid is not available.

#### Capacity:

**Fill with the same amount of ATF as drained.**

#### Capacity when transmission is overhauled:

**9.6 — 10.0 ℓ (10.1 — 10.6 US qt, 8.4 — 8.8 Imp qt)**

7) Check the level and leaks of ATF. <Ref. to 5AT-28, INSPECTION, Automatic Transmission Fluid.>



## C: CONDITION CHECK

**NOTE:**

When replacing ATF, check the inside condition of transmission body by inspecting the drained ATF.

Fluid condition	Trouble and possible cause	Corrective action
Large amount of metallic pieces are found.	Internal metal parts of transmission body are excessively worn.	Replace ATF and check if AT operates correctly.
Is thick and is a varnish-form fluid.	Clutch etc. is burned.	Replace ATF and check the AT body or vehicle for faulty.
Clouded fluid or bubbles are found in fluid.	Water is mixed.	Replace ATF and check the water entering point.

# Differential Gear Oil

## AUTOMATIC TRANSMISSION

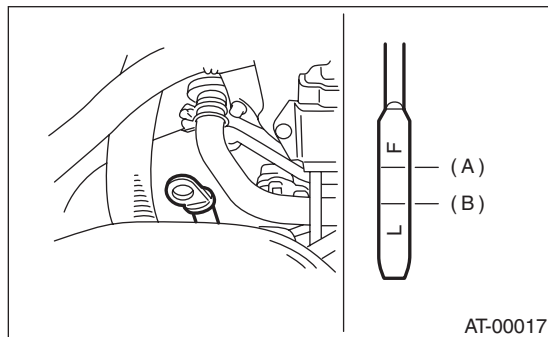
### 3. Differential Gear Oil

#### A: INSPECTION

- 1) Park the vehicle on a level surface.
- 2) Remove the collector cover.
- 3) Remove the oil level gauge and wipe it clean.
- 4) Reinsert the level gauge all the way. Make sure the level gauge is inserted correctly and in the proper orientation.
- 5) Remove the oil level gauge again, and check the level of differential gear oil. If the differential gear oil level is below "L" line, add oil to bring the level up to "F" line.

#### NOTE:

To prevent overfilling the differential gear oil, do not add oil above the "F" line.



- (A) Upper level  
(B) Lower level

#### B: REPLACEMENT

- 1) Lift up the vehicle.
- 2) Remove the differential gear oil drain plug using TORX® bit T70, and then drain differential gear oil.

#### CAUTION:

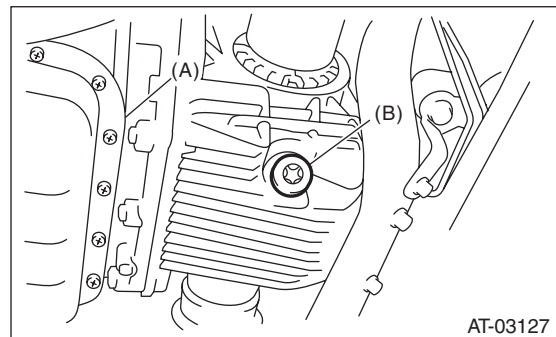
- Immediately after the vehicle has been running or after idling for a long time, the differential gear oil will be hot. Be careful not to burn yourself.
  - Be careful not to spill differential gear oil on the exhaust pipe to prevent it from emitting smoke or causing a fire. If differential gear oil is spilled on the exhaust pipe, wipe it off completely.
- 3) Tighten the differential gear oil drain plug using TORX® bit T70.

#### NOTE:

Use a new gasket.

#### Tightening torque:

**70 N·m (7.1 kgf·m, 51.6 ft·lb)**



- (A) Oil pan  
(B) Differential gear oil drain plug

- 4) Lower the vehicle.
- 5) Pour gear oil into the gauge hole.

#### Recommended gear oil:

**<Ref. to 5AT-3, RECOMMENDED GEAR OIL, SPECIFICATION, General Description.>**

#### Gear oil capacity:

**1.3 — 1.5 ℓ (1.4 — 1.6 US qt, 1.1 — 1.3 Imp qt)**

- 6) Check the level of differential gear oil. <Ref. to 5AT-30, INSPECTION, Differential Gear Oil.>

## 4. Road Test

### A: INSPECTION

#### 1. GENERAL PRECAUTION

Road tests should be conducted to properly diagnose the condition of automatic transmission.

NOTE:

When performing the test, do not exceed posted speed limit.

#### 2. D RANGE SHIFT FUNCTION

Check shifting between 1st ↔ 2nd ↔ 3rd ↔ 4th ↔ 5th while driving on normal city streets.

#### 3. D RANGE SHIFT SHOCK

Check the shock level when shifting up during normal driving.

#### 4. KICK-DOWN FUNCTION

Check kick-down for each gear. Check the shock level during kick-down at the same time.

#### 5. ENGINE BRAKE OPERATION

- Check the 4th gear engine brake by shifting down from 5th to 4th range while driving in 5th gear of manual mode [50 — 60 km/h (31 — 37 MPH)].
- Check the 3rd gear engine brake by shifting down from 4th to 3rd range while driving in 4th gear of manual mode [50 — 60 km/h (31 — 37 MPH)].
- Check the 2nd gear engine brake by shifting down from 3rd to 2nd range while driving in 3rd gear of manual mode [40 — 50 km/h (25 — 31 MPH)].
- Check the 1st gear engine brake by shifting down from 2nd to 1st range while driving in 2nd gear of manual mode [20 — 30 km/h (12 — 19 MPH)].

#### 6. P RANGE OPERATION

Stop the vehicle on an uphill grade of 5% or more and shift to the “P” range. Check that the vehicle does not move when the parking brake is released.

#### 7. NOISE & VIBRATION

Check for noise and vibration while driving and during shifting.

#### 8. OIL LEAKAGE

After the driving test, inspect for oil leaks from the transmission body.

# Stall Test

## AUTOMATIC TRANSMISSION

### 5. Stall Test

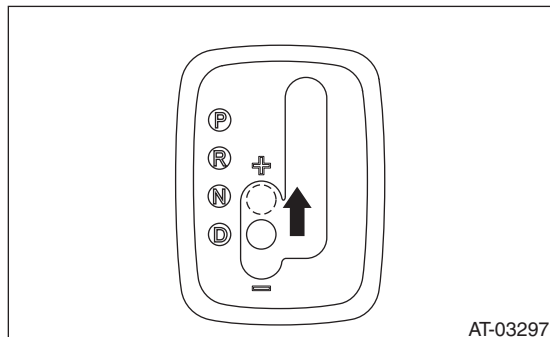
#### A: INSPECTION

##### NOTE:

The stall test is extremely important in diagnosing the condition of an automatic transmission and engine. The test is necessary to measure the engine stall speeds in “2nd of manual mode”.

Purposes of the stall test:

- Operational check of the automatic transmission clutch
  - Operational check of the torque converter clutch
  - Engine performance check
- 1) Check that the throttle valve fully opens.
  - 2) Check that the engine oil level is correct.
  - 3) Check that the coolant level is correct.
  - 4) Check that the ATF level is correct.
  - 5) Check that the differential gear oil level is correct.
  - 6) Raise the ATF temperature to 70 to 80°C (158 to 176°F) by driving a distance of 5 to 10 km (3 to 6 miles). Confirm the ATF temperature on Subaru Select Monitor. <Ref. to 5AT(diag)-16, READ CURRENT DATA, OPERATION, Subaru Select Monitor.>
  - 7) Place the wheel chocks at the front and rear of all wheels and apply the parking brake.
  - 8) Move the select lever to ensure it operates properly, and then set to the “2nd gear of manual mode”.



- 9) While stepping hard on the brake pedal, gradually step on the accelerator pedal.
- 10) When the engine speed is stabilized, quickly record the engine speed and release accelerator pedal.
- 11) Shift the select lever to “N” range, and cool down the engine by idling it for more than one minute.

##### NOTE:

- Do not continue the stall test for 5 seconds or more at a time (from fully closed throttle to fully open throttle until stall speed reading). Doing so will make the engine oil and ATF deteriorate and the clutch and brake to be adversely affected.
- After performing the stall test, be sure to cool down the engine for at least one minute with the select lever set in “P” or “N” range, and at an idle speed of 1,200 rpm or less.
- 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.
- When depressing the accelerator pedal again after performing the stall test for 5 seconds or more, the electronic throttle control remains closed for approx. 60 seconds.
- When the stall test is performed for 15 seconds or more continuously, the test is completed forcibly to protect the transmission unit.

When depressing the accelerator pedal again, the electronic throttle control remains closed for approx. 60 seconds.

##### **Stall speed (at sea level):**

**2,100 — 2,600 rpm**

Stall speed (at sea level)	Range	Possible faulty parts
Over specified value	2nd gear of manual mode	<ul style="list-style-type: none"><li>• Line pressure too low</li><li>• Forward brake</li><li>• Direct clutch</li><li>• 3rd one-way clutch</li></ul>

## 6. Time Lag Test

### A: INSPECTION

#### NOTE:

When the select lever is shifted while the engine is idling, there will be a certain time elapse or lag before shock is felt. Using this, check the condition of forward brake, reverse brake, 1st one-way clutch and 3rd one-way clutch.

- Perform the test at normal operation fluid temperature of 70 — 80°C (158 — 176°F).
- Be sure to allow one minute or more interval between tests.
- Make three measurements and take the average value.

1) Fully apply the parking brake.

2) Start the engine.

Check the idle speed (A/C OFF).

3) Shift the select lever from “N” to “D” range. Using a stop watch, measure the time-lag from shifting the lever until the shock is felt.

#### *Time-lag*

##### **Standard: 1.2 seconds or less**

If “N” → “D” time-lag is longer than specification:

- Line pressure too low
- Forward brake worn
- One-way clutch not operating properly

4) In the same manner, measure the time lag of “N” → “R”.

#### *Time-lag*

##### **Standard: 1.5 seconds or less**

If “N” → “R” time lag is longer than specification:

- Line pressure too low
- Reverse brake worn

# Line Pressure Test

AUTOMATIC TRANSMISSION

## 7. Line Pressure Test

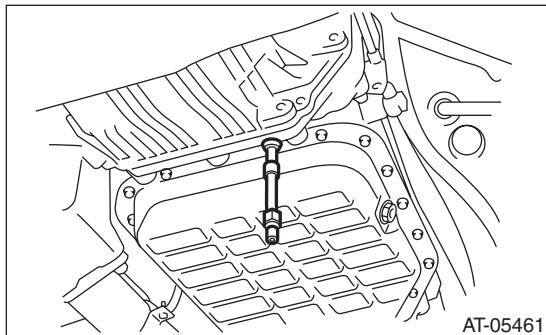
### A: MEASUREMENT

NOTE:

If the clutch or brake shows a sign of slippage, or shifting interval is not correct, check the line pressure.

- Excessive shock during up-shift may be due to the line pressure being too high.
- In many cases, slippage or inability to operate the vehicle may be due to insufficient oil pressure for the operation of clutch, brake or control valve.

- 1) Set the vehicle on a lift.
  - 2) Remove the under cover.
  - 3) Remove the test plug and install the ST.
- ST 498897200 OIL PRESSURE ADAPTER



- 4) Set the ST1 and ST2.  
ST1 498897200 OIL PRESSURE ADAPTER  
ST2 498575400 OIL PRESSURE GAUGE ASSY
- 5) Lower the vehicle, and pull ST2 which was set in step 4) into the vehicle.
- 6) Connect the Subaru Select Monitor to the data link connector and read the current data. <Ref. to 5AT(di-ag)-16, READ CURRENT DATA, OPERATION, Subaru Select Monitor.>
- 7) Perform the line pressure test.

NOTE:

- Do not perform the line pressure test for 5 seconds or more at a time. Doing so will make the engine oil and ATF deteriorate and the clutch and brake to be adversely affected.
- After performing the line pressure test, be sure to cool down the engine for at least one minute with the select lever set in “P” or “N” range and with the idle speed at 1,200 rpm or less.

Range of the select lever	Accelerator pedal opening angle	ATF temperature condition	“P/L Solenoid Pressure” displayed on the Subaru Select Monitor kPa	Standard line pressure kPa (kg/cm <sup>2</sup> , psi)
2nd gear of manual mode	Full closed	45 — 55°C (113 — 131°F)	350 — 500	Target pressure (displayed on Subaru Select Monitor) -10 — +190 (Target pressure -0.10 — +1.94, Target pressure -1.45 — +27.5)
	Full open		2,000 or more	1,320 — 1,520 (13.46 — 15.50, 191.4 — 220.4)
R	Full open		1,600 or more	1,660 — 1,860 (16.93 — 18.97, 240.7 — 269.7)

- 8) Remove the ST and install the test plug.

NOTE:

Use a new gasket.

**Tightening torque:**

**13 N·m (1.3 kgf·m, 9.6 ft·lb)**

## 8. Transfer Clutch Pressure Test

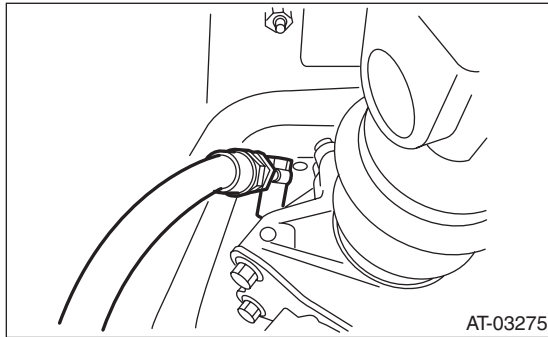
### A: INSPECTION

- 1) Lift up the vehicle.
- 2) Remove the bolts holding the heat shield cover, and move the heat shield cover to the rear.
- 3) Remove the test plug and install the ST.

**CAUTION:**

**Be careful not to cut yourself on the heat shield cover when removing the test plugs and setting the ST.**

ST 498897800 OIL PRESSURE ADAPTER SET



- 4) Set the ST.  
ST 498575400 OIL PRESSURE GAUGE ASSY
- 5) Lower the vehicle, and pull ST which was set in step 4) into the vehicle.
- 6) Connect the Subaru Select Monitor to the data link connector and read the current data. <Ref. to 5AT(di-ag)-16, READ CURRENT DATA, OPERATION, Subaru Select Monitor.>
- 7) Perform the transfer clutch pressure test.

**NOTE:**

- Do not perform the transfer clutch pressure test for 5 seconds or more at a time. Doing so will make the engine oil and ATF deteriorate and the clutch and brake to be adversely affected.
- After performing the transfer clutch pressure test, be sure to cool down the engine for at least one minute with the select lever set in the “P” or “N” range, and at an idle speed of 1,200 rpm or less.
- Adjust the accelerator pedal opening angle in order to obtain the “T/F solenoid target pressure” displayed on the Subaru Select Monitor.

Range of the select lever	Accelerator pedal opening angle	ATF temperature condition	“T/F Solenoid Target Pressure” displayed on the Subaru Select Monitor kPa	Standard transfer clutch pressure kPa (kg/cm <sup>2</sup> , psi)
2nd gear of manual mode	Partial throttle	45 — 55°C (113 — 131°F)	400	300 — 500 (3.06 — 5.10, 43.5 — 72.5)
N	Full closed		0	0 — 50 (0 — 0.51, 0 — 7.2)

- 8) Remove the ST and install the test plug.

**NOTE:**

Use a new gasket.

**Tightening torque:**

**13 N·m (1.3 kgf·m, 9.6 ft·lb)**

- 9) Install the heat shield cover.

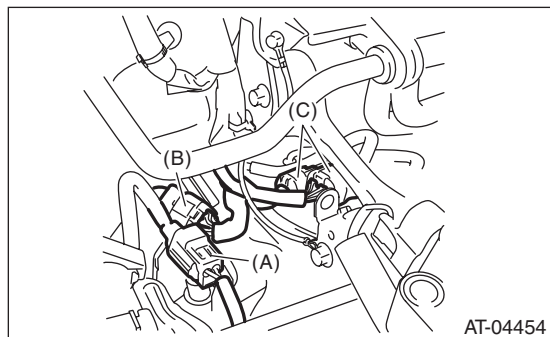
# Automatic Transmission Assembly

## AUTOMATIC TRANSMISSION

### 9. Automatic Transmission Assembly

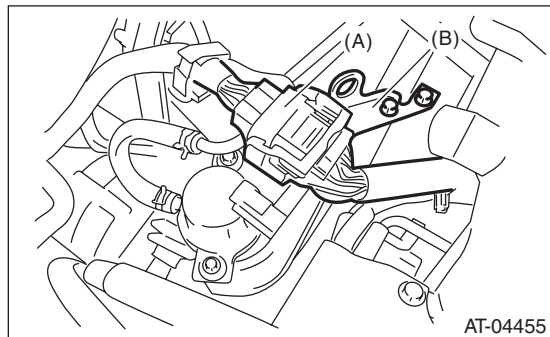
#### A: REMOVAL

- 1) Set the vehicle on a lift.
- 2) Open the front hood and support with the hood stay.
- 3) Disconnect the ground cable from battery.
- 4) Remove the collector cover.
- 5) Remove the air intake chamber and intake boot. <Ref. to IN(H6DO)-8, REMOVAL, Air Intake Chamber.>
- 6) Remove the air breather hose. <Ref. to 5AT-58, REMOVAL, Air Breather Hose.>
- 7) Remove the starter. <Ref. to SC(H6DO)-6, REMOVAL, Starter.>
- 8) Disconnect the front oxygen (A/F) sensor, rear oxygen sensor and transmission harness connector.



- (A) Front oxygen (A/F) sensor connector
- (B) Rear oxygen sensor connector
- (C) Transmission harness connectors

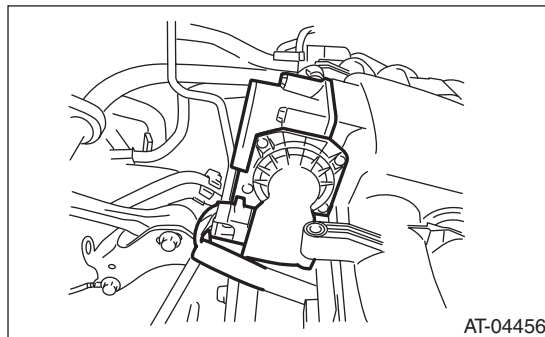
- 9) Disconnect the engine harness connectors, and then remove the engine hanger rear.



- (A) Engine harness connectors
- (B) Engine hanger rear

- 10) Remove the vacuum pipe & hose assembly and the brake vacuum pump. <Ref. to BR-41, REMOVAL, Brake Vacuum Pump.>

- 11) Remove the throttle body securing bolts to and slide the throttle body over.

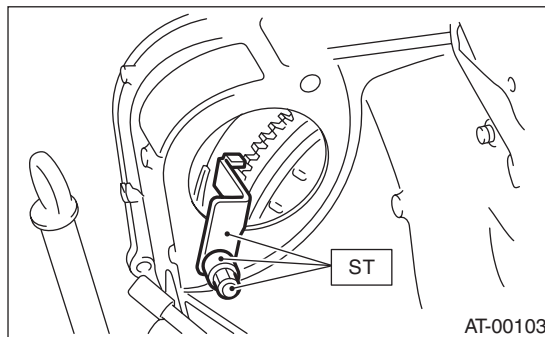


- 12) Separate the torque converter from drive plate.
  - (1) Remove the service hole plug.
  - (2) Remove the bolts which hold torque converter to drive plate.
  - (3) Remove the four bolts by rotating the crank pulley a little at a time.
  - (4) Make sure the torque converter moves freely by rotating with finger through the starter installation hole.

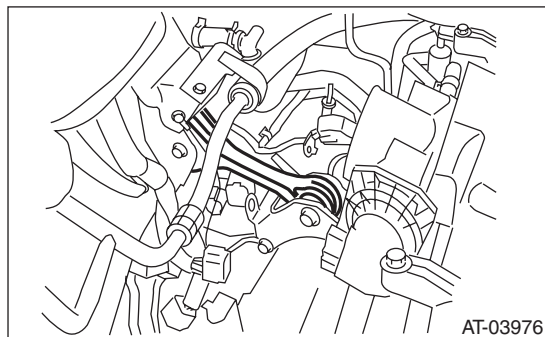
#### CAUTION:

**Be careful not to drop bolts into converter housing.**

- 13) Attach the ST to the converter case.  
ST 498277200 STOPPER SET



- 14) Remove the pitching stopper.

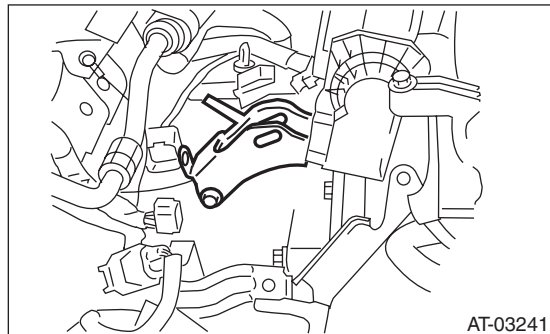




# Automatic Transmission Assembly

AUTOMATIC TRANSMISSION

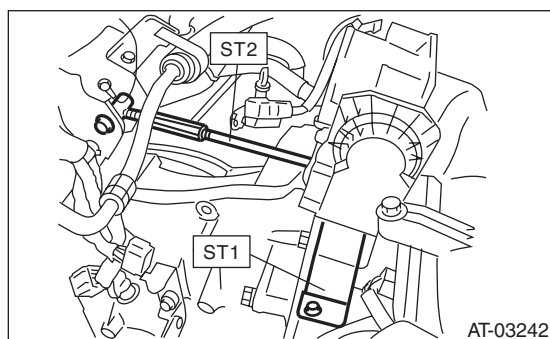
15) Remove the pitching stopper bracket.



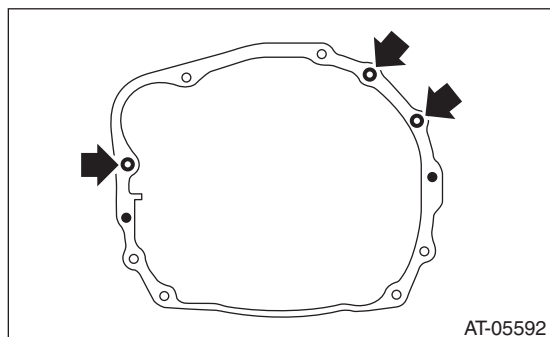
16) Set the ST.

ST1 41099AA010 ENGINE SUPPORT BRACKET

ST2 41099AA020 ENGINE SUPPORT



17) Remove the transmission mounting bolt (upper side).

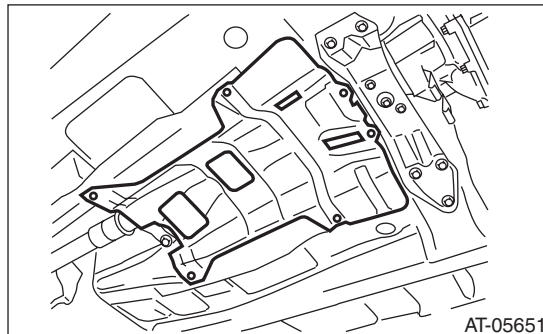


18) Lift up the vehicle.

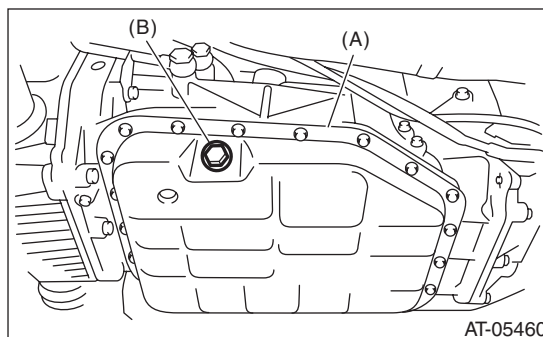
19) Remove the under cover.

20) Remove the front exhaust pipe, rear exhaust pipe and muffler. <Ref. to EX(H6DO)-5, REMOVAL, Front Exhaust Pipe.> <Ref. to EX(H6DO)-7, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H6DO)-9, REMOVAL, Muffler.>

21) Remove the heat shield cover.



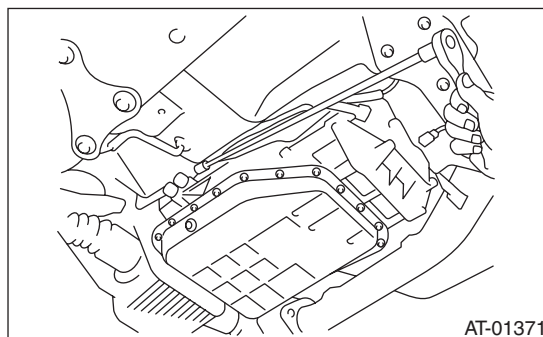
22) Remove the ATF drain plug to drain ATF.



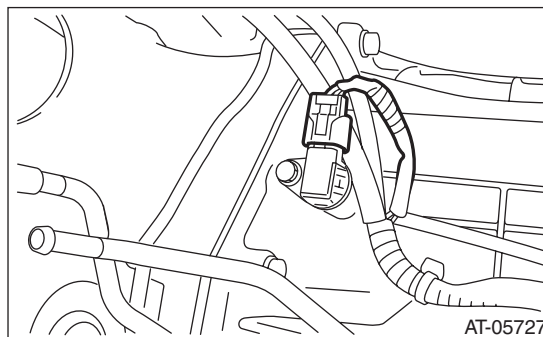
(A) Oil pan

(B) ATF drain plug

23) Remove the oil charge pipe.



24) Disconnect the connector from turbine speed sensor 1.



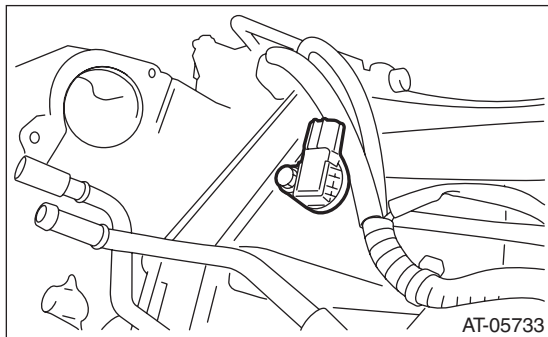
# Automatic Transmission Assembly

## AUTOMATIC TRANSMISSION

25) Remove the turbine speed sensor 1 from the transmission body.

### CAUTION:

Failure to follow this procedure may cause the interference between vehicle body and sensor while removing/installing transmission, and resulting in damage.

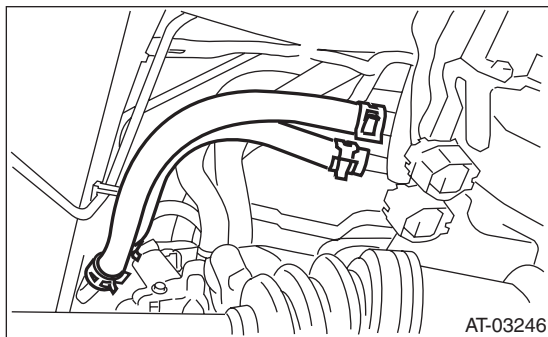


26) To prevent contamination by foreign objects, cover the attachment hole for turbine speed sensor 1 with vinyl tape.

27) Remove the propeller shaft. <Ref. to DS-10, REMOVAL, Propeller Shaft.>

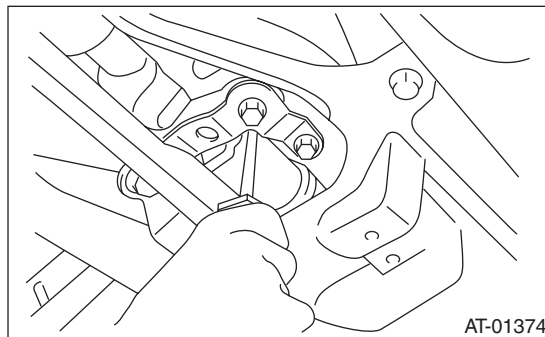
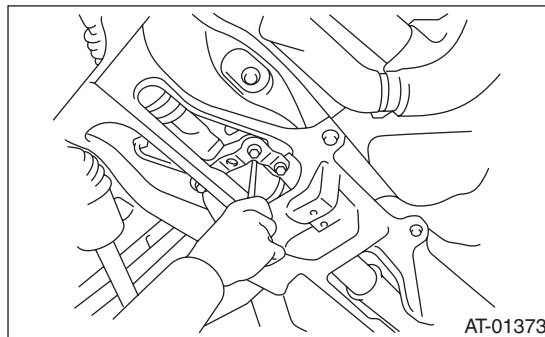
28) Remove the shift select cable. <Ref. to CS-26, REMOVAL, Select Cable.>

29) Disconnect the hose from the ATF inlet and outlet pipes.



30) Remove the front crossmember support plate. <Ref. to FS-14, REMOVAL, Front Crossmember Support Plate.>

31) Remove the two clutch housing cover securing bolts.

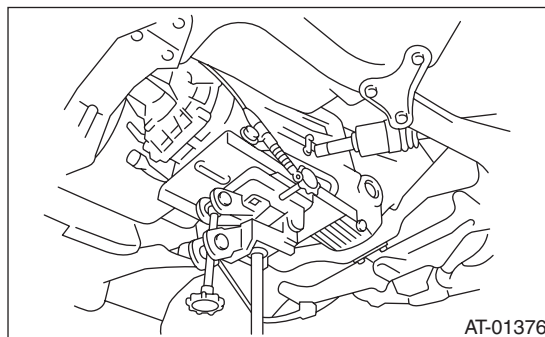


32) Remove the front stabilizer clamp. <Ref. to FS-15, REMOVAL, Front Stabilizer.>

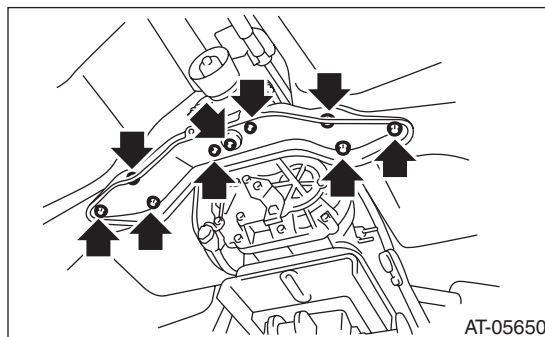
33) Remove the bolts which secure front ball joint to the housing. <Ref. to FS-16, REMOVAL, Front Ball Joint.>

34) Pull out the drive shaft from transmission.

35) Set the transmission jack under the transmission.



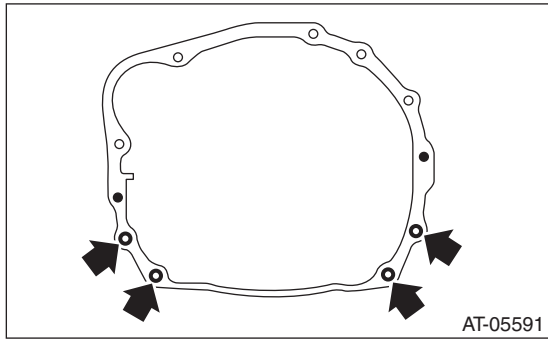
36) Remove the rear crossmember.



# Automatic Transmission Assembly

AUTOMATIC TRANSMISSION

37) Remove the transmission mounting bolt and nut (lower side).



38) Remove the transmission.

**NOTE:**

- Turn the engine support assembly from the vehicle under body to the left (to shorten the engine support length), and lower the rear of the engine for easy disassembly.
- Be careful not to allow breather pipe and etc. to touch the vehicle body when detaching the automatic transmission assembly by pulling it backward.

39) Remove the rear cushion rubber.

## B: INSTALLATION

1) Replace the front differential side retainer oil seal.

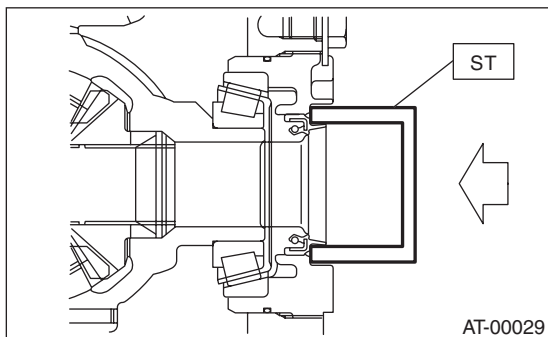
(1) Remove the oil seal by using flat tip screwdriver etc.

(2) Install a new oil seal using ST.

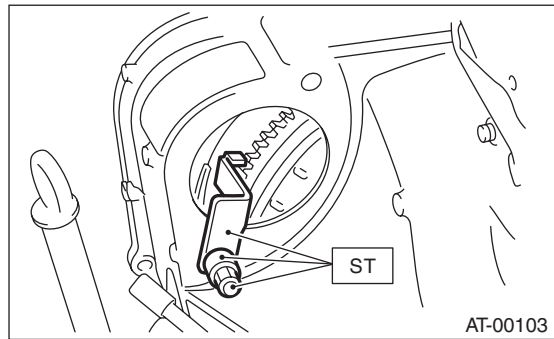
ST 18675AA000 DIFFERENTIAL SIDE OIL SEAL INSTALLER

**NOTE:**

- Apply oil to the oil seal lips.
- Be sure to replace the differential side oil seal after the procedure of removing front drive shaft from transmission.



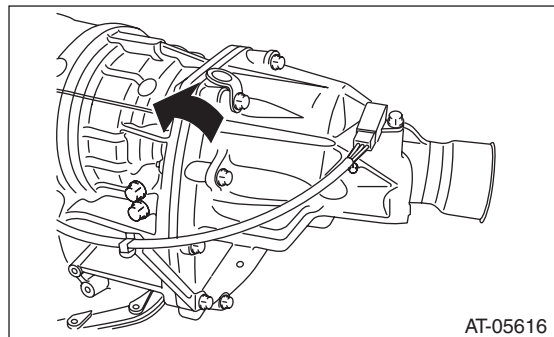
2) Attach the ST to converter case.  
ST 498277200 STOPPER SET



3) Tap the transmission hanger in the rear side of transmission with a rubber hammer to bend it until it is in close contact with the transmission case.

**CAUTION:**

**Do not apply excessive load or impact to the transmission case.**



4) Install the rear cushion rubber.

**Tightening torque:**

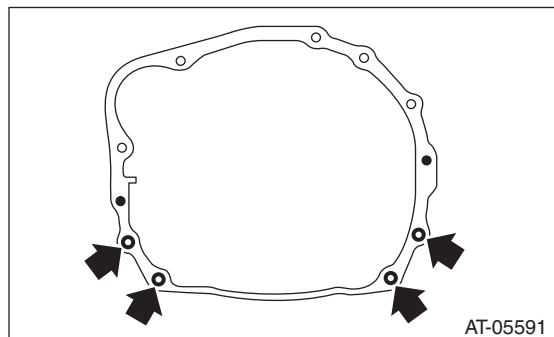
**40 N·m (4.1 kgf-m, 29.5 ft-lb)**

5) Install the transmission onto the engine.

6) Install the engine mounting bolt and nut (lower side).

**Tightening torque:**

**50 N·m (5.1 kgf-m, 36.9 ft-lb)**



# Automatic Transmission Assembly

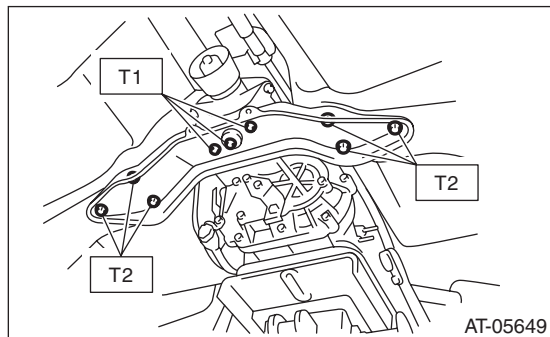
## AUTOMATIC TRANSMISSION

7) Install the transmission rear crossmember.

### Tightening torque:

**T1: 35 N·m (3.6 kgf-m, 25.8 ft-lb)**

**T2: 75 N·m (7.6 kgf-m, 55.3 ft-lb)**



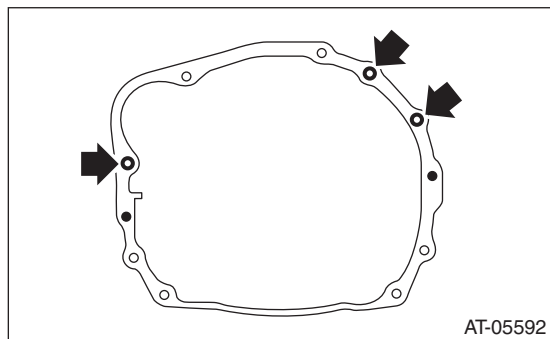
8) Remove the transmission jack.

9) Lower the vehicle.

10) Install the engine mounting bolt (upper side).

### Tightening torque:

**50 N·m (5.1 kgf-m, 36.9 ft-lb)**



11) Remove the ST from converter case.

12) Install the torque converter to drive plate.

### CAUTION:

- Be careful not to drop bolts into converter housing.
- Be careful not to damage the mounting bolts.

- (1) Install the bolts which hold torque converter to drive plate.
- (2) Install all four bolts by rotating the crank pulley a little at a time.
- (3) Install the service hole.

### Tightening torque:

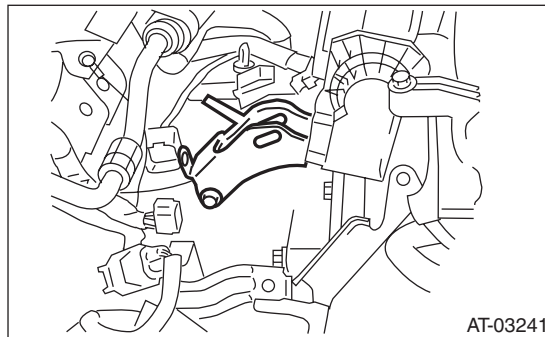
**25 N·m (2.5 kgf-m, 18.4 ft-lb)**

13) Install the starter. <Ref. to SC(H6DO)-6, INSTALLATION, Starter.>

14) Remove the ST and install the pitching stopper bracket.

### Tightening torque:

**41 N·m (4.2 kgf-m, 30.2 ft-lb)**

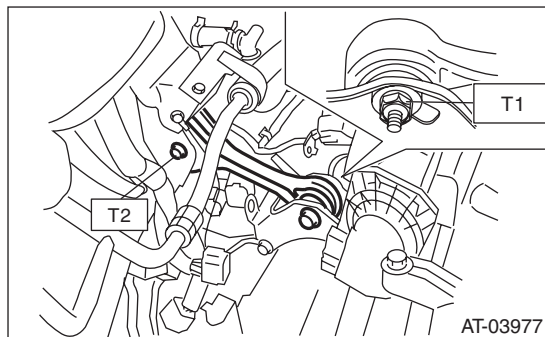


15) Install the pitching stopper.

### Tightening torque:

**T1: 50 N·m (5.1 kgf-m, 36.9 ft-lb)**

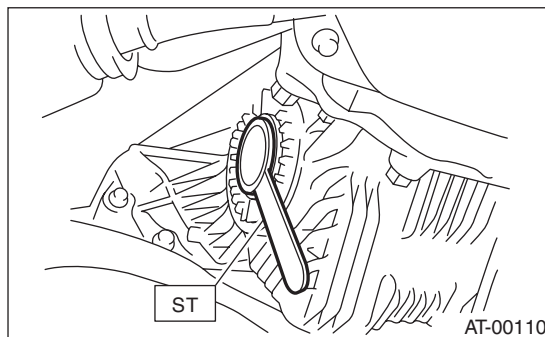
**T2: 58 N·m (5.9 kgf-m, 42.8 ft-lb)**



16) Lift up the vehicle.

17) Set the ST to side retainer.

ST 28399SA010 OIL SEAL PROTECTOR



18) Install the front drive shaft into the transmission.

### NOTE:

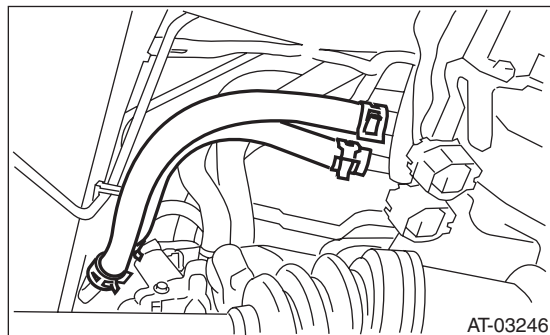
Replace the circlip of drive shaft with a new part.

19) Install the front drive shaft into transmission, remove the ST and insert the drive shaft securely.

20) Install the inlet and outlet hoses to the ATF inlet and outlet pipes.

**NOTE:**

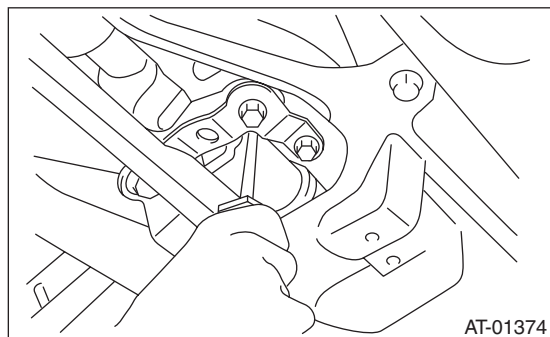
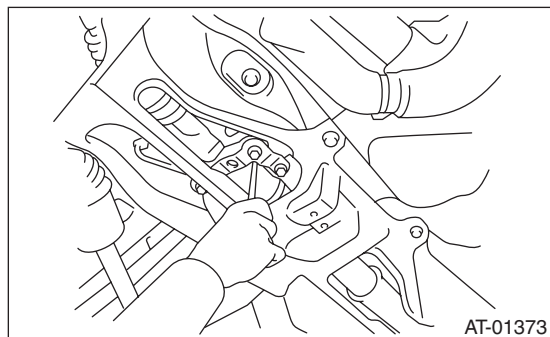
Use the new inlet hose and outlet hose.



21) Insert the ball joint into housing. <Ref. to FS-16, INSTALLATION, Front Ball Joint.>

22) Install the front stabilizer clamp. <Ref. to FS-15, INSTALLATION, Front Stabilizer.>

23) Install the clutch housing cover securing bolts.



24) Install the front crossmember support plate. <Ref. to FS-14, INSTALLATION, Front Crossmember Support Plate.>

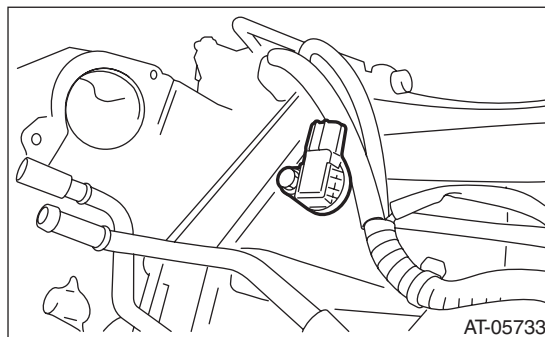
25) Install the propeller shaft. <Ref. to DS-11, INSTALLATION, Propeller Shaft.>

26) Install the shift select cable. <Ref. to CS-27, INSTALLATION, Select Cable.>

27) Install the turbine speed sensor 1 and harness, and then connect the connector.

**Tightening torque:**

**7 N·m (0.7 kgf·m, 5.2 ft·lb)**



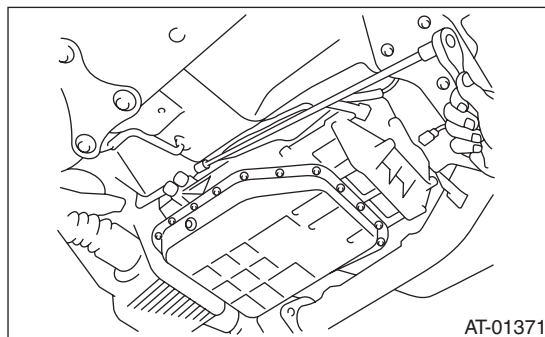
28) Install the oil charge pipe.

**NOTE:**

Use a new bolt.

**Tightening torque:**

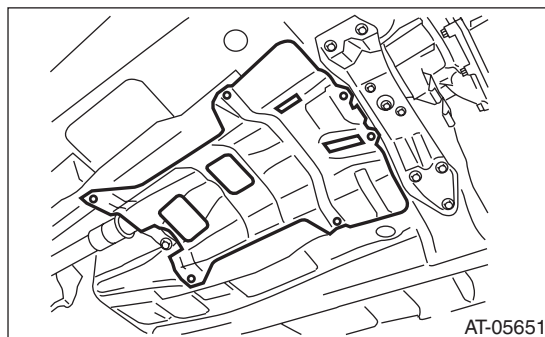
**38 N·m (3.9 kgf·m, 28.0 ft·lb)**



29) Install the heat shield cover.

**Tightening torque:**

**18 N·m (1.8 kgf·m, 13.3 ft·lb)**



30) Install the front exhaust pipe, rear exhaust pipe and muffler. <Ref. to EX(H6DO)-5, INSTALLATION, Front Exhaust Pipe.> <Ref. to EX(H6DO)-7, INSTALLATION, Rear Exhaust Pipe.> <Ref. to EX(H6DO)-9, INSTALLATION, Muffler.>

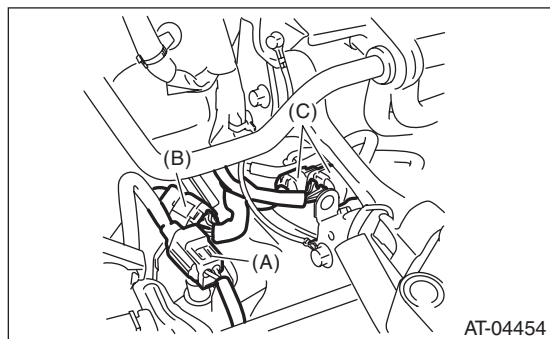
31) Install the under cover.

32) Lower the vehicle.

# Automatic Transmission Assembly

## AUTOMATIC TRANSMISSION

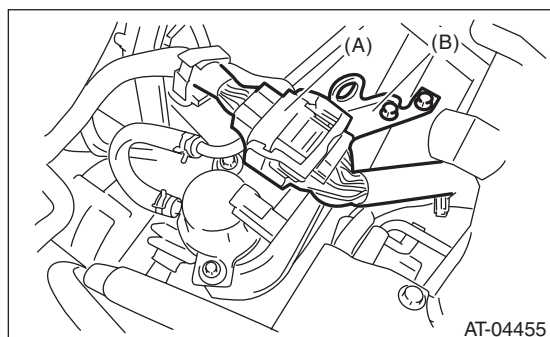
33) Connect the front oxygen (A/F) sensor, rear oxygen sensor and transmission harness connector.



- (A) Front oxygen (A/F) sensor connector
- (B) Rear oxygen sensor connector
- (C) Transmission harness connectors

34) Install the vacuum pump and vacuum pipe & hose. <Ref. to BR-41, INSTALLATION, Brake Vacuum Pump.>

35) Install the engine hanger rear, and then connect the engine harness connector.



- (A) Engine harness connectors
- (B) Engine hanger rear

36) Pour ATF from the oil charge pipe. <Ref. to 5AT-28, REPLACEMENT, Automatic Transmission Fluid.>

37) Install the air breather hose. <Ref. to 5AT-58, INSTALLATION, Air Breather Hose.>

38) Install the throttle body to intake manifold.

### **Tightening torque:**

**8 N·m (0.8 kgf-m, 5.9 ft-lb)**

39) Install the air intake chamber and intake boot. <Ref. to IN(H6DO)-8, INSTALLATION, Air Intake Chamber.>

40) Install the collector cover.

41) Connect the battery ground terminal.

42) Perform Clear Memory 2 operation. <Ref. to 5AT(diag)-17, CLEAR MEMORY MODE, OPERATION, Subaru Select Monitor.>

43) Perform the diagnosis again. <Ref. to 5AT(diag)-21, Learning Control.>

44) Perform the inspection at the end of repair work, and make sure there is no faulty as below;

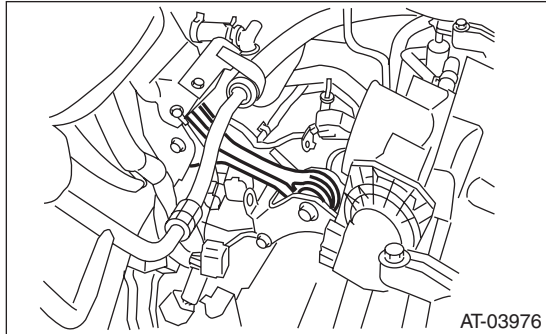
- Excessive shift shock
- Oil leakage from the transmission body, etc.
- Occurrence of noise caused by interference etc.

## 10. Transmission Mounting System

### A: REMOVAL

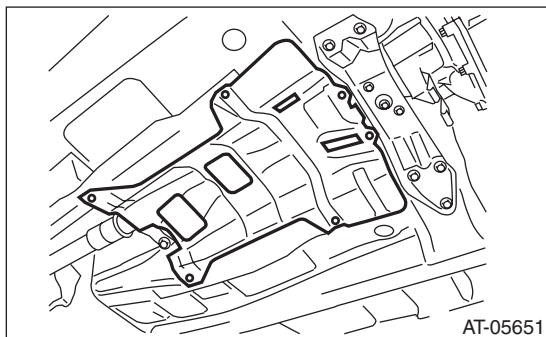
#### 1. PITCHING STOPPER

- 1) Disconnect the ground cable from battery.
- 2) Remove the air intake chamber and intake boot. <Ref. to IN(H6DO)-8, REMOVAL, Air Intake Chamber.>
- 3) Remove the pitching stopper.



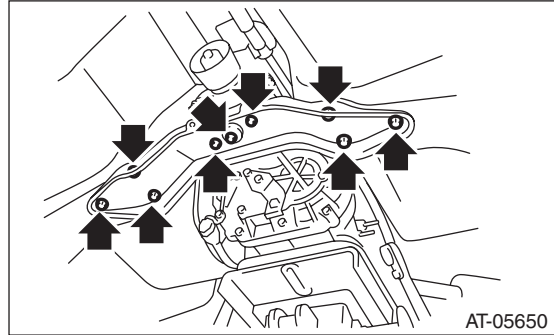
#### 2. TRANSMISSION REAR CROSSMEMBER & REAR CUSHION RUBBER

- 1) Disconnect the ground cable from battery.
- 2) Lift up the vehicle.
- 3) Remove the front exhaust pipe, rear exhaust pipe and muffler. <Ref. to EX(H6DO)-5, REMOVAL, Front Exhaust Pipe.> <Ref. to EX(H6DO)-7, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H6DO)-9, REMOVAL, Muffler.>
- 4) Remove the heat shield cover.



- 5) Set the transmission jack under transmission. Make sure that the support plate of transmission jack does not touch the oil pan.

- 6) Remove the transmission rear crossmember.



- 7) Remove the rear cushion rubber from transmission.

### B: INSTALLATION

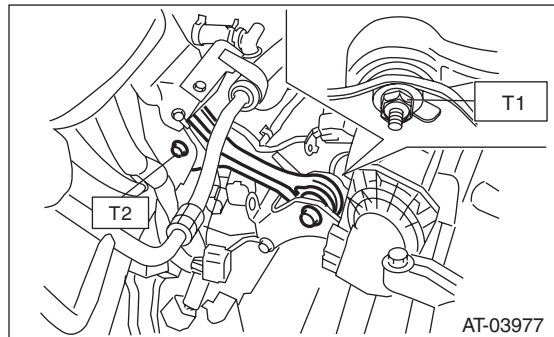
#### 1. PITCHING STOPPER

- 1) Install the pitching stopper.

#### Tightening torque:

**T1: 50 N·m (5.1 kgf-m, 36.9 ft-lb)**

**T2: 58 N·m (5.9 kgf-m, 42.8 ft-lb)**



- 2) Install the air intake chamber and intake boot. <Ref. to IN(H6DO)-8, INSTALLATION, Air Intake Chamber.>
- 3) Connect the ground cable to battery.

# Transmission Mounting System

## AUTOMATIC TRANSMISSION

### 2. TRANSMISSION REAR CROSSMEMBER & REAR CUSHION RUBBER

1) Install the rear cushion rubber to the transmission.

**Tightening torque:**

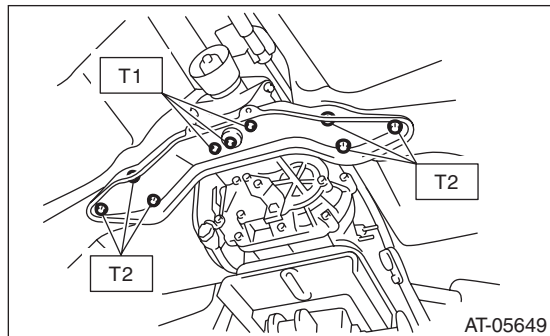
**40 N·m (4.1 kgf·m, 29.5 ft·lb)**

2) Install the crossmember.

**Tightening torque:**

**T1: 35 N·m (3.6 kgf·m, 25.8 ft·lb)**

**T2: 75 N·m (7.6 kgf·m, 55.3 ft·lb)**

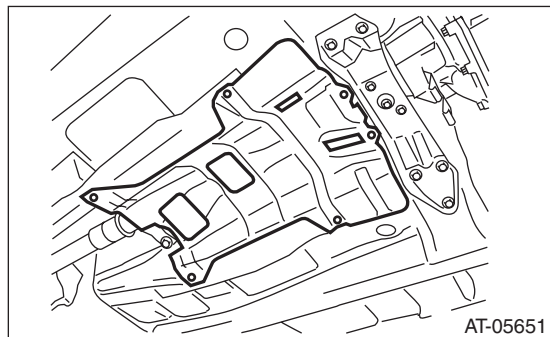


3) Remove the transmission jack.

4) Install the heat shield cover.

**Tightening torque:**

**18 N·m (1.8 kgf·m, 13.3 ft·lb)**



5) Install the front exhaust pipe, rear exhaust pipe and muffler. <Ref. to EX(H6DO)-5, INSTALLATION, Front Exhaust Pipe.> <Ref. to EX(H6DO)-7, INSTALLATION, Rear Exhaust Pipe.> <Ref. to EX(H6DO)-9, INSTALLATION, Muffler.>

6) Connect the ground cable to battery.

### C: INSPECTION

Repair or replace parts if the results of the inspection below are not satisfied.

#### 1. PITCHING STOPPER

Check pitching stopper for bends or damage. Check that there are no cracks, hardening or damage on rubber parts.

#### 2. TRANSMISSION REAR CROSSMEMBER & REAR CUSHION RUBBER

Check crossmember for bends or damage. Check that there are no cracks, hardening, or damage on cushion rubbers.



## 11. Extension Case Oil Seal

### A: INSPECTION

Inspect there is no ATF leakage from the joint of transmission and propeller shaft. If a leak is found, replace the oil seal. <Ref. to 5AT-45, REPLACEMENT, Extension Case Oil Seal.>

### B: REPLACEMENT

- 1) Lift up the vehicle.
- 2) Clean the transmission exterior.
- 3) Remove the ATF drain plug to drain ATF.

#### CAUTION:

**Immediately after the vehicle has been running or after idling for a long time, the ATF will be hot. Be careful not to burn yourself.**

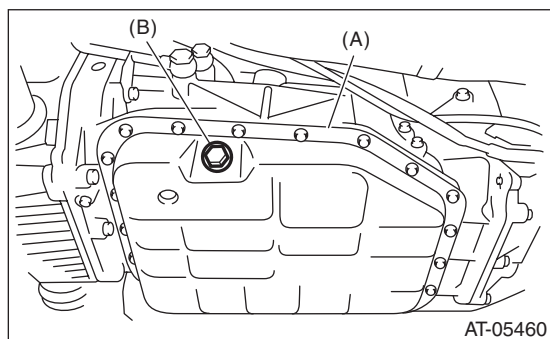
- 4) Tighten the ATF drain plug.

#### NOTE:

Use a new gasket.

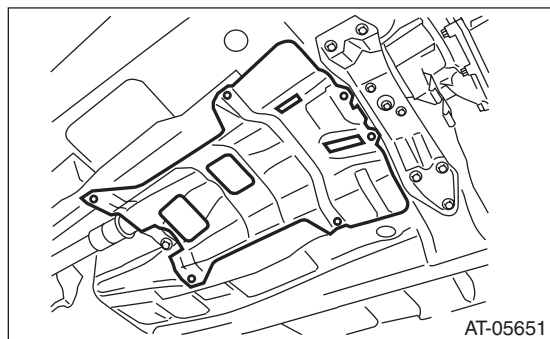
#### Tightening torque:

**20 N·m (2.0 kgf·m, 14.8 ft·lb)**



- (A) Oil pan
- (B) ATF drain plug

- 5) Remove the rear exhaust pipe and muffler. <Ref. to EX(H6DO)-7, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H6DO)-9, REMOVAL, Muffler.>
- 6) Remove the front exhaust pipe. <Ref. to EX(H6DO)-5, REMOVAL, Front Exhaust Pipe.>
- 7) Remove the heat shield cover.

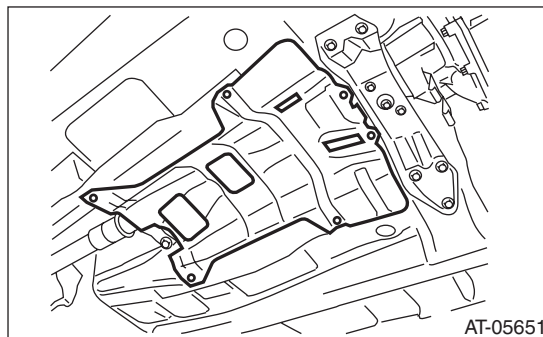


- 8) Remove the propeller shaft. <Ref. to DS-10, REMOVAL, Propeller Shaft.>

- 9) Using the ST, remove the oil seal.  
ST 398527700 PULLER ASSY
- 10) Using the ST, install the oil seal.  
ST 498057300 INSTALLER
- 11) Install the propeller shaft. <Ref. to DS-11, INSTALLATION, Propeller Shaft.>
- 12) Install the heat shield cover.

#### Tightening torque:

**18 N·m (1.8 kgf·m, 13.3 ft·lb)**



- 13) Install the front exhaust pipe. <Ref. to EX(H6DO)-5, INSTALLATION, Front Exhaust Pipe.>
- 14) Install the rear exhaust pipe and muffler. <Ref. to EX(H6DO)-7, INSTALLATION, Rear Exhaust Pipe.> <Ref. to EX(H6DO)-9, INSTALLATION, Muffler.>
- 15) Pour ATF from the oil charge pipe. <Ref. to 5AT-28, REPLACEMENT, Automatic Transmission Fluid.>
- 16) Check the level and leaks of ATF. <Ref. to 5AT-28, INSPECTION, Automatic Transmission Fluid.>

# Differential Side Retainer Oil Seal

AUTOMATIC TRANSMISSION

## 12. Differential Side Retainer Oil Seal

### A: INSPECTION

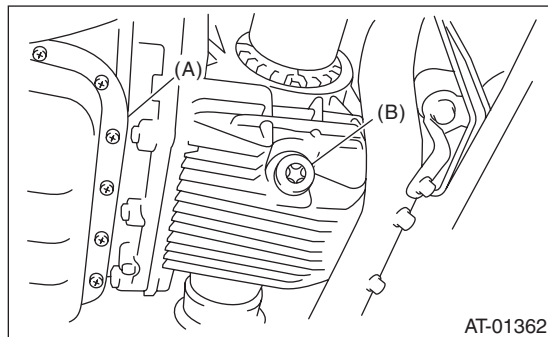
Check for leakage of gear oil from differential side retainer oil seal part. If there is an oil leak, replace the oil seal.

### B: REPLACEMENT

- 1) Lift up the vehicle.
- 2) Remove the front exhaust pipe. <Ref. to EX(H6DO)-5, REMOVAL, Front Exhaust Pipe.>
- 3) Remove the differential gear oil drain plug using TORX® bit T70, and then drain differential gear oil.

#### CAUTION:

- Immediately after the vehicle has been running or after idling for a long time, the differential gear oil will be hot. Be careful not to burn yourself.
- Be careful not to spill the differential gear oil on exhaust pipe to prevent it from emitting smoke or fire. If differential gear oil is spilled on the exhaust pipe, wipe it off completely.



- (A) Oil pan  
(B) Differential gear oil drain plug

- 4) Tighten the differential gear oil drain plug.

#### NOTE:

Use a new gasket.

#### Tightening torque:

**70 N·m (7.1 kgf·m, 51.6 ft·lb)**

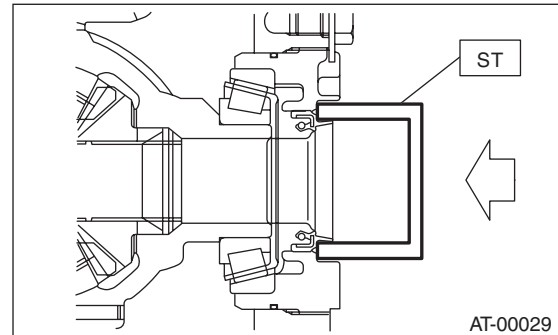
- 5) Separate the front drive shaft from the transmission. <Ref. to DS-25, REMOVAL, Front Drive Shaft.>
- 6) Remove the differential side retainer oil seal using driver wrapped with vinyl tape etc.

- 7) Using the ST, install the differential side retainer oil seal by lightly tapping with a hammer.

ST 18675AA000 DIFFERENTIAL SIDE OIL SEAL INSTALLER

#### NOTE:

- Apply differential gear oil to the oil seal lip.
- Oil seal has an identification mark (L, R). Check it before installation.



- 8) Apply oil to the oil seal lips.
- 9) Install the front drive shaft. <Ref. to DS-25, INSTALLATION, Front Drive Shaft.>
- 10) Install the front exhaust pipe. <Ref. to EX(H6DO)-5, INSTALLATION, Front Exhaust Pipe.>
- 11) Lower the vehicle.
- 12) Pour gear oil into the level gauge hole. <Ref. to 5AT-30, REPLACEMENT, Differential Gear Oil.>
- 13) Check the level of differential gear oil. <Ref. to 5AT-30, INSPECTION, Differential Gear Oil.>

## 13. Inhibitor Switch

### A: INSPECTION

Inhibitor switch cannot be checked, because the inhibitor switch is installed on control valve assembly. When a malfunction occurs, refer to 5AT (diag) section. <Ref. to 5AT(diag)-34, DTC P0705 TRANSMISSION RANGE SENSOR CIRCUIT (PRNDL INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

# Front Vehicle Speed Sensor

AUTOMATIC TRANSMISSION

## 14. Front Vehicle Speed Sensor

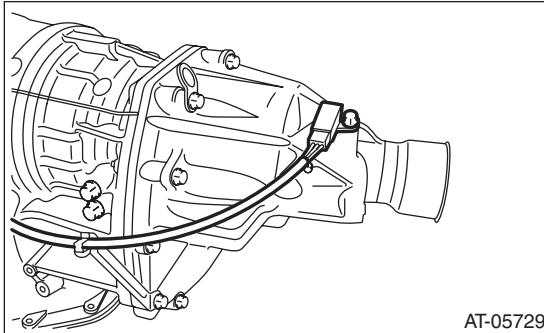
### A: REMOVAL

1) Remove the transmission assembly from the vehicle. <Ref. to 5AT-36, REMOVAL, Automatic Transmission Assembly.>

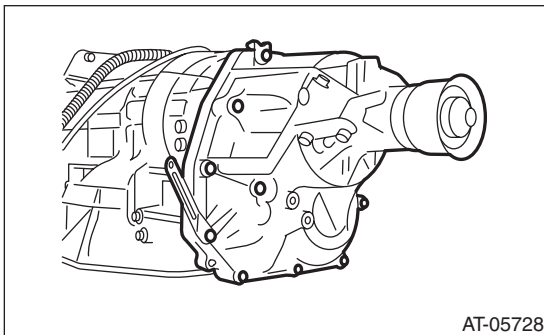
2) Disconnect the rear vehicle speed sensor connector.

#### NOTE:

Secure the transmission harness to the transmission body using wire etc.



3) Remove the extension case.

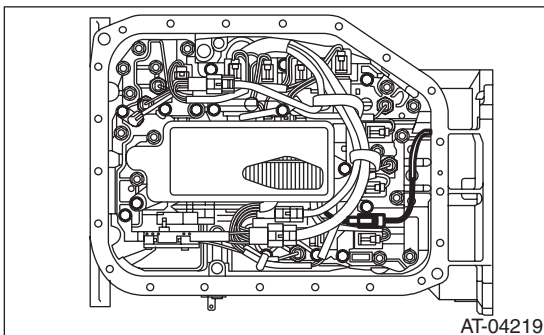


4) Remove the center differential carrier. <Ref. to 5AT-71, REMOVAL, Center Differential Carrier.>

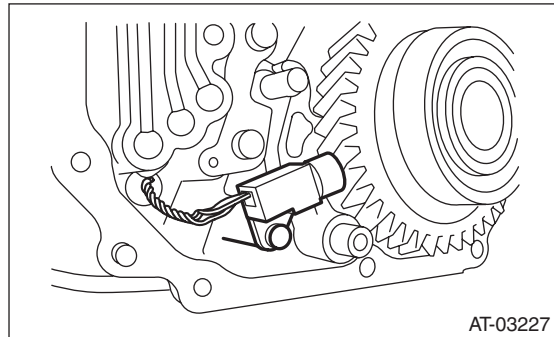
5) Lay along the transmission case, and then remove the oil pan.

6) Remove the old gasket on the oil pan and transmission case completely.

7) Disconnect the front vehicle speed sensor connector.



8) Remove the front vehicle speed sensor securing bolt.



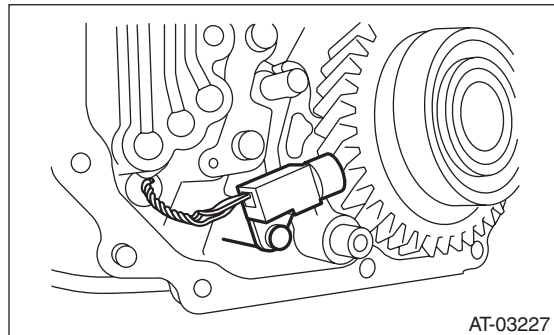
9) Remove the front vehicle speed sensor through the hole of AT transmission main case.

### B: INSTALLATION

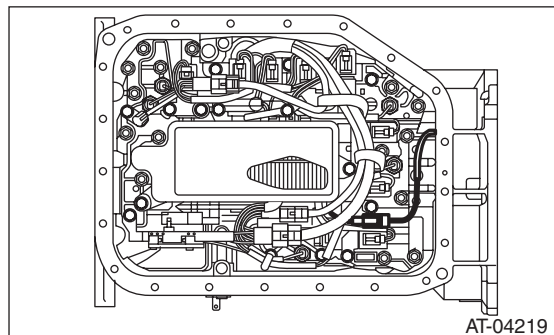
1) Install the front vehicle speed sensor.

#### Tightening torque:

**7 N·m (0.7 kgf-m, 5.2 ft-lb)**



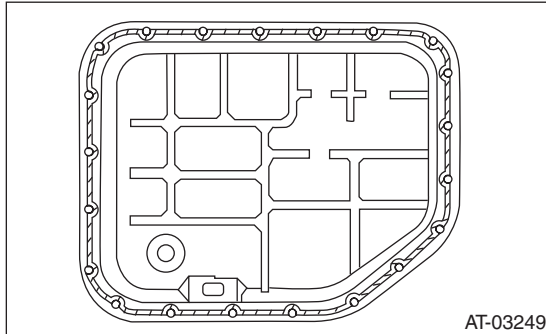
2) Connect the front vehicle speed sensor connector.



3) Apply proper amount of liquid gasket to the entire oil pan mating surface.

**Liquid gasket:**

**THREE BOND 1217B (Part No. K0877YA020)  
or equivalent**



4) Install the oil pan by equally tightening the bolts.

**Tightening torque:**

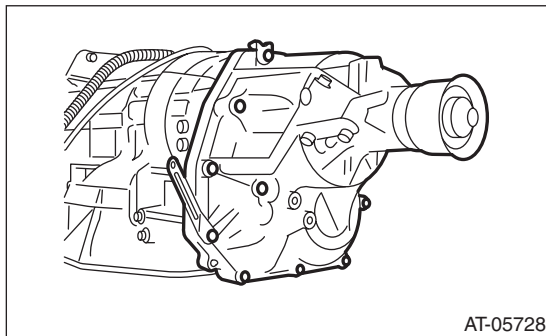
**5 N·m (0.5 kgf·m, 3.7 ft·lb)**

5) Install the center differential carrier. <Ref. to 5AT-71, INSTALLATION, Center Differential Carrier.>

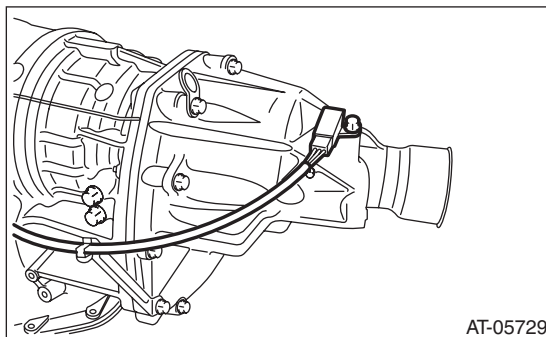
6) Install the extension case.

**Tightening torque:**

**25 N·m (2.5 kgf·m, 18.4 ft·lb)**



7) Connect the rear vehicle speed sensor connector.



8) Install the transmission assembly to the vehicle. <Ref. to 5AT-39, INSTALLATION, Automatic Transmission Assembly.>

9) Pour ATF from the oil charge pipe. <Ref. to 5AT-28, REPLACEMENT, Automatic Transmission Fluid.>

10) Check the level and leaks of ATF. <Ref. to 5AT-28, INSPECTION, Automatic Transmission Fluid.>

# Rear Vehicle Speed Sensor

AUTOMATIC TRANSMISSION

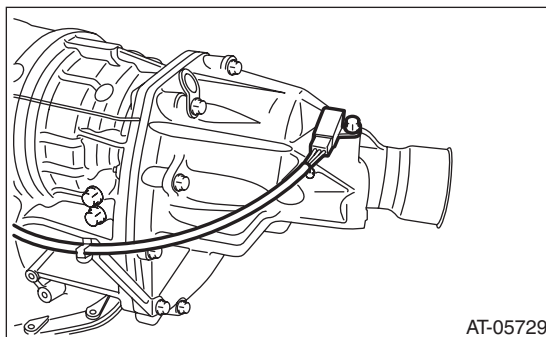
## 15. Rear Vehicle Speed Sensor

### A: REMOVAL

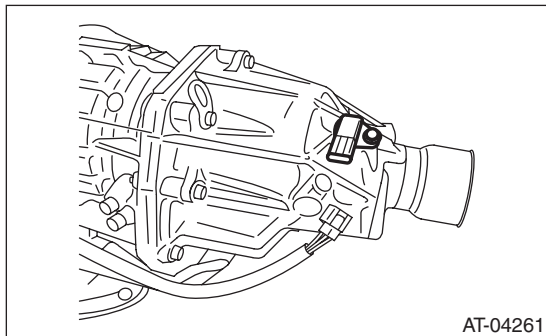
- 1) Set the vehicle on a lift.
- 2) Disconnect the ground cable from battery.
- 3) Lift up the vehicle.
- 4) Clean the transmission exterior.
- 5) Separate the front exhaust pipe from rear exhaust pipe.



- 6) Remove the bolts holding the heat shield cover, and move the heat shield cover to the rear.
- 7) Disconnect the rear vehicle speed sensor connector.



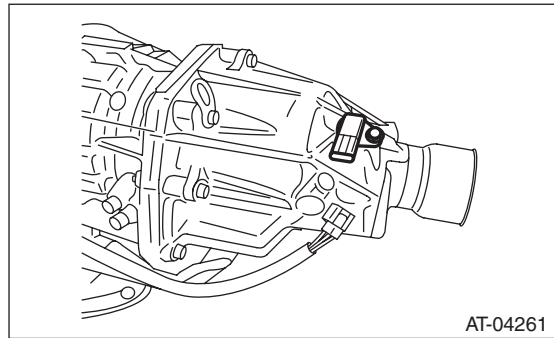
- 8) Remove the rear vehicle speed sensor.



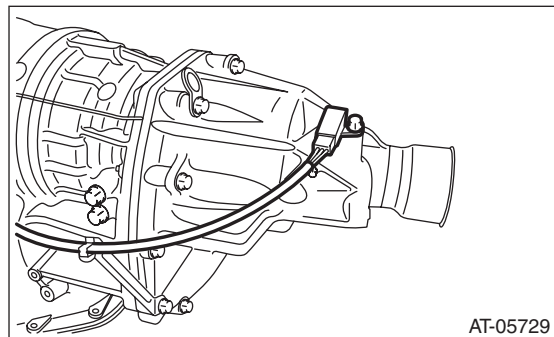
### B: INSTALLATION

- 1) Install the rear vehicle speed sensor.

**Tightening torque:**  
**7 N·m (0.7 kgf-m, 5.2 ft-lb)**



- 2) Connect the rear vehicle speed sensor connector.

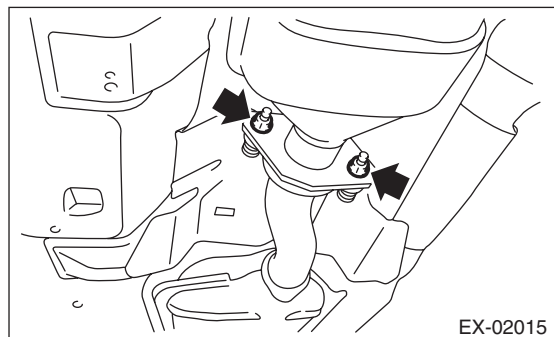


- 3) Install the heat shield cover.

**Tightening torque:**  
**18 N·m (1.8 kgf-m, 13.3 ft-lb)**

- 4) Tighten the bolts which install front exhaust pipe to rear exhaust pipe.

**Tightening torque:**  
**18 N·m (1.8 kgf-m, 13.3 ft-lb)**

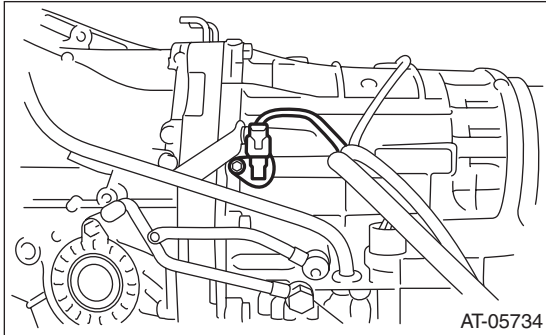


- 5) Lower the vehicle.

## 16. Turbine Speed Sensor 1

### A: REMOVAL

- 1) Set the vehicle on a lift.
- 2) Disconnect the ground cable from battery.
- 3) Lift up the vehicle.
- 4) Remove the under cover.
- 5) Remove the front exhaust pipe.
- 6) Clean the transmission exterior.
- 7) Disconnect the turbine speed sensor 1 connector.



- 8) Remove the turbine speed sensor 1.

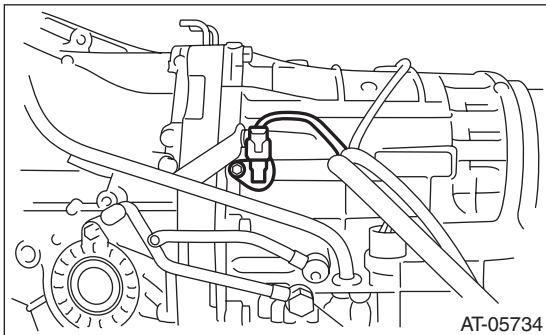
### B: INSTALLATION

- 1) Install the turbine speed sensor 1.

#### ***Tightening torque:***

***7 N·m (0.7 kgf·m, 5.2 ft·lb)***

- 2) Connect the turbine speed sensor 1 connector.



- 3) Lower the vehicle.
- 4) Install the front exhaust pipe.
- 5) Install the under cover.
- 6) Lower the vehicle.
- 7) Connect the ground cable to battery.

# Control Valve Body

## AUTOMATIC TRANSMISSION

### 17. Control Valve Body

#### A: REMOVAL

- 1) Set the vehicle on a lift.
- 2) Disconnect the ground cable from the battery.
- 3) Lift up the vehicle.
- 4) Clean the transmission exterior.
- 5) Remove the ATF drain plug to drain ATF.

#### CAUTION:

Immediately after the vehicle has been running or after idling for a long time, the ATF will be hot. Be careful not to burn yourself.

- 6) Tighten the ATF drain plug.

#### NOTE:

Use a new gasket.

#### Tightening torque:

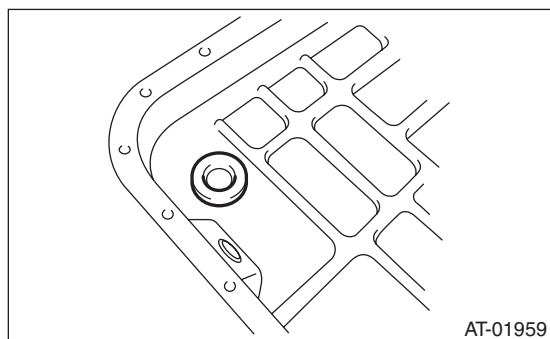
**20 N·m (2.0 kgf·m, 14.8 ft·lb)**

- 7) Remove the oil pan.

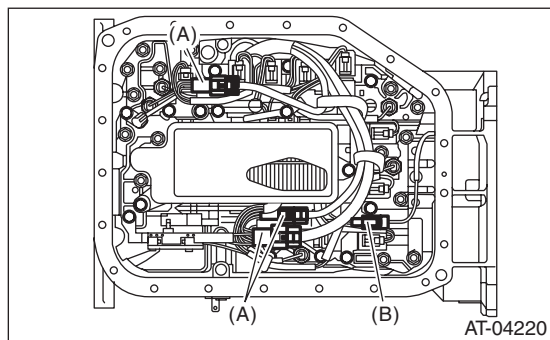
#### CAUTION:

Be sure to prevent the entering of dust and other foreign matters into oil pan.

- 8) Remove the magnet.



- 9) Clean the magnet.
- 10) Completely remove the remaining liquid gasket on the transmission case and oil pan.
- 11) Disconnect the control valve connector and front vehicle speed sensor connector.

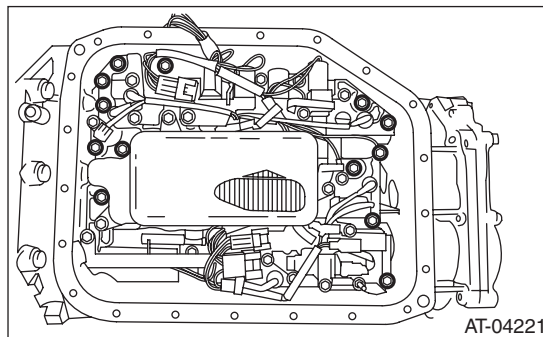


- (A) Control valve connector  
(B) Front vehicle speed sensor connector

- 12) Remove the control valve body.

#### NOTE:

The control valve body is replaced as an assembly only, because it is a non-disassembly part.

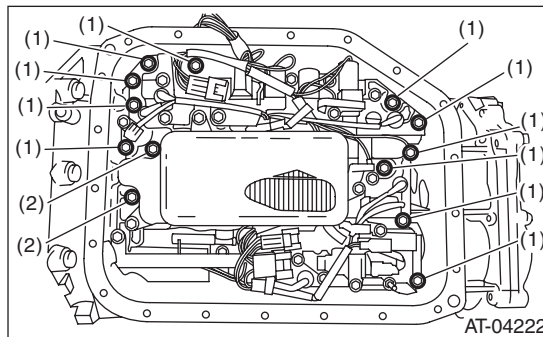


#### B: INSTALLATION

- 1) Check the control valve body for dust and other foreign matter.
- 2) Install the control valve body to transmission by equally tightening the bolts.

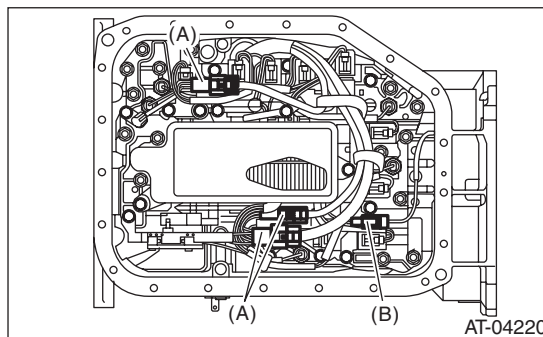
#### Tightening torque:

**8 N·m (0.8 kgf·m, 5.9 ft·lb)**



- (1) 30 mm (1.18 in)  
(2) 40 mm (1.57 in)

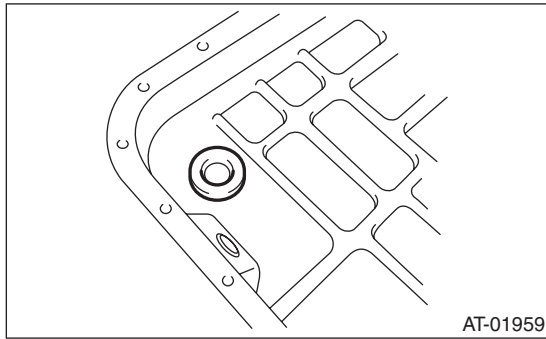
- 3) Connect the control valve connector.



- (A) Control valve connector  
(B) Front vehicle speed sensor connector



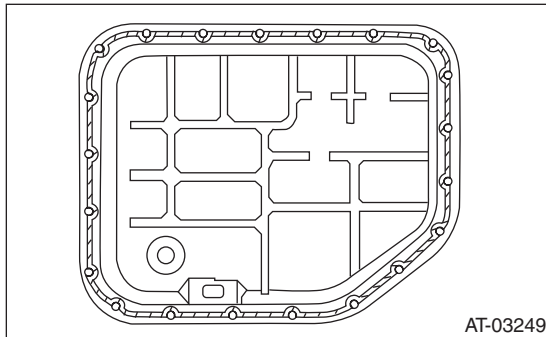
- 4) Attach the magnet at the specified position of the oil pan.



- 5) Apply liquid gasket to the oil pan.

**Liquid gasket:**

**THREE BOND 1217B (Part No. K0877YA020)  
or equivalent**



- 6) Install the oil pan by equally tightening the bolts.

**Tightening torque:**

**5 N·m (0.5 kgf·m, 3.7 ft·lb)**

- 7) Pour ATF through the oil charge pipe. <Ref. to 5AT-28, REPLACEMENT, Automatic Transmission Fluid.>
- 8) Check the ATF level. <Ref. to 5AT-28, INSPECTION, Automatic Transmission Fluid.>
- 9) Perform Clear Memory 2 operation. <Ref. to 5AT(diag)-17, CLEAR MEMORY MODE, OPERATION, Subaru Select Monitor.>
- 10) Perform the diagnosis again. <Ref. to 5AT(diag)-21, Learning Control.>
- 11) Perform the inspection at the end of repair work, and make sure there is no faulty as below;
- Excessive shift shock
  - Oil leakage from the transmission body, etc.
  - Occurrence of noise caused by interference etc.

**C: INSPECTION**

Check each parts for holes, damages or other foreign matters.

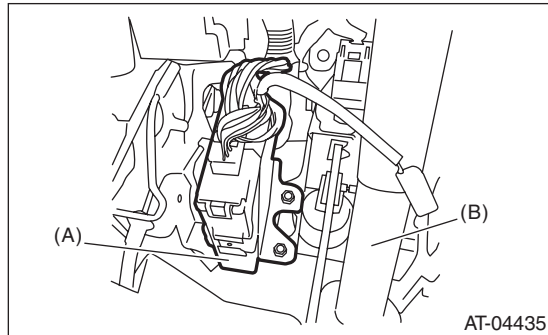
# Transmission Control Module (TCM)

## AUTOMATIC TRANSMISSION

### 18. Transmission Control Module (TCM)

#### A: REMOVAL

- 1) Disconnect the ground cable from battery.
- 2) Remove the instrument panel lower cover. <Ref. to EI-37, REMOVAL, Instrument Panel Lower Cover.>
- 3) Disconnect the connector from TCM.



- (A) Transmission control module (TCM)  
(B) Steering column

- 4) Remove the TCM.

#### NOTE:

Replace the TCM and bracket as a set.

#### B: INSTALLATION

- 1) Install the TCM to the bracket.

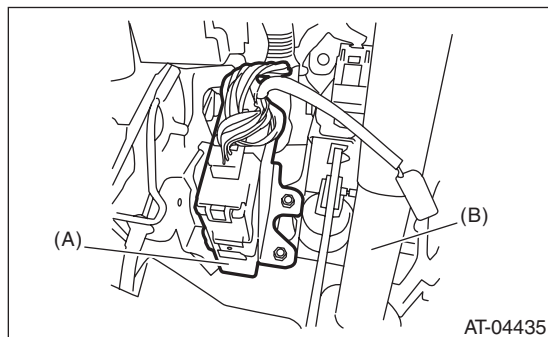
#### CAUTION:

To avoid the damage to bracket and TCM, do not remove after installing TCM to bracket. If installed by mistake, the part must be replaced with a new part.

- 2) Install the TCM.

#### Tightening torque:

**7.5 N·m (0.8 kgf-m, 5.5 ft-lb)**



- (A) Transmission control module (TCM)  
(B) Steering column

- 3) Connect the connector to TCM.
- 4) Install in the reverse order of removal.

5) Perform Clear Memory 2 operation. <Ref. to 5AT(diag)-17, CLEAR MEMORY MODE, OPERATION, Subaru Select Monitor.>

6) Perform the diagnosis again. <Ref. to 5AT(diag)-21, Learning Control.>

7) Perform the inspection at the end of repair work, and make sure there is no problem with the shift shock.

## 19. ATF Cooler Pipe and Hose

### A: REMOVAL

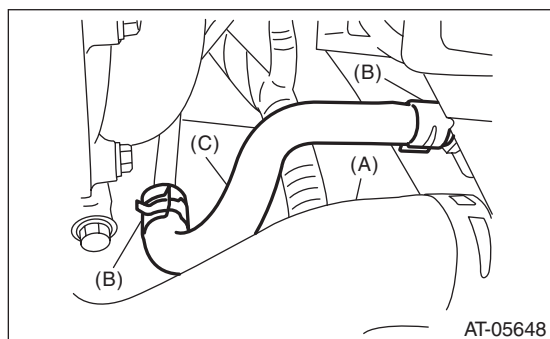
#### CAUTION:

Be careful not to spill ATF on the exhaust pipe to prevent it from emitting smoke or causing a fire. If ATF is spilled on the exhaust pipe, wipe it off completely.

- 1) Set the vehicle on a lift.
- 2) Lift up the vehicle.
- 3) Remove the under cover.
- 4) Remove the ATF cooler hose from under the radiator.

#### NOTE:

- Do not use a screwdriver or other pointed tools.
- If it is hard to remove the hose, wrap the hose with cloth to prevent from damaging it, and while turning with pliers, pull straight out by hand.

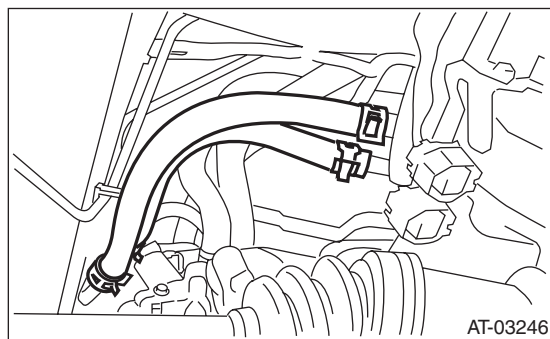


- (A) Radiator hose
- (B) Clip
- (C) ATF cooler hose

- 5) Remove the front exhaust pipe.
- 6) Remove the ATF cooler hose from the pipe.

#### NOTE:

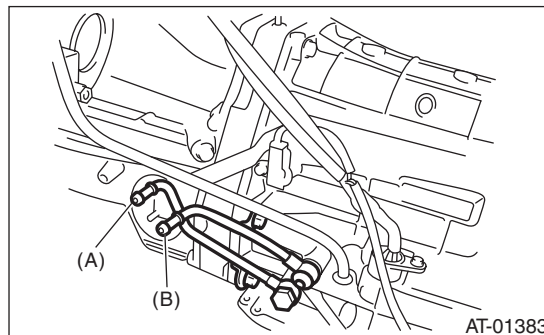
- Do not use a screwdriver or other pointed tools.
- If it is hard to remove the hose, wrap the hose with cloth to prevent from damaging it, and while turning with pliers, pull straight out by hand.



- 7) Remove the ATF inlet pipe and ATF outlet pipe.

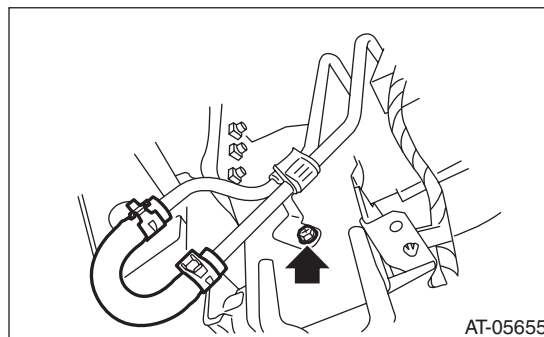
#### NOTE:

When disconnecting the outlet pipe, be careful not to lose the ball and spring with retaining screw.



- (A) ATF outlet pipe
- (B) ATF inlet pipe

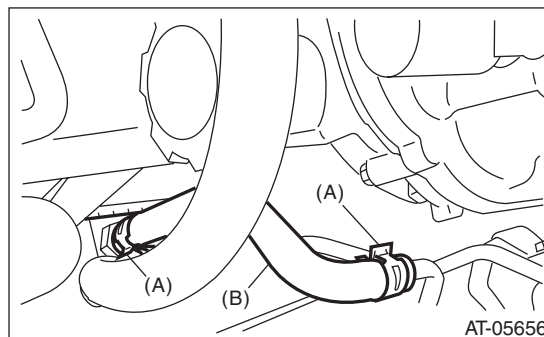
- 8) Lower the vehicle.
- 9) Remove the front bumper. <Ref. to EI-22, REMOVAL, Front Bumper.>
- 10) Remove the ATF cooler hose and remove the bolts securing the ATF cooler pipe.



- 11) Remove the ATF cooler hose from the upper side of the radiator.

#### NOTE:

- Do not use a screwdriver or other pointed tools.
- If it is hard to remove the hose, wrap the hose with cloth to prevent from damaging it, and while turning with pliers, pull straight out by hand.

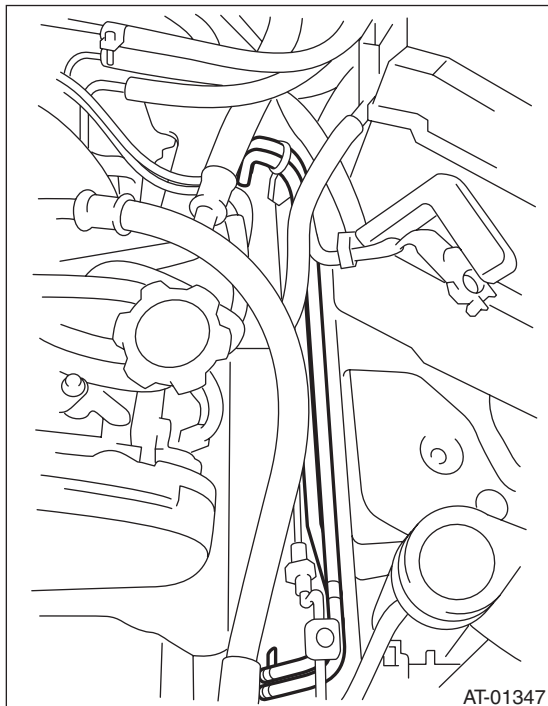


- (A) Clip
- (B) ATF cooler hose

# ATF Cooler Pipe and Hose

## AUTOMATIC TRANSMISSION

- 12) Disconnect the harness connector from the A/C pressure sensor.
- 13) Remove the ATF cooler pipe from frame.



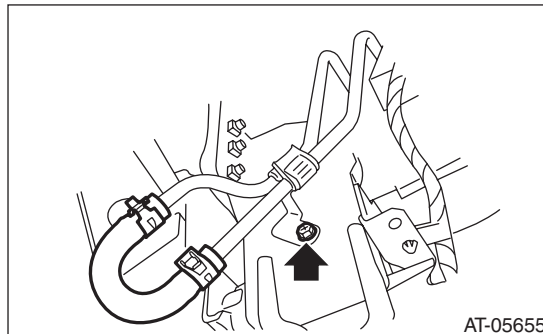
- 2) Attach the bolts securing the ATF cooler pipe, and attach the ATF cooler hose.

### NOTE:

Use a new ATF cooler hose.

### Tightening torque:

**7.5 N·m (0.76 kgf-m, 5.5 ft-lb)**



- 3) Connect the harness connector to the A/C pressure sensor.
- 4) Disconnect the ATF cooler hose from the radiator.

### NOTE:

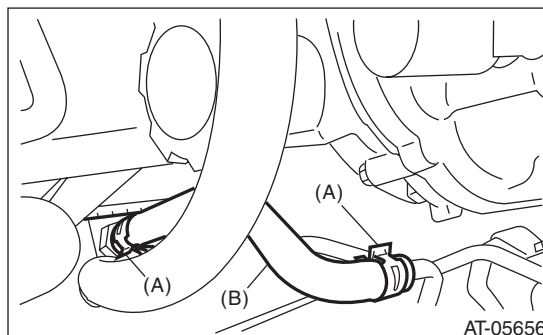
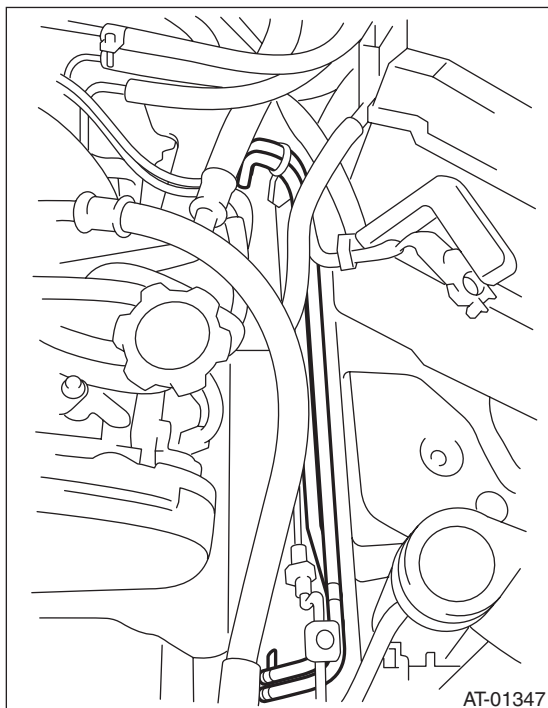
Use a new ATF cooler hose.

## B: INSTALLATION

- 1) Install the ATF cooler pipe to frame.

### Tightening torque:

**7.5 N·m (0.76 kgf-m, 5.5 ft-lb)**



(A) Clip

(B) ATF cooler hose

- 5) Install the front bumper. <Ref. to EI-23, INSTALLATION, Front Bumper.>
- 6) Lift up the vehicle.

7) Install the ATF inlet pipes and outlet pipes with new washer.

**NOTE:**

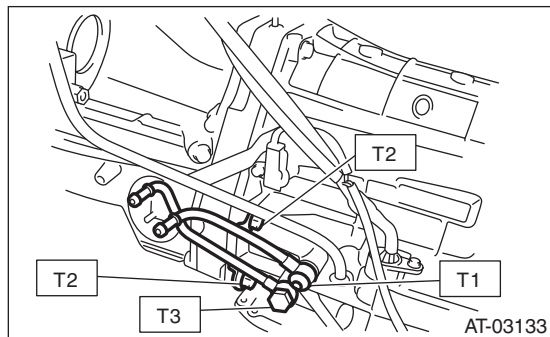
Use a new bolt for the converter case joint.

**Tightening torque:**

**T1: 40 N·m (4.1 kgf-m, 29.5 ft-lb)**

**T2: 38 N·m (3.9 kgf-m, 28.0 ft-lb)**

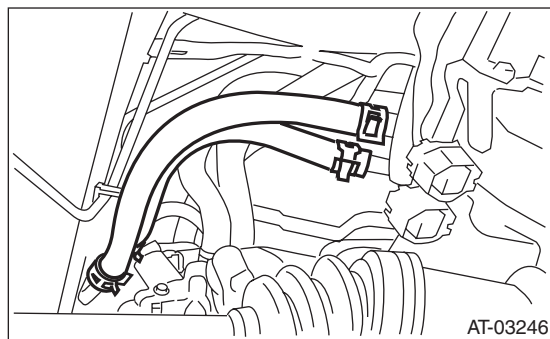
**T3: 45 N·m (4.6 kgf-m, 33.2 ft-lb)**



8) Connect the ATF cooler hose to the pipe on the transmission side.

**NOTE:**

- Install so that the hose is not folded over, excessively bent or twisted.
- Insert the hose to the specified position.
- Use a new ATF cooler hose.

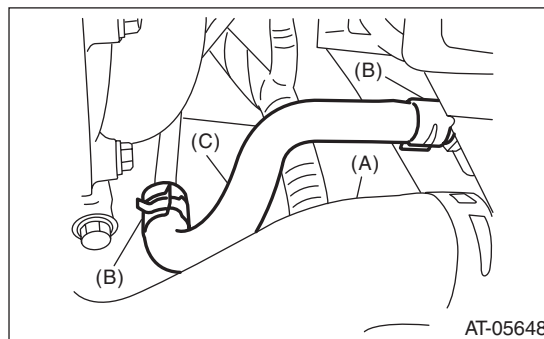


9) Connect the ATF cooler hose to the pipe on the radiator side.

**NOTE:**

- Install so that the hose is not folded over, excessively bent or twisted.
- Insert the hose to the specified position.

- Use a new ATF cooler hose.



- (A) Radiator hose
- (B) Clip
- (C) ATF cooler hose

10) Install the front exhaust pipe.

11) Install the under cover.

12) Fill ATF. <Ref. to 5AT-28, Automatic Transmission Fluid.>

**NOTE:**

Make sure there are no ATF leaks in joints between the transmission, radiator, pipes, and hoses.

**C: INSPECTION**

Repair or replace any faulty hoses, pipes, clips, and washers found in the inspection below.

- 1) Check for ATF leaks in joints between the transmission, radiator, pipes, and hoses.
- 2) Check clips for deformation.
- 3) Lightly bend the hose and check for cracks in the surface or other damages.
- 4) Pinch the hose with your fingers and check for poor elasticity. Also check for poor elasticity in the parts where the clip was installed by pressing with your fingernail.
- 5) Check for peeling, cracks, and deformation at the tip of the hose.

# Air Breather Hose

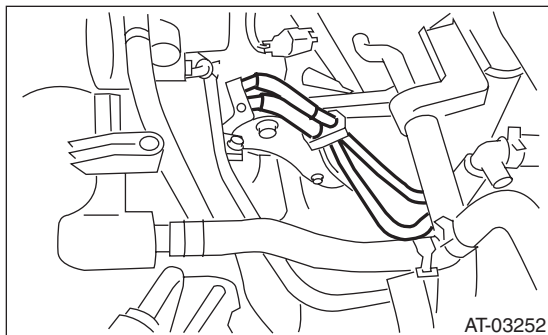
AUTOMATIC TRANSMISSION

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## 20. Air Breather Hose

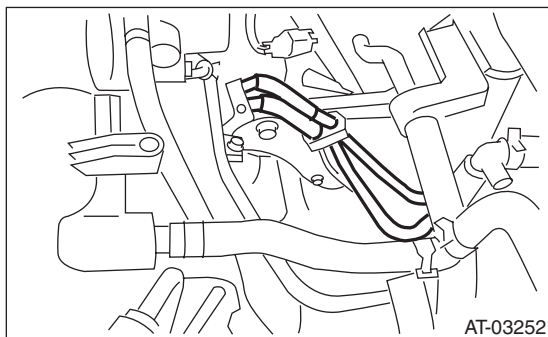
### A: REMOVAL

- 1) Remove the collector cover.
- 2) Remove the air intake chamber and intake boot.  
<Ref. to IN(H6DO)-8, REMOVAL, Air Intake Chamber.>
- 3) Disconnect the air breather hose.



### B: INSTALLATION

- 1) Connect the air breather hose.



- 2) Install the air intake chamber and intake boot.  
<Ref. to IN(H6DO)-8, INSTALLATION, Air Intake Chamber.>
- 3) Install the collector cover.

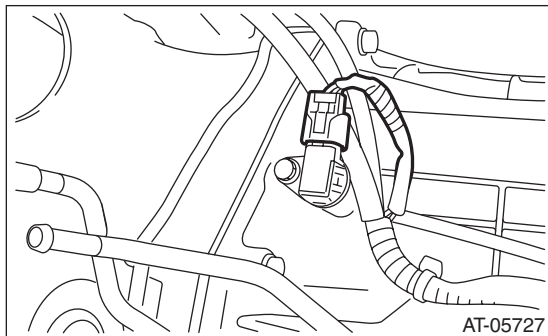
### C: INSPECTION

Make sure the hose is not cracked or clogged.

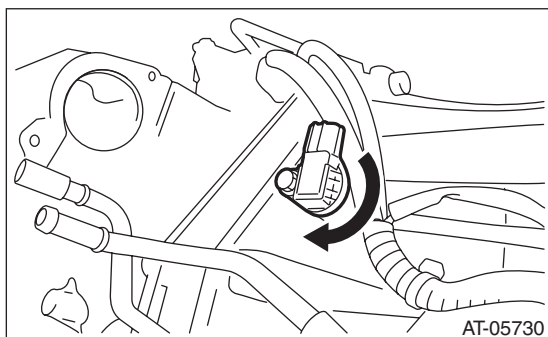
## 21.Oil Charge Pipe

### A: REMOVAL

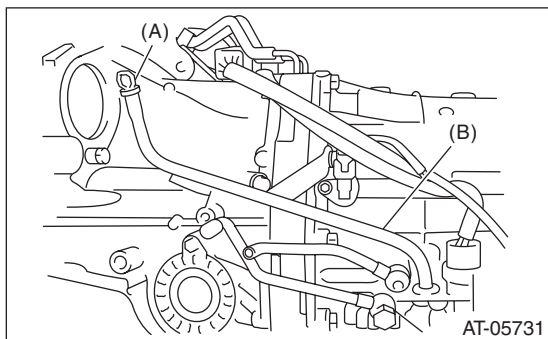
- 1) Set the vehicle on a lift.
- 2) Disconnect the ground cable from battery.
- 3) Lift up the vehicle.
- 4) Remove the under cover.
- 5) Remove the front exhaust pipe.
- 6) Clean the transmission exterior.
- 7) Disconnect the connector from turbine speed sensor 1.



- 8) Remove the turbine speed sensor 1 mounting bolt and rotate the sensor by 180°.



- 9) Remove the oil charge pipe, and then remove the O-ring from flange side.



- (A) ATF level gauge
- (B) Oil charge pipe

### B: INSTALLATION

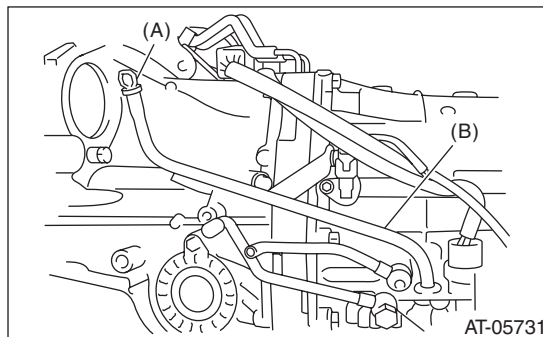
- 1) Install the oil charge pipe with a new O-ring.

#### NOTE:

Use a new bolt.

#### Tightening torque:

**38 N·m (3.9 kgf-m, 28.0 ft-lb)**

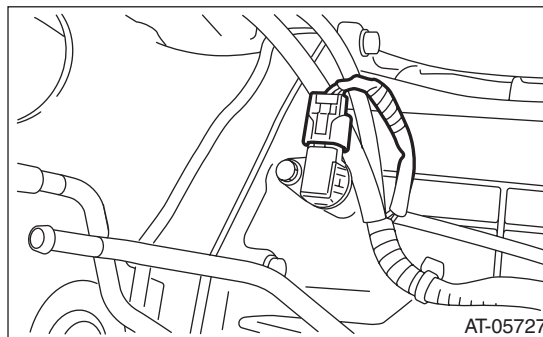


- (A) ATF level gauge
- (B) Oil charge pipe

- 2) Turn the turbine speed sensor 1 back to the original orientation, and install the bolt and connect the connector.

#### Tightening torque:

**7 N·m (0.7 kgf-m, 5.2 ft-lb)**



- 3) Install the front exhaust pipe.
- 4) Install the under cover.
- 5) Lower the vehicle.
- 6) Connect the ground cable to battery.

### C: INSPECTION

Make sure the oil charge pipe is not deformed or damaged.

# Torque Converter Assembly

AUTOMATIC TRANSMISSION

## 22. Torque Converter Assembly

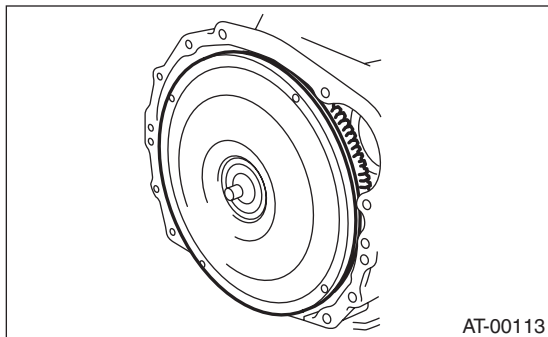
### A: REMOVAL

1) Remove the transmission assembly from vehicle body. <Ref. to 5AT-36, REMOVAL, Automatic Transmission Assembly.>

2) Pull out the torque converter and oil pump shaft horizontally.

#### NOTE:

- Be sure not to scratch the inside of bushing in oil pump shaft.
- Be careful that the oil pump shaft may drawn out simultaneously.



3) Remove the oil pump shaft from torque converter as necessary.

### B: INSTALLATION

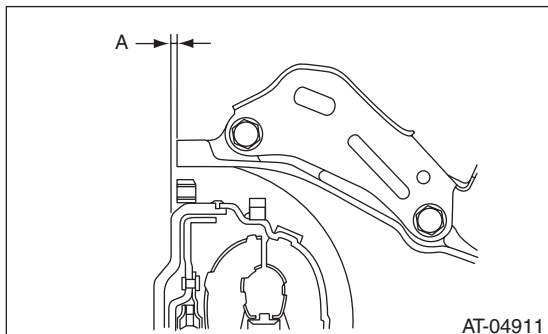
1) When the oil pump shaft is removed, install the shaft to torque converter.

#### NOTE:

- Use a new circlip.
  - Make sure the circlip is firmly inserted.
- 2) Install the oil pump shaft to torque converter, and then make sure that the clip is secured on groove.
- 3) Apply ATF to the revolving and sliding surface of the oil pump shaft.
- 4) Holding the torque converter assembly by hand, lightly rotate it to engage with the oil pump rotor.
- 5) Check the protruding dimension of the torque converter assembly.

#### **Dimension A:**

**8 mm (0.31 in) or less**



A Measured value

6) Install the transmission assembly to the vehicle. <Ref. to 5AT-39, INSTALLATION, Automatic Transmission Assembly.>

### C: INSPECTION

Make sure the ring gear and protrusion of torque converter end are not deformed or damaged.



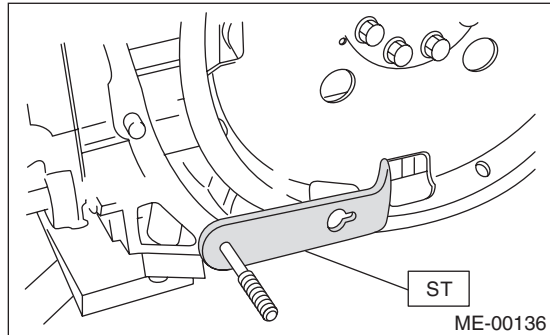
## 23. Drive Plate

### A: REMOVAL

1) Remove the transmission assembly from the vehicle. <Ref. to 5AT-36, REMOVAL, Automatic Transmission Assembly.>

2) Use the ST to lock the crankshaft, and remove the drive plate.

ST 498497100 CRANKSHAFT STOPPER

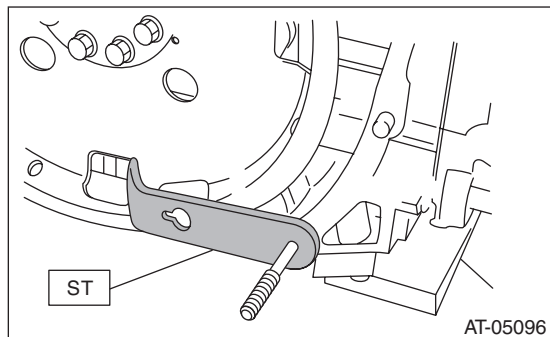


### B: INSTALLATION

1) Temporarily tighten the drive plate.

2) Using the ST, lock the crankshaft.

ST 498497100 CRANKSHAFT STOPPER



3) Tighten the drive plate to the specified torque.

#### NOTE:

Tighten the drive plate mounting bolts gradually. Each bolt should be tightened in a crisscross order.

#### **Tightening torque:**

**90 N·m (9.2 kgf·m, 66.4 ft·lb)**

4) Install the transmission assembly to the vehicle. <Ref. to 5AT-39, INSTALLATION, Automatic Transmission Assembly.>

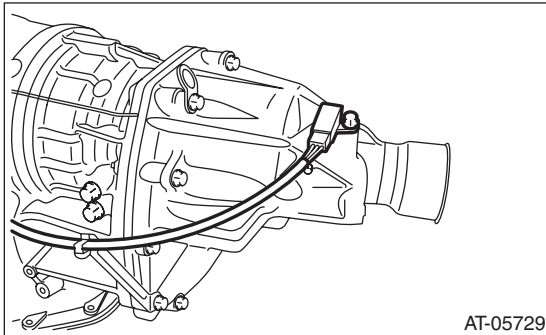
## Extension Case

### AUTOMATIC TRANSMISSION

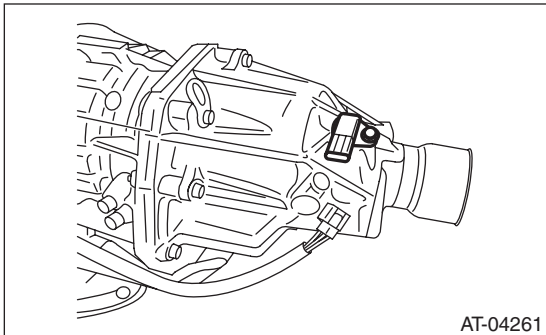
## 24. Extension Case

### A: REMOVAL

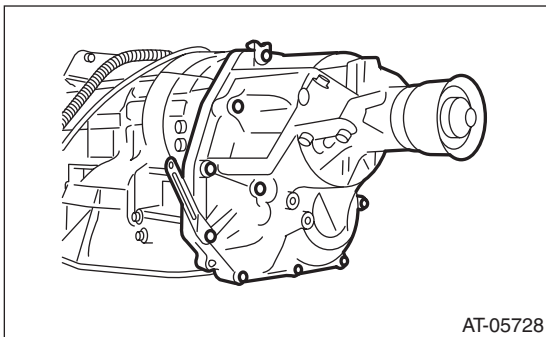
- 1) Remove the transmission assembly. <Ref. to 5AT-36, REMOVAL, Automatic Transmission Assembly.>
- 2) Disconnect the rear vehicle speed sensor connector.



- 3) Remove the rear vehicle speed sensor.



- 4) Remove the extension case.



### B: INSTALLATION

- 1) Attach the selected reduction driven gear shim to end surface of reduction driven gear with vaseline. <Ref. to 5AT-69, ADJUSTMENT, Reduction Driven Gear.>

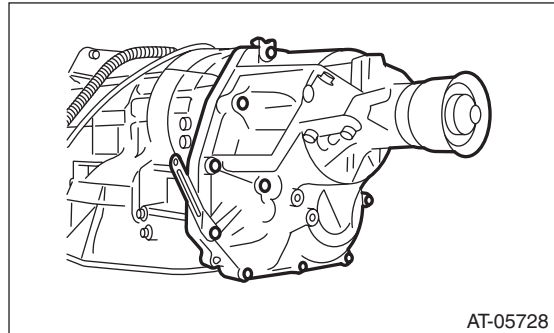
- 2) Install the extension case.

#### NOTE:

Use a new gasket.

#### Tightening torque:

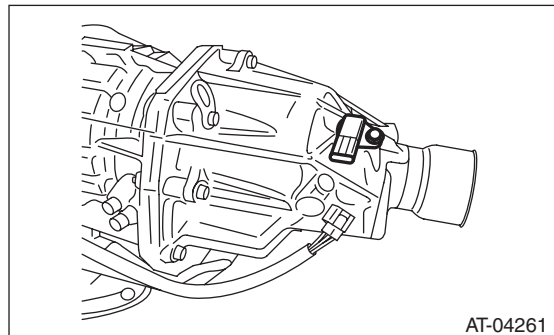
**25 N·m (2.5 kgf-m, 18.4 ft-lb)**



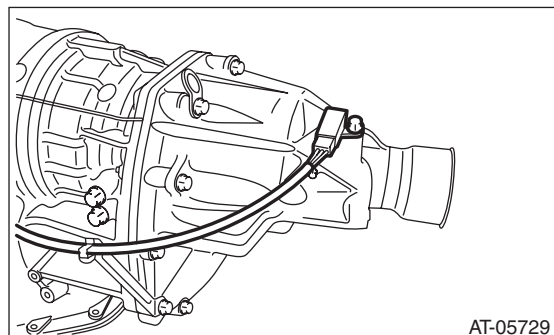
- 3) Install the rear vehicle speed sensor.

#### Tightening torque:

**7 N·m (0.7 kgf-m, 5.2 ft-lb)**



- 4) Connect the rear vehicle speed sensor connector.



- 5) Install the transmission assembly. <Ref. to 5AT-39, INSTALLATION, Automatic Transmission Assembly.>

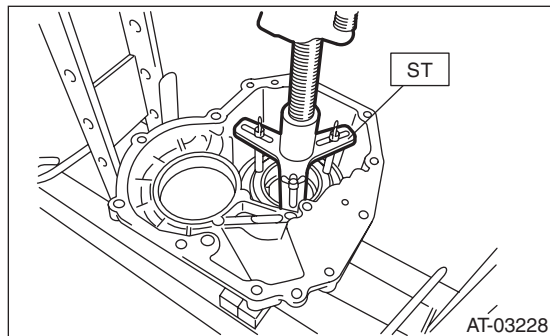
## C: DISASSEMBLY

1) Take out the transfer clutch and rear drive shaft by lightly tapping the end of rear drive shaft.

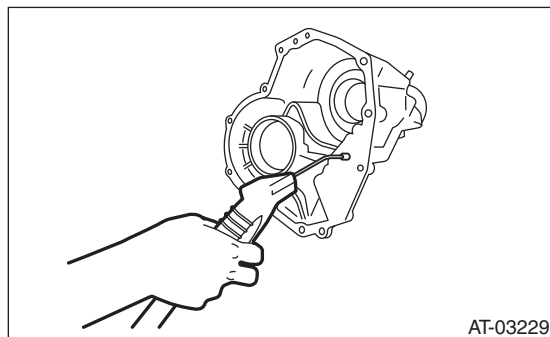
### NOTE:

Be careful not to damage the oil seal of the extension.

2) Remove the snap ring using the ST and press.  
ST 18762AA000 COMPRESSOR SPECIAL TOOL



3) Supply compressed air to remove the clutch piston.



4) Remove the dust cover from extension case.

5) Remove the oil seal from the extension case.

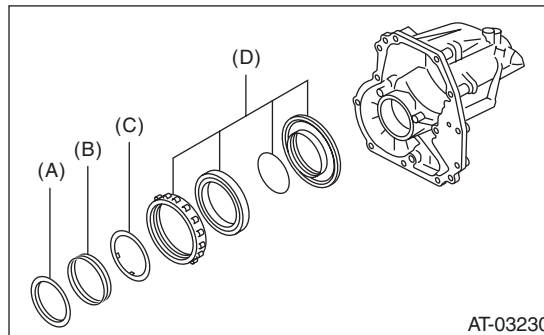
## D: ASSEMBLY

1) Press-fit the new oil seal using ST and the press.

ST 498057300 INSTALLER

2) Press-fit the dust cover.

3) Insert the transfer clutch assembly, spring retainer, return spring and clutch spring retainer.



(A) Clutch spring retainer

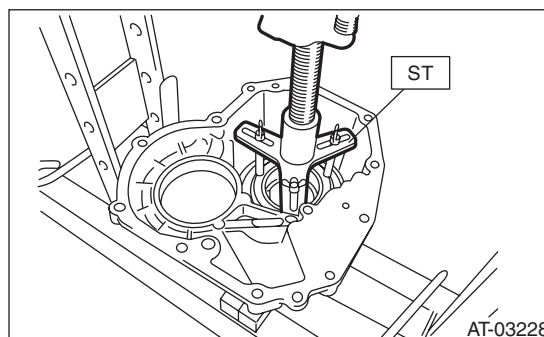
(B) Return spring

(C) Spring retainer

(D) Transfer clutch piston ASSY

4) Using the ST and compressor, install the snap ring.

ST 18762AA000 COMPRESSOR SPECIAL TOOL



5) Install the transfer clutch. <Ref. to 5AT-64, INSTALLATION, Transfer Clutch.>

6) Install the rear drive shaft.

## E: INSPECTION

- Use compressed air to make sure the extension case routes are not clogged or leaking.
- Inspect the extension end play, and adjust it to within the standard value. <Ref. to 5AT-64, ADJUSTMENT, Transfer Clutch.>

# Transfer Clutch

## AUTOMATIC TRANSMISSION

### 25. Transfer Clutch

#### A: REMOVAL

1) Remove the transmission assembly from vehicle body. <Ref. to 5AT-36, REMOVAL, Automatic Transmission Assembly.>

2) Remove the extension case, and then remove the transfer clutch. <Ref. to 5AT-62, REMOVAL, Extension Case.> <Ref. to 5AT-63, DISASSEMBLY, Extension Case.>

#### B: INSTALLATION

1) Select the rear drive shaft shim. <Ref. to 5AT-64, ADJUSTMENT, Transfer Clutch.>

2) Select driven plate No. 3 <Ref. to 5AT-64, ADJUSTMENT, Transfer Clutch.>

3) Install the extension case. <Ref. to 5AT-62, INSTALLATION, Extension Case.>

4) Install the transmission assembly to the vehicle. <Ref. to 5AT-39, INSTALLATION, Automatic Transmission Assembly.>

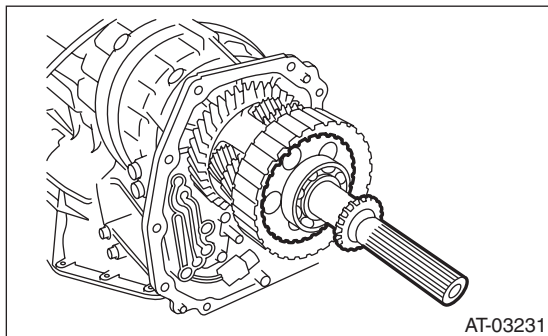
#### C: INSPECTION

- Inspect the drive plate facing for wear and damage.
- Make sure the snap ring is not worn and the return spring has no permanent distortion, damage, or deformation.
- Check that the D-ring is not damaged.
- Inspect the extension end play, and adjust it to within the standard value. <Ref. to 5AT-64, ADJUSTMENT, Transfer Clutch.>

#### D: ADJUSTMENT

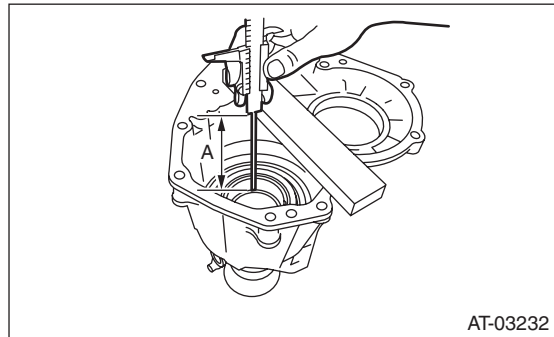
##### 1. REAR DRIVE SHAFT SHIM SELECTION

1) Insert the rear drive shaft into the reduction drive gear and center differential assembly.



2) Using the ST, measure the depth "A", which is from mating surface of extension case to ball bearing outer ring contact surface.

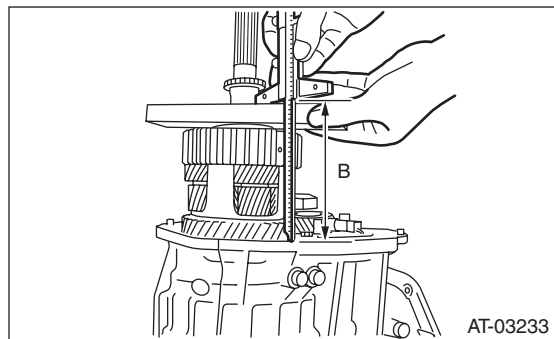
ST 398643600 GAUGE



A Measured value

3) Using the ST, measure the height "B" from the AT main case mating surface to ball bearing outer ring contact surface.

ST 398643600 GAUGE



B Measured value

#### 4) Calculation formula:

When clearances are 0.05 mm (0.0020 in):

$$T \text{ (mm)} = A - B + 0.23$$

$$[T \text{ (in)} = A - B + 0.0091]$$

When clearances are 0.25 mm (0.0098 in):

$$T \text{ (mm)} = A - B + 0.03$$

$$[T \text{ (in)} = A - B + 0.0012]$$

A: Depth from end of extension case to ball bearing outer ring contact surface

B: Height from end of AT main case contact surface to the ball bearing outer ring contact surface

T: Shim thickness

#### Specification:

**0.05 — 0.25 mm (0.0020 — 0.0098 in)**

#### NOTE:

Calculation formula for “T” above is applied when measuring with the ST (398643600 GAUGE).

When not using the ST,

When clearances are 0.05 mm (0.0020 in):

$$T \text{ (mm)} = (A - \alpha) - ((B - \beta) - 0.28) - 0.05$$

$$[T \text{ (in)} = (A - \alpha) - ((B - \beta) - 0.011) - 0.0020]$$

When clearances are 0.25 mm (0.0098 in):

$$T \text{ (mm)} = (A - \alpha) - ((B - \beta) - 0.28) - 0.25$$

$$[T \text{ (in)} = (A - \alpha) - ((B - \beta) - 0.011) - 0.0098]$$

is applied.

T: Shim thickness

A: Depth from end of extension case to ball bearing outer ring contact surface

B: Height from end of AT main case contact surface to the ball bearing outer ring contact surface

$\alpha$ : Thickness of collar used when measuring “A”

$\beta$ : Thickness of collar used when measuring “B”

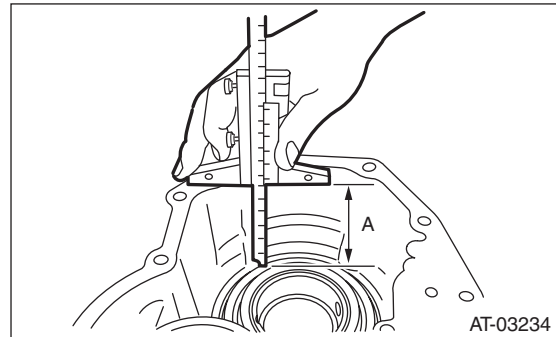
0.28 (0.011): Gasket thickness (Unit mm (in))

Adjustment shim	
Part No.	Thickness mm (in)
33281AA040	0.2 (0.008)
33281AA050	0.5 (0.020)
33281AA060	0.3 (0.012)

## 2. SELECTION OF DRIVEN PLATE NO. 3

1) Install the drive plate and driven plate to the center differential carrier.

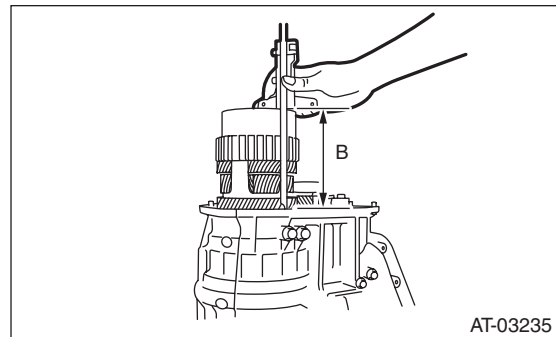
2) Measure the depth “A” from the mating surface of the extension case to the transfer clutch piston.



A Measured value

3) Using the ST, measure the height “B” from the AT main case mating surface to end of ST, and then subtract the thickness of ST (PISTON GUIDE) (50 mm (1.97 in)) from measured value.

ST 398744300 PISTON GUIDE



B Measured value

# Transfer Clutch

## AUTOMATIC TRANSMISSION

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### 4) Calculation formula:

When clearances are 0.2 mm (0.008 in):

$$T \text{ (mm)} = A - B + 0.08$$

$$[T \text{ (in)} = A - B + 0.0031]$$

When clearances are 0.6 mm (0.024 in):

$$T \text{ (mm)} = A - B + 0.32$$

$$[T \text{ (in)} = A - B + 0.0126]$$

T: Thickness of driven plate No. 3

A: Depth from mating surface of the extension case to the transfer clutch piston.

B: Height from AT main case mating surface to end of ST

### **Standard:**

**0.2 — 0.6 mm (0.008 — 0.024 in)**

### NOTE:

Calculation formula for “T” is applied when measuring using ST (398643600 GAUGE, 398744300 PISTON GUIDE). When not using the ST,

When clearances are 0.2 mm (0.008 in):

$$T \text{ (mm)} = A - (B - \alpha - 0.28) - 0.2$$

$$[T \text{ (in)} = A - (B - \alpha - 0.011) - 0.008]$$

When clearances are 0.6 mm (0.024 in):

$$T \text{ (mm)} = A - (B - \alpha - 0.28) - 0.6$$

$$[T \text{ (in)} = A - (B - \alpha - 0.011) - 0.024]$$

is applied.

T: Thickness of driven plate No. 3

A: Depth from mating surface of the extension case to the transfer clutch piston.

B: Height from the AT main case mating surface to the contact face of the tool that was used as the substitute of the ST.

$\alpha$ : Thickness of tool used when measuring “B”

0.28 (0.011): Gasket thickness (Unit mm (in))

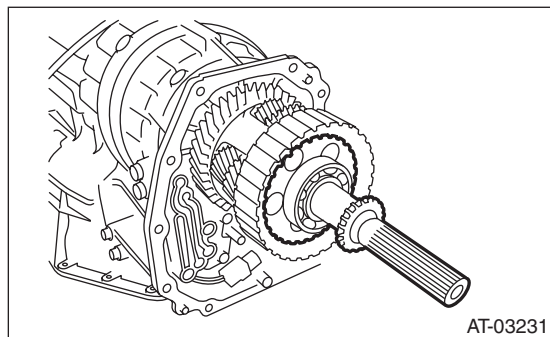
If it is out of specification, select the driven plate No. 3 to adjust within the specification.

Driven plate No. 3	
Part No.	Thickness mm (in)
31589AA041	1.6 (0.063)
31589AA050	2.0 (0.079)
31589AA060	2.4 (0.094)
31589AA070	2.8 (0.110)

## 26.Rear Drive Shaft

### A: REMOVAL

- 1) Remove the transmission assembly from vehicle body. <Ref. to 5AT-36, REMOVAL, Automatic Transmission Assembly.>
- 2) Remove the rear vehicle speed sensor, and then remove the extension case. <Ref. to 5AT-62, REMOVAL, Extension Case.>
- 3) Pull out the rear drive shaft from center differential assembly.



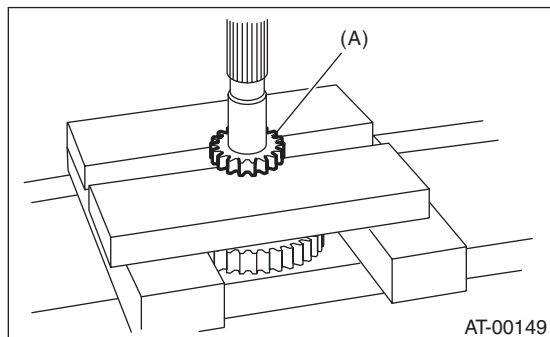
- 4) Remove the drive plate and driven plate.

### B: INSTALLATION

- 1) Select the shim. <Ref. to 5AT-64, ADJUSTMENT, Transfer Clutch.>
- 2) Install drive plate and driven plate.
- 3) Insert the rear drive shaft into the center differential assembly.
- 4) Combine the extension case, and then install the rear vehicle speed sensor. <Ref. to 5AT-62, INSTALLATION, Extension Case.>
- 5) Install the transmission assembly to the vehicle. <Ref. to 5AT-39, INSTALLATION, Automatic Transmission Assembly.>

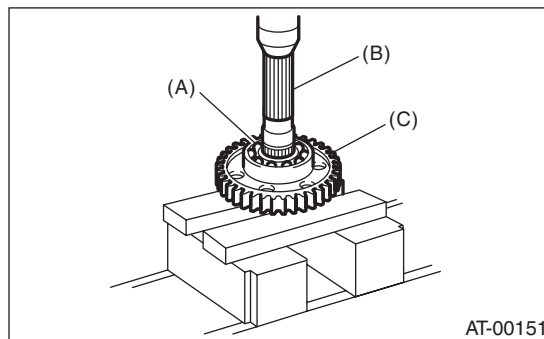
### C: DISASSEMBLY

- 1) Using a press, remove the revolution gear.



(A) Revolution gear

- 2) Using a press, remove the front and rear side ball bearings and clutch hub.



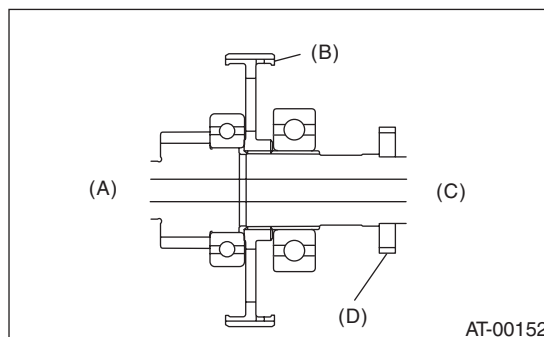
(A) Rear ball bearing  
 (B) Rear drive shaft  
 (C) Clutch hub

### D: ASSEMBLY

Assemble in the reverse order of disassembly.

#### NOTE:

- Use new ball bearings and revolution gear.
- Make sure the clutch hub is facing the correct direction.



(A) Front side  
 (B) Clutch hub  
 (C) Rear side  
 (D) Revolution gear

### E: INSPECTION

- Check each parts for holes, damages or other foreign matters.
- Inspect the extension end play, and adjust it to within the standard value. <Ref. to 5AT-64, ADJUSTMENT, Transfer Clutch.>

# Reduction Driven Gear

AUTOMATIC TRANSMISSION

## 27.Reduction Driven Gear

### A: REMOVAL

1) Remove the transmission assembly from vehicle body. <Ref. to 5AT-36, REMOVAL, Automatic Transmission Assembly.>

2) Remove the rear vehicle speed sensor, and separate the extension case from transmission case. <Ref. to 5AT-62, REMOVAL, Extension Case.>

3) Remove the center differential carrier. <Ref. to 5AT-71, REMOVAL, Center Differential Carrier.>

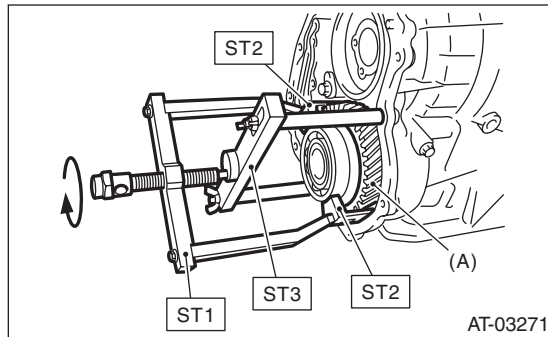
4) Set the range select lever to the "P" range.

5) Using ST1, ST2 and ST3, pull out the reduction driven gear.

ST1 499737100 PULLER SET

ST2 18680AA010 GEAR HOLDER

ST3 18766AA000 SUPPORT PULLER



(A) Reduction driven gear

### B: INSTALLATION

1) Set the range select lever to the "P" range.

2) Use a plastic hammer to install reduction driven gear assembly.

3) Select the reduction gear shims. <Ref. to 5AT-69, ADJUSTMENT, Reduction Driven Gear.>

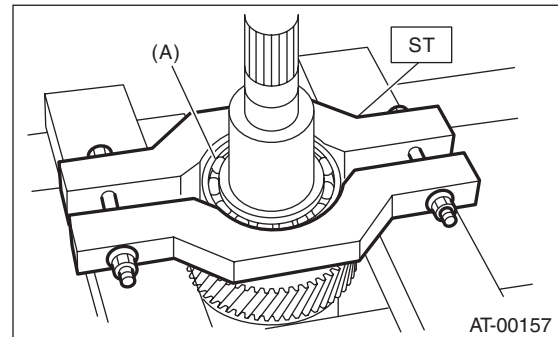
4) Join the transmission case and the extension case, and then install the rear vehicle speed sensor. <Ref. to 5AT-62, INSTALLATION, Extension Case.>

5) Install the transmission assembly to the vehicle. <Ref. to 5AT-39, INSTALLATION, Automatic Transmission Assembly.>

### C: DISASSEMBLY

1) Remove the ball bearing from reduction driven gear using ST.

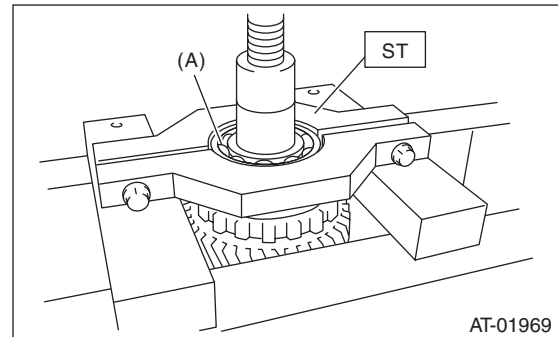
ST 498077300 REMOVER



(A) Ball bearing

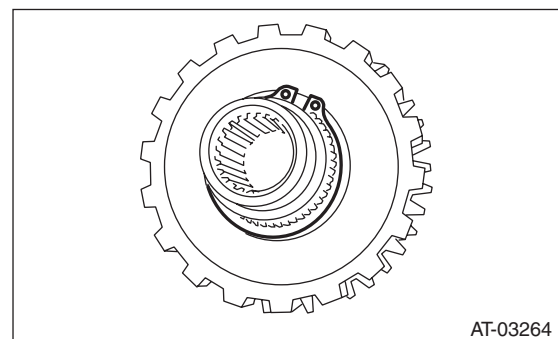
2) Remove the ball bearing on the reverse side with the same procedure as step 1).

ST 498077300 REMOVER



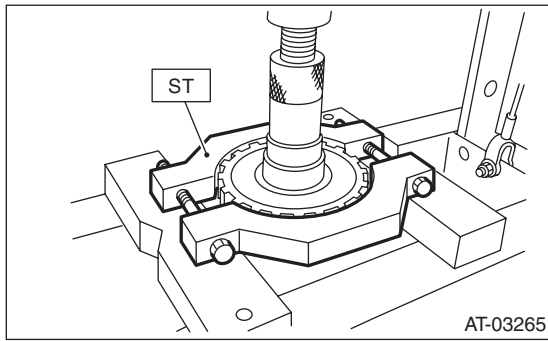
(A) Ball bearing

3) Remove the snap ring of the parking gear.

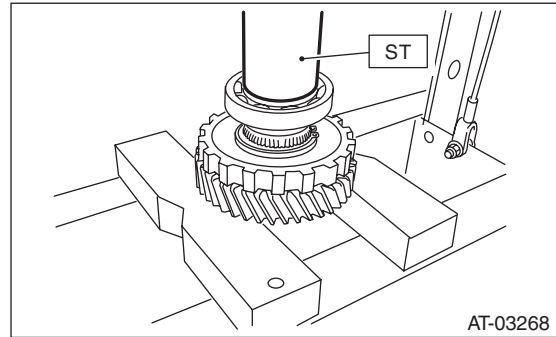




- 4) Using the ST, remove the parking gear.  
ST 18767AA000 REMOVER

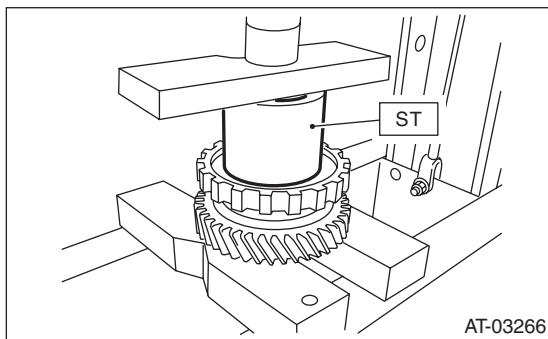


- 4) Install the ball bearing on the reverse side with the same procedure as step 3).  
ST 18654AA000 INSTALLER

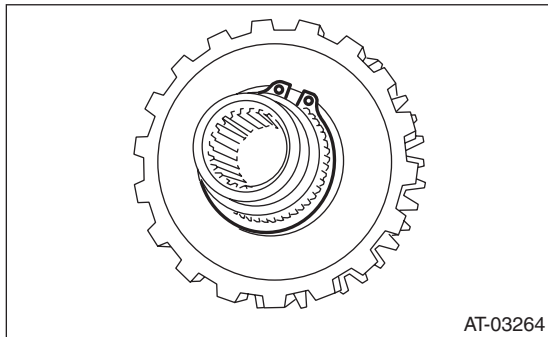


## D: ASSEMBLY

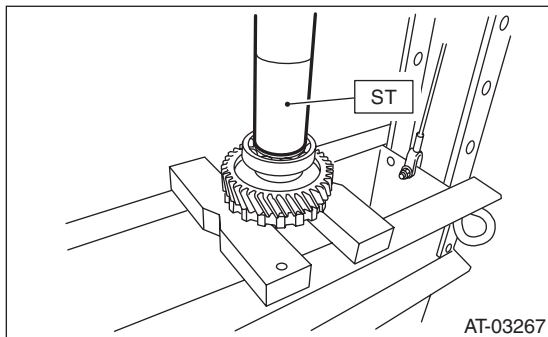
- 1) Using the ST, install the parking gear.  
ST 499755602 PRESS



- 2) Install the snap ring.



- 3) Install the new ball bearing to reduction driven gear using press.  
ST 18654AA000 INSTALLER



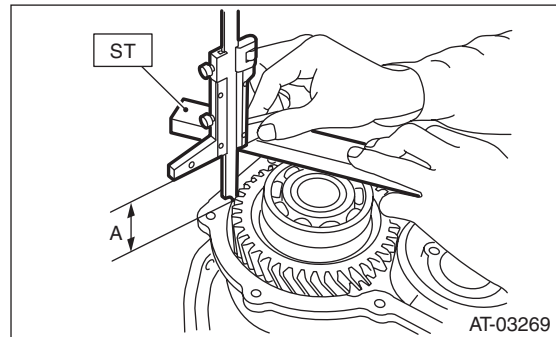
## E: INSPECTION

Make sure the ball bearing and gear is not deformed or damaged.

## F: ADJUSTMENT

- 1) Using the ST, measure the height "A" from the AT main case mating surface to ball bearing outer ring contact surface.

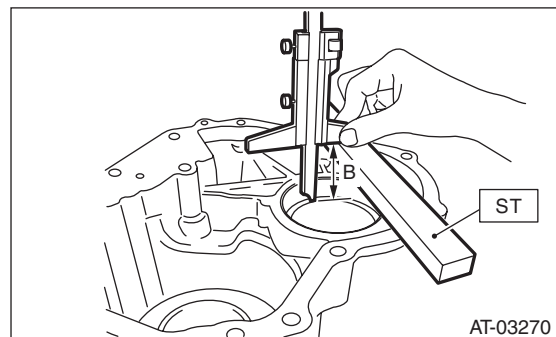
ST 499575400 GAUGE



A Measured value

- 2) Using the ST, measure the depth "B", which is from mating surface of extension case to ball bearing outer ring contact surface.

ST 499575400 GAUGE



B Measured value

## Reduction Driven Gear

### AUTOMATIC TRANSMISSION

---

#### 3) Calculation formula:

Select the ball bearing shim from the table to adjust clearances within 0.05 — 0.25 mm (0.0020 — 0.0098 in).

When clearances are 0.05 mm (0.0020 in):

$$T \text{ (mm)} = B - A + 0.23$$

$$[T \text{ (in)} = B - A + 0.0091]$$

When clearances are 0.25 mm (0.0098 in):

$$T \text{ (mm)} = B - A + 0.03$$

$$[T \text{ (in)} = B - A + 0.0012]$$

T: Shim clearance

A: Height from the mating surface of the AT main case to the ball bearing outer ring end surface

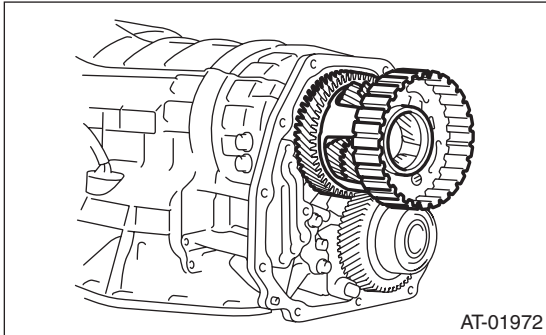
B: Depth from mating surface of extension case to ball bearing outer ring contact surface

Reduction gear shim	
Part No.	Thickness mm (in)
31288AA030	0.2 (0.008)
31288AA050	0.5 (0.020)
31288AA060	0.3 (0.012)

## 28.Center Differential Carrier

### A: REMOVAL

- 1) Remove the transmission assembly from vehicle body. <Ref. to 5AT-36, REMOVAL, Automatic Transmission Assembly.>
- 2) Remove the rear vehicle speed sensor, and separate the extension case from transmission case. <Ref. to 5AT-62, REMOVAL, Extension Case.>
- 3) Extract the rear drive shaft. <Ref. to 5AT-67, REMOVAL, Rear Drive Shaft.>
- 4) Pull out the center differential carrier assembly.



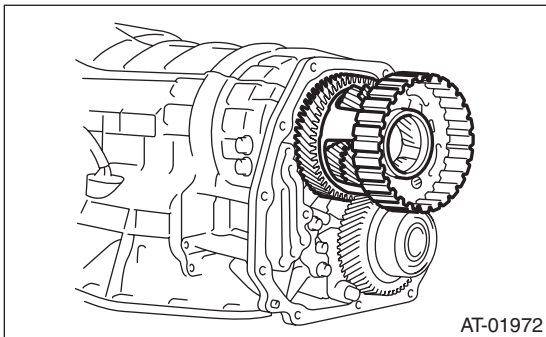
- 5) Pull out the shim(s) from transmission case.

### B: INSTALLATION

- 1) Install the center differential assembly with the shim(s).

**NOTE:**

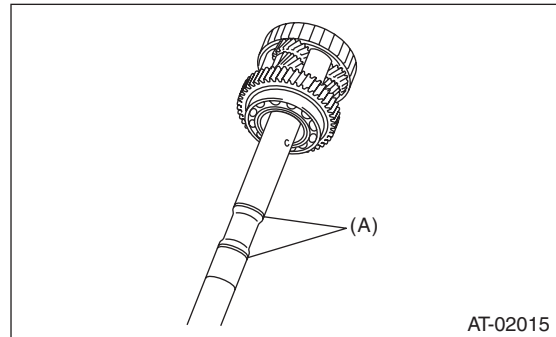
Press-fit it to the bottom of bearing shoulder completely.



- 2) Insert the rear drive shaft. <Ref. to 5AT-67, INSTALLATION, Rear Drive Shaft.>
- 3) Join the transmission case and the extension case, and then install the rear vehicle speed sensor. <Ref. to 5AT-62, INSTALLATION, Extension Case.>
- 4) Install the transmission assembly to the vehicle. <Ref. to 5AT-39, INSTALLATION, Automatic Transmission Assembly.>

### C: DISASSEMBLY

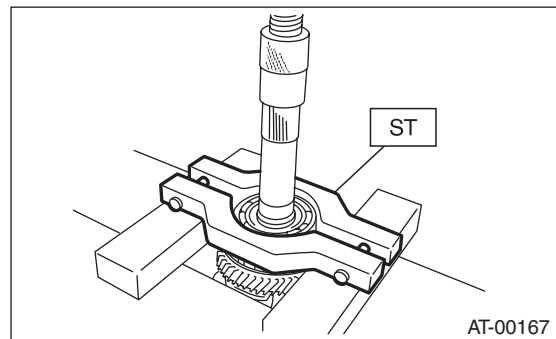
- 1) Remove the seal ring.



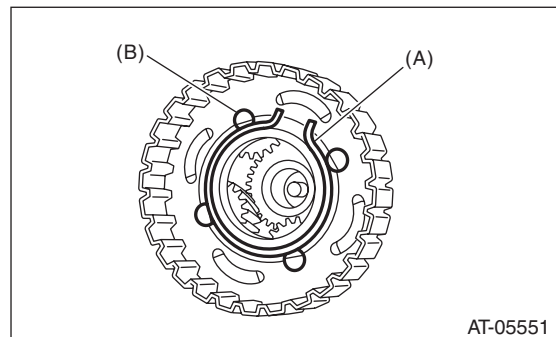
(A) Seal ring

- 2) Remove the ball bearing using the ST and the press.

ST 498077600 REMOVER



- 3) Remove the snap ring, and pull out the pinion shaft from center differential assembly.

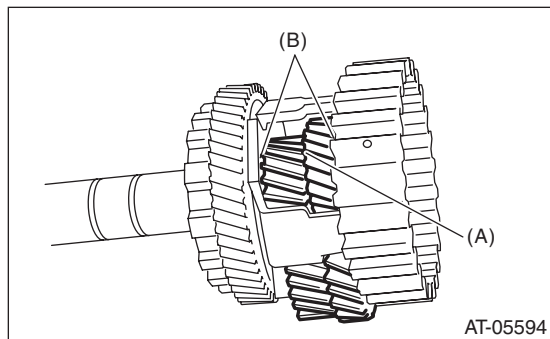


(A) Snap ring  
(B) Pinion shaft

# Center Differential Carrier

## AUTOMATIC TRANSMISSION

4) Remove the pinion gear and washers from center differential assembly.



- (A) Pinion gear
- (B) Washer

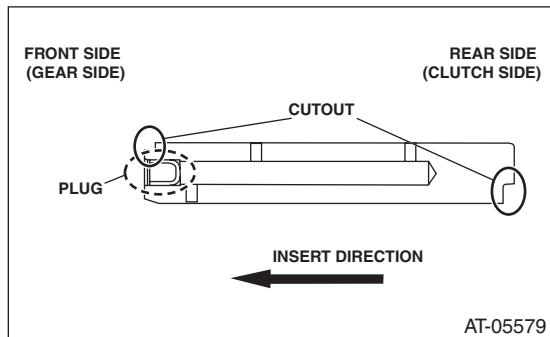
5) Pull out the intermediate shaft and thrust bearing.

### D: ASSEMBLY

- 1) Install the thrust bearing onto intermediate shaft.
- 2) Insert the intermediate shaft into the center differential assembly.
- 3) Install the pinion gears and washers.
- 4) Insert the shaft into the center differential assembly.

#### NOTE:

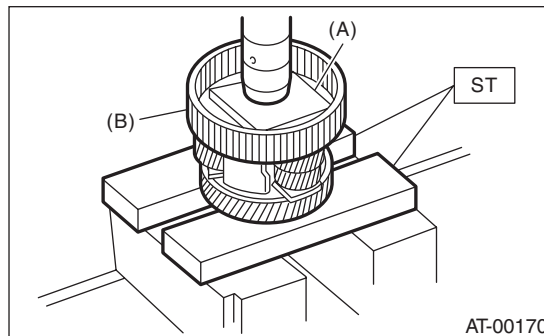
Insert the pinion shaft with the plug end toward the front (gear side), and adjust its position so that the cutout portion on the near side is on the inner side.



5) Install the snap ring.

6) Using a press, install a new ball bearing into the center differential assembly.

ST 498077000 REMOVER



- (A) Plate
- (B) Center differential carrier

7) Apply vaseline onto the seal ring outer surface and shaft grooves.

8) Install a new seal ring.

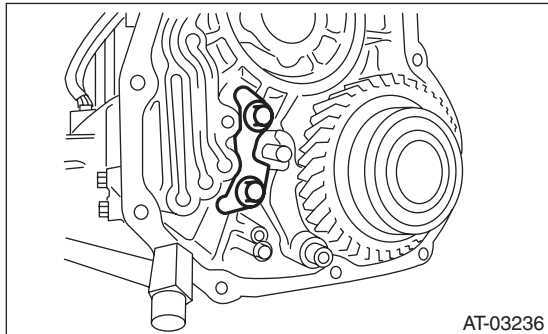
### E: INSPECTION

- Check each parts for holes, damages or other foreign matters.
- Inspect the extension end play, and adjust it to within the standard value. <Ref. to 5AT-64, ADJUSTMENT, Transfer Clutch.>

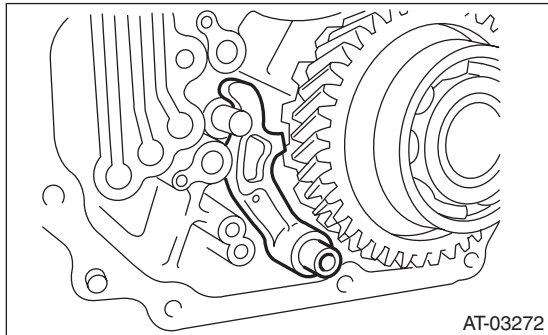
## 29. Parking Pawl

### A: REMOVAL

- 1) Remove the transmission assembly from vehicle body. <Ref. to 5AT-36, REMOVAL, Automatic Transmission Assembly.>
- 2) Remove the extension case. <Ref. to 5AT-62, REMOVAL, Extension Case.>
- 3) Remove the center differential carrier. <Ref. to 5AT-71, REMOVAL, Center Differential Carrier.>
- 4) Remove the front vehicle speed sensor. <Ref. to 5AT-48, REMOVAL, Front Vehicle Speed Sensor.>
- 5) Remove the parking support actuator.

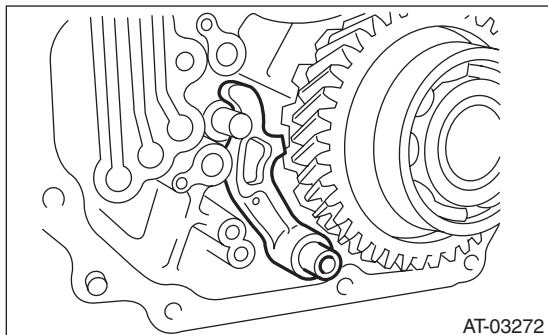


- 6) Remove the parking pawl, parking pawl shaft and return spring.



### B: INSTALLATION

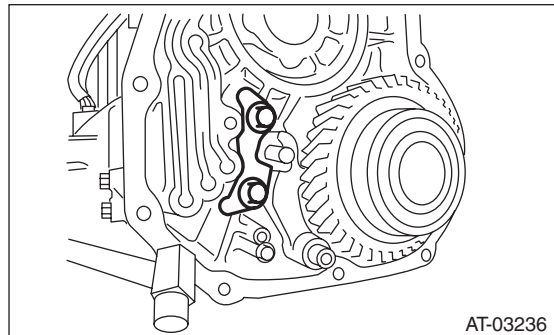
- 1) Set the transmission to the "N" range.
- 2) Install the parking pawl, parking pawl shaft and return spring.



- 3) Install the parking support actuator.

#### Tightening torque:

$10 \pm 2 \text{ N}\cdot\text{m}$  ( $1.0 \pm 0.2 \text{ kgf}\cdot\text{m}$ ,  $7.4 \pm 1.5 \text{ ft}\cdot\text{lb}$ )



- 4) Using the ST, tighten the bolts which tightened in step 3) with specified angle.

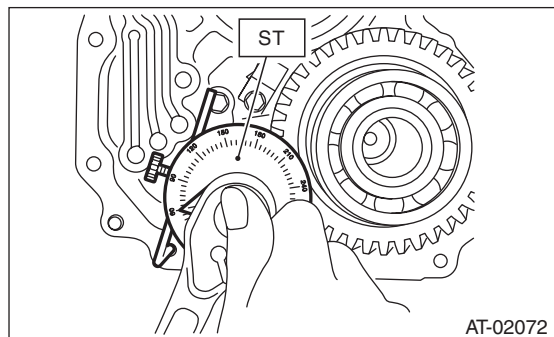
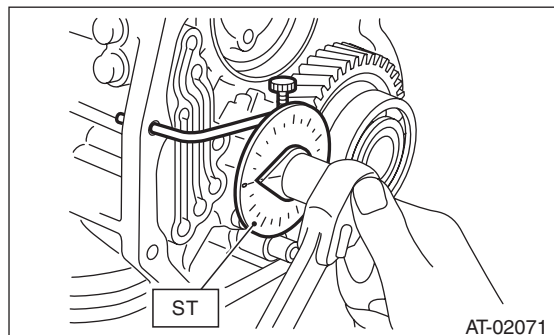
#### Tightening angle:

$17^\circ \pm 2^\circ$

ST 18854AA000 ANGLE GAUGE

#### NOTE:

Do not use extension as much as possible.

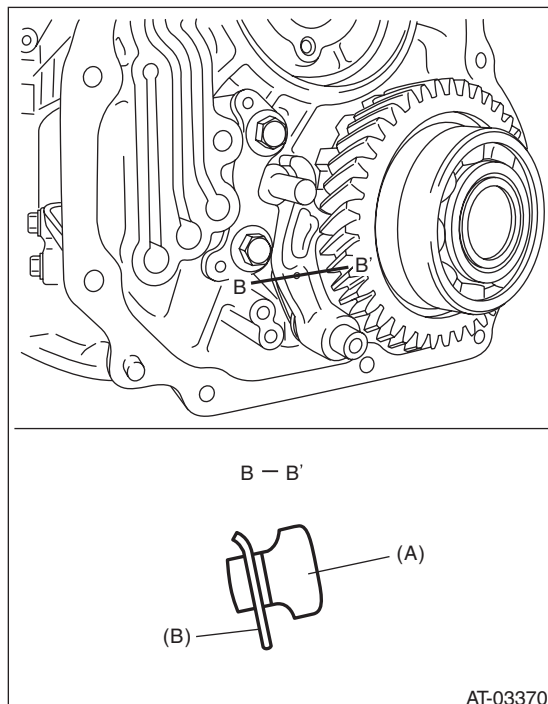


## Parking Pawl

### AUTOMATIC TRANSMISSION

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5) Make sure that the return spring is sticking out of the parking pole hole.



- (A) Parking pawl
- (B) Return spring

6) Install the front vehicle speed sensor. <Ref. to 5AT-48, INSTALLATION, Front Vehicle Speed Sensor.>

7) Install the center differential carrier. <Ref. to 5AT-71, INSTALLATION, Center Differential Carrier.>

8) Install the extension case. <Ref. to 5AT-62, INSTALLATION, Extension Case.>

9) Install the transmission assembly to the vehicle. <Ref. to 5AT-39, INSTALLATION, Automatic Transmission Assembly.>

### C: INSPECTION

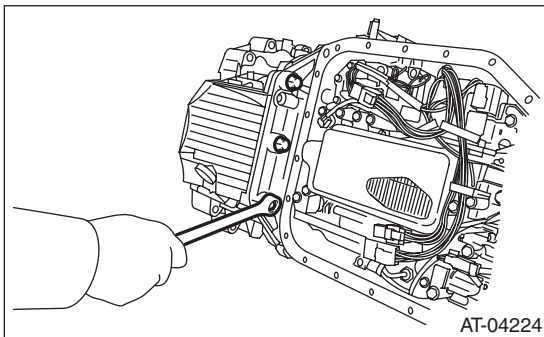
Make sure that the tab of parking pawl on reduction driven gear is not worn or otherwise damaged.

## 30. Converter Case

### A: REMOVAL

- 1) Remove the transmission assembly from vehicle body. <Ref. to 5AT-36, REMOVAL, Automatic Transmission Assembly.>
- 2) Remove the torque converter assembly. <Ref. to 5AT-60, REMOVAL, Torque Converter Assembly.>
- 3) Remove the transmission harness connector from stay.
- 4) Remove the turbine speed sensor 1. <Ref. to 5AT-51, REMOVAL, Turbine Speed Sensor 1.>
- 5) Remove the oil charge pipe. <Ref. to 5AT-59, REMOVAL, Oil Charge Pipe.>
- 6) Remove the ATF inlet and outlet pipes. <Ref. to 5AT-55, REMOVAL, ATF Cooler Pipe and Hose.>
- 7) Remove the converter case attachment bolts.
- 8) Lay along the transmission body, and then remove the oil pan.
- 9) Remove the three converter case mounting bolts (TORX®).

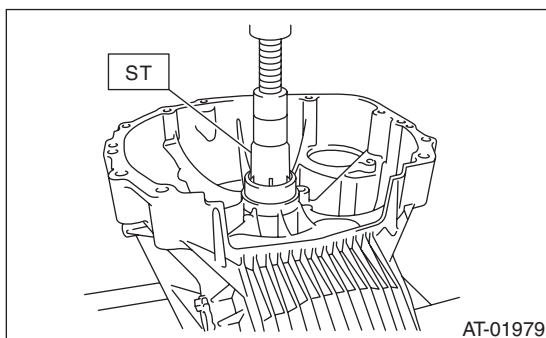
ST 18676AA020 TORX® WRENCH



- 10) Separate the converter case by lightly tapping with plastic hammer.
- 11) Remove the front differential assembly. <Ref. to 5AT-86, REMOVAL, Front Differential Assembly.>
- 12) Remove the oil seal from converter case.

### B: INSTALLATION

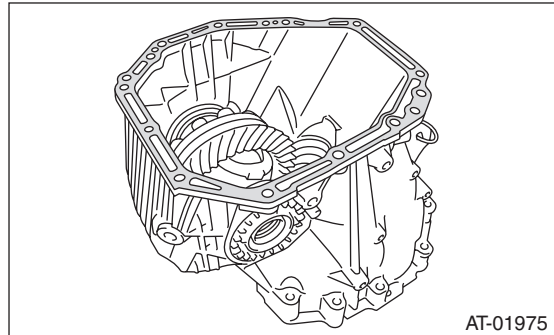
- 1) Check the appearance of each component and clean them.
- 2) Press-fit the oil seal to converter case using ST. ST 499587100 OIL SEAL INSTALLER



- 3) Install the front differential assembly to the case. <Ref. to 5AT-86, INSTALLATION, Front Differential Assembly.>
- 4) Install the right and left side retainers. <Ref. to 5AT-89, ADJUSTMENT, Front Differential Assembly.>
- 5) Apply proper amount of liquid gasket to the entire matching surface of converter case.

#### Liquid gasket:

**THREE BOND 1215 (Part No. 004403007) or equivalent**



- 6) Install the converter case assembly without damaging bushing and oil seal.

#### NOTE:

Use new bolts for the oil charge pipe and ATF cooler pipe.

#### Tightening torque:

**Oil charge pipe and ATF cooler pipe**  
**38 N·m (3.9 kgf-m, 28.0 ft-lb)**

#### Other than above

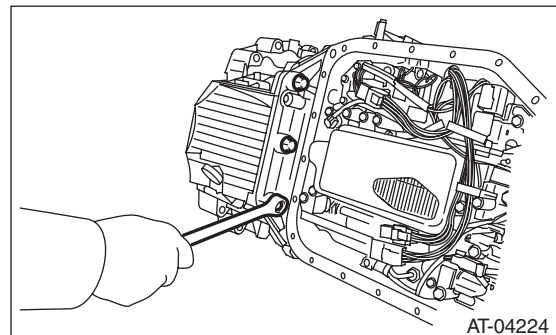
**41 N·m (4.2 kgf-m, 30.2 ft-lb)**

- 7) Install the three converter case mounting bolts (TORX®).

ST 18676AA020 TORX® WRENCH

#### Tightening torque:

**41 N·m (4.2 kgf-m, 30.2 ft-lb)**



## Converter Case

### AUTOMATIC TRANSMISSION

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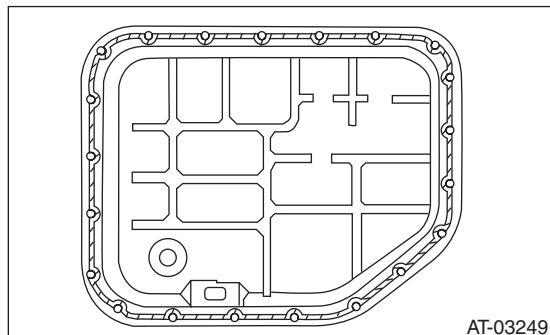
8) Apply proper amount of liquid gasket to the entire oil pan mating surface, and then install it.

**Liquid gasket:**

**THREE BOND 1217B (Part No. K0877YA020)  
or equivalent**

**Tightening torque:**

**5 N·m (0.5 kgf·m, 3.7 ft·lb)**



9) Install the transmission harness connector to the stay.

10) Install the air breather hose. <Ref. to 5AT-58, INSTALLATION, Air Breather Hose.>

11) Install the ATF cooler pipe. <Ref. to 5AT-56, INSTALLATION, ATF Cooler Pipe and Hose.>

12) Install the oil charge pipe with O-ring. <Ref. to 5AT-59, INSTALLATION, Oil Charge Pipe.>

13) Install the torque converter assembly. <Ref. to 5AT-60, INSTALLATION, Torque Converter Assembly.>

14) Install the transmission assembly to the vehicle. <Ref. to 5AT-39, INSTALLATION, Automatic Transmission Assembly.>

### **C: INSPECTION**

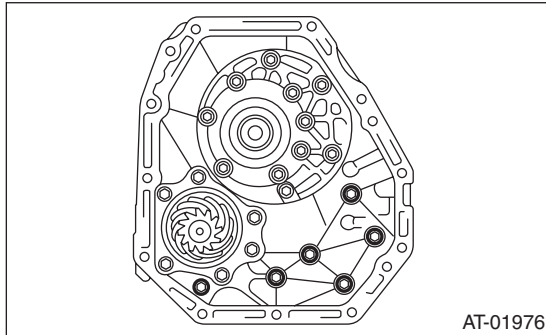
Measure the backlash, and then adjust it to be within standard values. <Ref. to 5AT-83, ADJUSTMENT, Drive Pinion Shaft Assembly.>



## 31.Oil Pump Cover

### A: REMOVAL

- 1) Remove the transmission assembly from vehicle body. <Ref. to 5AT-36, REMOVAL, Automatic Transmission Assembly.>
- 2) Pull out the torque converter assembly. <Ref. to 5AT-60, REMOVAL, Torque Converter Assembly.>
- 3) Remove the transmission harness connector from stay.
- 4) Remove the oil charge pipe. <Ref. to 5AT-59, REMOVAL, Oil Charge Pipe.>
- 5) Remove the ATF inlet and outlet pipes. <Ref. to 5AT-55, REMOVAL, ATF Cooler Pipe and Hose.>
- 6) Separate the converter case and transmission case. <Ref. to 5AT-75, REMOVAL, Converter Case.>
- 7) Remove the oil pump cover mounting bolt, and then separate the oil pump cover from the AT main case by lightly tapping with plastic hammer.

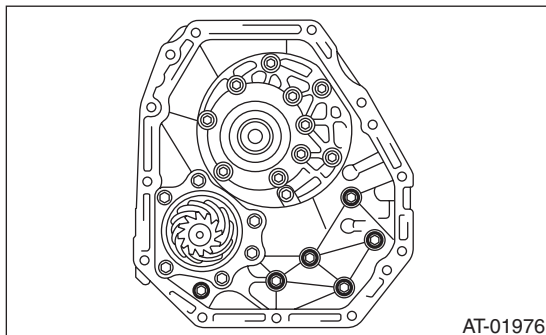


### B: INSTALLATION

- 1) Secure the oil pump cover.

#### Tightening torque:

**41 N·m (4.2 kgf-m, 30.2 ft-lb)**



- 2) Install the converter case assembly to the transmission case assembly. <Ref. to 5AT-75, INSTALLATION, Converter Case.>
- 3) Install the transmission harness connector to the stay.
- 4) Install the ATF cooler pipe. <Ref. to 5AT-56, INSTALLATION, ATF Cooler Pipe and Hose.>

- 5) Install the oil charge pipe together with an O-ring. <Ref. to 5AT-59, INSTALLATION, Oil Charge Pipe.>

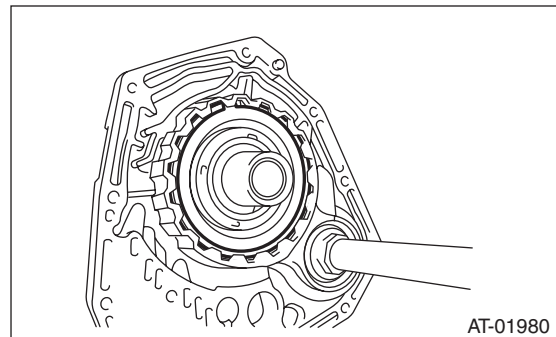
- 6) Install the torque converter assembly. <Ref. to 5AT-60, INSTALLATION, Torque Converter Assembly.>

- 7) Install the transmission assembly to the vehicle. <Ref. to 5AT-39, INSTALLATION, Automatic Transmission Assembly.>

### C: DISASSEMBLY

#### 1. FRONT BRAKE

- 1) Remove the snap ring.



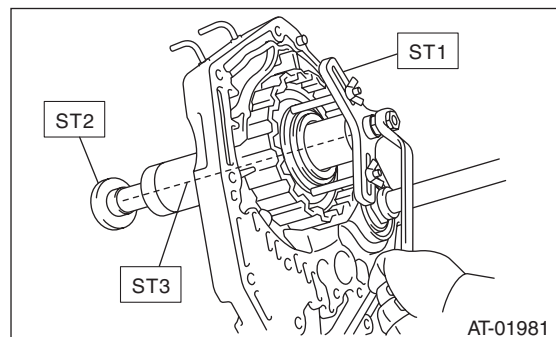
- 2) Remove the retaining plate, drive plate and driven plate.

- 3) Using the ST1, ST2 and ST3, remove the snap ring.

ST1 18762AA000 COMPRESSOR SPECIAL TOOL

ST2 18765AA000 COMPRESSOR SUPPORT

ST3 18763AA000 COMPRESSOR SHAFT

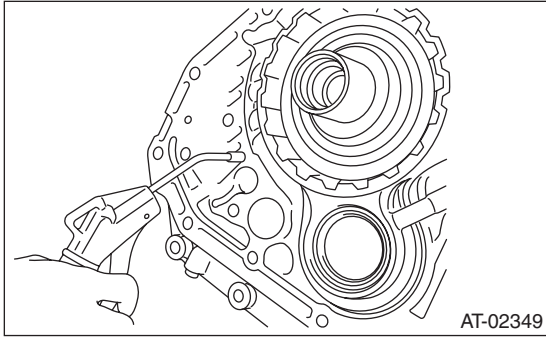


- 4) Remove the retainer and return spring.

# Oil Pump Cover

## AUTOMATIC TRANSMISSION

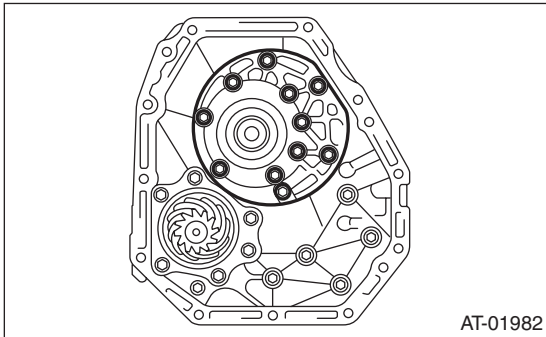
5) Remove the front brake piston using compressed air.



6) Remove the D-ring from front brake piston.

## 2. OIL PUMP

1) Take out the oil pump housing.



2) Take out the oil pump body.

## D: ASSEMBLY

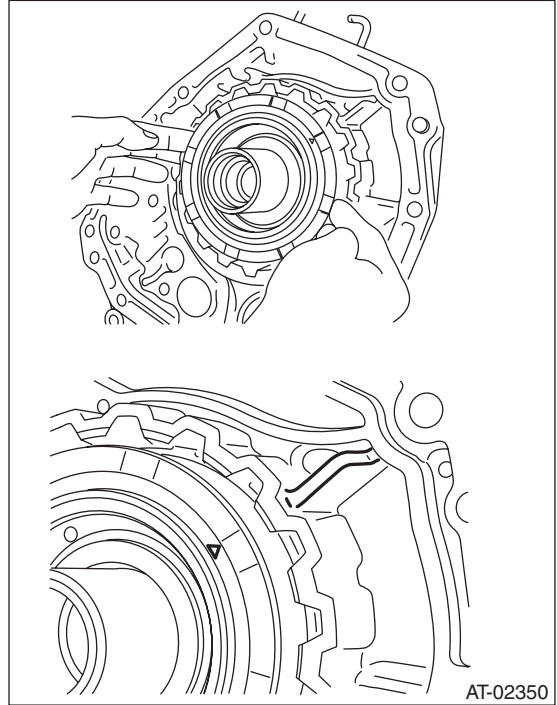
### 1. FRONT BRAKE

1) Apply ATF to D-ring, and then install it to the front brake piston.

2) Install the front brake piston to oil pump cover.

#### NOTE:

Install by aligning the “▲” mark on front brake piston surface with the oil pump cover rib.



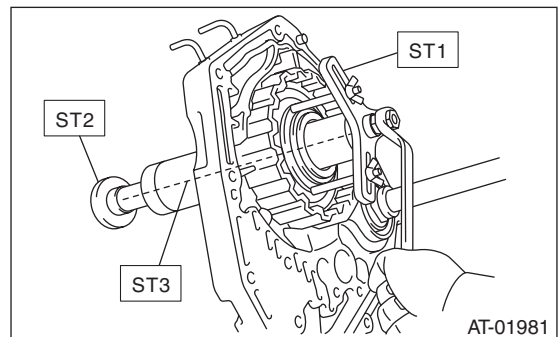
3) Install the retainer and return spring.

4) Install the front brake piston assembly using ST1, ST2 and ST3.

ST1 18762AA000 COMPRESSOR SPECIAL TOOL

ST2 18765AA000 COMPRESSOR SUPPORT

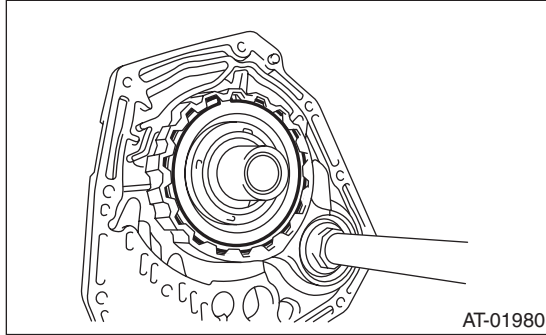
ST3 18763AA000 COMPRESSOR SHAFT



5) Install the genuine driven plate instead of retaining plate, and temporarily assemble the drive plate and driven plate.

Part No. 31536AA290 Driven plate

6) Install the snap ring.



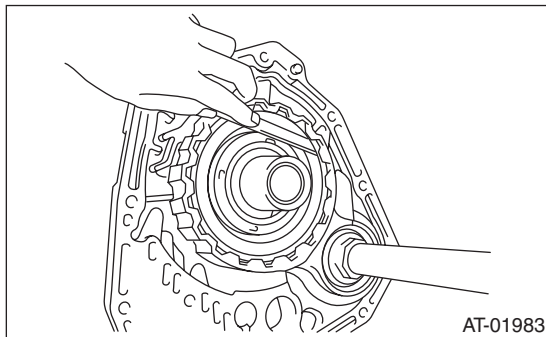
7) Measure the clearance between the driven plate and snap ring. If the value exceeds the specification, replace the driven plate and drive plate as a set and select the retaining plate within the specification.

**NOTE:**

The thickness of the genuine driven plate is  $2.8 \pm 0.055$  mm ( $0.11 \pm 0.0022$  in).

**Front brake clearance specification:**

**0.7 — 1.1 mm (0.028 — 0.043 in)**



Front brake retaining plate	
Part No.	Thickness mm (in)
31567AB130	3.4 (0.134)
31567AB140	3.6 (0.142)
31567AB150	3.8 (0.150)
31567AB160	4.0 (0.157)

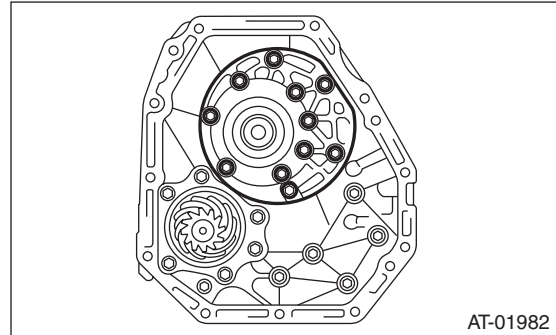
8) Remove the snap ring, replace the driven plate used in measurement of clearance with the selected retaining plate, and then reassemble.

## 2. OIL PUMP

- 1) Apply ATF to oil pump assembly, and then install it to oil pump housing.
- 2) Install the O-ring to oil pump cover.
- 3) Install the oil pump housing to the oil pump cover.

**Tightening torque:**

**10 N·m (1.0 kgf·m, 7.4 ft·lb)**



## E: INSPECTION

### 1. FRONT BRAKE

Check the following items.

- Drive plate facing for wear and damage
- Snap ring for wear, return spring for damage, and retainer for damage
- Piston for damage
- D-ring for damage

### 2. OIL PUMP

Check the following items.

- Oil pump cover and oil seal for breakage or damage
  - Oil pump body for scratch or damage
- 1) Check the seal ring and oil seal for breaks and damage.
  - 2) Check other parts for dents or faults.
  - 3) Oil pump rotor assembly selection

# Oil Pump Cover

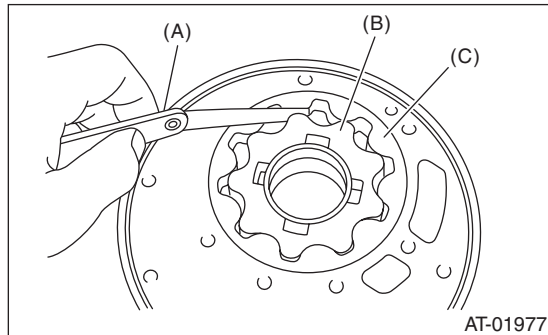
## AUTOMATIC TRANSMISSION

### (1) Tip clearance

Install the inner rotor and outer rotor to oil pump housing. With rotor gears facing each other, measure the crest-to-crest clearance.

#### **Tip clearance:**

**0.02 — 0.15 mm (0.0008 — 0.0059 in)**



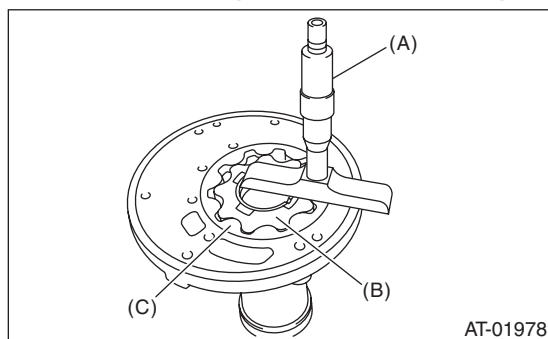
- (A) Thickness gauge
- (B) Inner rotor
- (C) Outer rotor

### (2) Side clearance

Set a depth gauge to oil pump housing, then measure the oil pump housing-to-rotor clearance.

#### **Side clearance:**

**0.02 — 0.045 mm (0.0008 — 0.0018 in)**



- (A) Depth gauge
- (B) Inner rotor
- (C) Outer rotor

(3) If the depth and/or side clearance are not within the specification, replace the rotor assembly.

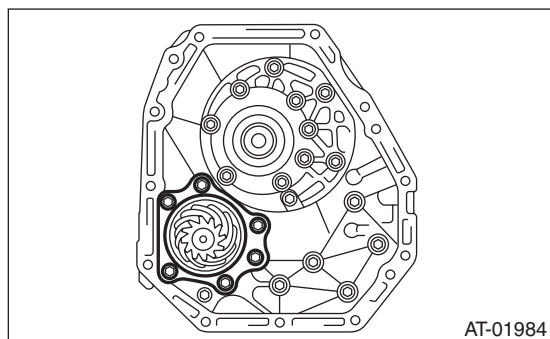
Oil pump rotor assembly	
Part No.	Thickness mm (in)
15008AA130	11.37 — 11.38 (0.4476 — 0.4480)
15008AA140	11.38 — 11.39 (0.4480 — 0.4484)
15008AA150	11.39 — 11.40 (0.4484 — 0.4488)

Measure the total end play and adjust it to be within specifications. <Ref. to 5AT-100, ADJUSTMENT, AT Main Case.>

## 32. Drive Pinion Shaft Assembly

### A: REMOVAL

- 1) Remove the transmission assembly from vehicle body. <Ref. to 5AT-36, REMOVAL, Automatic Transmission Assembly.>
- 2) Pull out the torque converter assembly. <Ref. to 5AT-60, REMOVAL, Torque Converter Assembly.>
- 3) Remove the transmission harness connector from stay.
- 4) Disconnect the air breather hose. <Ref. to 5AT-58, REMOVAL, Air Breather Hose.>
- 5) Remove the oil charge pipe. <Ref. to 5AT-59, REMOVAL, Oil Charge Pipe.>
- 6) Remove the ATF inlet and outlet pipes. <Ref. to 5AT-55, REMOVAL, ATF Cooler Pipe and Hose.>
- 7) Separate the converter case and transmission case. <Ref. to 5AT-75, REMOVAL, Converter Case.>
- 8) Remove the drive pinion shaft mounting bolts, and then remove the drive pinion shaft assembly from oil pump cover.



- 9) Remove the oil pump cover from AT main case. <Ref. to 5AT-77, Oil Pump Cover.>

### B: INSTALLATION

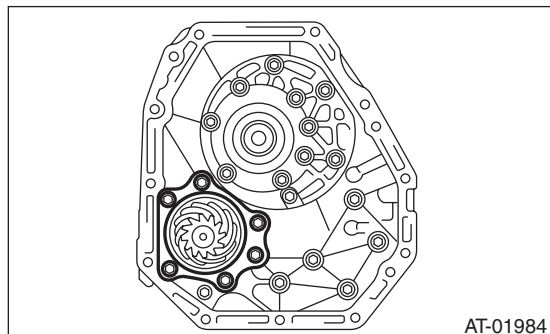
- 1) Assemble the drive pinion assembly to oil pump cover.

#### NOTE:

Be careful not to bend the shim.

#### Tightening torque:

**70 N·m (7.1 kgf·m, 51.6 ft·lb)**

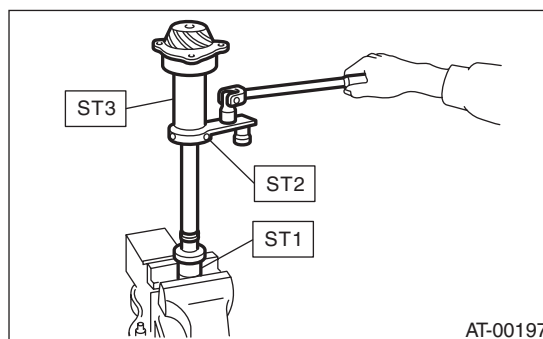


- 2) Adjust the tooth contact between drive pinion shaft assembly and the front differential side gear. <Ref. to 5AT-83, ADJUSTMENT, Drive Pinion Shaft Assembly.>
- 3) Join the converter case with the transmission case. <Ref. to 5AT-75, INSTALLATION, Converter Case.>
- 4) Install the transmission harness connector to the stay.
- 5) Install the ATF cooler pipe. <Ref. to 5AT-56, INSTALLATION, ATF Cooler Pipe and Hose.>
- 6) Install the oil charge pipe with O-ring.
- 7) Install the torque converter assembly. <Ref. to 5AT-60, INSTALLATION, Torque Converter Assembly.>
- 8) Install the transmission assembly to the vehicle. <Ref. to 5AT-39, INSTALLATION, Automatic Transmission Assembly.>

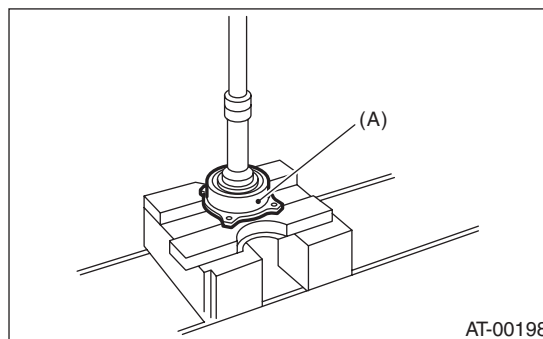
### C: DISASSEMBLY

- 1) Remove the crimped part of the lock nut, and then remove the lock nut while holding the rear spline part of the shaft using ST1 and ST2. Pull out the drive pinion collar.

- ST1 18667AA010 HOLDER  
 ST2 499787700 WRENCH  
 ST3 499787500 ADAPTER



- 2) Remove the O-ring.
- 3) Separate the roller bearing and outer race from shaft using a press.



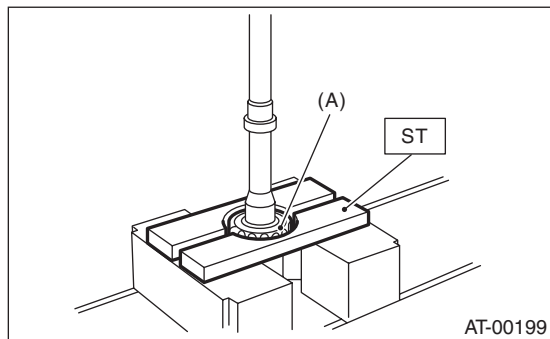
(A) Outer race

# Drive Pinion Shaft Assembly

## AUTOMATIC TRANSMISSION

4) Separate the front roller bearing from shaft using a press and ST.

ST 498517000 REPLACER

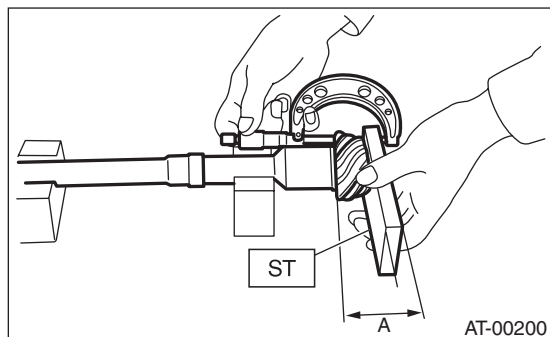


(A) Front roller bearing

## D: ASSEMBLY

1) Measure the dimension "A" of drive pinion shaft.

ST 398643600 GAUGE

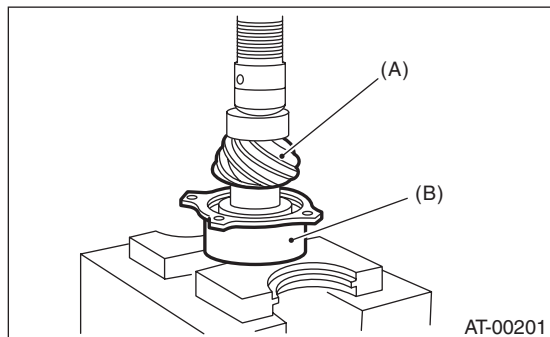


A Measured value

2) Using a press, press-fit the new roller bearing into the specified position.

### NOTE:

If excessive force is applied to roller bearing, the roller bearing will not turn easily.



(A) Drive pinion shaft

(B) Roller bearing

3) After fitting a new O-ring to the shaft, attach the drive pinion collar to the shaft.

4) Tighten the new lock nuts using ST1, ST2 and ST3.

Calculate the tightening torque using following formula.

$$T2 = L2 / (L1 + L2) \times T1$$

T1: 116 N·m (11.8 kgf·m, 85.6 ft·lb)

[Required torque setting]

T2: Tightening torque

L1: ST2 length 0.072 m (2.83 in)

L2: Torque wrench length

Example:

Torque wrench length m (in)	Tightening torque N·m (kgf·m, ft·lb)
0.4 (15.75)	98 (10.0, 72.3)
0.45 (17.72)	100 (10.2, 73.8)
0.5 (19.69)	101 (10.3, 74.5)
0.55 (21.65)	102 (10.4, 75.2)

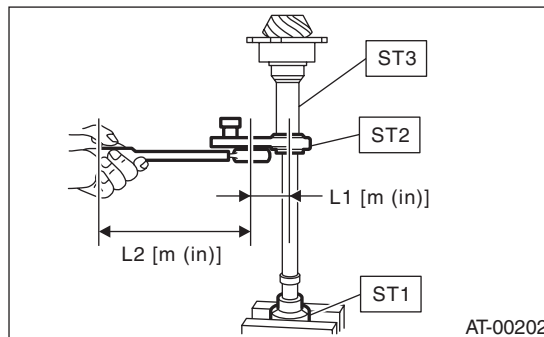
ST1 18667AA010 HOLDER

ST2 499787700 WRENCH

ST3 499787500 ADAPTER

### NOTE:

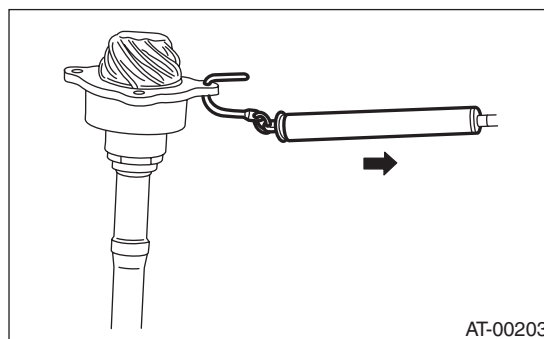
Attach ST2 to torque wrench as straight as possible.



5) Measure the starting torque of the bearing. Make sure the starting torque is within the specified range. If the torque is not within specified range, replace the roller bearing.

### Starting torque:

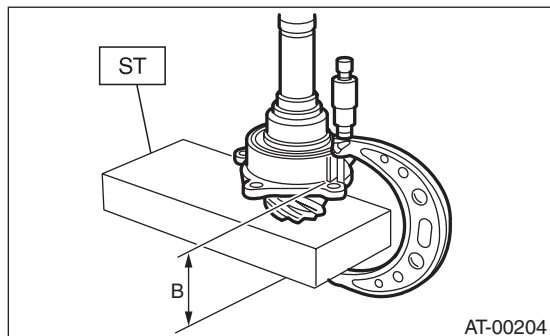
**7.6 — 38.1 N (0.775 — 3.88 kgf, 1.7 — 8.6 lb)**



6) Crimp the locknut in 2 locations.

7) Measure the dimension “B” of the drive pinion shaft.

ST 398643600 GAUGE



B Measured value

8) Calculate the thickness “t” mm (in) of the drive pinion shim.

$$t = 6.5 \pm 0.0625 \text{ (0.256} \pm 0.0025) - (B - A)$$

9) Select three or less shims from following table.

Drive pinion shim	
Part No.	Thickness mm (in)
31451AA180	0.150 (0.0059)
31451AA190	0.175 (0.0069)
31451AA200	0.200 (0.0079)
31451AA210	0.225 (0.0089)
31451AA220	0.250 (0.0098)
31451AA230	0.275 (0.0108)

## E: INSPECTION

- Make sure that all component parts are free of scratches, holes and other faults.
- Adjust the tooth alignment. <Ref. to 5AT-83, ADJUSTMENT, Drive Pinion Shaft Assembly.>

## F: ADJUSTMENT

- 1) Remove the liquid gasket from the mating surface completely.
- 2) Install the converter case to oil pump cover, and secure them with tightening four bolts evenly.

### NOTE:

Use an old gasket or aluminum washer to prevent damaging the mating surface of the housing.

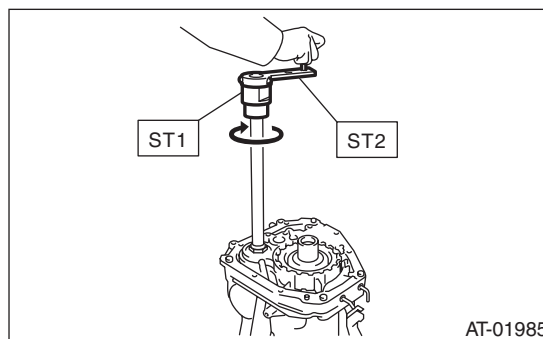
### Tightening torque:

**41 N·m (4.2 kgf·m, 30.2 ft·lb)**

- 3) Rotate the drive pinion a few times using ST1 and ST2.

ST1 18667AA010 HOLDER

ST2 499787700 WRENCH



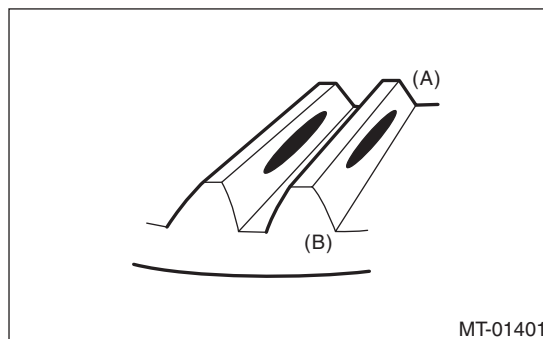
- 4) Adjust the drive pinion and hypoid driven gear backlash. <Ref. to 5AT-89, ADJUSTMENT, Front Differential Assembly.>

5) Apply lead-free red dye evenly on the surface of three to four teeth of the hypoid driven gear. Rotate the drive pinion in the leftward and rightward for several times. Remove the oil pump cover, and check the tooth contact pattern.

If the teeth contact is inappropriate, adjust the backlash and shim thickness. <Ref. to 5AT-89, ADJUSTMENT, Front Differential Assembly.>

- Correct tooth contact

**Check item: Tooth contact surface is slightly shifted toward the toe side under a no-load condition. (When driving, it moves towards the heel side.)**



(A) Toe side

(B) Heel side

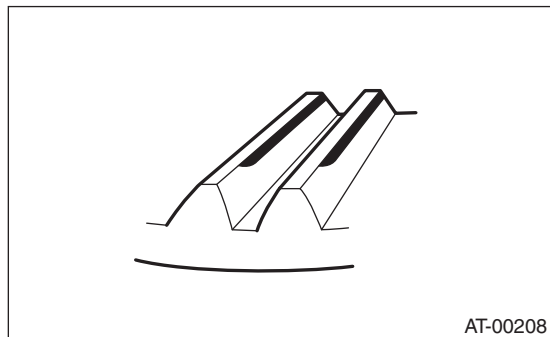
# Drive Pinion Shaft Assembly

## AUTOMATIC TRANSMISSION

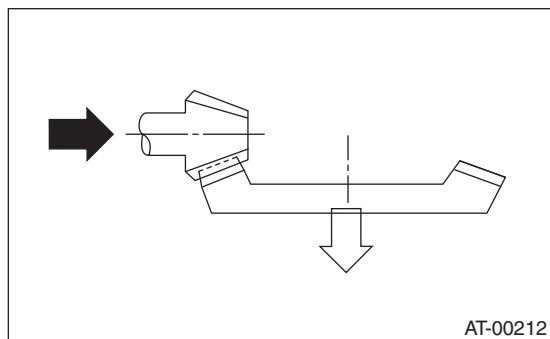
- Face contact

**Check item: Backlash is too large.**

Contact pattern



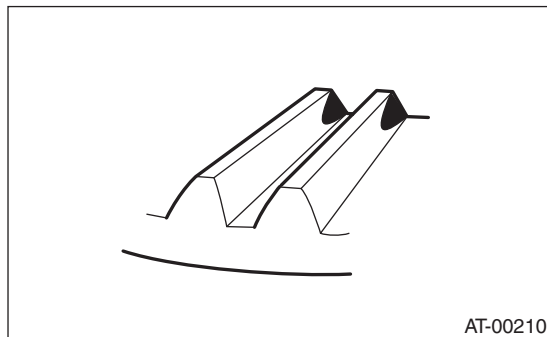
Adjustment: Increase the thickness of the shim according to the procedures for moving the drive pinion closer to the driven gear.



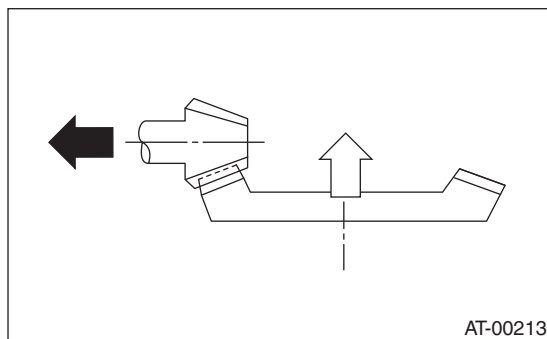
- Toe contact (inside contact)

**Check item: Teeth contact area is too small.**

Contact pattern



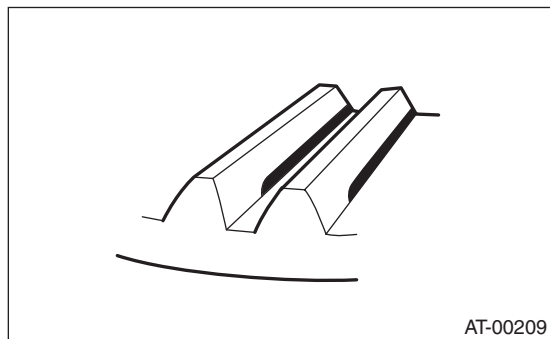
Adjustment: Reduce the thickness of the shim according to the procedure for moving the drive pinion away from the driven gear.



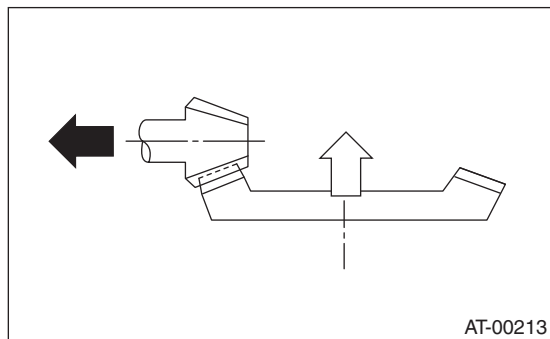
- Flank contact

**Check item: Backlash is too small.**

Contact pattern



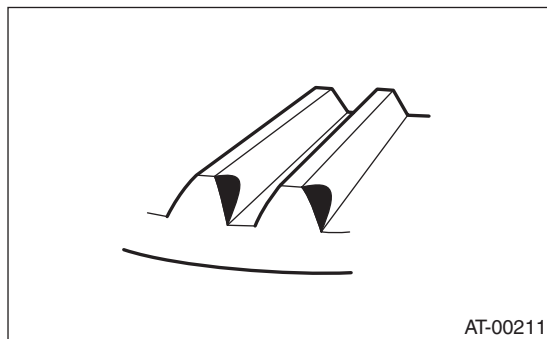
Adjustment: Reduce the thickness of the shim according to the procedure for moving the drive pinion away from the driven gear.



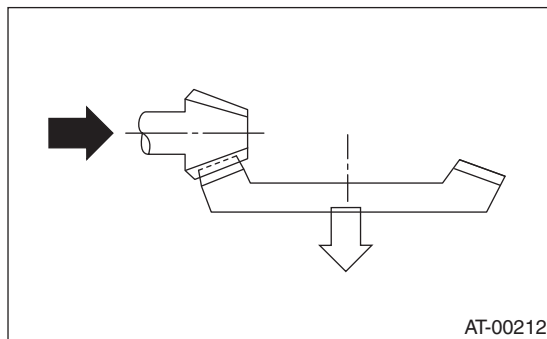
- Heel contact (outside end contact)

**Check item: Teeth contact area is too small.**

Contact pattern



Adjustment: Increase the thickness of the shim according to the procedures for moving the drive pinion closer to the driven gear.

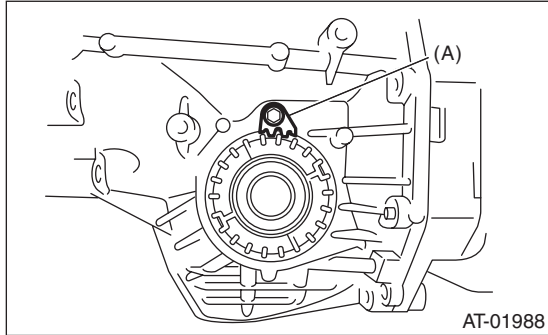




6) If tooth contact is correct, mark the retainer position and loosen it. After fitting a new O-ring and oil seal, screw in the retainer to the marked position. Tighten the lock plate with specified torque.

**Tightening torque:**

**25 N·m (2.5 kgf·m, 18.4 ft·lb)**



(A) Lock plate

# Front Differential Assembly

AUTOMATIC TRANSMISSION

## 33. Front Differential Assembly

### A: REMOVAL

- 1) Remove the transmission assembly from vehicle body. <Ref. to 5AT-36, REMOVAL, Automatic Transmission Assembly.>
- 2) Pull out the torque converter assembly. <Ref. to 5AT-60, REMOVAL, Torque Converter Assembly.>
- 3) Remove the transmission harness connector from stay.
- 4) Remove the oil charge pipe. <Ref. to 5AT-59, REMOVAL, Oil Charge Pipe.>
- 5) Remove the ATF inlet and outlet pipes. <Ref. to 5AT-55, REMOVAL, ATF Cooler Pipe and Hose.>
- 6) Separate the converter case from the transmission case. <Ref. to 5AT-75, REMOVAL, Converter Case.>
- 7) Remove the differential side retainers using ST.

#### NOTE:

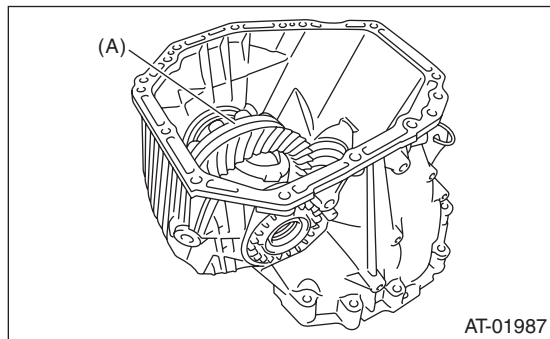
Hold the differential case assembly by hand to avoid damaging the retainer mounting hole of the converter case.

ST 18630AA010 WRENCH COMPL RETAINER

- 8) Remove the differential assembly while being careful not to damage the attachment part of retainer.

### B: INSTALLATION

- 1) When installing the front differential assembly to case, be careful not to damage the inside of case (particularly, the differential side retainer mating surface).



(A) Front differential ASSY

- 2) Install the O-ring to left and right side retainer.
- 3) Using the ST, install the side retainer. <Ref. to 5AT-89, ADJUSTMENT, Front Differential Assembly.>

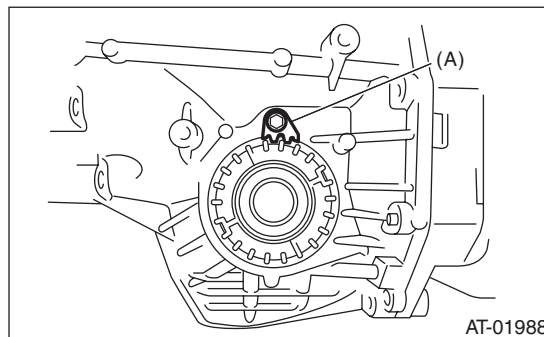
ST 18630AA010 WRENCH COMPL RETAINER

- 4) Adjust the backlash of the front differential. <Ref. to 5AT-89, ADJUSTMENT, Front Differential Assembly.>

- 5) Install the lock plate.

#### Tightening torque:

25 N·m (2.5 kgf·m, 18.4 ft·lb)



(A) Lock plate

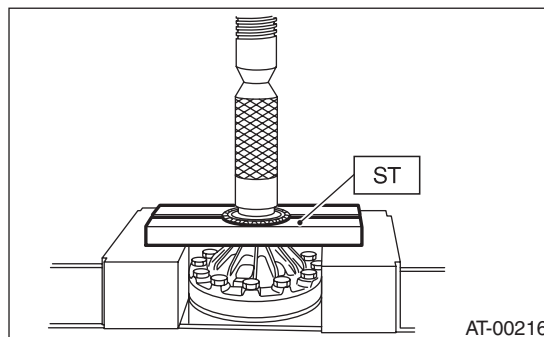
- 6) Install the converter case to the transmission case. <Ref. to 5AT-75, INSTALLATION, Converter Case.>
- 7) Install the transmission harness connector to the stay.
- 8) Install the ATF cooler pipe. <Ref. to 5AT-56, INSTALLATION, ATF Cooler Pipe and Hose.>
- 9) Install the oil charge pipe together with an O-ring. <Ref. to 5AT-59, INSTALLATION, Oil Charge Pipe.>
- 10) Install the torque converter assembly. <Ref. to 5AT-60, INSTALLATION, Torque Converter Assembly.>
- 11) Install the transmission assembly to the vehicle. <Ref. to 5AT-39, INSTALLATION, Automatic Transmission Assembly.>

### C: DISASSEMBLY

#### 1. DIFFERENTIAL CASE ASSEMBLY

- 1) Remove the taper roller bearing using the ST and a press.

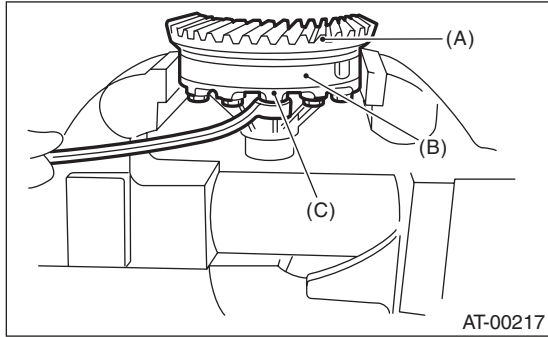
ST 498077000 REMOVER



# Front Differential Assembly

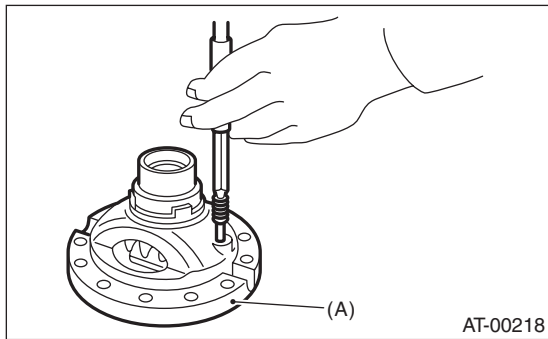
AUTOMATIC TRANSMISSION

2) Secure the case in a vise, remove the hypoid driven gear tightening bolts, then separate the hypoid driven gear into case (RH) and case (LH).



- (A) Hypoid driven gear
- (B) Differential case (RH)
- (C) Differential case (LH)

3) Pull out the straight pin and shaft, and then remove the differential bevel gear, washer and differential bevel pinion.



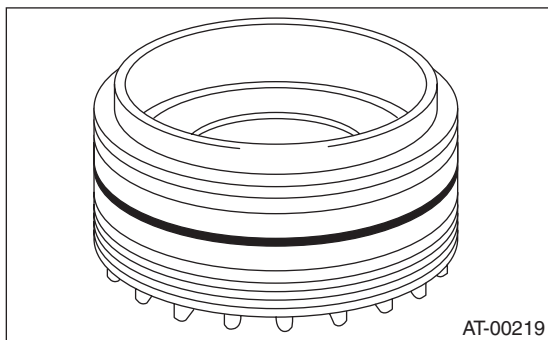
- (A) Differential case (RH)

## 2. SIDE RETAINER

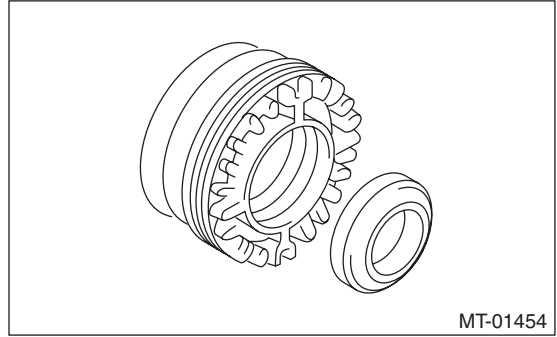
### NOTE:

After adjusting the drive pinion backlash and tooth contact, remove and install the oil seal and O-ring.

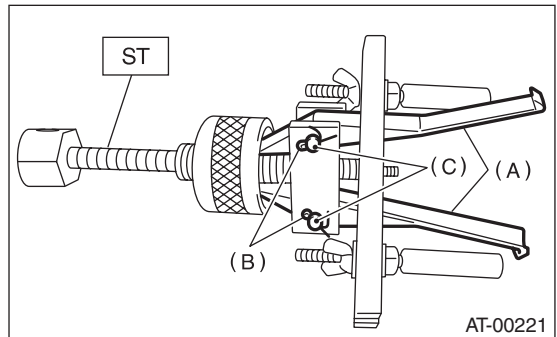
1) Remove the O-ring.



2) Remove the oil seal.



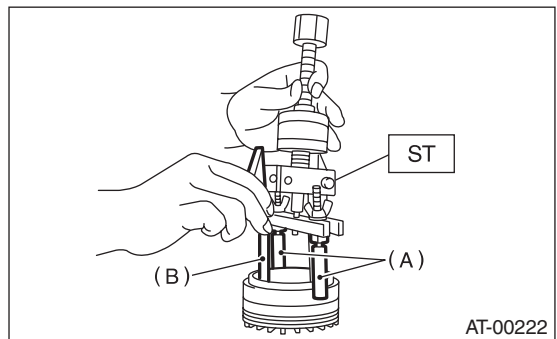
3) Remove the split pin, and then remove the claw.  
ST 398527700 PULLER ASSY



- (A) Claw
- (B) Split pin
- (C) Pin

4) Attach two claws to the outer race, and set the ST to side retainer.

ST 398527700 PULLER ASSY



- (A) Shaft
- (B) Claw

5) Restore the removed claws to original position, and install the pin and split pin.

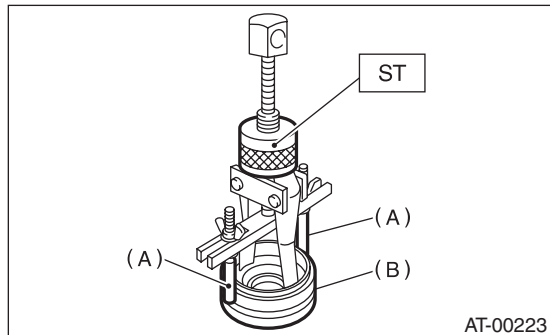
# Front Differential Assembly

## AUTOMATIC TRANSMISSION

6) Hold the shaft of ST to avoid removing from side retainer, and then remove the bearing outer race.  
ST 398527700 PULLER ASSY

### NOTE:

Replace the bearing inner and outer races as a single unit.



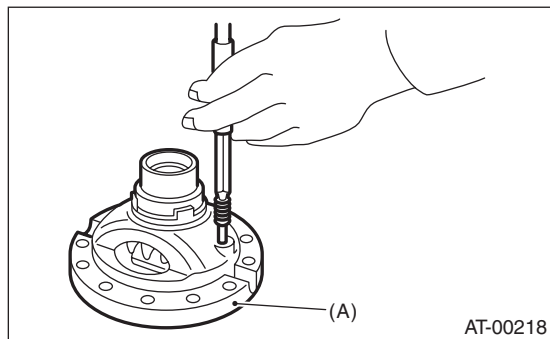
- (A) Shaft
- (B) Side retainer

## D: ASSEMBLY

### 1. DIFFERENTIAL CASE ASSEMBLY

1) Install the washer, differential bevel gear and differential bevel pinion in the differential case (RH). Insert the pinion shaft.

2) Attach the straight pin in the reverse direction.



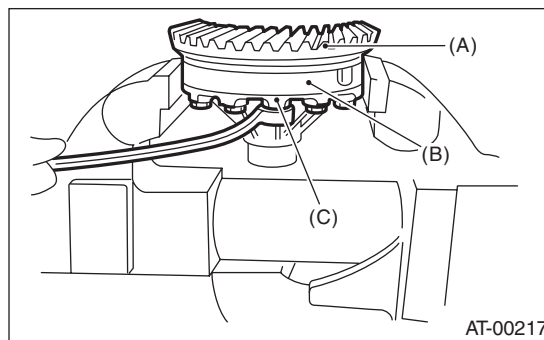
- (A) Differential case (RH)

3) Install the washer and differential bevel gear to the differential case (LH). Put the differential case (RH) on the case, and assemble two cases.

4) Install the hypoid driven gear and secure by tightening the bolt.

### Tightening torque:

**70 N·m (7.1 kgf·m, 51.6 ft·lb)**



- (A) Hypoid driven gear
- (B) Differential case (RH)
- (C) Differential case (LH)

5) Measurement of backlash (Selection of washer)  
(1) Install the SUBARU genuine axle shaft to differential case.

Part No. 38415AA070 Axle shaft

(2) Measure the gear backlash using ST1 and ST2, and then insert ST2 from the access window of the case.

ST1 498247001 MAGNET BASE

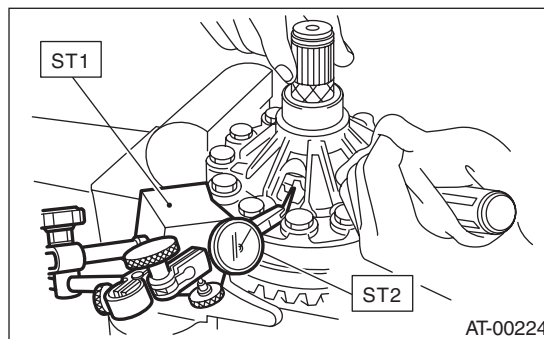
ST2 498247100 DIAL GAUGE

### NOTE:

- Measure the backlash by applying a differential bevel pinion tooth between two differential bevel gear teeth.
- Fix the differential bevel pinion gear in place with a screwdriver covered with cloth or similar tool when measuring.

### Specification:

**0.13 — 0.18 mm (0.0051 — 0.0071 in)**



(3) If the backlash is not within specification, select a washer from the table below.

Washer	
Part No.	Thickness mm (in)
803038021	0.95 (0.037)
803038022	1.00 (0.039)
803038023	1.05 (0.041)

6) Using the ST, install the taper roller bearing.

ST 398487700 DRIFT

## 2. SIDE RETAINER

**NOTE:**

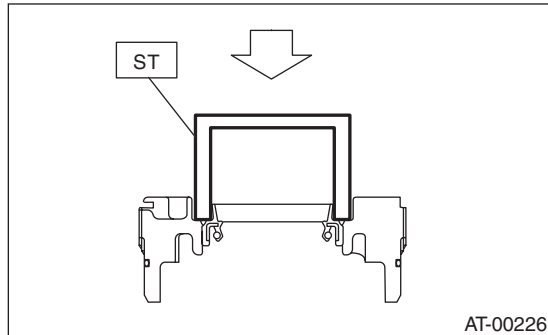
Install the oil seal and O-ring of side retainer after the adjustment of backlash and tooth contact.

- 1) Install the bearing outer race to side retainer.
- 2) Install a new oil seal using ST.

ST 18675AA000 DIFFERENTIAL SIDE OIL SEAL INSTALLER

**NOTE:**

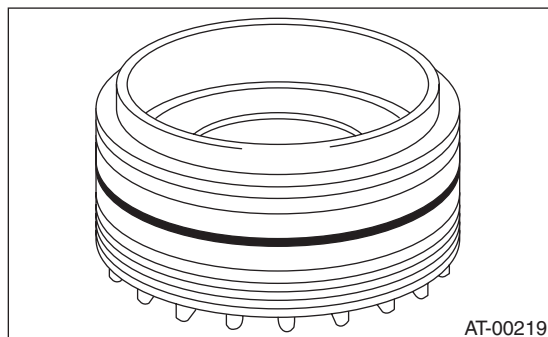
Apply oil to the oil seal lips.



- 3) Install a new O-ring.

**NOTE:**

- Use new O-rings.
- Apply gear oil to O-ring.



## E: INSPECTION

- Check each component for scratches, damage or other faults.
- Measure the backlash, and then adjust it to be within specification. <Ref. to 5AT-89, ADJUSTMENT, Front Differential Assembly.>

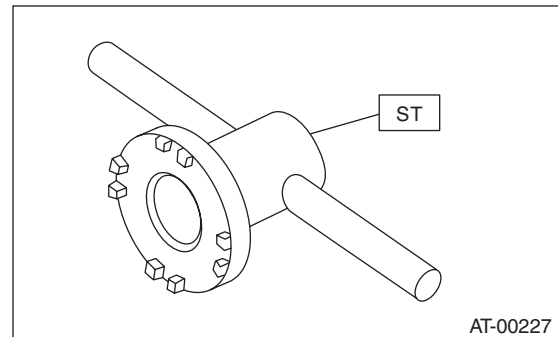
## F: ADJUSTMENT

- 1) Using the ST, screw-in the retainer until resistance is felt.

**NOTE:**

Screw-in the RH side slightly deeper than the LH side.

ST 18630AA010 WRENCH COMPL RETAINER



- 2) Remove the oil pump cover.
- 3) Remove the liquid gasket from the mating surface completely.
- 4) Install the oil pump cover to converter case, and secure them with tightening four bolts evenly.

**NOTE:**

Use an old gasket or aluminum washer to prevent damaging the mating surface of the housing.

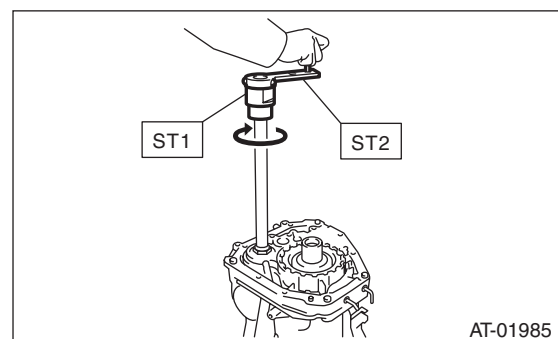
**Tightening torque:**

**41 N·m (4.2 kgf·m, 30.2 ft·lb)**

- 5) Rotate the drive pinion ten times or more using ST1 and ST2.

ST1 18667AA010 HOLDER

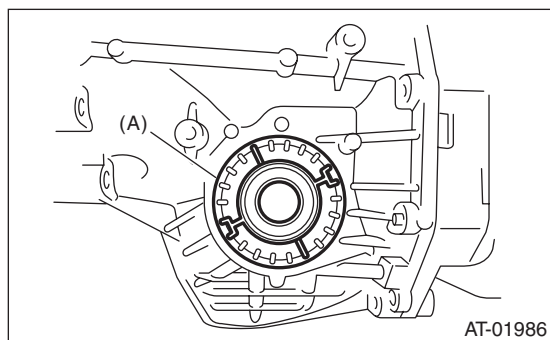
ST2 499787700 WRENCH



# Front Differential Assembly

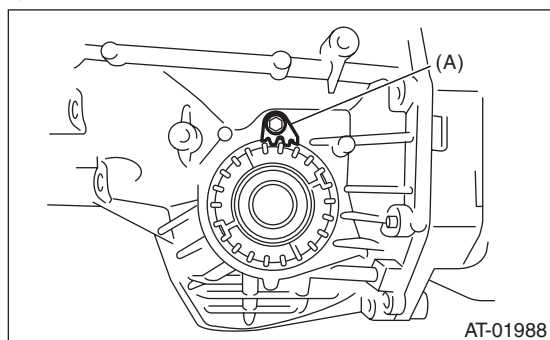
## AUTOMATIC TRANSMISSION

6) Tighten the LH retainer by rotating the shaft until resistance is felt. Then loosen the retainer RH. Keep tightening the retainer LH, and loosening the retainer RH until the pinion shaft no longer be turned. This is the "zero" state.



(A) Retainer

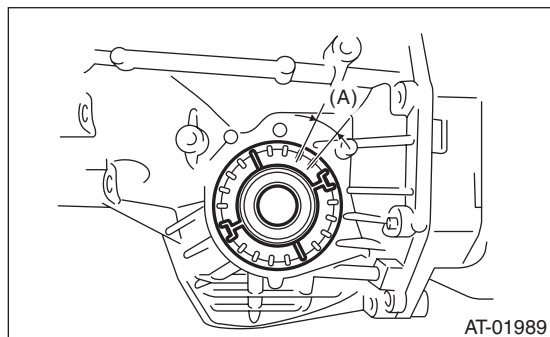
7) After the "zero" state is established, loosen the retainer LH by 3 notches and secure it with the lock plate. Then loosen the retainer RH and retighten until it stops. Rotate the drive pinion 2 or 3 times. Tighten the retainer RH further 1-3/4 notches. This sets the preload. Finally, secure the retainer with its lock plate.



(A) Lock plate

### NOTE:

Turning the retainer by one tooth changes the backlash approx. 0.05 mm (0.0020 in).



(A) 0.05 mm (0.0020 in)

8) Install the SUBARU genuine axle shaft to the left and right sides of the front differential.

Part No. 38415AA070 Axle shaft

9) Turn the drive pinion a few times with ST1 and check to see if the backlash is within the specified value, using ST2, ST3, ST4 and ST5.

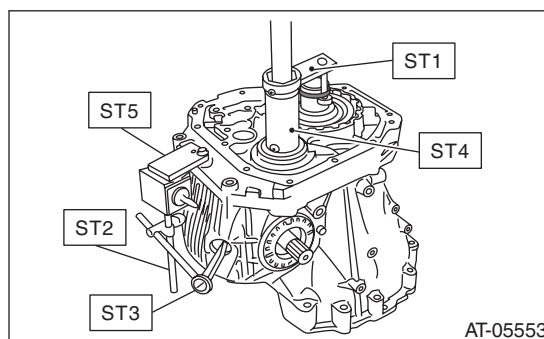
### NOTE:

Secure the ST1 and stator shaft with the tie-wrap.

### Backlash:

**0.13 — 0.18 mm (0.0051 — 0.0071 in)**

ST1	499787700	WRENCH
ST2	498247001	MAGNET BASE
ST3	498247100	DIAL GAUGE
ST4	499787500	ADAPTER
ST5	498255400	PLATE



10) Adjust the teeth contact of the front differential and drive shaft. <Ref. to 5AT-83, ADJUSTMENT, Drive Pinion Shaft Assembly.>

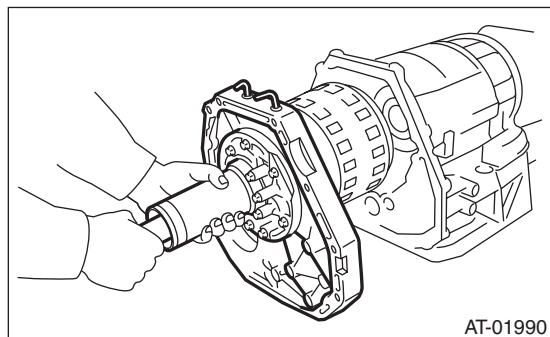
## 34.AT Main Case

### A: REMOVAL

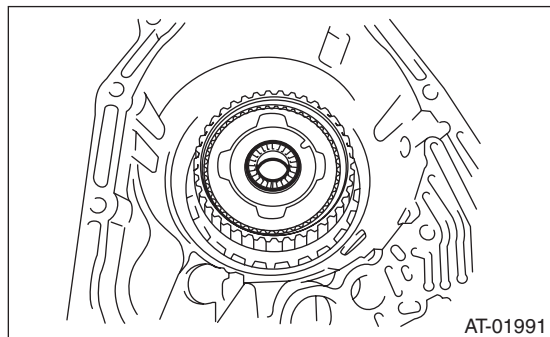
- 1) Remove the transmission assembly from the vehicle. <Ref. to 5AT-36, REMOVAL, Automatic Transmission Assembly.>
- 2) Pull out the torque converter assembly. <Ref. to 5AT-60, REMOVAL, Torque Converter Assembly.>
- 3) Remove the transmission harness connector from stay.
- 4) Remove the ATF inlet and outlet pipes. <Ref. to 5AT-55, REMOVAL, ATF Cooler Pipe and Hose.>
- 5) Remove the extension case. <Ref. to 5AT-62, REMOVAL, Extension Case.>
- 6) Remove the center differential carrier. <Ref. to 5AT-71, REMOVAL, Center Differential Carrier.>
- 7) Remove the reduction driven gear. <Ref. to 5AT-68, REMOVAL, Reduction Driven Gear.>
- 8) Separate the converter case from the transmission case. <Ref. to 5AT-75, REMOVAL, Converter Case.>
- 9) Remove the control valve body. <Ref. to 5AT-52, REMOVAL, Control Valve Body.>
- 10) Remove the oil pump cover. <Ref. to 5AT-77, REMOVAL, Oil Pump Cover.>

**NOTE:**

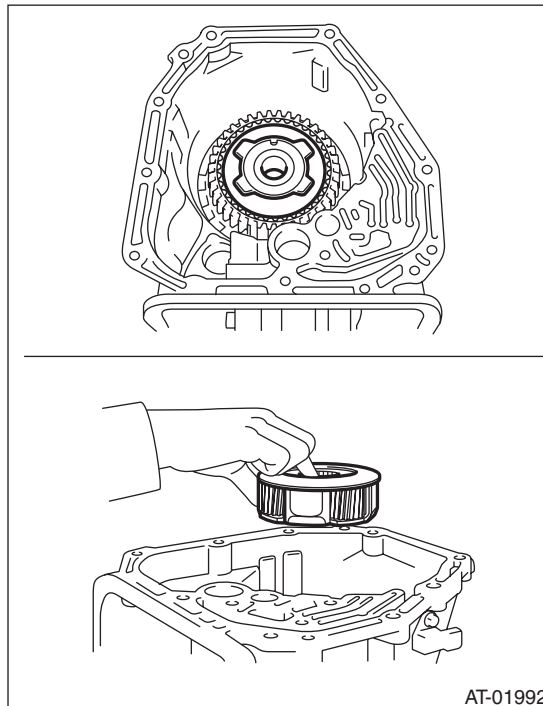
The input clutch pack assembly and front sun gear assembly are also removed together.



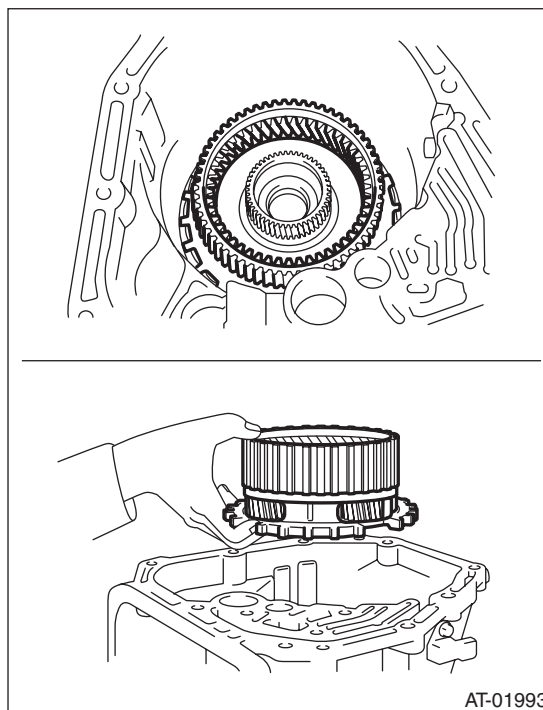
- 11) Remove the needle bearing of the middle carrier assembly.



- 12) Remove the middle carrier assembly.



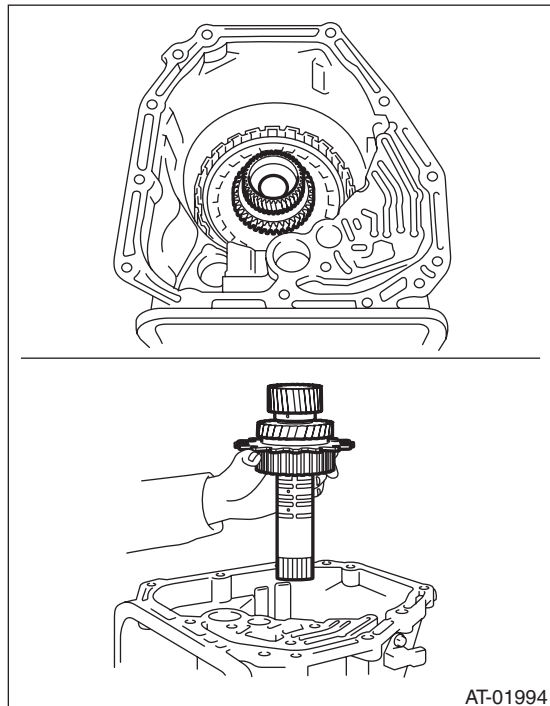
- 13) Remove the rear carrier assembly.



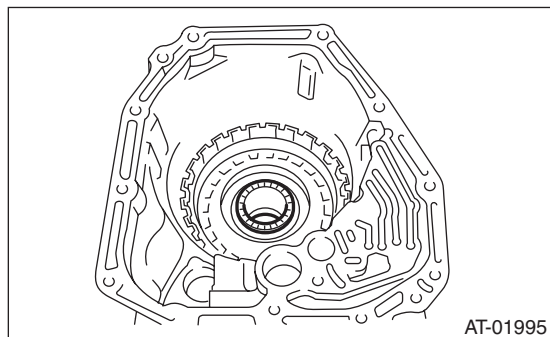
# AT Main Case

## AUTOMATIC TRANSMISSION

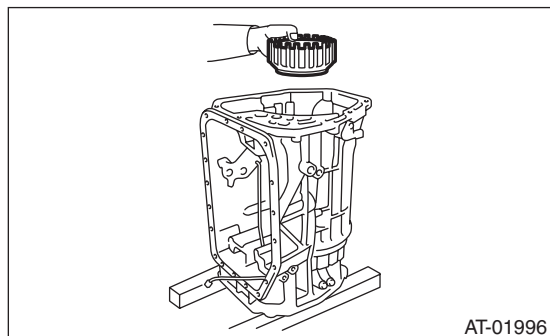
14) Remove the middle & rear sun gear assembly.



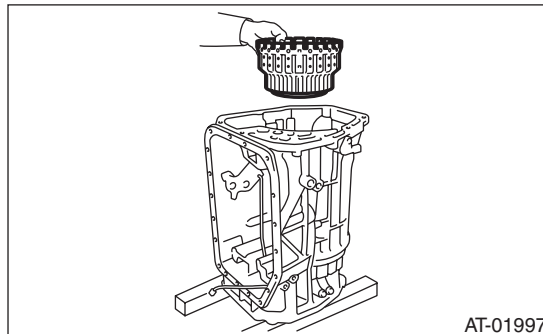
15) Remove the thrust needle bearing of high & low reverse clutch.



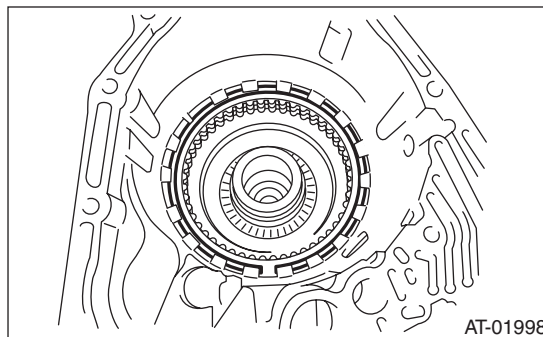
16) Remove the high & low reverse clutch assembly.



17) Remove the direct clutch assembly.

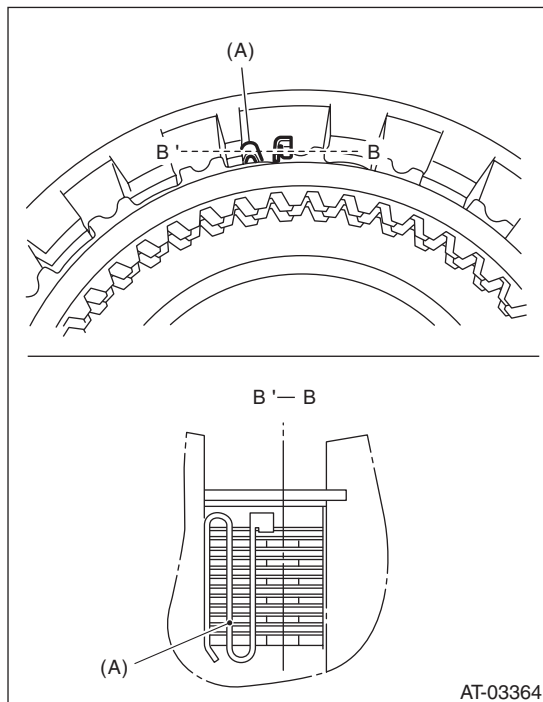


18) Remove the snap ring of reverse brake.



19) Remove the retaining plate.

20) Remove the leaf spring.



(A) Leaf spring

21) Take out the drive plate, driven plate and dish plate.

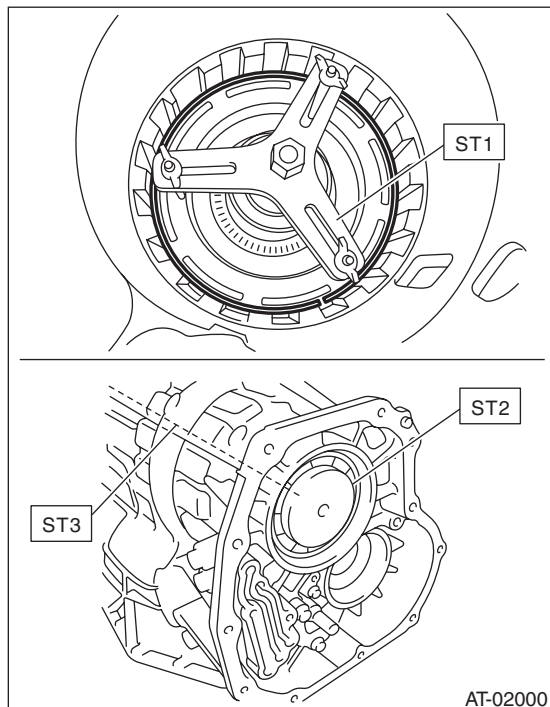


22) Remove the snap ring of the reverse brake spring retainer.

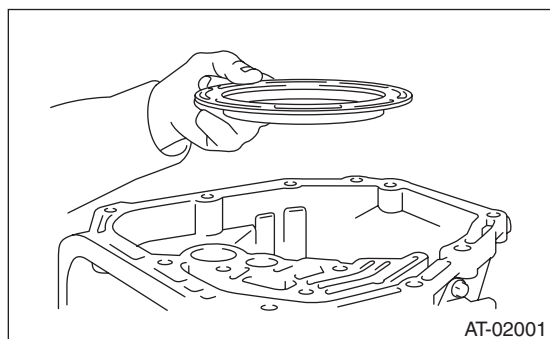
ST1 18762AA000 COMPRESSOR SPECIAL TOOL

ST2 18765AA000 COMPRESSOR SUPPORT

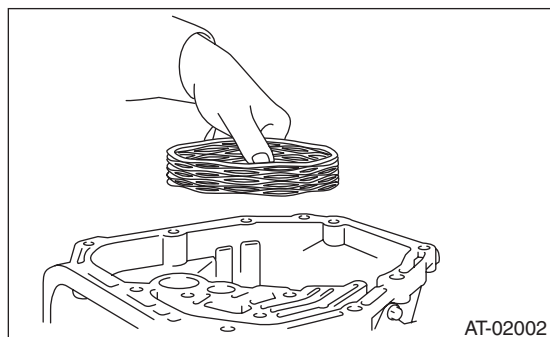
ST3 18763AA000 COMPRESSOR SHAFT



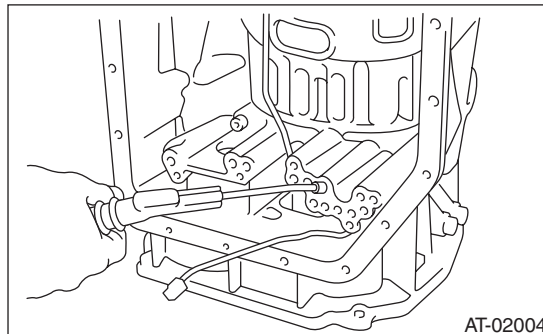
23) Remove the spring retainer.



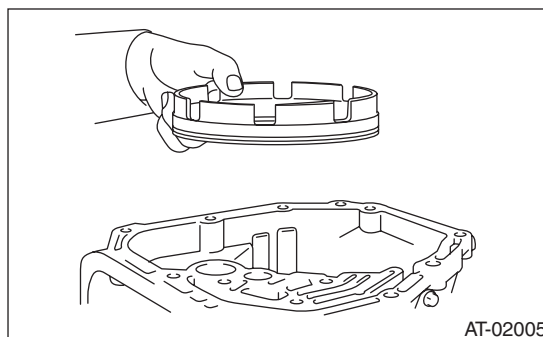
24) Remove the return spring.



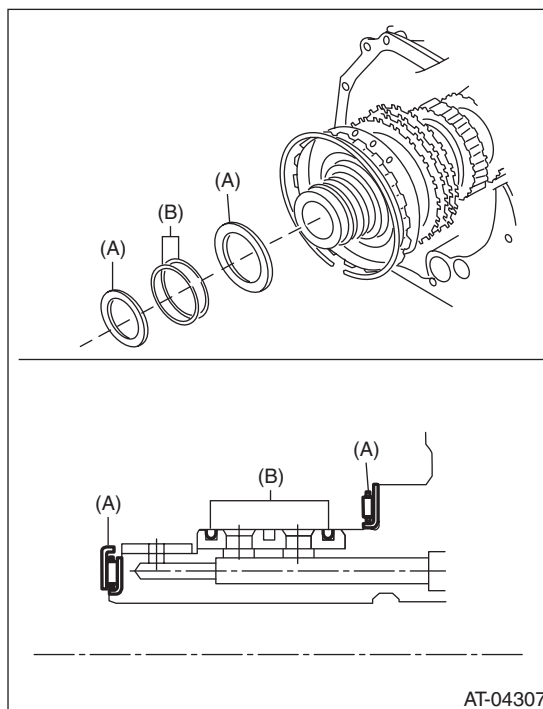
25) Apply compressed air.



26) Remove the reverse brake piston.



27) Remove the thrust bearing and seal ring.



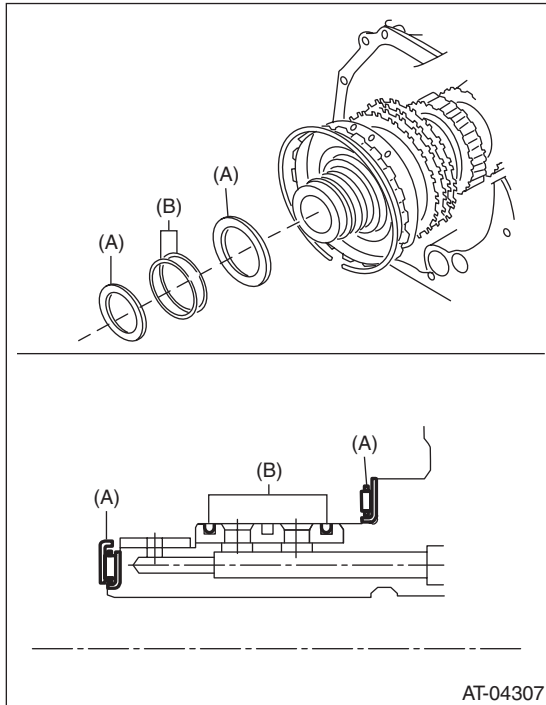
(A) Thrust bearing  
(B) Seal ring

# AT Main Case

## AUTOMATIC TRANSMISSION

### B: INSTALLATION

- 1) Apply ATF to the new seal ring.
- 2) Install the thrust bearing and new seal ring to the drum support.



- (A) Thrust bearing  
(B) Seal ring

- 3) Install the reverse brake piston.

#### NOTE:

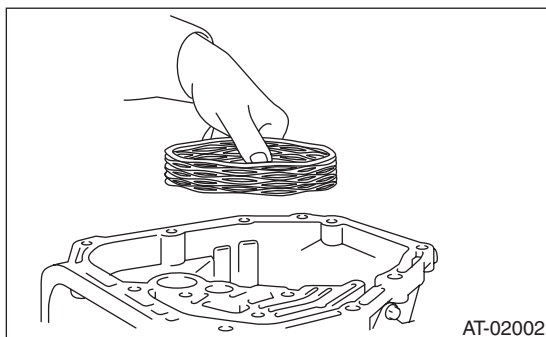
Apply ATF onto the piston sliding surface.

ST1 18762AA000 COMPRESSOR SPECIAL TOOL

ST2 18765AA000 COMPRESSOR SUPPORT

ST3 18763AA000 COMPRESSOR SHAFT

- 4) Install the return spring.

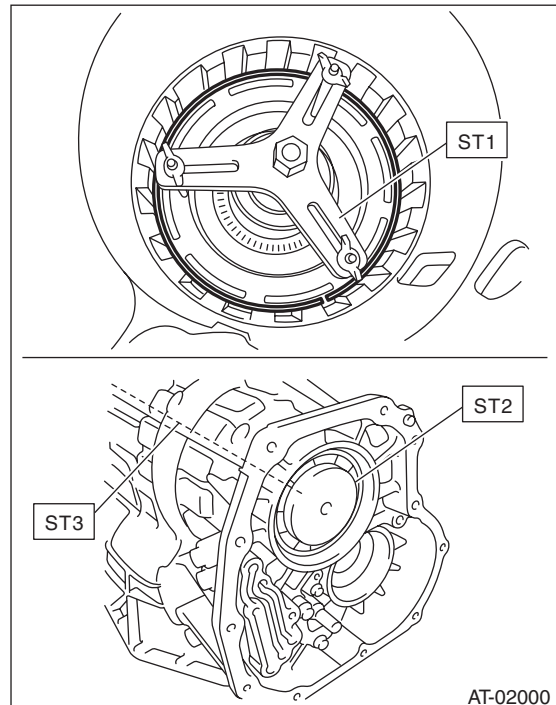


- 5) Install the spring retainer and snap ring.

ST1 18762AA000 COMPRESSOR SPECIAL TOOL

ST2 18765AA000 COMPRESSOR SUPPORT

ST3 18763AA000 COMPRESSOR SHAFT



- 6) Install the dish plate.

#### NOTE:

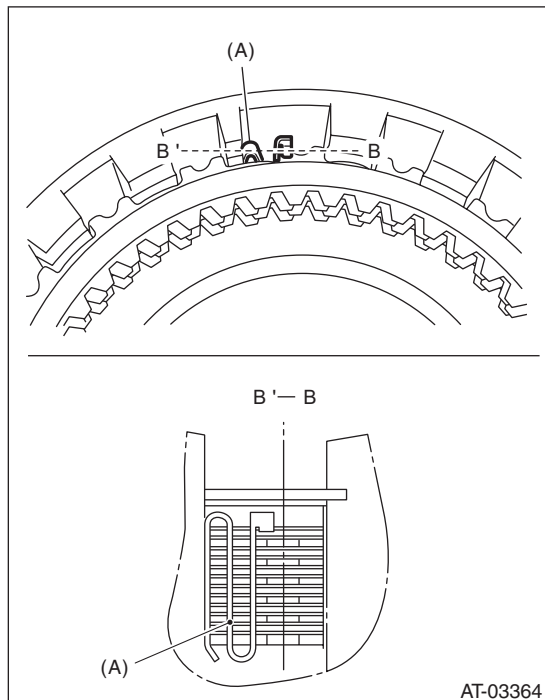
When installing, make sure that the identification mark is facing the rear side of transmission.

- 7) Install the drive plate and driven plate.

#### NOTE:

When the reverse brake is disassembled, use a new drive plate and driven plate set.

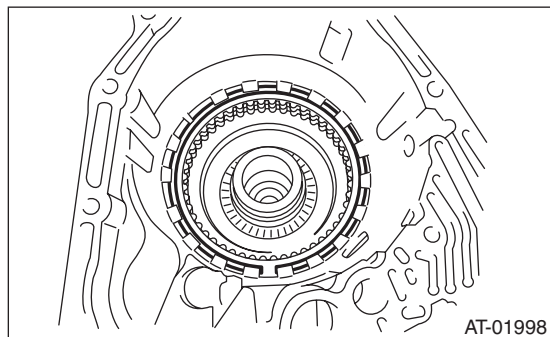
8) Install the leaf spring.



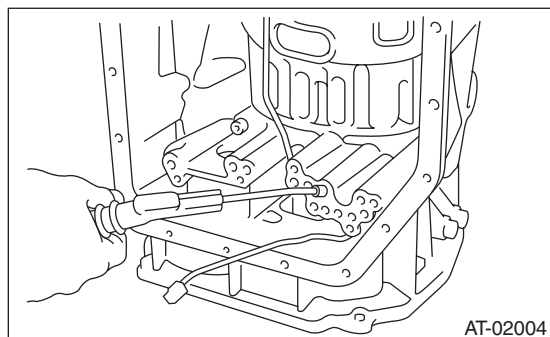
(A) Leaf spring

9) Install the retaining plate.

10) Install the snap ring of the reverse brake.



11) Apply compressed air intermittently to check for operation.



12) Check the piston stroke.

(1) Read the value of the drive plate compression amount described in the wave clutch set of repair parts.

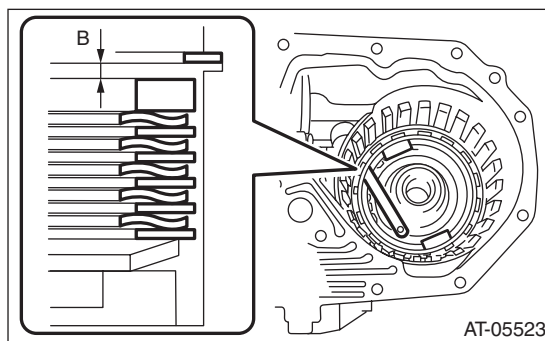
NOTE:

This value is "A".

(2) Measure the clearance "B" between the retaining plate and snap ring using a thickness gauge.

NOTE:

- Set shims of the same thickness on both sides so that the retaining plate will not tilt.
- Do not push the shim down with force to a point where the waves on the drive plate will become crushed.



B Clearance between retaining plate and snap ring

(3) Select and install a retaining plate so that the value calculated from the dimensions A and B is within the standard.

$$T = A + B$$

T: Piston stroke

A: Amount of drive plate compression described on the repair parts

B: Clearance between retaining plate and snap ring

**Initial standard:**

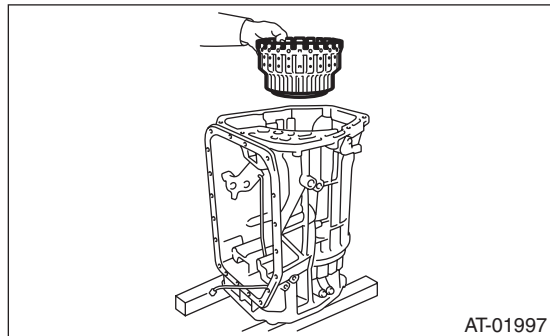
**2.0 — 2.4 mm (0.08 — 0.09 in)**

Retaining plate	
Part No.	Thickness mm (in)
31567AB100	4.2 (0.165)
31567AB170	4.4 (0.173)
31567AB180	4.6 (0.181)
31567AB190	4.8 (0.189)
31567AB200	5.0 (0.197)

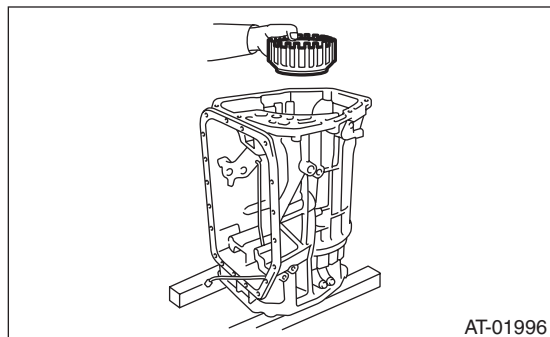
# AT Main Case

## AUTOMATIC TRANSMISSION

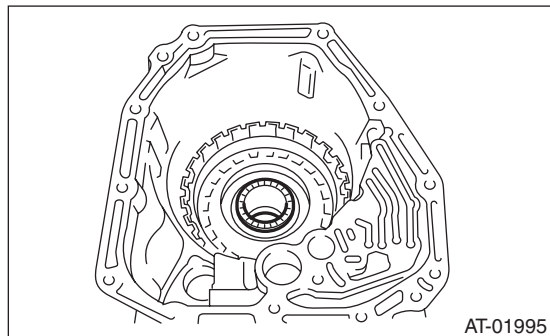
13) Install the direct clutch assembly.



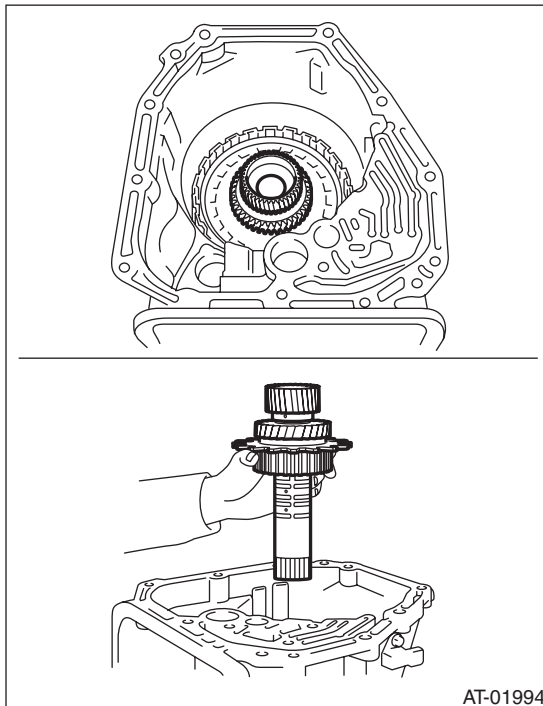
14) Install the high & low reverse clutch assembly.



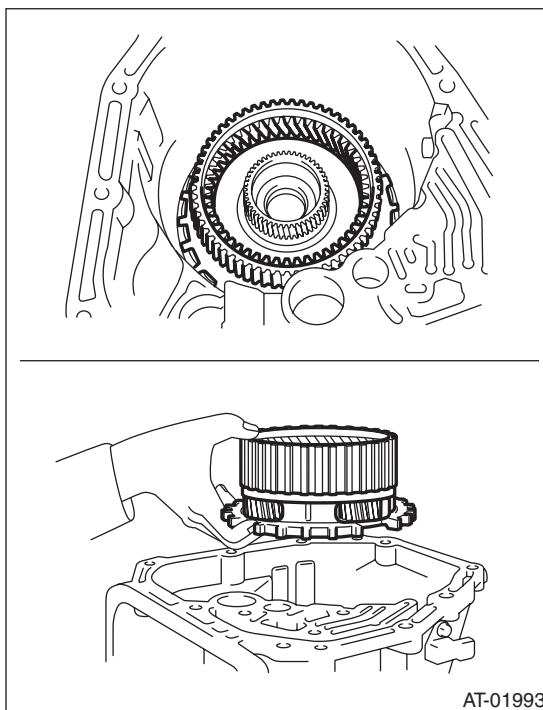
15) Install the thrust needle bearing of the high & low reverse clutch.



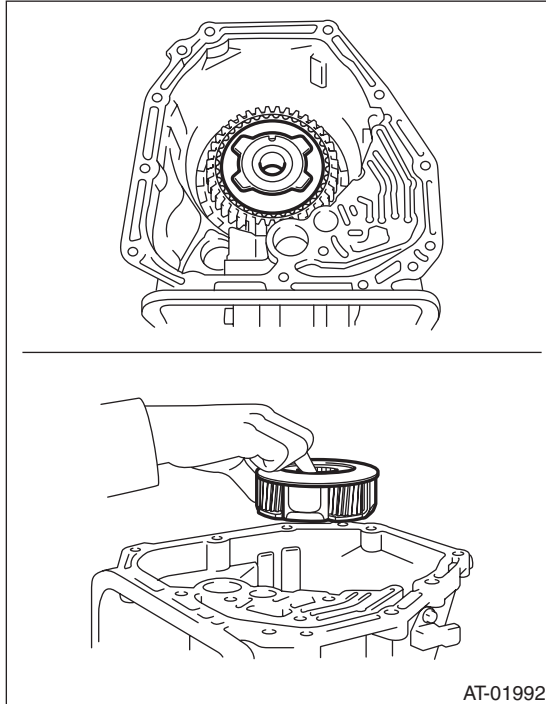
16) Install the middle & rear sun gear assembly.



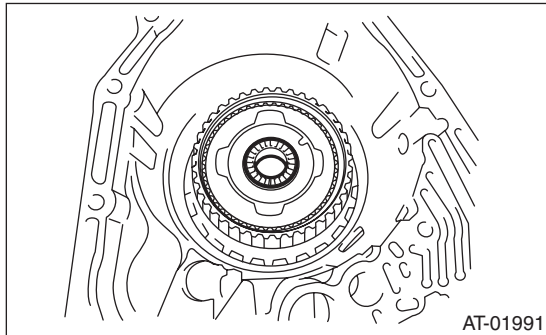
17) Install the rear carrier assembly.



18) Install the middle carrier assembly.

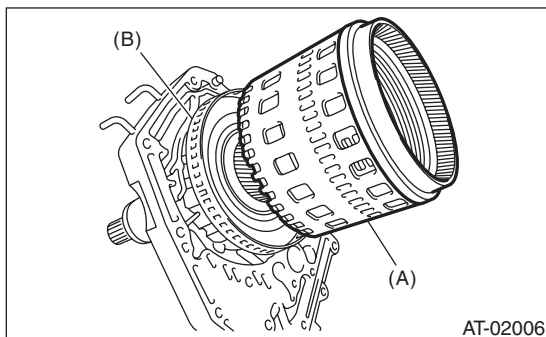


19) Install the thrust needle bearing of middle carrier assembly.



20) Measure the total end play, and select the bearing. <Ref. to 5AT-100, ADJUSTMENT, AT Main Case.>

21) Install the input clutch pack assembly to oil pump cover.

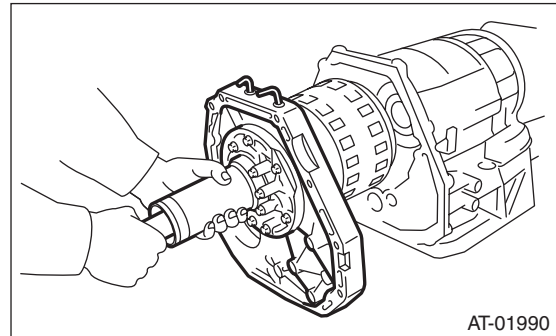


- (A) Input clutch pack ASSY
- (B) Front sun gear ASSY

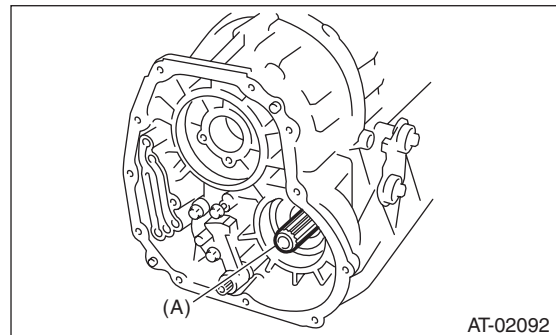
22) Turn the transmission sideways.

23) Install the oil pump cover.

- (1) Apply ATF to the O-ring of input clutch shaft.
- (2) Install the oil pump cover to AT main case while supporting the input clutch shaft and oil pump housing with your hand.



- (3) Make sure the rear end of drive pinion shaft is engaged to the spline of reduction driven gear.

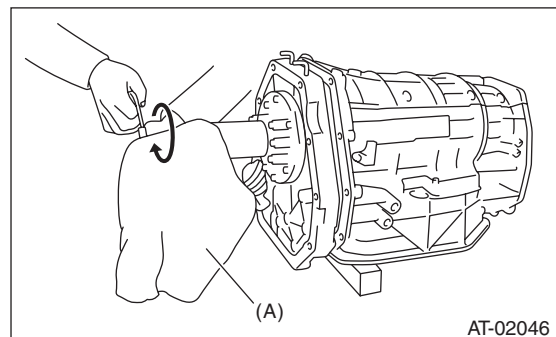


- (A) Drive pinion shaft

- (4) Protect the input clutch shaft with a cloth, and rotate to engage the spline of the input clutch and rear carrier using pliers.

**NOTE:**

Work with pressing the oil pump cover.



- (A) Cloth

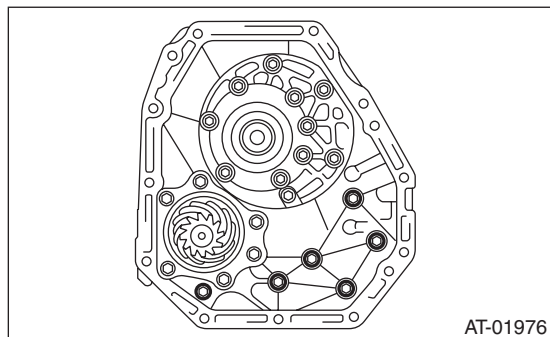
# AT Main Case

## AUTOMATIC TRANSMISSION

(5) Combine the oil pump cover with transmission main case.

### Tightening torque:

**41 N·m (4.2 kgf·m, 30.2 ft·lb)**



24) Install the center differential carrier. <Ref. to 5AT-71, INSTALLATION, Center Differential Carrier.>

25) Install the reduction driven gear. <Ref. to 5AT-68, INSTALLATION, Reduction Driven Gear.>

26) Install the extension case. <Ref. to 5AT-62, INSTALLATION, Extension Case.>

27) Install the control valve body. <Ref. to 5AT-52, INSTALLATION, Control Valve Body.>

28) Install the converter case assembly to the transmission case assembly. <Ref. to 5AT-75, INSTALLATION, Converter Case.>

29) Install the ATF cooler pipe. <Ref. to 5AT-56, INSTALLATION, ATF Cooler Pipe and Hose.>

30) Install the torque converter assembly. <Ref. to 5AT-60, INSTALLATION, Torque Converter Assembly.>

31) Install the transmission assembly to the vehicle. <Ref. to 5AT-39, INSTALLATION, Automatic Transmission Assembly.>

32) Perform Clear Memory 2 operation. <Ref. to 5AT(diag)-20, Clear Memory Mode.>

33) Perform the diagnosis again. <Ref. to 5AT(diag)-21, Learning Control.>

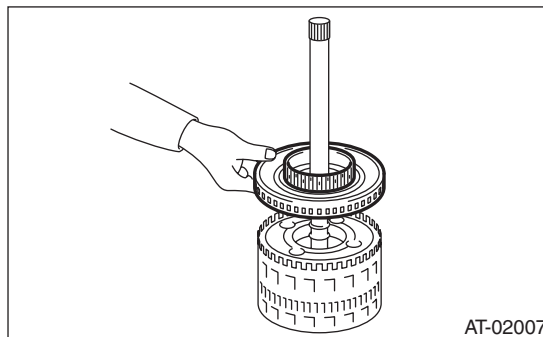
34) Perform the inspection at the end of repair work, and make sure there is no faulty as below;

- Excessive shift shock
- Oil leakage from the transmission body, etc.
- Occurrence of noise caused by interference etc.

## C: DISASSEMBLY

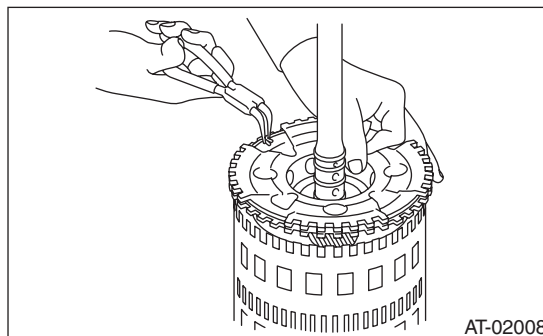
### 1. INPUT CLUTCH PACK ASSEMBLY

1) Remove the front sun gear.

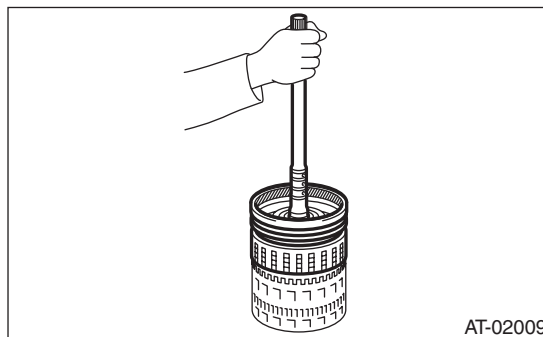


2) Remove the thrust bearing.

3) Remove the snap ring, and then remove the front carrier.



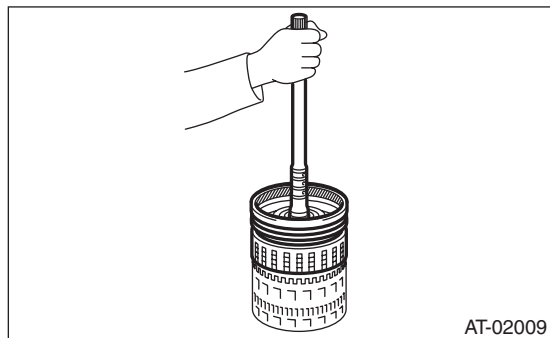
4) Remove the input clutch assembly from rear internal gear.



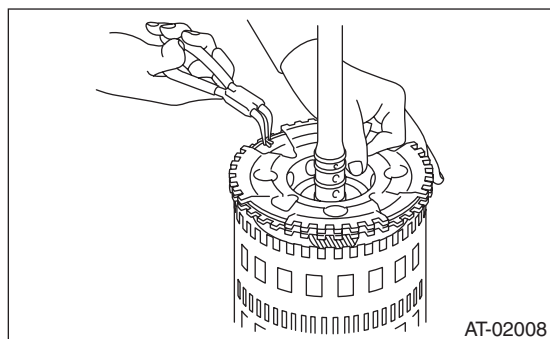
## D: ASSEMBLY

### 1. INPUT CLUTCH PACK ASSEMBLY

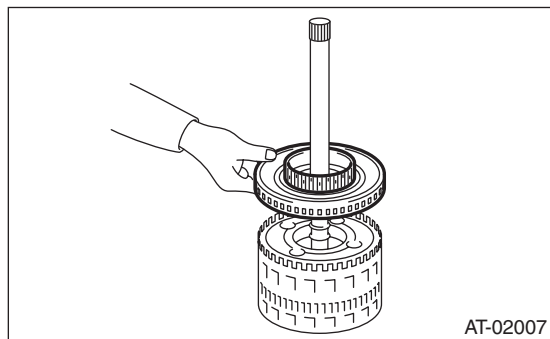
1) Assemble the input clutch assembly to rear internal gear.



2) Install the front carrier, and then install the snap ring.



3) Install the thrust needle bearing.  
4) Install the front sun gear.



## E: INSPECTION

### 1. FRONT, MIDDLE & REAR PLANETARY CARRIER ASSEMBLY

Check the following items.

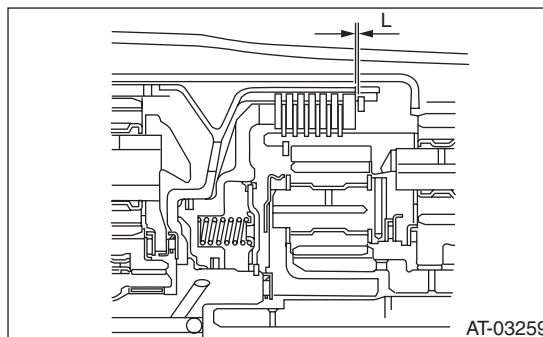
- Visually inspect the tooth surface of planetary gear, and replace with new part if damaged, broken or excessively worn.
- Inspect the planetary carrier body for damage or breakage.

### 2. INPUT CLUTCH

- Check the clearance of the input clutch. Measure the clearance "L" between snap ring and retaining plate using a thickness gauge. If it is out of specification, replace the entire input clutch assembly.
- Check for damage on the drive plate, driven plate and snap ring, and replace the entire input clutch assembly if damaged.

**Standard:**

**0.7 — 1.1 mm (0.028 — 0.043 in)**



### 3. HIGH & LOW REVERSE CLUTCH ASSY

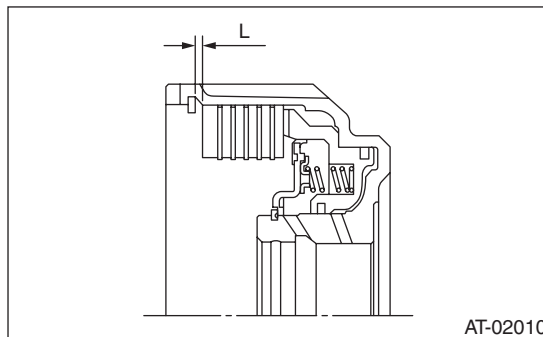
- Check the clearance of the high & low reverse clutch.

Measure the clearance "L" between snap ring and retaining plate using a thickness gauge. If it is out of specification, replace the entire high & low reverse clutch assembly.

- Check for damage on the drive plate, driven plate and snap ring, and replace the entire high & low reverse clutch assembly if damaged.

**Standard:**

**1.8 — 2.2 mm (0.071 — 0.087 in)**



# AT Main Case

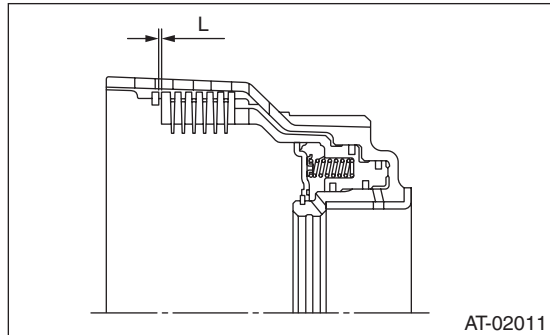
## AUTOMATIC TRANSMISSION

### 4. DIRECT CLUTCH ASSEMBLY

- Check the clearance of direct clutch. Measure the clearance “L” between snap ring and retaining plate using a thickness gauge. If it is out of specification, replace the entire direct clutch assembly.
- Check for damage on the drive plate, driven plate and snap ring, and replace the entire direct clutch assembly if damaged.

#### Standard:

**0.6 — 1.0 mm (0.024 — 0.039 in)**



### 5. REVERSE BRAKE

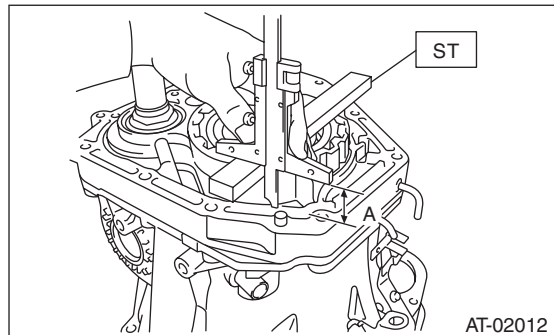
Check the following items.

- Drive plate facing for wear or damage
- Snap ring for wear, return spring for breakage, and spring retainer for deformation
- Lip seal and D-ring for damage
- Piston operation
- Piston stroke

### F: ADJUSTMENT

1) Using the ST, measure the height “A” from the AT main case mating surface to convex surface of oil pump cover.

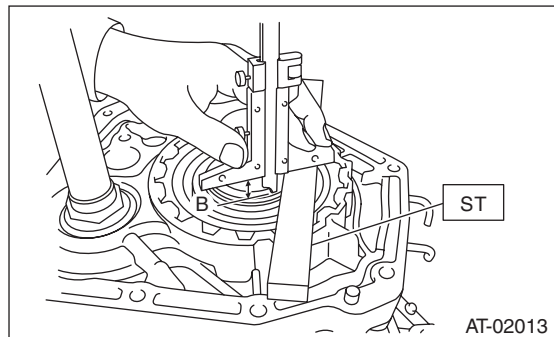
ST 499575400 GAUGE



A Measured value

2) Using the ST, measure the depth “B” from the convex surface of oil pump cover to thrust bearing transferring surface.

ST 499575400 GAUGE



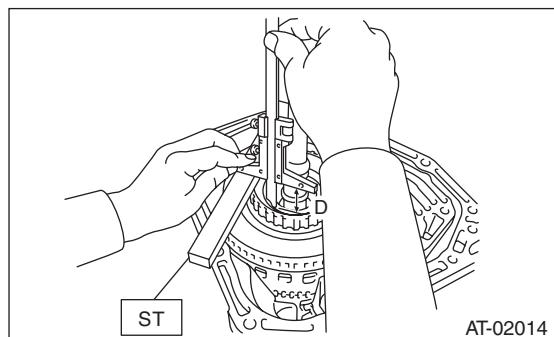
B Measured value

3) Calculate the measured value from step 1) and 2), and then set the calculated value as “C”.

Calculation formula:  $C = A - B$

4) Using the ST, measure the depth “D” from the AT main case mating surface to thrust bearing transferring surface of front sun gear.

ST 499575400 GAUGE



D Measured value



5) Set the value as “E” which subtract the thickness of ST (499575400 GAUGE) from the measured value on step 4).

Calculation:  $E \text{ (mm)} = D - 15$

$[E \text{ (in)} = D - 0.59]$

6) Calculation formula:

Select one thrust bearing from the table to adjust clearance within 0.25 — 0.55 mm (0.0098 — 0.0217 in).

When clearances are 0.25 mm (0.0098 in):

$T \text{ (mm)} = E - C + 0.03$

$[T \text{ (in)} = E - C + 0.0012]$

When clearances are 0.55 mm (0.0217 in):

$T \text{ (mm)} = E - C + 0.27$

$[T \text{ (in)} = E - C + 0.0106]$

T: Thrust bearing thickness

C: Distance from oil pump cover mating surface to rear end of oil pump cover

E: Depth from mating surface of AT main case to bearing surface of front sun gear

**NOTE:**

Calculation formula for “T” above is applied when measuring with the ST (499575400 GAUGE). In the calculation without using ST, substitute the thickness of collar used to calculate the value “E” on step 5).

Thrust bearing	
Part No.	Thickness mm (in)
806548020	3.2 (0.126)
606548030	3.4 (0.134)
806548040	3.6 (0.142)
806548050	3.8 (0.150)
806548060	4.0 (0.157)
806548070	4.2 (0.165)

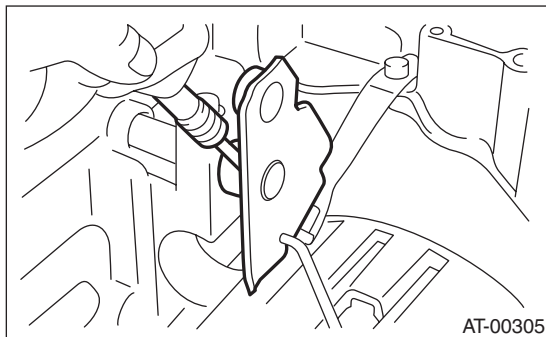
# Transmission Control Device

## AUTOMATIC TRANSMISSION

### 35. Transmission Control Device

#### A: REMOVAL

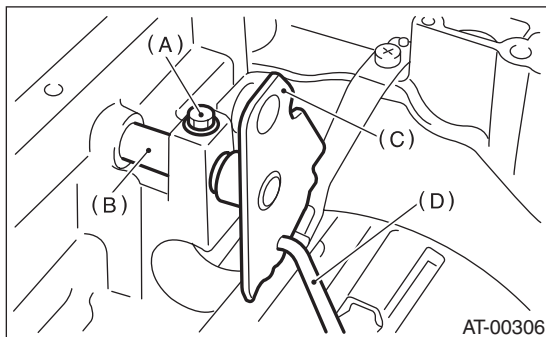
- 1) Remove the transmission assembly from vehicle body. <Ref. to 5AT-36, REMOVAL, Automatic Transmission Assembly.>
- 2) Pull out the torque converter assembly. <Ref. to 5AT-60, REMOVAL, Torque Converter Assembly.>
- 3) Lift up the lever on the rear side of transmission harness connector, and then disconnect it from the stay.
- 4) Disconnect the air breather hose. <Ref. to 5AT-58, REMOVAL, Air Breather Hose.>
- 5) Wrap vinyl tape around the nipple attached to the air breather hose.
- 6) Remove the pitching stopper bracket.
- 7) Remove the control valve body assembly. <Ref. to 5AT-52, REMOVAL, Control Valve Body.>
- 8) Pull out the straight pin of manual plate.



- 9) Remove the bolts securing range select lever, and then remove the select lever, manual plate and parking rod.

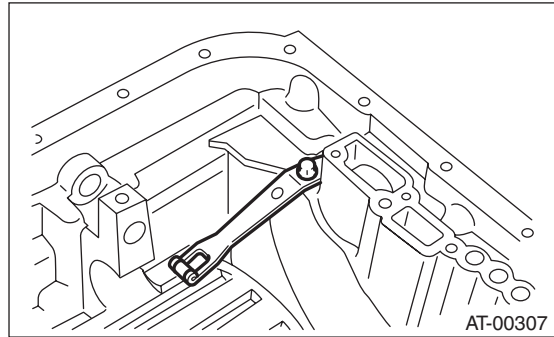
#### NOTE:

Be careful not to damage the lips of press-fitted oil seal in the case.



- (A) Bolt
- (B) Range select lever
- (C) Manual plate
- (D) Parking rod

- 10) Remove the detent spring.

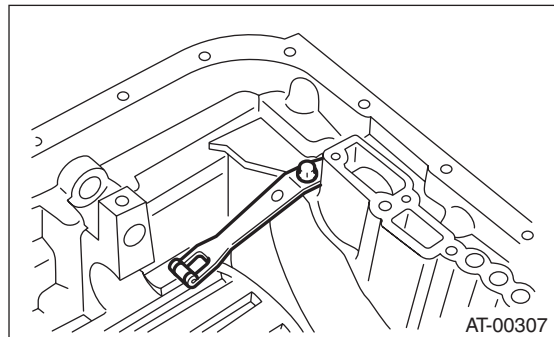


#### B: INSTALLATION

- 1) Install the detent spring to the transmission case.

#### Tightening torque:

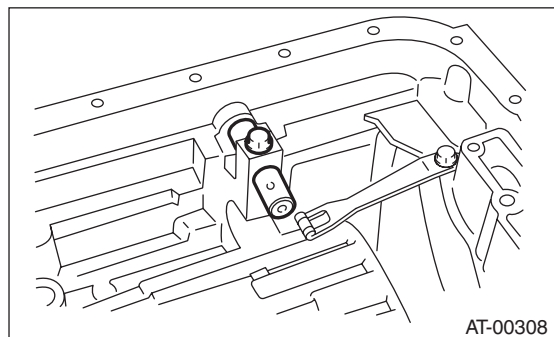
**7 N·m (0.7 kgf-m, 5.2 ft-lb)**



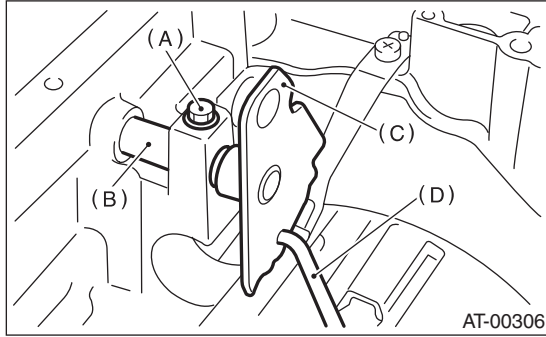
- 2) Insert the select lever, and then tighten the bolt.

#### Tightening torque:

**6 N·m (0.6 kgf-m, 4.4 ft-lb)**

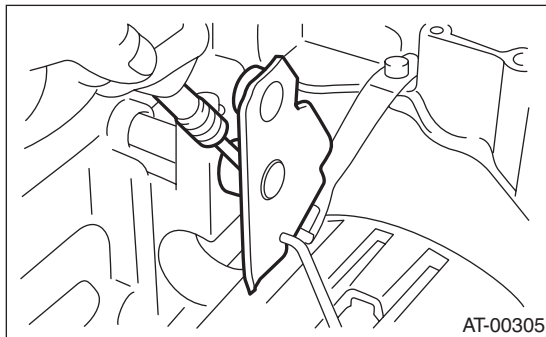


3) Insert the manual plate and parking rod.



- (A) Bolt
- (B) Range select lever
- (C) Manual plate
- (D) Parking rod

4) Insert the spring pin to the manual plate.



5) Install the oil pan and the control valve body assembly. <Ref. to 5AT-52, INSTALLATION, Control Valve Body.>

6) Install the pitching stopper bracket.

### **Tightening torque:**

**41 N·m (4.2 kgf·m, 30.2 ft·lb)**

7) Insert the transmission connector to the stay.

8) Install the air breather hose. <Ref. to 5AT-58, INSTALLATION, Air Breather Hose.>

9) Install the torque converter assembly. <Ref. to 5AT-60, INSTALLATION, Torque Converter Assembly.>

10) Install the transmission assembly to the vehicle. <Ref. to 5AT-39, INSTALLATION, Automatic Transmission Assembly.>

## **C: INSPECTION**

Make sure the manual lever and detent spring are not worn or otherwise damaged.

# Transmission Control Device

AUTOMATIC TRANSMISSION

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# AUTOMATIC TRANSMISSION (DIAGNOSTICS)

## *5AT(diag)*

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# Basic Diagnostic Procedure

## AUTOMATIC TRANSMISSION (DIAGNOSTICS)

### 1. Basic Diagnostic Procedure

#### A: PROCEDURE

Step	Check	Yes	No
<b>1 CHECK PRE-INSPECTION.</b> 1) Ask the customer when and how the trouble occurred using the interview check list. <Ref. to 5AT(diag)-4, Check List for Interview.> 2) Check the following items which may be affecting the AT trouble. <ul style="list-style-type: none"> <li>• General inspection &lt;Ref. to 5AT(diag)-5, INSPECTION, General Description.&gt;</li> <li>• Oil leakage</li> <li>• Stall speed test &lt;Ref. to 5AT-32, Stall Test.&gt;</li> <li>• Line pressure test &lt;Ref. to 5AT-34, Line Pressure Test.&gt;</li> <li>• Transfer clutch pressure test &lt;Ref. to 5AT-35, Transfer Clutch Pressure Test.&gt;</li> <li>• Time lag test &lt;Ref. to 5AT-33, Time Lag Test.&gt;</li> <li>• Road test &lt;Ref. to 5AT-31, Road Test.&gt;</li> <li>• Inhibitor switch &lt;Ref. to 5AT-47, Inhibitor Switch.&gt;</li> </ul>	Is the item that might influence the AT problem normal?	Go to step 2.	Repair or replace items which might affect the AT problem.
<b>2 CHECK AT OIL TEMP LIGHT.</b> Turn the ignition switch to ON and wait for at least 2 seconds.	Does the AT OIL TEMP light illuminate?	Go to step 3.	Check the AT OIL TEMP light.
<b>3 CHECK AT OIL TEMP LIGHT.</b> Start the engine and wait for 2 seconds or more.	Does the AT OIL TEMP light blink?	Go to step 4.	Go to step 6.
<b>4 CHECK DTC.</b> Read the DTC. <Ref. to 5AT(diag)-18, OPERATION, Read Diagnostic Trouble Code (DTC).> NOTE: If the communication function of Subaru Select Monitor cannot be executed normally, check communication circuit. <Ref. to 5AT(diag)-28, COMMUNICATION FOR INITIALIZING IMPOSSIBLE, Diagnostic Procedure for Subaru Select Monitor Communication.>	Is DTC displayed on Subaru Select Monitor?	Record all DTC. Go to step 5.	Go to step 6.
<b>5 CHECK FREEZE FRAME DATA.</b> Using the Subaru Select Monitor, check the Freeze Frame Data.	Are freeze frame data recorded?	Record the freeze frame data. Go to step 7.	Go to step 7.
<b>6 PERFORM GENERAL DIAGNOSTICS.</b> 1) Inspect using "Diagnostic Procedure without Diagnostic Trouble Code (DTC)". <Ref. to 5AT(diag)-96, Diagnostic Procedure without Diagnostic Trouble Code (DTC).> 2) Perform the Clear Memory Mode. 3) Perform the Inspection Mode. <Ref. to 5AT(diag)-19, Inspection Mode.> 4) Display the DTC.	Is DTC displayed on Subaru Select Monitor?	Go to step 7.	Finish the diagnosis.

# Basic Diagnostic Procedure

## AUTOMATIC TRANSMISSION (DIAGNOSTICS)

	Step	Check	Yes	No
7	<p><b>PERFORM DIAGNOSIS.</b></p> <p>1) Inspect using "Diagnostic Procedure with Diagnostic Trouble Code (DTC)". &lt;Ref. to 5AT(diag)-34, Diagnostic Procedure with Diagnostic Trouble Code (DTC).&gt;</p> <p>NOTE: For the DTC table, refer to "List of Diagnostic Trouble Code (DTC)". &lt;Ref. to 5AT(diag)-31, List of Diagnostic Trouble Code (DTC).&gt;</p> <p>2) Repair the trouble cause.</p> <p>3) Perform the Clear Memory Mode.</p> <p>4) Perform the Inspection Mode. &lt;Ref. to 5AT(diag)-19, Inspection Mode.&gt;</p> <p>5) Display the DTC.</p>	Is DTC displayed on Subaru Select Monitor?	Inspect using "Diagnostic Procedure with Diagnostic Trouble Code (DTC)". <Ref. to 5AT(diag)-34, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Finish the diagnosis.

## Check List for Interview

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

### 2. Check List for Interview

#### A: CHECK

Check the following item when problem has occurred.

NOTE:

Use copies of this page for interviewing customers.

Customer's name		
Date of purchase		
Date of repair		
Transmission model	Transmission	V.I.N.
Odometer reading	km (miles)	
Symptom	<input type="checkbox"/> No up-shift	
	<input type="checkbox"/> No down-shift	
	<input type="checkbox"/> No kick down	
	<input type="checkbox"/> Vehicle does not move ( <input type="checkbox"/> Any position <input type="checkbox"/> Particular position)	
	<input type="checkbox"/> Lock-up malfunction	
	<input type="checkbox"/> Noise or vibration	
	<input type="checkbox"/> Shift shock or slip	
	<input type="checkbox"/> Select lever does not move	
	<input type="checkbox"/> Others ( )	
Frequency	<input type="checkbox"/> Continuous <input type="checkbox"/> Intermittent (    times a day)	
Weather	<input type="checkbox"/> Fine <input type="checkbox"/> Cloudy <input type="checkbox"/> Rainy <input type="checkbox"/> Snowy <input type="checkbox"/> Others ( )	
Place	<input type="checkbox"/> Highland <input type="checkbox"/> Suburbs <input type="checkbox"/> Inner city <input type="checkbox"/> Uphill <input type="checkbox"/> Rough road <input type="checkbox"/> Others ( )	
Ambient air temperature	<input type="checkbox"/> Hot <input type="checkbox"/> Warm <input type="checkbox"/> Cool <input type="checkbox"/> Cold	
Vehicle speed	km/h (MPH)	
AT warning light (AT OIL TEMP light)	<input type="checkbox"/> Blinks continuously <input type="checkbox"/> Not blink	
Select lever position	<input type="checkbox"/> P <input type="checkbox"/> R <input type="checkbox"/> N <input type="checkbox"/> D <input type="checkbox"/> Manual mode	
Driving condition	<input type="checkbox"/> Not affected	<input type="checkbox"/> At starting
	<input type="checkbox"/> At racing	<input type="checkbox"/> Accelerating
	<input type="checkbox"/> Reducing speed	<input type="checkbox"/> While turning ( <input type="checkbox"/> RH/ <input type="checkbox"/> LH)
		<input type="checkbox"/> While idling <input type="checkbox"/> While cruising
Manual mode	<input type="checkbox"/> ON <input type="checkbox"/> OFF	



# General Description

## AUTOMATIC TRANSMISSION (DIAGNOSTICS)

### 3. General Description

#### A: CAUTION

##### 1. SRS AIRBAG SYSTEM

The airbag system wiring harness is routed near the TCM.

#### CAUTION:

- All airbag system wiring harnesses and connectors are colored yellow. Do not use an electric test equipment to check these circuits.
- Be careful not to damage the airbag system wiring harness when performing diagnostics or servicing the TCM.

##### 2. MEASUREMENT

When measuring the 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 a pin of more than 0.65 mm (0.026 in) diameter.

#### B: INSPECTION

##### 1. BATTERY

Measure the battery voltage and specific gravity of electrolyte.

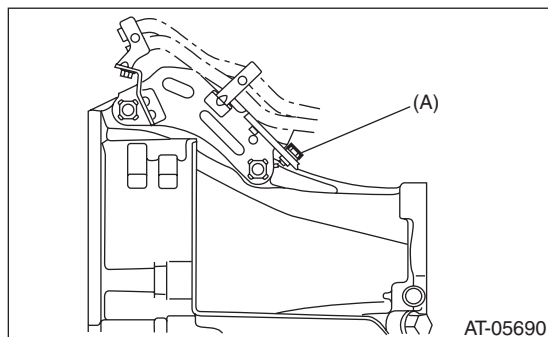
**Standard voltage:**  
12 V or more

**Specific gravity:**  
1.260 or more

##### 2. TRANSMISSION GROUND

Make sure that the ground terminal bolt is tightened securely.

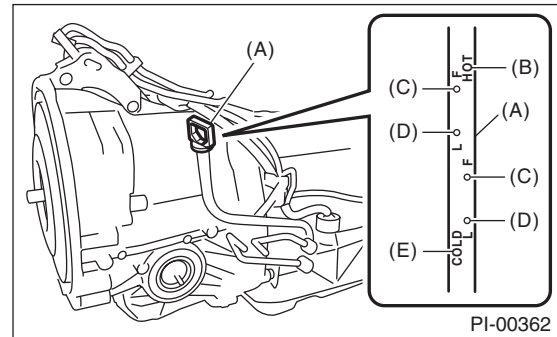
**Tightening torque:**  
7 N·m (0.7 kgf·m, 5.2 ft·lb)



(A) Ground bolt

##### 3. ATF LEVEL

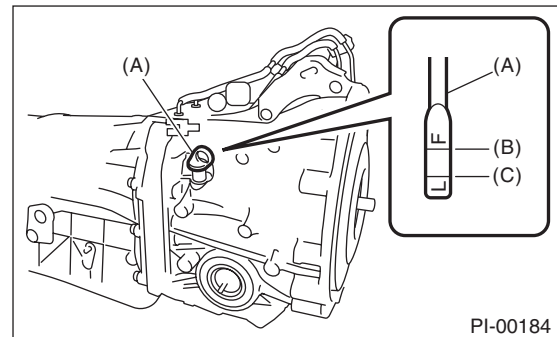
Make sure that ATF level is the specified amount. <Ref. to 5AT-28, INSPECTION, Automatic Transmission Fluid.>



- (A) Oil level gauge
- (B) Inspection position when "HOT"
- (C) Upper level
- (D) Lower level
- (E) Inspection position when "COLD"

##### 4. FRONT DIFFERENTIAL OIL LEVEL

Make sure the front differential oil level is the specified amount. <Ref. to 5AT-30, INSPECTION, Differential Gear Oil.>



- (A) Oil level gauge
- (B) Upper level
- (C) Lower level

##### 5. OPERATION OF SHIFT SELECT LEVER

Make sure there is no noise, dragging or contact pattern in each select lever range.

#### WARNING:

**Stop the engine while checking operation of the select lever.**

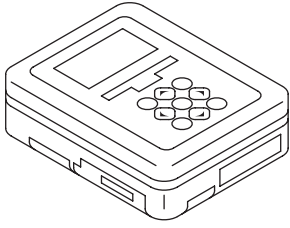
# General Description

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

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## C: PREPARATION TOOL

### 1. SPECIAL TOOL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST1B022XU0	1B022XU0	SUBARU SELECT MONITOR III KIT	Used for troubleshooting the electrical system.

### 2. GENERAL TOOL

TOOL NAME	REMARKS
Circuit tester	Used for measuring resistance, voltage and current.
Oscilloscope	Used for measuring the sensor.

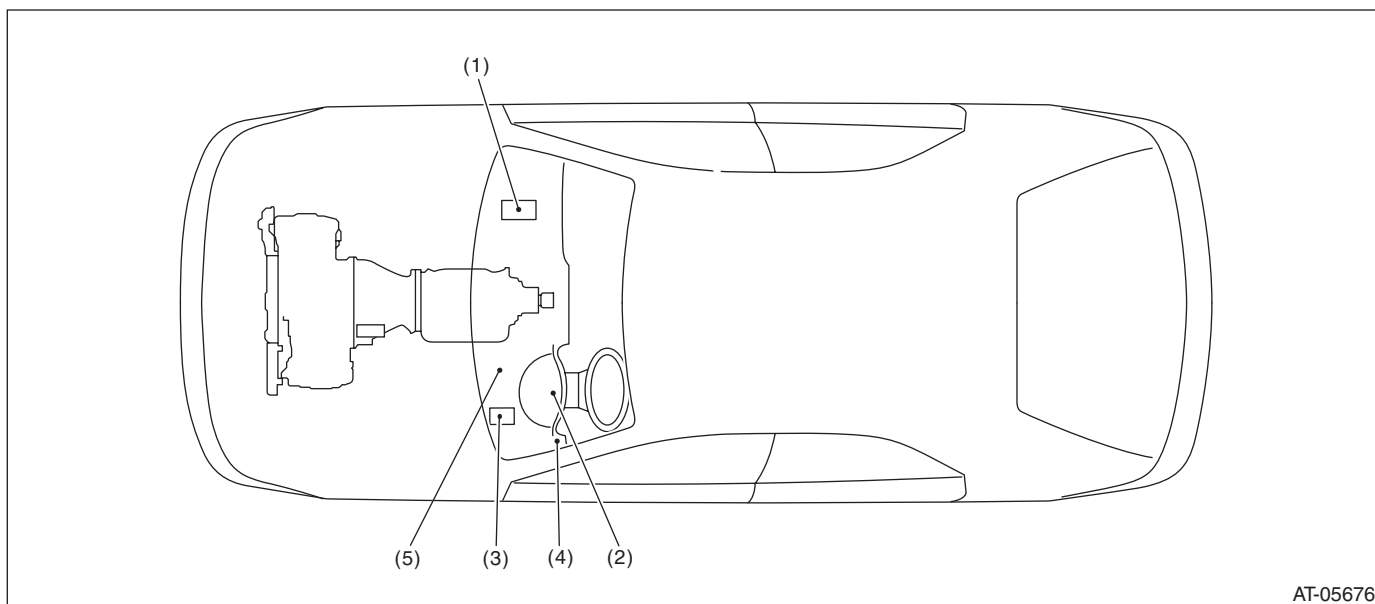
# Electrical Component Location

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

## 4. Electrical Component Location

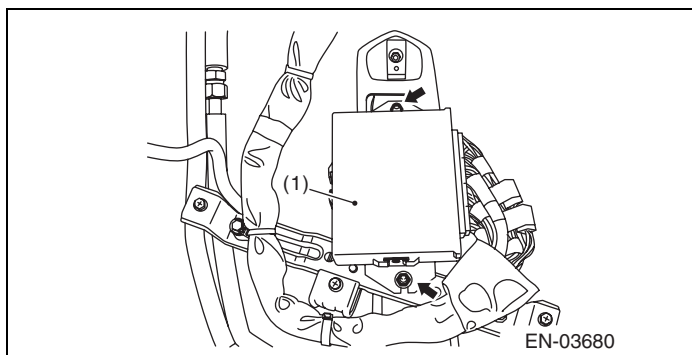
### A: LOCATION

#### 1. CONTROL MODULE

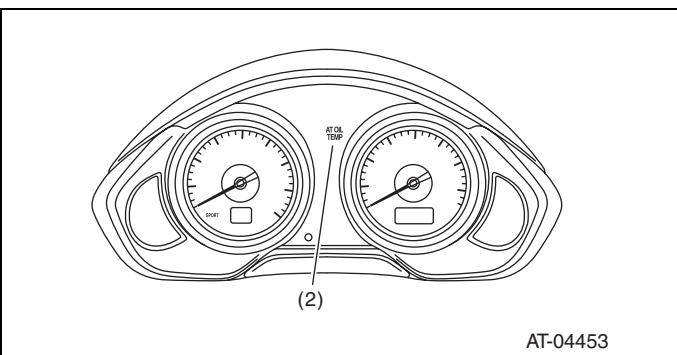


AT-05676

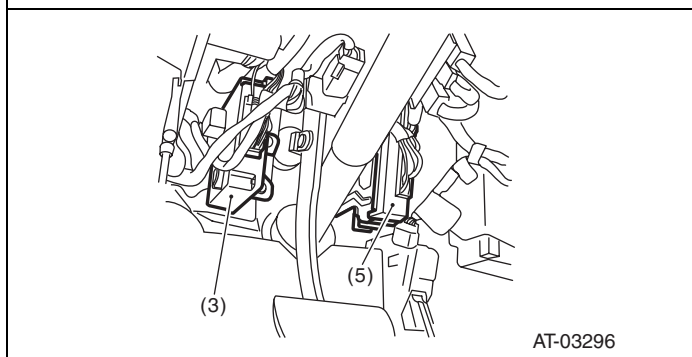
- |  |                                       |                          |
|--|---------------------------------------|--------------------------|
| (1) Engine control module (ECM)          | (3) Transmission control module (TCM) | (5) Body integrated unit |
| (2) AT OIL TEMP light (AT warning light) | (4) Data link connector               |                          |



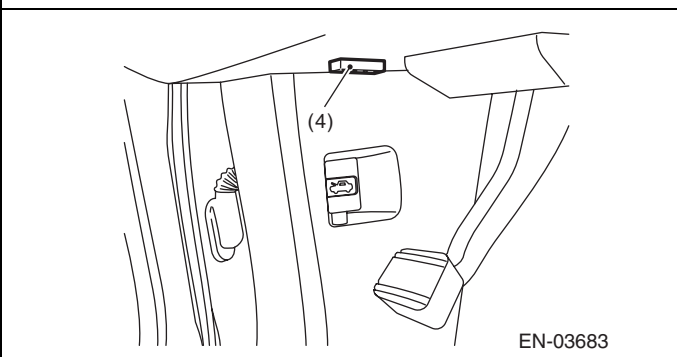
EN-03680



AT-04453



AT-03296

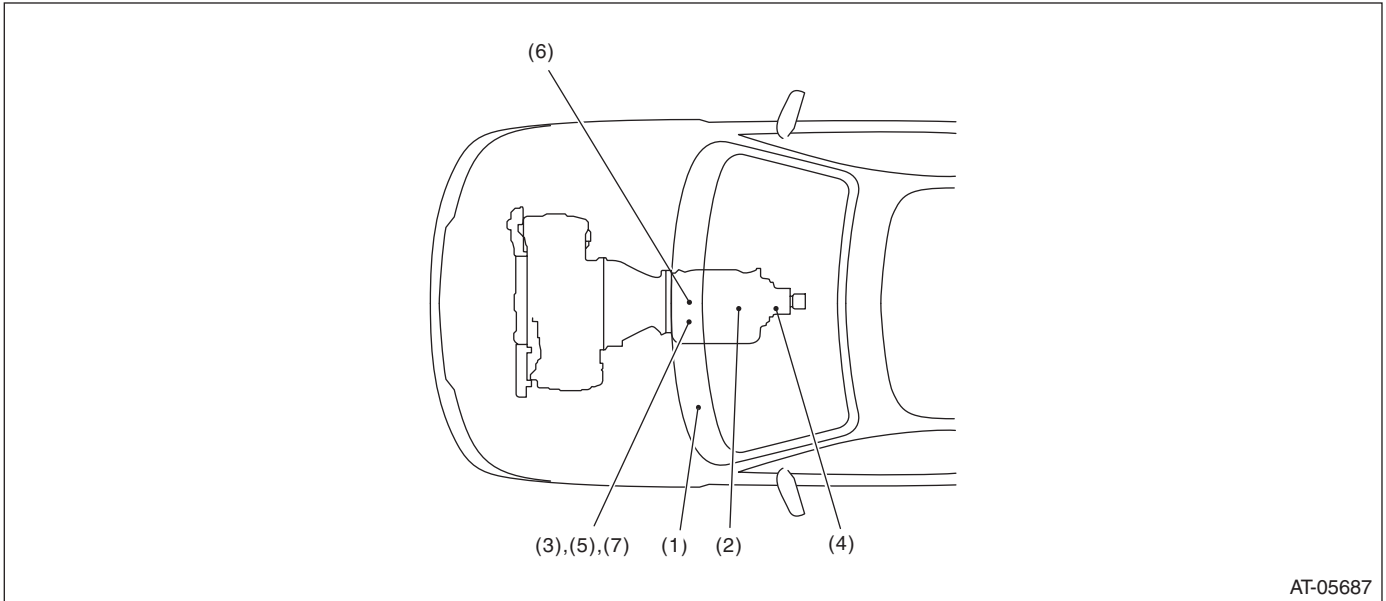


EN-03683

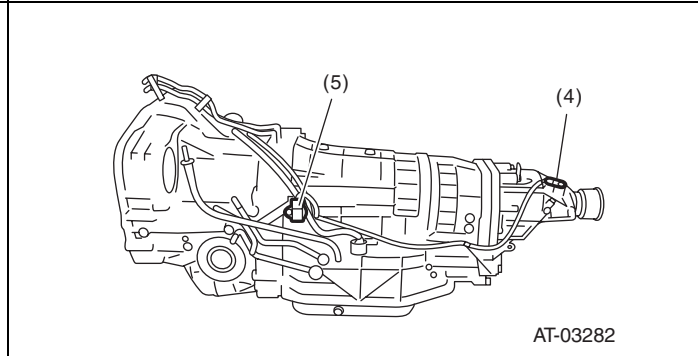
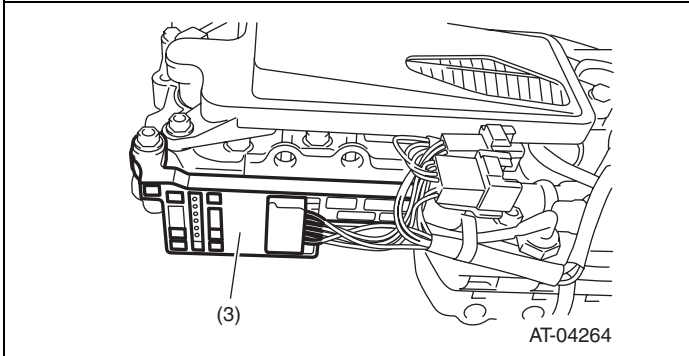
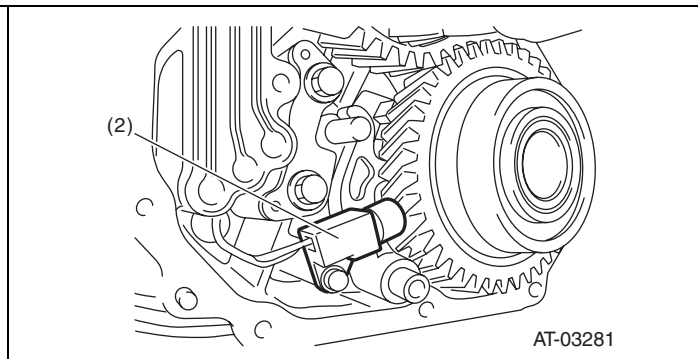
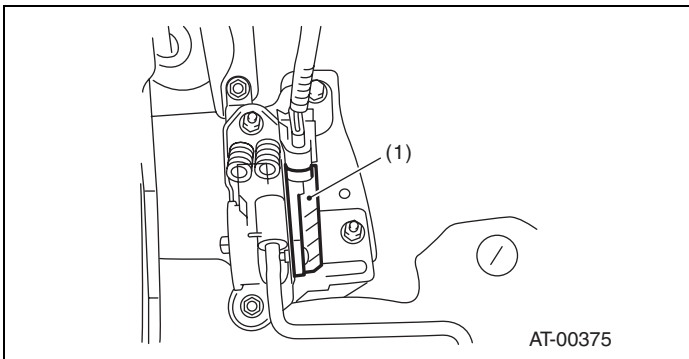
# Electrical Component Location

## AUTOMATIC TRANSMISSION (DIAGNOSTICS)

### 2. SENSOR

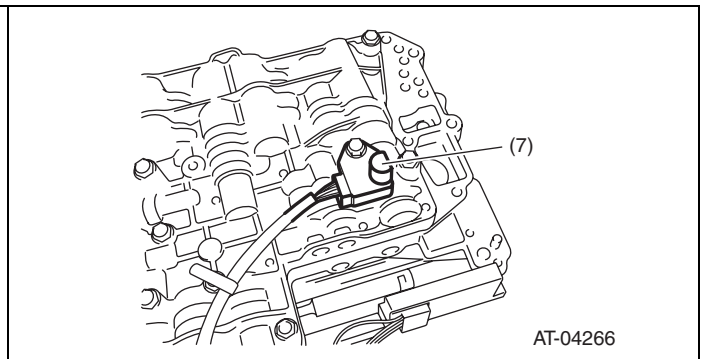
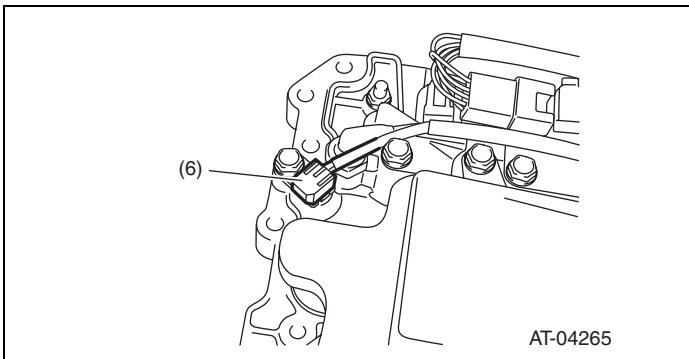


- |                                       |                               |                            |
|---------------------------------------|-------------------------------|----------------------------|
| (1) Accelerator pedal position sensor | (4) Rear vehicle speed sensor | (6) ATF temperature sensor |
| (2) Front vehicle speed sensor        | (5) Turbine speed sensor 1    | (7) Turbine speed sensor 2 |
| (3) Inhibitor switch                  |                               |                            |

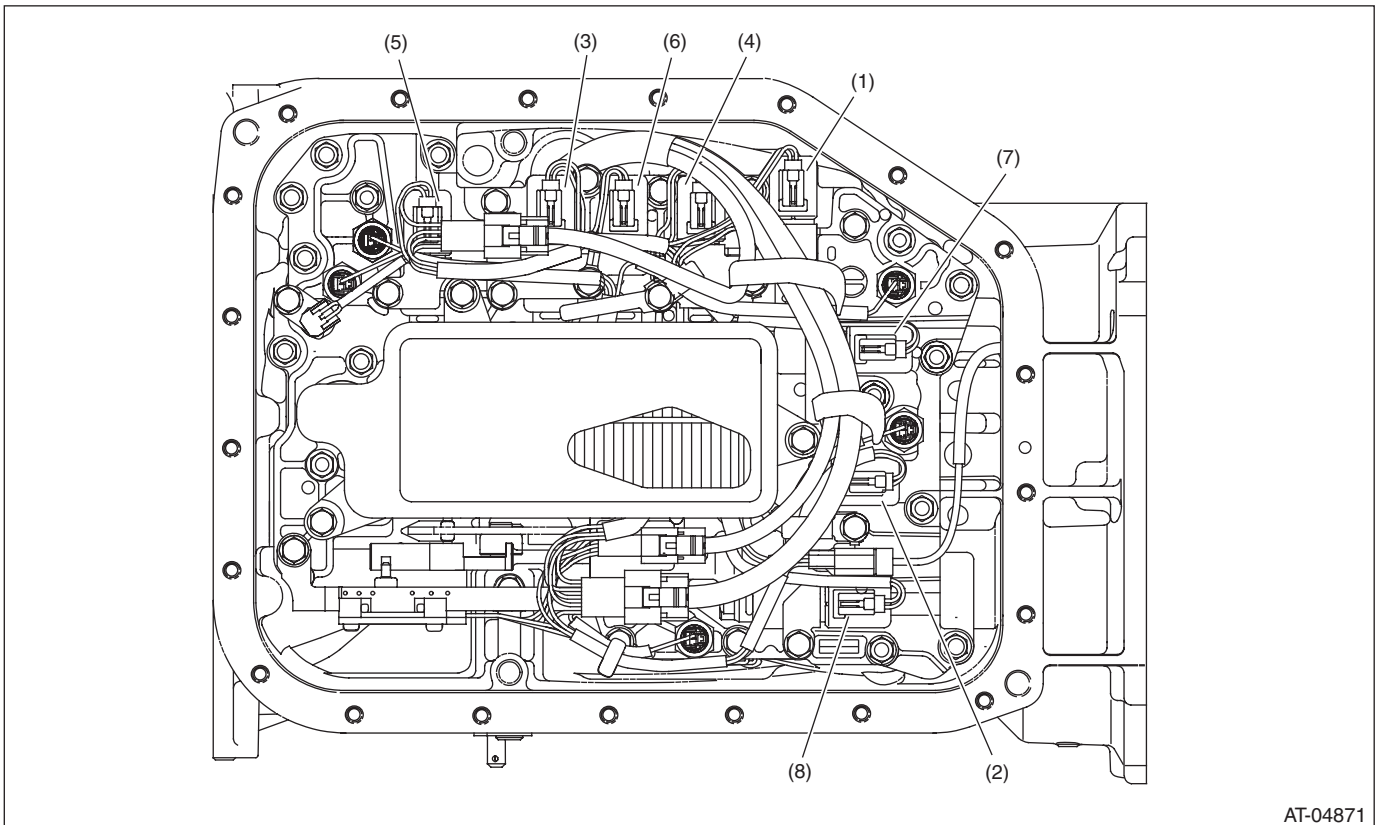


# Electrical Component Location

## AUTOMATIC TRANSMISSION (DIAGNOSTICS)



### 3. SOLENOID



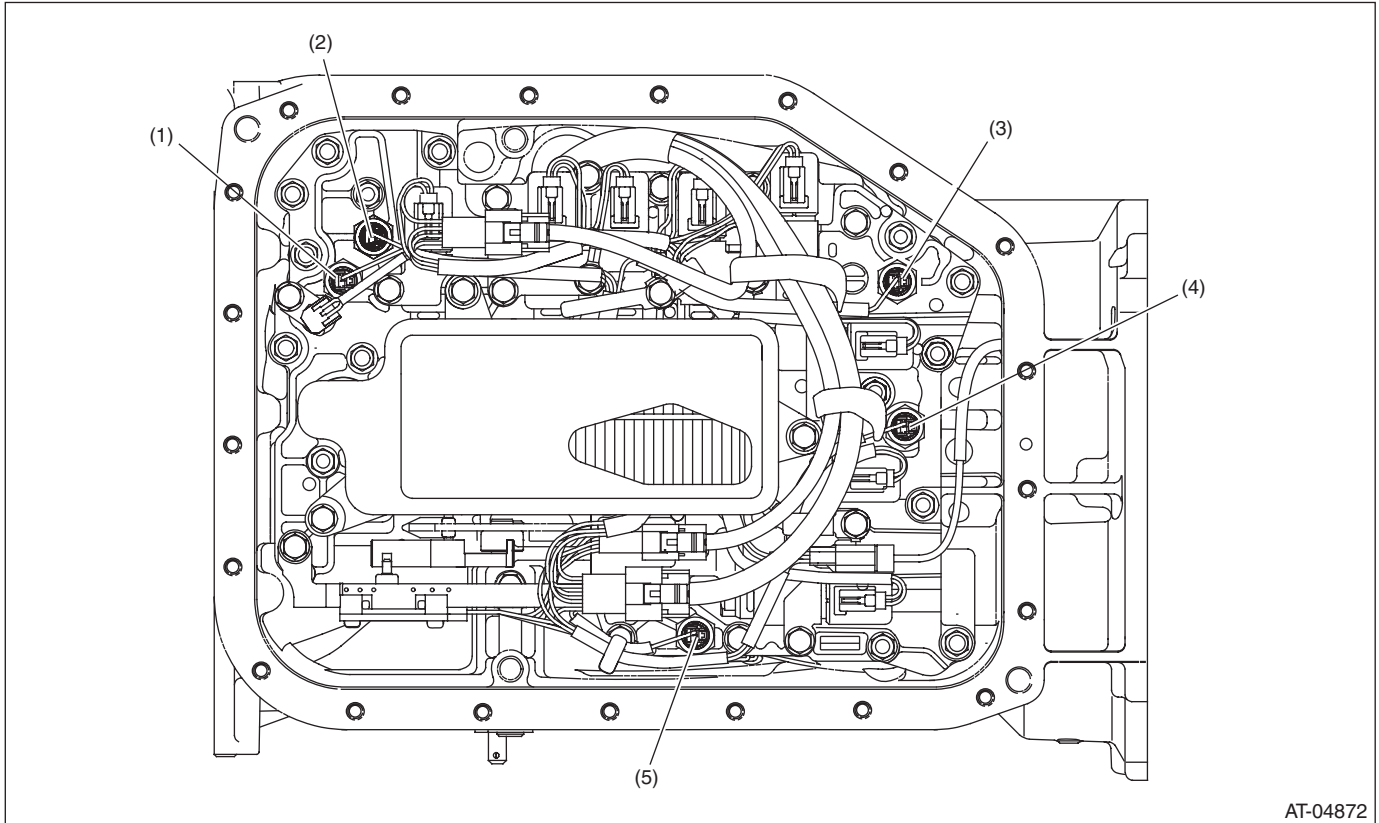
AT-04871

- |  |                            |                            |
|--|----------------------------|----------------------------|
| (1) High & low reverse clutch solenoid | (4) Input clutch solenoid  | (7) Transfer solenoid      |
| (2) Direct clutch solenoid             | (5) Line pressure solenoid | (8) Forward brake solenoid |
| (3) Front brake solenoid               | (6) Lock up solenoid       |                            |

# Electrical Component Location

## AUTOMATIC TRANSMISSION (DIAGNOSTICS)

### 4. OIL PRESSURE SWITCH



AT-04872

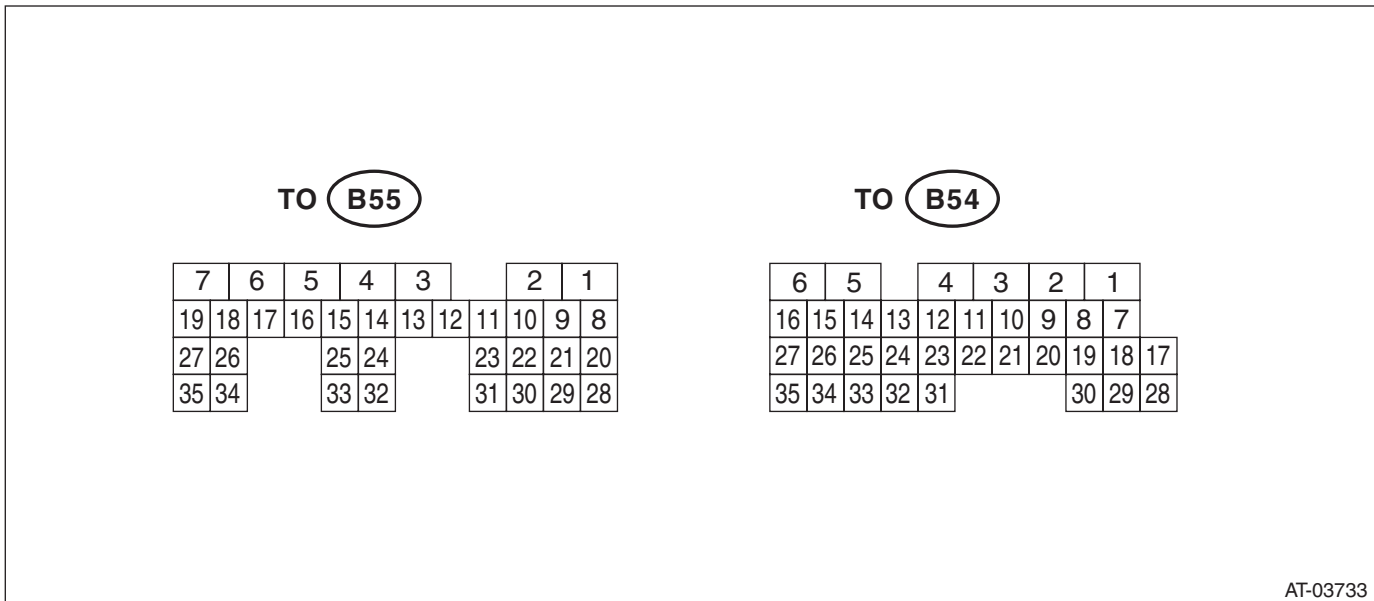
- |                                      |   |                                       |
|--------------------------------------|---|---------------------------------------|
| (1) Front brake oil pressure switch  | (3) High & low reverse clutch oil pressure switch | (5) Forward brake oil pressure switch |
| (2) Input clutch oil pressure switch | (4) Direct clutch oil pressure switch             |                                       |

# Transmission Control Module (TCM) I/O Signal

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

## 5. Transmission Control Module (TCM) I/O Signal

### A: ELECTRICAL SPECIFICATION



AT-03733

**NOTE:**

The measurement should be performed after warming up.

Item	Connector No.	Terminal No.	Measuring condition	Measured value	Resistance between terminal and chassis ground	Remarks
P/L solenoid output	B54	6	Engine ON, "P" range, accelerator OFF, brake ON	3.5 — 7.5 V	3 — 9 Ω (ATF temperature 20°C (68°F))	Drive frequency: 300 Hz
I/C oil pressure switch input	B54	20	While driving at 1st-3rd of manual mode	6 V or more		
			While driving at 4th or 5th of manual mode	Less than 1.5 V		
Power GND	B54	12	Always	Approx. 0 V	—	
CAN communication line (+)	B55	21	—	—	—	
CAN communication line (-)	B55	20	—	—	—	
ATF temperature sensor input	B54	17	Ignition switch ON ATF oil temperature 20°C (68°F)	3.5 — 4.3 V	2.5 — 7.0 kΩ	Measure the resistance with the connector disconnected.
			Ignition switch ON ATF oil temperature 80°C (176°F)	1 — 2.2 V	0.3 — 0.8 kΩ	
Backup power supply	B55	24	Ignition switch ON	8 V or more	—	
			Ignition switch OFF			
I/C solenoid output	B54	3	While driving at 1st-3rd of manual mode	5 V or more	3 — 9 Ω (ATF temperature 20°C (68°F))	Drive frequency: 300 Hz
			While driving at 4th or 5th of manual mode	Less than 1.5 V		
H & LR/C solenoid output	B54	5	While driving at 2nd of manual mode	5 V or more	3 — 9 Ω (ATF temperature 20°C (68°F))	Drive frequency: 300 Hz
			While driving at 1st, 3rd-5th of manual mode	Less than 1.5 V		

# Transmission Control Module (TCM) I/O Signal

## AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Item	Connector No.	Terminal No.	Measuring condition	Measured value	Resistance between terminal and chassis ground	Remarks
Power GND	B54	13	Always	Approx. 0 V	—	
Analog GND	B54	18	Always	Approx. 0 V	—	
Fr/B solenoid output	B54	4	While driving at other than 4th of manual mode	5 V or more	3 — 9 Ω (ATF temperature 20°C (68°F))	Drive frequency: 300 Hz
			While driving at 4th of manual mode	Less than 1.5 V		
L/U solenoid output	B54	7	When lock-up	3 V or more	3 — 9 Ω (ATF temperature 20°C (68°F))	Drive frequency: 300 Hz
			When not lock-up	Less than 1 V		
D/C solenoid output	B54	1	While driving at 1st or 5th of manual mode	5 V or more	3 — 9 Ω (ATF temperature 20°C (68°F))	Drive frequency: 300 Hz
			While driving at 2nd-4th of manual mode	Less than 1.5 V		
D/C oil pressure switch input	B54	22	While driving at 1st or 5th of manual mode	6 V or more		
			While driving at 2nd-4th of manual mode	Less than 1.5 V		
Subaru Select Monitor communication line	B55	8	Ignition switch ON	8 V or more	—	
			Ignition switch OFF	Less than 1 V		
Sensor GND (analog)	B54	16	Always	Approx. 0 V	—	
H&LR/C oil pressure switch input	B54	14	While driving at 2nd of manual mode	6 V or more	—	
			While driving at 3rd-5th of manual mode	Less than 1.5 V		
Fwd/B solenoid output	B54	19	While driving at 1st or 2nd of manual mode	5 V or more		Drive frequency: 300 Hz
			While driving at 3rd-5th of manual mode	Less than 1.5 V		
Fwd/B oil pressure switch input	B54	21	While driving at 1st or 2nd of manual mode	Less than 1.5 V		
			While driving at 3rd-5th of manual mode	6 V or more		
Front vehicle speed sensor input	B54	24	While driving at 2nd and 20 km/h (12 MPH) of manual mode	Approx. 500 — 700 rpm	—	Use the Subaru Select Monitor.
			While driving at 4th and 80 km/h (50 MPH) of manual mode	Approx. 2,000 — 2,500 rpm		Use the Subaru Select Monitor.
Inhibitor switch 1 input	B54	8	Ignition switch ON, "P" range	Less than 0.5 V	—	
			Ignition switch ON, "N" range	5 V or more		
Inhibitor switch 2 input	B54	9	Ignition switch ON, "P" range	5 V or more	—	
			Ignition switch ON, "D" range	Less than 0.5 V		
Ignition power supply	B54	27	Ignition switch ON	8 V or more	—	
			Ignition switch OFF	Less than 1 V		



# Transmission Control Module (TCM) I/O Signal

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Item	Connector No.	Terminal No.	Measuring condition	Measured value	Resistance between terminal and chassis ground	Remarks
Rear vehicle speed sensor input	B54	23	While driving at 2nd and 20 km/h (12 MPH) of manual mode	Approx. 500 — 700 rpm	—	Use the Subaru Select Monitor.
			While driving at 4th and 80 km/h (50 MPH) of manual mode	Approx. 2,000 — 2,500 rpm		Use the Subaru Select Monitor.
Fr/B oil pressure switch input	B54	15	While driving at other than 4th of manual mode	Less than 1.5 V	—	
			While driving at 4th of manual mode	6 V or more		
Turbine speed sensor 1 input	B54	26	2nd of manual mode, turbine speed sensor is 2,000 rpm (Read from Subaru Select Monitor)	Approx. 0 rpm	—	Use the Subaru Select Monitor.
			4th of manual mode, turbine speed sensor is 2,000 rpm (Read from Subaru Select Monitor)	Approx. 1,900 — 2,100 rpm		Use the Subaru Select Monitor.
Inhibitor switch 3 input	B54	10	Ignition switch ON, "R" range	5 V or more	—	
			Ignition switch ON, "D" range	Less than 0.5 V		
Control GND1	B55	23	Ignition switch ON	Approx. 0 V		
			Ignition switch OFF			
Control GND2	B55	22	Ignition switch ON	Approx. 0 V		
			Ignition switch OFF			
Inhibitor switch 4 input	B54	11	Ignition switch ON, "P" range	Less than 0.5 V	—	
			Ignition switch ON, "D" range	5 V or more		
Back-up light relay output	B55	13	Ignition switch ON, "R" range	Less than 1 V	90 — 110 Ω (ATF temperature 25°C (77°F))	
			Ignition switch ON, other than "R" range	8 V or more		
AWD solenoid output	B54	2	Engine ON, "P" range or "N" range, accelerator OFF	Less than 1 V	3 — 9 Ω (ATF temperature 20°C (68°F))	Drive frequency: 300 Hz
			Engine ON, "D" range, accelerator OFF, brake ON	2 V or more		
Turbine speed sensor 2 input	B54	25	2nd gear of manual mode, turbine speed sensor is 2,000 rpm (Read from Subaru Select Monitor)	Approx. 1,200 — 1,500 rpm	—	Use the Subaru Select Monitor.
			4th of manual mode, turbine speed sensor is 2,000 rpm (Read from Subaru Select Monitor)	Approx. 1,900 — 2,100 rpm		Use the Subaru Select Monitor.
PN signal output	B55	11	Ignition switch ON, Other than "P" range or "N" range	8 V or more	—	
			Ignition switch ON, "P" range or "N" range	Less than 1 V		

# Transmission Control Module (TCM) I/O Signal

## AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Item	Connector No.	Terminal No.	Measuring condition	Measured value	Resistance between terminal and chassis ground	Remarks
Ignition power supply 1	B55	26	Ignition switch ON	8 V or more		
			Ignition switch OFF	Less than 1 V		
Ignition power supply 2	B55	19	Ignition switch ON	8 V or more		
			Ignition switch OFF	Less than 1 V		
Ignition power supply 3	B55	18	Ignition switch ON	8 V or more		
			Ignition switch OFF	Less than 1 V		
Ignition power supply 4	B55	25	Ignition switch ON	8 V or more		
			Ignition switch OFF	Less than 1 V		

## 6. Subaru Select Monitor

### A: OPERATION

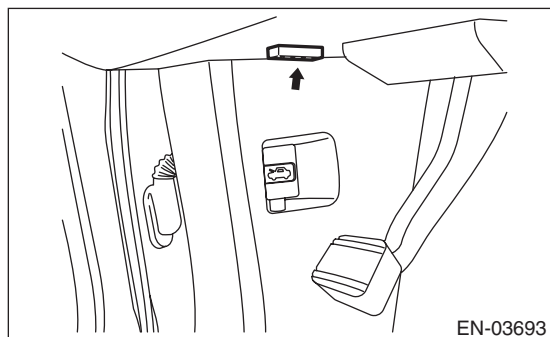
#### 1. READ DIAGNOSTIC TROUBLE CODE (DTC)

- 1) Prepare the Subaru Select Monitor kit. <Ref. to 5AT(diag)-6, PREPARATION TOOL, General Description.>
- 2) Prepare PC with Subaru Select Monitor installed.
- 3) Connect the USB cable to the SDI (Subaru Diagnostic Interface) and the USB port of the personal computer (port for Subaru Select Monitor).

#### NOTE:

The dedicated port for the Subaru Select Monitor means the USB port which was used to install the Subaru Select Monitor.

- 4) Connect the diagnosis cable to SDI.
- 5) Connect the SDI to the data link connector located in the lower portion of the instrument panel (on the driver's side).



#### CAUTION:

**Do not connect scan tools other than the Subaru Select Monitor.**

- 6) Start the PC.
- 7) Turn the ignition switch to ON (engine OFF).
- 8) Run the "PC application for Subaru Select Monitor".
- 9) On the «Main Menu» display screen, select the {Each System Check}.
- 10) On the «System Selection Menu», select {Transmission Control System}.
- 11) After transmission type information pops up, select [OK].
- 12) On the «Transmission Diagnosis» display screen, select {Diagnostic Code(s) Display}.
- 13) On the «Diagnostic Code(s) Display» screen, select the {Temporary Diagnostic Code(s)} or {Memorized Diagnostic Code(s)}

# Subaru Select Monitor

## AUTOMATIC TRANSMISSION (DIAGNOSTICS)

### 2. READ CURRENT DATA

- 1) On «Main Menu» display, select {Each System Check}.
  - 2) On «System Selection Menu» display, select {Transmission Control System}.
  - 3) After transmission type information pops up, select [OK].
  - 4) On «Transmission Diagnosis» display, select {Current Data Display & Save}.
  - 5) On «Current Data Display & Save» display, select {Normal sampling}.
  - 6) Using the scroll key, scroll the display screen up or down until the desired data is shown.
- A list of the support data is shown in the following table.

Item	Display	Unit of measure
Engine speed signal	Engine Speed	rpm
Battery voltage	Battery Voltage	V
Accelerator position sensor	Accel. Opening Angle	%
Front vehicle speed sensor signal	Front Wheel Speed	km/h
Gear position	Gear Position	—
Turbine speed sensor signal	Turbine Revolution Speed	rpm
Rear vehicle speed sensor signal	Rear Wheel Speed	km/h
G sensor	Lateral G Sensor	V
ATF temperature sensor signal	ATF Temp.	°C
Turbine speed sensor 1 signal	AT Turbine Speed 1	rpm
Turbine speed sensor 2 signal	AT Turbine Speed 2	rpm
High & low reverse clutch solenoid set current	H&LR/C Solenoid Current	A
Direct clutch solenoid set current	D/C Solenoid Current	A
Front brake solenoid set current	F/B Solenoid Current	A
Input clutch solenoid set current	I/C Solenoid Current	A
Line pressure solenoid set current	P/L Solenoid Current	A
Lock-up solenoid set current	L/U Solenoid Current	A
Transfer solenoid set current	AWD Sol. Current	A
High & low reverse clutch solenoid pressure	H&LR/C Solenoid Pressure	kPa
Direct clutch solenoid pressure	D/C Solenoid Pressure	kPa
Front brake solenoid pressure	F/B Solenoid Pressure	kPa
Input clutch solenoid pressure	I/C Solenoid Pressure	kPa
Line pressure solenoid pressure	P/L Solenoid Pressure	kPa
Lock-up solenoid pressure	L/U Solenoid Pressure	kPa
Transfer solenoid pressure	AWD Solenoid Pressure	kPa
Forward brake set current	Fwd/B solenoid current	A
Forward brake solenoid pressure	Fwd/B solenoid target pressure	kPa
Ignition switch	Ignition Switch	ON input or OFF input
Manual mode switch signal	Tiptronic Mode Switch	ON or OFF
Cruise control set signal	Cruise Control Signal	ON or OFF
Down shift signal	Down Switch	ON or OFF
Stop light switch signal	Stop Light Switch	ON or OFF
Up shift signal	Up Switch	ON or OFF
Drive range signal	D Range Signal	ON or OFF
Reverse range signal	R Range Signal	ON or OFF
Diagnosis light output signal	Diagnosis Lamp	ON or OFF
ATF temperature light signal	ATF Temperature Lamp	ON or OFF
Parking range signal	P Range	ON or OFF
P/N range output signal	P/N Signal	ON or OFF
Neutral range signal	N Range	ON or OFF
Inhibitor switch 1 input signal	Inhibitor SW 1	High or Low
Inhibitor switch 2 input signal	Inhibitor SW 2	High or Low

# Subaru Select Monitor

## AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Item	Display	Unit of measure
Inhibitor switch 3 input signal	Inhibitor SW 3	High or Low
Inhibitor switch 4 input signal	Inhibitor SW 4	High or Low
Back-up light relay output signal	Back Lamp Relay	ON or OFF
High & low reverse clutch fluid pressure switch input signal	H&LR/C Fluid Pressure	ON or OFF
Direct clutch fluid pressure switch input signal	D/C Fluid Pressure	ON or OFF
Front brake fluid pressure switch input signal	F/B Fluid Pressure	ON or OFF
Input clutch fluid pressure switch input signal	I/C Fluid Pressure	ON or OFF
Forward brake fluid pressure switch input signal	Fwd/B hydraulic pressure SW	ON or OFF
AT learning mode	AT learning	Completed or not completed

### NOTE:

For details concerning the operation procedure, refer to “PC application help for Subaru Select Monitor”.

### 3. CLEAR MEMORY MODE

- 1) Shift the select lever to “P” range.
- 2) On the «Main Menu» display screen, select the {Each System Check}.
- 3) On the «System Selection Menu», select {Transmission Control System}.
- 4) After transmission type information pops up, select [OK].
- 5) On the «Transmission Diagnosis» display screen, select {Clear Memory}.
- 6) When “Done. Turn ignition switch to OFF” pops up, select [OK].
- 7) Turn the Subaru Select Monitor and ignition switch to OFF. To turn the ignition switch to ON again, wait for more than 10 seconds.

### NOTE:

- To clear the previous DTC, use {Clear Memory}, and to clear the learned value, use {Clear Memories 2}.
- For details concerning the operation procedure, refer to the “PC application help for Subaru Select Monitor”.

## Read Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

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### 7. Read Diagnostic Trouble Code (DTC)

#### A: OPERATION

Refer to “Subaru Select Monitor” for information about how to obtain and understand DTC. <Ref. to 5AT(diag)-15, OPERATION, Subaru Select Monitor.>

## 8. Inspection Mode

### A: PROCEDURE

#### WARNING:

**Observe the traffic law when driving on public roads.**

- 1) Shift the select lever to “D” range, and then drive the vehicle with changing the gear from 1st to 5th.
- 2) When driving the vehicle at 5th speed of “D” range, set the gear to manual mode and drive the vehicle by downshifting using “-” of the select lever from 5th → 4th, 4th → 3rd, 3rd → 2nd, and 2nd → 1st.

#### NOTE:

At shifting down, drive the vehicle at least 10 seconds in each speed.

- 3) Shift the select lever to “R” range and drive the vehicle for 2 seconds or more.

## Clear Memory Mode

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

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### 9. Clear Memory Mode

#### A: OPERATION

Use "Subaru Select Monitor" to clear DTC. <Ref. to 5AT(diag)-17, CLEAR MEMORY MODE, OPERATION, Subaru Select Monitor.>

#### NOTE:

DTC cannot be cleared without using Subaru Select Monitor.



## 10. Learning Control

### A: GENERAL DESCRIPTION

- Follow the messages displayed on the Subaru Select Monitor when working.
- When the following work is performed, perform learning work for the transmission.

Replacement of TCM/Replacement or disassembly of transmission assembly/Replacement of control valve body/Performing “Clear Memories 2” is executed.

### B: PROCEDURE

#### 1. PREPARATION FOR LEARNING

- 1) Warm up or cool down the vehicle until the ATF temperature displayed on the Subaru Select Monitor is 60 — 80°C (140 — 176°F).
- 2) Shift the select lever to “P” range.
- 3) Fully apply the parking brake.
- 4) Lift up the vehicle.

#### CAUTION:

**While working, be sure to keep the lower edge of the tires 30 cm or more above the ground as vehicle will vibrate.**

- 5) Connect the Subaru Select Monitor to data link connector.
- 6) Turn the ignition switch to ON. (For model with push button start, press the push button ignition switch twice without depressing brake pedal.)
- 7) Turn off all switches causing an electrical load, such as headlights, A/C, seat heater and rear defogger.

#### 2. SIMPLE LEARNING

#### NOTE:

Simple learning is performed with the vehicle lifted, without actually running the vehicle.

#### CAUTION:

**Do not turn the power of the Subaru Select Monitor OFF during work, and do not disconnect the data link connector.**

- 1) Select {AT related learning & inspecting mode} in the «Transmission Diagnosis» display screen of the Subaru Select Monitor.
- 2) Select {AT learning mode} in the «AT related learning & inspecting mode» screen of the Subaru Select Monitor.
- 3) Follow the messages displayed on the Subaru Select Monitor screen when working.

#### NOTE:

For the messages “SHIFT control system learning in progress” and “AWD control system learning in progress”, AT OIL TEMP light in the combination meter blinks at a cycle of 2 Hz before learning operation starts. When AT OIL TEMP light in the combination meter goes off, the following message is displayed on the screen. When operation ends abnormally during the learning, AT OIL TEMP light blinks at a cycle of 4 Hz.

# Learning Control

## AUTOMATIC TRANSMISSION (DIAGNOSTICS)

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4) When «AT learning normally ended.» is displayed, simple AT learning is completed.

### NOTE:

- If communication error occurs during learning, retry the “AT learning mode” from the beginning.
- If the message «Execute AT learning again after fixing troubles of the vehicle» is displayed during learning, select [OK] to display the List of Diagnostics Trouble Code. After repairing the locations indicated by the DTC, start the “AT learning mode” over from the beginning.
- If the message «AT learning ended abnormally.» is displayed, start the “AT learning mode” over from the beginning.

Message	Main reasons for abnormal termination
«AT learning ended abnormally.»	<ul style="list-style-type: none"><li>• Fault is detected during AT learning.</li><li>• The accelerator pedal is depressed during AT learning.</li><li>• An unspecified operation was performed during AT learning</li><li>• Brake pedal is not fully depressed.</li><li>• Parking brake not applied strongly enough.</li><li>• Abnormal idle speed increase, etc.</li></ul>

- For detailed operation procedures, refer to “PC application help for Subaru Select Monitor”.

### 3. DRIVING CHECK

Drive the vehicle to check that there is no malfunction such as shifting shock.

When shifting shock is felt, perform learning again.

When reducing of shifting shock is not felt, check that other parts are normal.

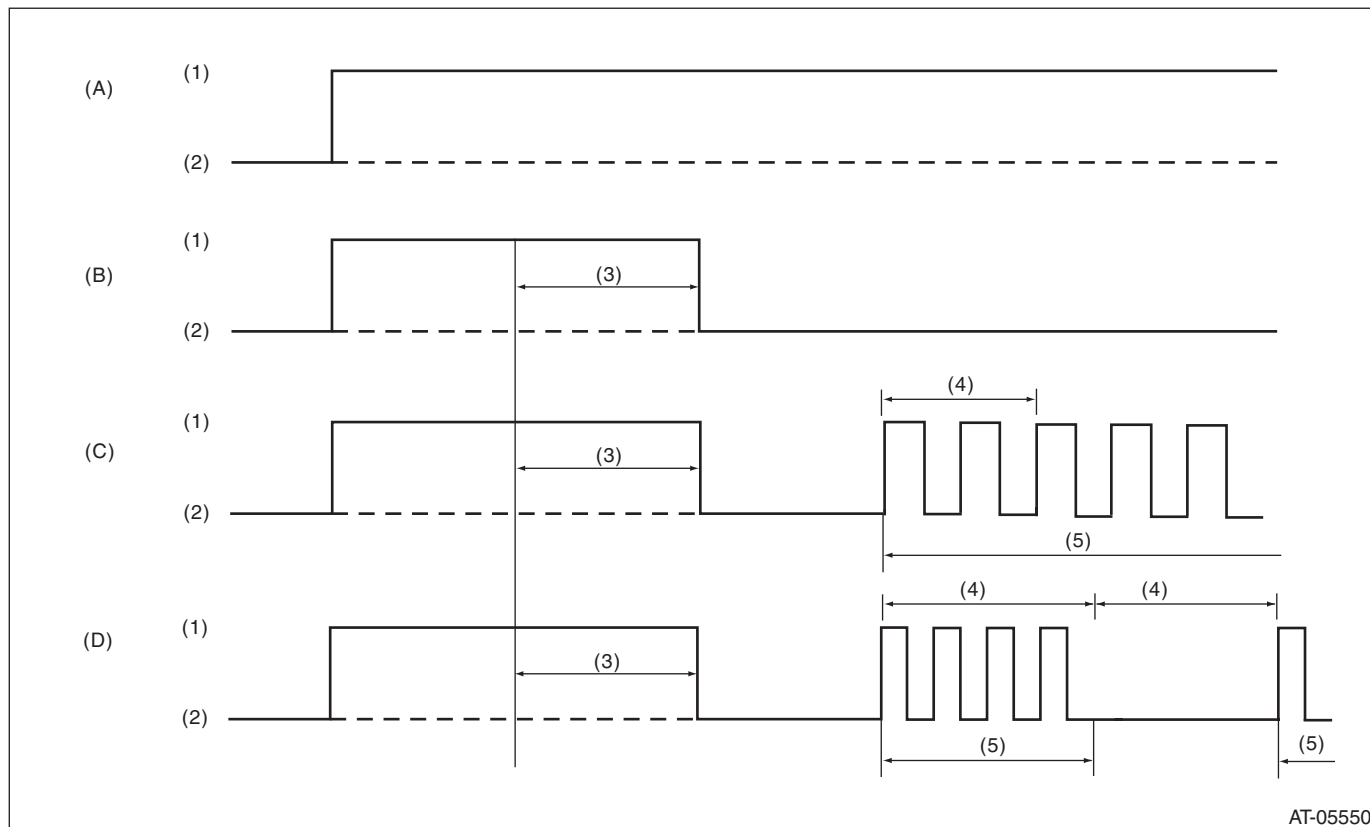
# AT OIL TEMP Warning Light Display

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

## 11. AT OIL TEMP Warning Light Display

### A: OPERATION

When any on-board diagnostics item is malfunctioning, or the learning has not yet completed, AT OIL TEMP light blinks. Blinking continues from the engine start to the ignition switch OFF. The faulty parts or unit can be identified by reading DTCs. Problems which occurred previously can also be identified through the memory function. If the AT OIL TEMP light does not blink although a problem is occurring, the problem can be determined by checking the performance characteristics of each sensor using the Subaru Select Monitor. If the learning has not yet completed, «AT learning not completed» is displayed when the Subaru Select Monitor is connected while AT OIL TEMP light is blinking. The AT OIL TEMP light blinking will go off, when the learning is performed. Indicator light signal patterns are as shown in the figure.



(A) Ignition switch (engine OFF)

(B) Normal (engine ON)

(C) Faulty (engine ON)

(D) Learning not completed (engine ON)

(1) ON

(3) 2 seconds

(5) Blink

(2) OFF

(4) 1 second

When the AT OIL TEMP light does not operate normally, check the AT OIL TEMP light circuit. <Ref. to 5AT(diag)-24, INSPECTION, AT OIL TEMP Warning Light Display.>

# AT OIL TEMP Warning Light Display

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

## B: INSPECTION

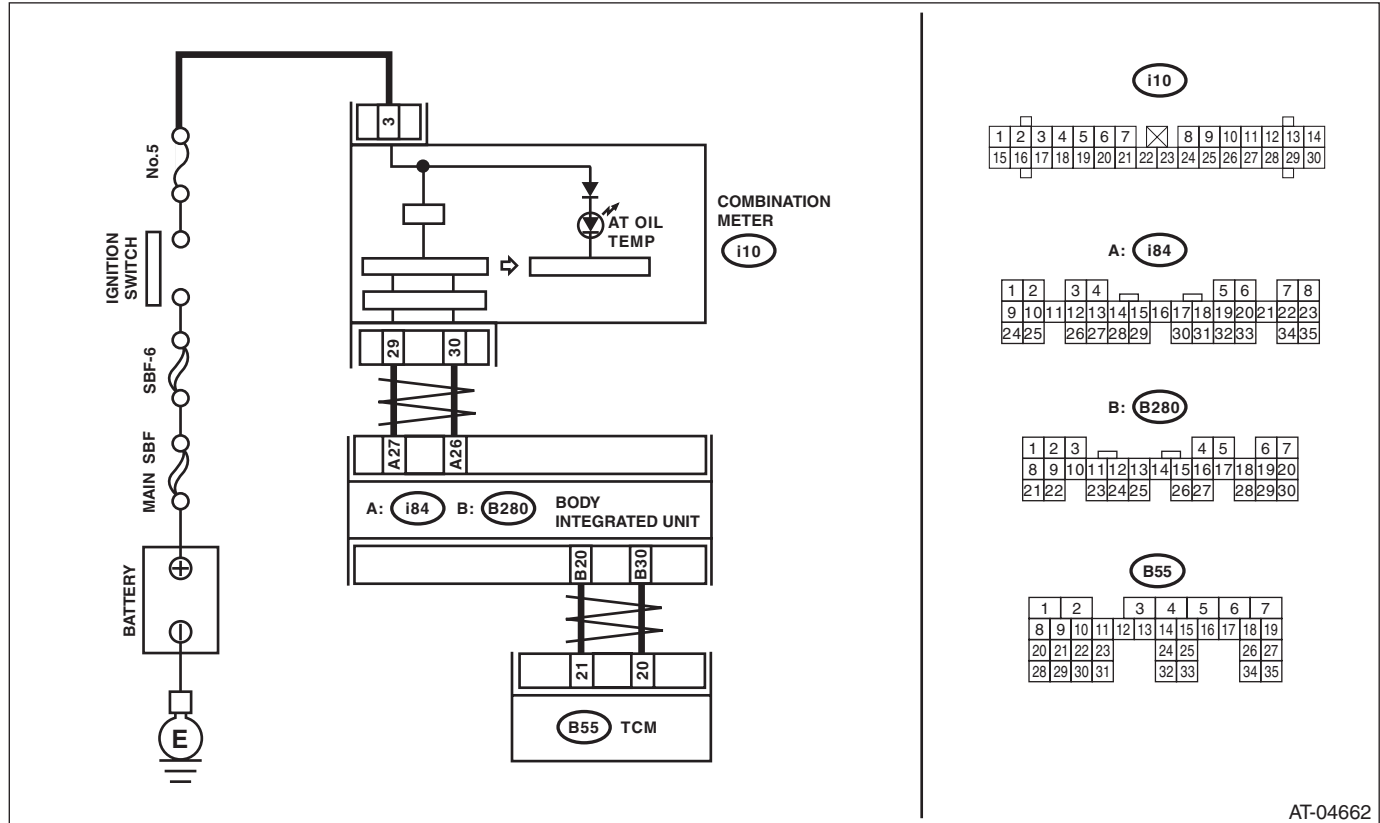
### DIAGNOSIS:

AT OIL TEMP light circuit is open or shorted.

### TROUBLE SYMPTOM:

When the ignition switch is turned to ON (engine OFF), AT OIL TEMP light does not illuminate.

### WIRING DIAGRAM:



AT-04662

Step	Check	Yes	No	
1	<b>CHECK AT OIL TEMP LIGHT.</b> Turn the ignition switch to ON.	Does the AT OIL TEMP light illuminate?	Go to step 2.	Perform the self-diagnosis of combination meter.
2	<b>CHECK AT OIL TEMP LIGHT.</b> Turn the ignition switch to ON and wait for at least 2 seconds.	Does the AT OIL TEMP light illuminate?	Go to step 3.	Go to step 4.
3	<b>CHECK AT OIL TEMP LIGHT.</b> Start the engine.	Does the AT OIL TEMP light go off?	Normal. Go back to Basic Diagnostic Procedure. <Ref. to 5AT(diag)-2, Basic Diagnostic Procedure.>	Go to step 7.
4	<b>CHECK SUBARU SELECT MONITOR COMMUNICATION.</b> Connect the Subaru Select Monitor to data link connector.	Is the communication between Subaru Select Monitor and TCM normal?	Go to step 5.	Check the power supply ground circuit of TCM and Subaru Select Monitor communication. <Ref. to 5AT(diag)-28, Diagnostic Procedure for Subaru Select Monitor Communication.>

# AT OIL TEMP Warning Light Display

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
<b>5 CHECK TCM.</b> 1) Display the current data of TCM using Subaru Select Monitor. <Ref. to 5AT(diag)-15, OPERATION, Subaru Select Monitor.> 2) Read the data of «Diagnosis Lamp» using Subaru Select Monitor.	Is "ON" displayed?	Go to step 6.	Replace the TCM. <Ref. to 5AT-54, Transmission Control Module (TCM).>
<b>6 CHECK BODY INTEGRATED UNIT.</b> 1) Connect the Subaru Select Monitor, and display the current data of the body integrated unit. <Ref. to LAN(diag)-12, OPERATION, Subaru Select Monitor.> 2) Read the data of «ATF Temperature Lamp» using the Subaru Select Monitor.	Is "ON" displayed?	Replace the combination meter assembly. <Ref. to IDI-11, Combination Meter.>	Check DTC of body integrated unit. <Ref. to LAN(diag)-27, Read Diagnostic Trouble Code (DTC).>
<b>7 CHECK TCM.</b> NOTE: If the ATF temperature is 138°C or more, cool down till the temperature is 137°C or less. 1) Start the engine. 2) Display the current data of TCM using Subaru Select Monitor. <Ref. to 5AT(diag)-15, OPERATION, Subaru Select Monitor.> 3) Read the data of «Diagnosis Lamp» using Subaru Select Monitor.	Is "ON" displayed?	Replace the TCM. <Ref. to 5AT-54, Transmission Control Module (TCM).>	Go to step 8.
<b>8 CHECK BODY INTEGRATED UNIT.</b> 1) Connect the Subaru Select Monitor, and display the current data of the body integrated unit. <Ref. to LAN(diag)-12, OPERATION, Subaru Select Monitor.> 2) Read the data of «ATF Temperature Lamp» using the Subaru Select Monitor.	Is "ON" displayed?	Check DTC of body integrated unit. Perform the diagnosis according to DTC. <Ref. to LAN(diag)-12, OPERATION, Subaru Select Monitor.>	Perform the self-diagnosis of combination meter. <Ref. to IDI-4, INSPECTION, Combination Meter System.>

# AWD Warning Light Display

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

## 12.AWD Warning Light Display

### A: OPERATION

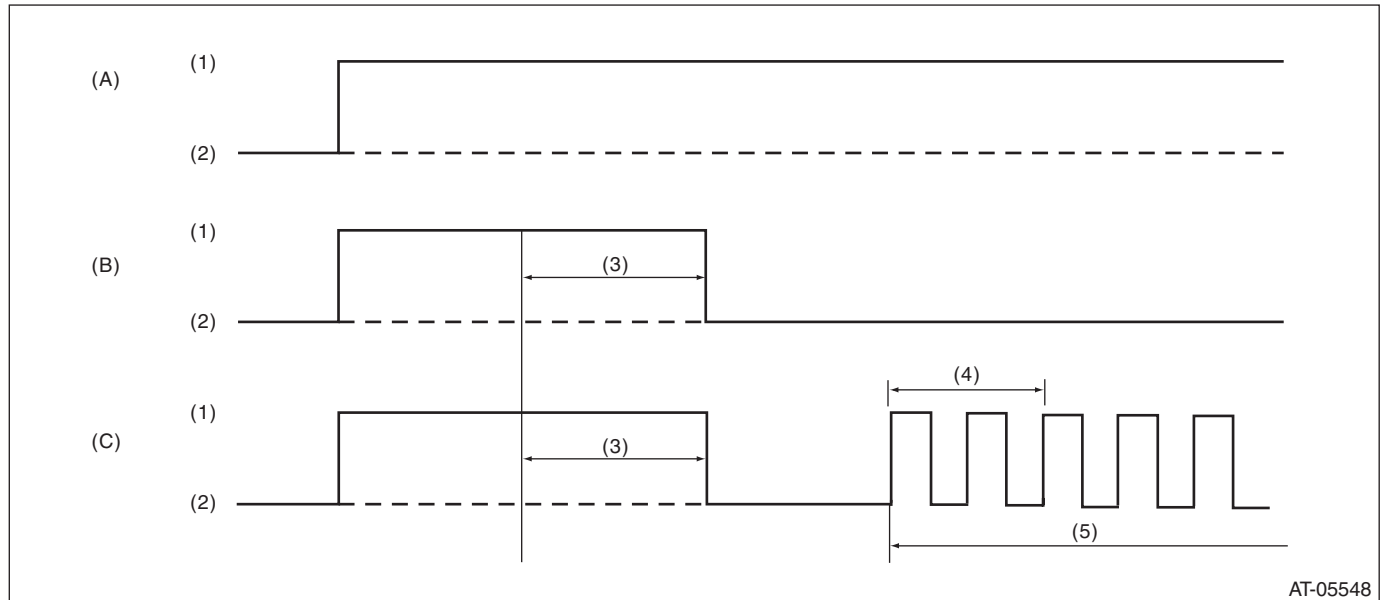
AWD warning light illuminates or blinks at start, or when AWD is faulty.

- If normal

AWD light always illuminates when the ignition switch is ON (engine OFF). Light goes off after two seconds from engine ON.

- Faulty

AWD warning light blinks at 2 Hz, when tires with different diameters are installed, or when the vehicle is driven with air pressure of any of the four tires significantly low.



(A) Ignition switch (engine OFF)

(B) Normal (engine ON)

(C) Faulty (engine ON)

(1) ON

(3) 2 seconds

(5) Blink

(2) OFF

(4) 1 second

If the AWD light does not illuminate, or illumination patterns are not as above, check the AWD light circuit.  
<Ref. to 5AT(diag)-26, INSPECTION, AWD Warning Light Display.>

### B: INSPECTION

#### DIAGNOSIS:

- AWD light circuit is open or shorted.
- Combination meter malfunction
- TCM malfunction

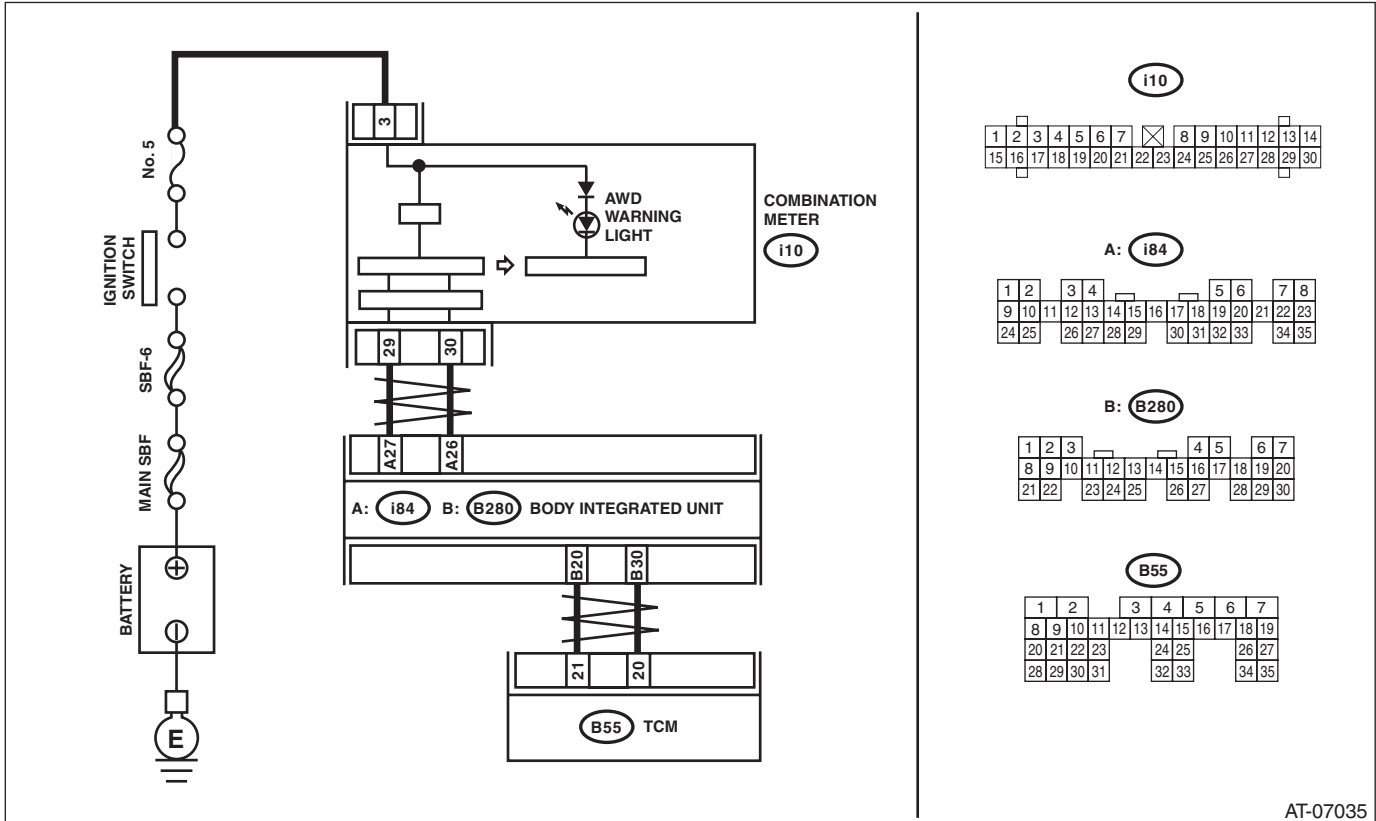
#### TROUBLE SYMPTOM:

- When the ignition switch is turned to ON, the AWD light does not illuminate.
- AWD light remains lit after engine start.

# AWD Warning Light Display

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

## WIRING DIAGRAM:



AT-07035

Step	Check	Yes	No
1 <b>CHECK AWD LIGHT.</b> Turn the ignition switch to ON.	Does the AWD light illuminate?	Go to step 2.	Perform the self-diagnosis of combination meter. <Ref. to IDI-4, INSPECTION, Combination Meter System.>
2 <b>CHECK AWD LIGHT.</b> Start the engine.	Does AWD light go off after two seconds from engine start?	Current condition is normal. Go back to Basic Diagnostic Procedure. <Ref. to 5AT(diag)-2, Basic Diagnostic Procedure.>	Go to step 3.
3 <b>CHECK DTC.</b>	Is DTC of CAN communication displayed?	Perform the diagnosis according to DTC.	Go to step 4.
4 <b>CHECK COMBINATION METER.</b> Perform the self-diagnosis of combination meter. <Ref. to IDI-4, INSPECTION, Combination Meter System.>	Is there any trouble with the combination meter?	Repair the combination meter.	Replace the TCM. <Ref. to 5AT-54, Transmission Control Module (TCM).>

# Diagnostic Procedure for Subaru Select Monitor Communication

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

## 13. Diagnostic Procedure for Subaru Select Monitor Communication

### A: COMMUNICATION FOR INITIALIZING IMPOSSIBLE

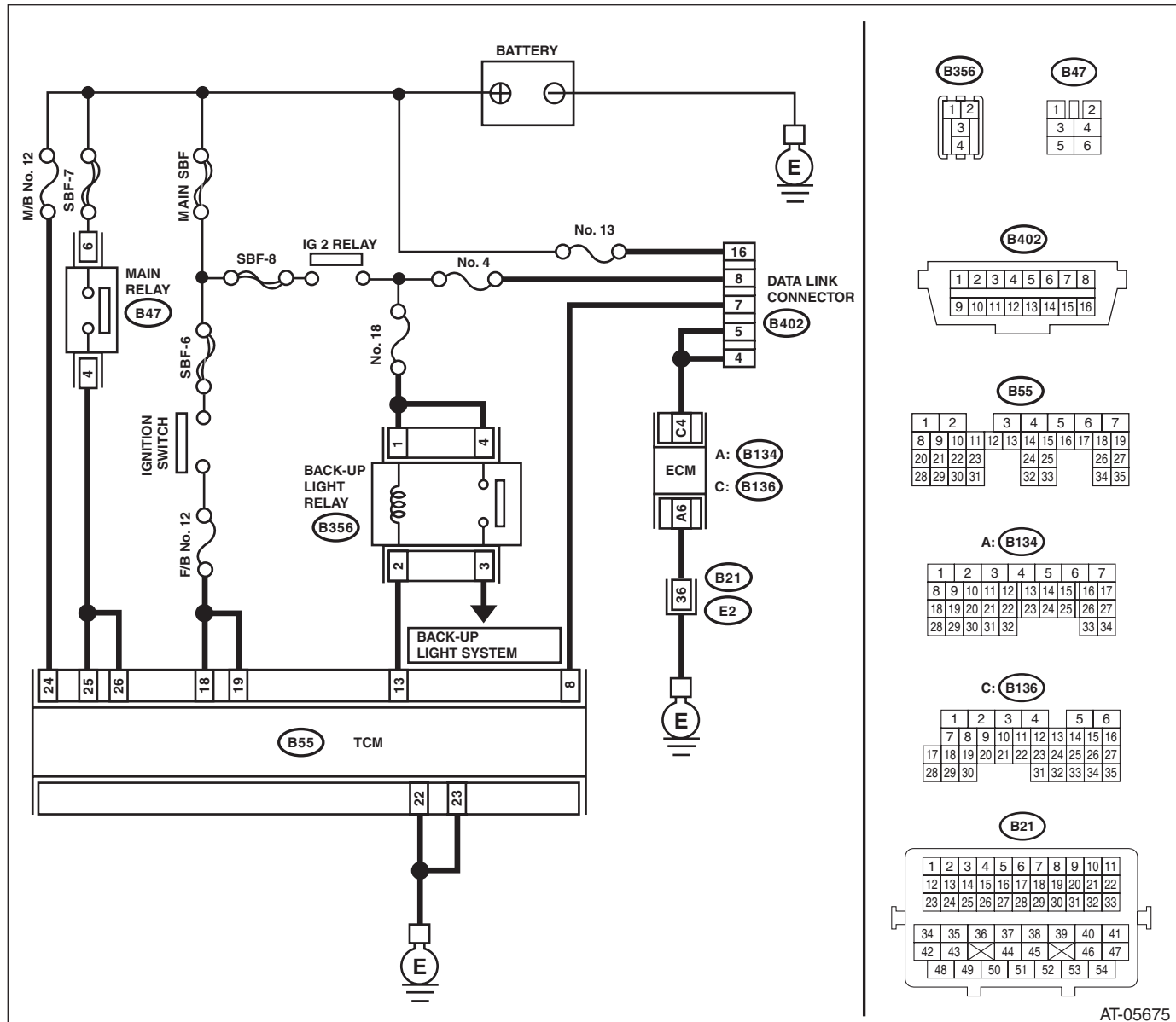
#### DIAGNOSIS:

Defective harness connector

#### TROUBLE SYMPTOM:

Subaru Select Monitor communication failure

#### WIRING DIAGRAM:



AT-05675

Step	Check	Yes	No	
1	<p><b>CHECK SUBARU SELECT MONITOR POWER SUPPLY CIRCUIT.</b> Measure the voltage between data link connector and chassis ground. <b>Connector &amp; terminal</b> <b>(B402) No. 16 (+) — Chassis ground (-):</b></p>	Is the voltage 10 V or more?	Go to step 2.	Repair harness connector between the battery and data link connector, and poor contact of the connector.



# Diagnostic Procedure for Subaru Select Monitor Communication

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
<b>2 CHECK SUBARU SELECT MONITOR GROUND CIRCUIT.</b> Measure the resistance of harness between data link connector and chassis ground. <i>Connector &amp; terminal</i> <i>(B402) No. 4 — Chassis ground:</i> <i>(B402) No. 5 — Chassis ground:</i>	Is the resistance less than 1 $\Omega$ ?	Go to step 3.	Repair the open circuit of harness between data link connector and ground terminal, and poor contact of connector.
<b>3 CHECK COMMUNICATION OF SUBARU SELECT MONITOR.</b> 1) Turn the ignition switch to ON. 2) Check communication with the transmission system using the Subaru Select Monitor.	Is the name of system displayed on Subaru Select Monitor?	Go to step 8.	Go to step 4.
<b>4 CHECK COMMUNICATION OF SUBARU SELECT MONITOR.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the TCM connector. 3) Turn the ignition switch to ON. 4) Check communication with the engine system.	Is the name of system displayed on Subaru Select Monitor?	Go to step 6.	Go to step 5.
<b>5 CHECK COMMUNICATION OF SUBARU SELECT MONITOR.</b> 1) Turn the ignition switch to OFF. 2) Connect the TCM connector. 3) Disconnect the connector from ECM. 4) Turn the ignition switch to ON. 5) Check communication with the transmission system.	Is the name of system displayed on Subaru Select Monitor?	Inspect the ECM.	Go to step 6.
<b>6 CHECK HARNESS CONNECTOR BETWEEN EACH CONTROL MODULE AND DATA LINK CONNECTOR.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the TCM and ECM connector. 3) Measure the resistance between TCM connector and chassis ground. <i>Connector &amp; terminal</i> <i>(B402) No. 7 — Chassis ground:</i>	Is the resistance 1 M $\Omega$ or more?	Go to step 7.	Check harness and connector between each control module and data link connector.
<b>7 CHECK OUTPUT SIGNAL OF TCM.</b> 1) Turn the ignition switch to ON. 2) Measure the voltage between TCM and chassis ground. <i>Connector &amp; terminal</i> <i>(B402) No. 7 (+) — Chassis ground (-):</i>	Is the voltage 1 V or more?	Check harness and connector between each control module and data link connector.	Go to step 8.
<b>8 CHECK HARNESS CONNECTOR BETWEEN TCM AND DATA LINK CONNECTOR.</b> Measure the resistance between TCM connector and data link connector. <i>Connector &amp; terminal</i> <i>(B55) No. 8 — (B402) No. 7:</i>	Is the resistance less than 1 $\Omega$ ?	Go to step 9.	Check the harness and connector between TCM and data link connector.
<b>9 CHECK INSTALLATION OF TCM CONNECTOR.</b> Turn the ignition switch to OFF.	Is TCM connector connected to TCM?	Go to step 10.	Connect the TCM connector to TCM.
<b>10 CHECK INSTALLATION OF TRANSMISSION HARNESS CONNECTOR.</b>	Is the transmission harness connector connected to bulk-head harness connector?	Go to step 11.	Connect the bulk-head harness connector to transmission harness connector.
<b>11 CHECK POOR CONTACT OF CONNECTORS.</b>	Is there poor contact of control module power supply and data link connector?	Repair the poor contact.	Go to step 12.

# Diagnostic Procedure for Subaru Select Monitor Communication

## AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
<b>12 CHECK POWER SUPPLY OF TCM.</b> 1) Disconnect the connector from TCM. 2) Turn the ignition switch to ON. 3) Measure the voltage between TCM connector and chassis ground. <b>Connector &amp; terminal</b> <b>(B55) No. 24 (+) — Chassis ground (-):</b> <b>(B55) No. 25 (+) — Chassis ground (-):</b> <b>(B55) No. 26 (+) — Chassis ground (-):</b>	Is the voltage 10 — 13 V?	Go to step 15.	Go to step 13.
<b>13 CHECK FUSE (M/B NO. 12).</b> 1) Turn the ignition switch to OFF. 2) Remove the fuse (M/B No. 12).	Is the fuse (M/B No. 12) blown out?	Replace the fuse (M/B No. 12).	Go to step 14.
<b>14 CHECK HARNESS.</b> Measure the resistance between TCM connector and chassis ground. <b>Connector &amp; terminal</b> <b>(B55) No. 24 — Chassis ground:</b> <b>(B55) No. 25 — Chassis ground:</b> <b>(B55) No. 26 — Chassis ground:</b>	Is the resistance less than 10 $\Omega$ ?	Replace the fuse (No. 12). If the replaced fuse (No. 12) blows out easily, repair the short circuit of harness between fuse (No. 12) and TCM.	Go to step 15.
<b>15 CHECK IGNITION POWER SUPPLY CIRCUIT.</b> 1) Turn the ignition switch to ON (engine OFF). 2) Measure the ignition power supply voltage between TCM connector and chassis ground. <b>Connector &amp; terminal</b> <b>(B55) No. 18 (+) — Chassis ground (-):</b> <b>(B55) No. 19 (+) — Chassis ground (-):</b>	Is the voltage 10 — 13 V?	Go to step 17.	Go to step 16.
<b>16 CHECK FUSE (F/B NO. 12).</b> Remove the fuse (F/B No. 12).	Is the fuse (F/B No. 12) blown out?	Replace the fuse (F/B No. 12). If the replaced fuse (F/B No. 12) blows out easily, repair the short circuit of harness between fuse (F/B No. 12) and TCM.	Go to step 17.
<b>17 CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connector from TCM. 3) Measure the resistance of the harness between TCM and transmission ground. <b>Connector &amp; terminal</b> <b>(B55) No. 22 — Transmission ground:</b> <b>(B55) No. 23 — Transmission ground:</b>	Is the resistance 1 M $\Omega$ or more?	Repair the short circuit of harness between TCM and transmission harness connector, and poor contact of connector.	Go to step 18.
<b>18 CHECK POOR CONTACT OF CONNECTORS.</b>	Is there poor contact of TCM power supply, ground and data link connector?	Repair the connector.	Replace the TCM. <Ref. to 5AT-54, Transmission Control Module (TCM).>

# List of Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

## 14. List of Diagnostic Trouble Code (DTC)

### A: LIST

DTC	Item	Content of diagnosis	Reference
P0705	Transmission Range Sensor Circuit (PRNDL Input)	Inhibitor switch malfunction, open or short circuit	<Ref. to 5AT(diag)-34, DTC P0705 TRANSMISSION RANGE SENSOR CIRCUIT (PRNDL INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0712	Transmission Fluid Temperature Sensor Circuit Low Input	ATF temperature sensor 1 malfunction, or open circuit of input signal	<Ref. to 5AT(diag)-38, DTC P0712 TRANSMISSION FLUID TEMPERATURE SENSOR CIRCUIT LOW INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0713	Transmission Fluid Temperature Sensor Circuit High Input	ATF temperature sensor 1 malfunction, or short circuit in input signal	<Ref. to 5AT(diag)-40, DTC P0713 TRANSMISSION FLUID TEMPERATURE SENSOR CIRCUIT HIGH INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0715	Input/Turbine Speed Sensor Circuit	Turbine speed sensor 1 malfunction, open or short in input signal circuit	<Ref. to 5AT(diag)-42, DTC P0715 INPUT/TURBINE SPEED SENSOR CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0719	Brake Switch Circuit Low	Brake switch malfunction, open circuit in input signal, body integrated unit malfunction, or CAN communication error	<Ref. to 5AT(diag)-45, DTC P0719 BRAKE SWITCH CIRCUIT LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0720	Output Speed Sensor Circuit	Front vehicle speed sensor malfunction, open or short in input signal circuit, ground or power supply	<Ref. to 5AT(diag)-47, DTC P0720 OUTPUT SPEED SENSOR CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0724	Brake Switch Circuit High	Brake switch malfunction, short circuit in input signal, body integrated unit malfunction, or CAN communication error	<Ref. to 5AT(diag)-50, DTC P0724 BRAKE SWITCH CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0731	Gear 1 Incorrect Ratio	Vehicle speed sensor, turbine speed sensor, control valve, or gear shift clutch malfunction	<Ref. to 5AT(diag)-51, DTC P0731 GEAR 1 INCORRECT RATIO, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0732	Gear 2 Incorrect Ratio	Vehicle speed sensor, turbine speed sensor, control valve, or gear shift clutch malfunction	<Ref. to 5AT(diag)-51, DTC P0732 GEAR 2 INCORRECT RATIO, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0733	Gear 3 Incorrect Ratio	Vehicle speed sensor, turbine speed sensor or gear shift clutch malfunction	<Ref. to 5AT(diag)-51, DTC P0733 GEAR 3 INCORRECT RATIO, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0734	Gear 4 Incorrect Ratio	Vehicle speed sensor, turbine speed sensor or gear shift clutch malfunction	<Ref. to 5AT(diag)-51, DTC P0734 GEAR 4 INCORRECT RATIO, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0735	Gear 5 Incorrect Ratio	Vehicle speed sensor, turbine speed sensor or gear shift clutch malfunction	<Ref. to 5AT(diag)-51, DTC P0735 GEAR 5 INCORRECT RATIO, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0736	Reverse Incorrect Ratio	Vehicle speed sensor, turbine speed sensor or gear shift clutch malfunction	<Ref. to 5AT(diag)-52, DTC P0736 REVERSE INCORRECT RATIO, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0741	Torque Converter Clutch Circuit Performance or Stuck Off	Lock-up clutch is faulty or valve is stuck.	<Ref. to 5AT(diag)-53, DTC P0741 TORQUE CONVERTER CLUTCH CIRCUIT PERFORMANCE OR STUCK OFF, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0743	Torque Converter Clutch Circuit Electrical	L/U solenoid circuit or L/U solenoid unit malfunction	<Ref. to 5AT(diag)-54, DTC P0743 TORQUE CONVERTER CLUTCH CIRCUIT ELECTRICAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

## List of Diagnostic Trouble Code (DTC)

### AUTOMATIC TRANSMISSION (DIAGNOSTICS)

DTC	Item	Content of diagnosis	Reference
P0748	Pressure Control Solenoid "A" Electrical	Line pressure solenoid circuit or line pressure solenoid unit malfunction	<Ref. to 5AT(diag)-56, DTC P0748 PRESSURE CONTROL SOLENOID "A" ELECTRICAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0751	Shift Solenoid "A" Performance or Stuck Off	Fr/B solenoid malfunction	<Ref. to 5AT(diag)-58, DTC P0751 SHIFT SOLENOID "A" PERFORMANCE OR STUCK OFF, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0753	Shift Solenoid "A" Electrical	Fr/B solenoid circuit or Fr/B solenoid unit malfunction	<Ref. to 5AT(diag)-60, DTC P0753 SHIFT SOLENOID "A" ELECTRICAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0756	Shift Solenoid "B" Performance or Stuck Off	I/C solenoid malfunction	<Ref. to 5AT(diag)-62, DTC P0756 SHIFT SOLENOID "B" PERFORMANCE OR STUCK OFF, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0758	Shift Solenoid "B" Electrical	I/C solenoid circuit or I/C solenoid unit malfunction	<Ref. to 5AT(diag)-64, DTC P0758 SHIFT SOLENOID "B" ELECTRICAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0761	Shift Solenoid "C" Performance or Stuck Off	H&LR/C solenoid malfunction	<Ref. to 5AT(diag)-66, DTC P0761 SHIFT SOLENOID "C" PERFORMANCE OR STUCK OFF, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0763	Shift Solenoid "C" Electrical	H&LR/C solenoid circuit or H&LR/C solenoid unit malfunction	<Ref. to 5AT(diag)-68, DTC P0763 SHIFT SOLENOID "C" ELECTRICAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0766	Shift Solenoid "D" Performance or Stuck Off	D/C solenoid malfunction	<Ref. to 5AT(diag)-70, DTC P0766 SHIFT SOLENOID "D" PERFORMANCE OR STUCK OFF, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0768	Shift Solenoid "D" Electrical	D/C solenoid circuit or D/C solenoid unit malfunction	<Ref. to 5AT(diag)-72, DTC P0768 SHIFT SOLENOID "D" ELECTRICAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0771	Shift Solenoid "E" Performance or Stuck Off	Fwd/B solenoid malfunction	<Ref. to 5AT(diag)-74, DTC P0771 SHIFT SOLENOID "E" PERFORMANCE OR STUCK OFF, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0773	Shift Solenoid "E" Electrical	Fwd/B solenoid circuit or Fwd/B solenoid unit malfunction	<Ref. to 5AT(diag)-76, DTC P0773 SHIFT SOLENOID "E" ELECTRICAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0801	Reverse Inhibit Control Circuit	<ul style="list-style-type: none"> <li>• Shift lock solenoid is faulty or output signal circuit is open or shorted.</li> <li>• TCM+B fuse is blown.</li> </ul>	<Ref. to 5AT(diag)-78, DTC P0801 REVERSE INHIBIT CONTROL CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0817	Starter Disable Circuit	<ul style="list-style-type: none"> <li>• Open or short in PN signal output circuit</li> <li>• ECM power supply malfunction</li> <li>• TCM+B fuse is blown.</li> </ul>	<Ref. to 5AT(diag)-80, DTC P0817 STARTER DISABLE CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0957	Backup Light Relay Circuit Low	Open or short in back-up light relay output circuit, or relay OFF malfunction	<Ref. to 5AT(diag)-82, DTC P0957 BACKUP LIGHT RELAY CIRCUIT LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0958	Backup Light Relay Circuit High	Short circuit in back-up light relay output, or relay ON malfunction	<Ref. to 5AT(diag)-84, DTC P0958 BACKUP LIGHT RELAY CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1706	AT Vehicle Speed Sensor Circuit Malfunction (Rear Wheel)	Rear vehicle speed sensor malfunction, open or short in input circuit, ground or power supply	<Ref. to 5AT(diag)-86, DTC P1706 AT VEHICLE SPEED SENSOR CIRCUIT MALFUNCTION (REAR WHEEL), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

# List of Diagnostic Trouble Code (DTC)

## AUTOMATIC TRANSMISSION (DIAGNOSTICS)

DTC	Item	Content of diagnosis	Reference
P1707	AT AWD Solenoid Valve Circuit Malfunction	AWD solenoid circuit or AWD solenoid unit malfunction	<Ref. to 5AT(diag)-88, DTC P1707 AT AWD SOLENOID VALVE CIRCUIT MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1710	Torque Converter Turbine 2 Speed Signal Circuit Malfunction	Turbine speed sensor 2 malfunction, open or short in input circuit, ground or power supply	<Ref. to 5AT(diag)-90, DTC P1710 TORQUE CONVERTER TURBINE 2 SPEED SIGNAL CIRCUIT MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1718	AT CAN Communication Circuit	Open circuit in CAN communication bus off, shorted ECM, ABS/VDCCM, body integrated unit malfunction	<Ref. to 5AT(diag)-91, DTC P1718 AT CAN COMMUNICATION CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1724	AT EEPROM Error	TCM EEPROM malfunction	<Ref. to 5AT(diag)-92, DTC P1724 AT EEPROM ERROR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1817	Sports Mode Switch Circuit (Manual Switch)	Open or short in manual mode switch circuit, or switch malfunction	<Ref. to 5AT(diag)-93, DTC P1817 SPORTS MODE SWITCH CIRCUIT (MANUAL SWITCH), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1840	Transmission Fluid Pressure Sensor Switch A Circuit	Open or short in Fr/B fluid pressure switch circuit, or switch malfunction	<Ref. to 5AT(diag)-95, DTC P1840 TRANSMISSION FLUID PRESSURE SENSOR SWITCH A CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1841	Transmission Fluid Pressure Sensor Switch B Circuit	Open or short in Fwd/B fluid pressure switch circuit, or switch malfunction	<Ref. to 5AT(diag)-95, DTC P1841 TRANSMISSION FLUID PRESSURE SENSOR SWITCH B CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1842	Transmission Fluid Pressure Sensor Switch C Circuit	Open or short in I/O fluid pressure switch circuit, or switch malfunction	<Ref. to 5AT(diag)-95, DTC P1842 TRANSMISSION FLUID PRESSURE SENSOR SWITCH C CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1843	Transmission Fluid Pressure Sensor Switch D Circuit	Open or short circuit in D/C fluid pressure switch circuit, or switch malfunction	<Ref. to 5AT(diag)-95, DTC P1843 TRANSMISSION FLUID PRESSURE SENSOR SWITCH D CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1844	Transmission Fluid Pressure Sensor Switch E Circuit	Open or short in H&LR/C fluid pressure switch circuit, or switch malfunction	<Ref. to 5AT(diag)-95, DTC P1844 TRANSMISSION FLUID PRESSURE SENSOR SWITCH E CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## AUTOMATIC TRANSMISSION (DIAGNOSTICS)

### 15. Diagnostic Procedure with Diagnostic Trouble Code (DTC)

#### A: DTC P0705 TRANSMISSION RANGE SENSOR CIRCUIT (PRNDL INPUT)

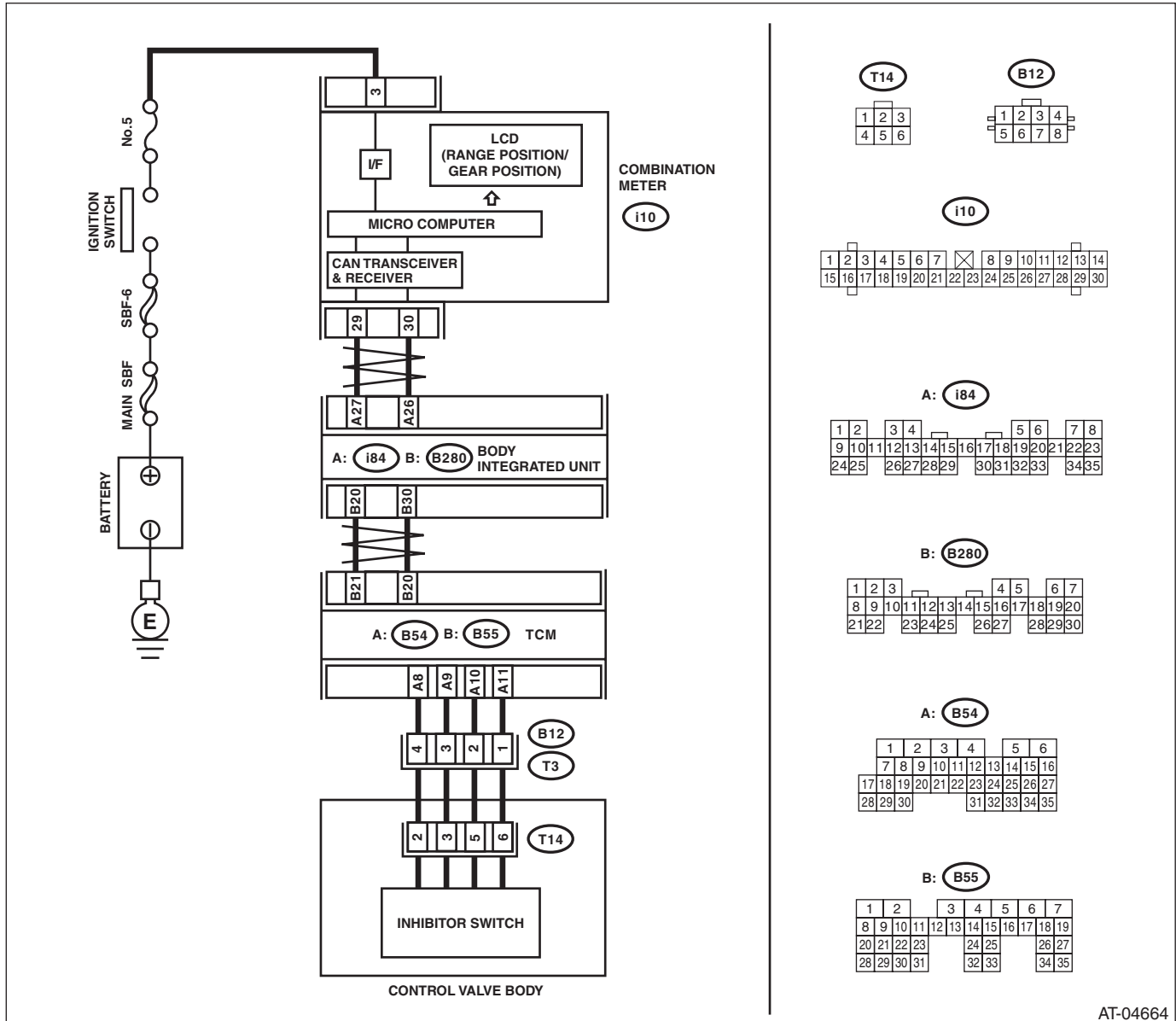
##### DTC DETECTING CONDITION:

The inhibitor switch is open or short.

##### TROUBLE SYMPTOM:

- Shift characteristics are erroneous.
- Shift indicator does not match with select lever.
- Shift indicator does not illuminate.
- N-D, N-R shock occur.

##### WIRING DIAGRAM:



AT-04664

Step	Check	Yes	No	
1	CHECK DTC OF TCM.	Is DTC of AT CAN communication circuit displayed?	Perform the diagnosis according to DTC.	Go to step 2.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No																									
<p><b>2 CHECK INHIBITOR SWITCH.</b> Using Subaru Select Monitor, read the data of «Inhibitor SW 1 — 4» for each range.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th></th> <th>SW1</th> <th>SW2</th> <th>SW3</th> <th>SW4</th> </tr> </thead> <tbody> <tr> <td>P</td> <td style="text-align: center;">○</td> <td></td> <td></td> <td style="text-align: center;">○</td> </tr> <tr> <td>R</td> <td></td> <td style="text-align: center;">○</td> <td></td> <td></td> </tr> <tr> <td>N</td> <td></td> <td></td> <td style="text-align: center;">○</td> <td style="text-align: center;">○</td> </tr> <tr> <td>D</td> <td style="text-align: center;">○</td> <td style="text-align: center;">○</td> <td style="text-align: center;">○</td> <td></td> </tr> </tbody> </table> <p>O=High</p> <p style="text-align: right;">AT-05083</p>		SW1	SW2	SW3	SW4	P	○			○	R		○			N			○	○	D	○	○	○		Is the display as in the table of step 2?	Go to step 9.	Go to step 3.
	SW1	SW2	SW3	SW4																								
P	○			○																								
R		○																										
N			○	○																								
D	○	○	○																									
<p><b>3 CHECK INHIBITOR SWITCH.</b> Using Subaru Select Monitor, read the data of «Inhibitor SW 1» for «P» and «D» ranges.</p>	Is the display «High» for both «P» and «D»?	Go to step 4.	Go to step 7.																									
<p><b>4 CHECK INHIBITOR SWITCH.</b> Using Subaru Select Monitor, read the data of «Inhibitor SW 2» for «R» and «D» ranges.</p>	Is the display «High» for both «R» and «D»?	Go to step 5.	Go to step 7.																									
<p><b>5 CHECK INHIBITOR SWITCH.</b> Using Subaru Select Monitor, read the data of «Inhibitor SW 3» for «N» and «D» ranges.</p>	Is the display «High» for both «N» and «D»?	Go to step 6.	Go to step 7.																									
<p><b>6 CHECK INHIBITOR SWITCH.</b> Using Subaru Select Monitor, read the data of «Inhibitor SW 4» for «P» and «N» ranges.</p>	Is the display «High» for both «P» and «N»?	Go to step 8.	Go to step 7.																									
<p><b>7 CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and transmission. 3) Measure the resistance of harness between TCM connector and transmission connector.</p> <p><b>Connector &amp; terminal</b> <b>(B54) No. 8 — (B12) No. 4:</b> <b>(B54) No. 9 — (B12) No. 3:</b> <b>(B54) No. 10 — (B12) No. 2:</b> <b>(B54) No. 11 — (B12) No. 1:</b></p>	Is the resistance less than 1 Ω?	Go to step 8.	Repair the open circuit of harness between TCM connector and transmission connector.																									
<p><b>8 CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and transmission. 3) Measure the resistance between TCM connector and chassis ground.</p> <p><b>Connector &amp; terminal</b> <b>(B54) No. 8 — Chassis ground:</b> <b>(B54) No. 9 — Chassis ground:</b> <b>(B54) No. 10 — Chassis ground:</b> <b>(B54) No. 11 — Chassis ground:</b></p>	Is the resistance 1 MΩ or more?	Go to step 9.	Repair the short circuit of harness between TCM connector and chassis ground.																									

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
<p><b>9 CHECK INPUT SIGNAL FOR TCM.</b></p> <ol style="list-style-type: none"> <li>1) Turn the ignition switch to OFF.</li> <li>2) Disconnect the transmission connector (B12).</li> <li>3) Connect the TCM connector.</li> <li>4) Turn the ignition switch to ON.</li> <li>5) Measure the voltage between TCM terminals.</li> </ol> <p><b>Connector &amp; terminal</b>  <b>(B54) No. 8 (+) — (B55) No. 23 (-):</b>  <b>(B54) No. 9 (+) — (B55) No. 23 (-):</b>  <b>(B54) No. 10 (+) — (B55) No. 23 (-):</b>  <b>(B54) No. 11 (+) — (B55) No. 23 (-):</b></p>	<p>Is the voltage of “Inhibitor SW 1 — 4” 8 V or more?</p>	<p>Go to step 11.</p>	<p>Go to step 10.</p>
<p><b>10 CHECK TCM I/O SIGNAL.</b></p> <p>Check the power supply and ground I/O signals. &lt;Ref. to 5AT(diag)-11, ELECTRICAL SPECIFICATION, Transmission Control Module (TCM) I/O Signal.&gt;</p>	<p>Is TCM I/O signal OK?</p>	<p>Replace the TCM. &lt;Ref. to 5AT-54, Transmission Control Module (TCM).&gt;</p>	<p>Repair the open or short circuit for power supply and ground.</p>
<p><b>11 CHECK INPUT SIGNAL FOR TCM.</b></p> <ol style="list-style-type: none"> <li>1) Connect all connectors.</li> <li>2) Lift up the vehicle.</li> <li>3) Start the engine.</li> <li>4) Read the data of «Front Wheel Speed» and «AT Turbine Speed 2» using Subaru Select Monitor. &lt;Ref. to 5AT(diag)-16, READ CURRENT DATA, OPERATION, Subaru Select Monitor.&gt;</li> </ol> <p>NOTE:  The speed difference between front and rear wheels lights the ABS warning light or the VDC warning light, but this does not indicate a malfunction. If the warning light is illuminated, clear the memory of ABS or VDC after completing AT control diagnosis. &lt;Ref. to VDC(diag)-26, Clear Memory Mode.&gt;</p>	<p>Does the speedometer indication increase as «Front Wheel Speed» and «AT Turbine Speed 2» values increase?</p>	<p>Go to step 12.</p>	<p>Replace the control valve body. &lt;Ref. to 5AT-52, Control Valve Body.&gt;</p>
<p><b>12 CHECK INPUT SIGNAL FOR TCM.</b></p> <ol style="list-style-type: none"> <li>1) Drive at 4th of manual mode.</li> </ol> <p>NOTE:  Turbine speed sensor 1 signal can be measured only on 4th speed.</p> <ol style="list-style-type: none"> <li>2) Read the data of «Rear Wheel Speed» and «AT Turbine Speed 1» using Subaru Select Monitor. &lt;Ref. to 5AT(diag)-16, READ CURRENT DATA, OPERATION, Subaru Select Monitor.&gt;</li> </ol> <p>NOTE:  The speed difference between front and rear wheels lights the ABS warning light or the VDC warning light, but this does not indicate a malfunction. If the warning light is illuminated, clear the memory of ABS or VDC after completing AT control diagnosis. &lt;Ref. to VDC(diag)-26, Clear Memory Mode.&gt;</p>	<p>Does the speedometer indication increase as «Rear Wheel Speed» and «AT Turbine Speed 1» values increase?</p>	<p>Go to step 13.</p>	<p>Repair the open circuit of harness or poor contact of connector between TCM and rear vehicle speed sensor and turbine speed sensor 1.</p>



# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
<p><b>13 CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.</b></p> <p>1) Turn the ignition switch to OFF.                      2) Disconnect the connector from transmission.                      3) Remove the transmission connector from bracket.                      4) Lift up the vehicle.                      5) Drain the ATF.</p> <p><b>CAUTION:</b>  <b>Do not drain ATF until it cools down.</b></p> <p>6) Remove the oil pan.                      7) Disconnect the control valve body connector.                      8) Measure the resistance between transmission connector and control valve body connector.</p> <p><b>Connector &amp; terminal</b>  <i>(T3) No. 4 — (T14) No. 2:</i>  <i>(T3) No. 3 — (T14) No. 3:</i>  <i>(T3) No. 2 — (T14) No. 5:</i>  <i>(T3) No. 1 — (T14) No. 6:</i></p>	<p>Is the resistance less than 1 Ω?</p>	<p>Go to step 14.</p>	<p>Repair the open circuit between control valve body connector and transmission connector.</p>
<p><b>14 CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.</b></p> <p>Measure the resistance between transmission ground and control valve body connector.</p> <p><b>Connector &amp; terminal</b>  <i>(T14) No. 2 — Transmission ground:</i>  <i>(T14) No. 3 — Transmission ground:</i>  <i>(T14) No. 5 — Transmission ground:</i>  <i>(T14) No. 6 — Transmission ground:</i></p>	<p>Is the resistance 1 MΩ or more?</p>	<p>Go to step 15.</p>	<p>Repair the short circuit between control valve body connector and transmission connector.</p>
<p><b>15 CHECK FOR POOR CONTACT.</b></p>	<p>Is there any poor contact of "Inhibitor SW 1 — 4" monitor circuit?</p>	<p>Repair the poor contact.</p>	<p>Replace the control valve body.                      &lt;Ref. to 5AT-52, Control Valve Body.&gt;</p>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

## B: DTC P0712 TRANSMISSION FLUID TEMPERATURE SENSOR CIRCUIT LOW INPUT

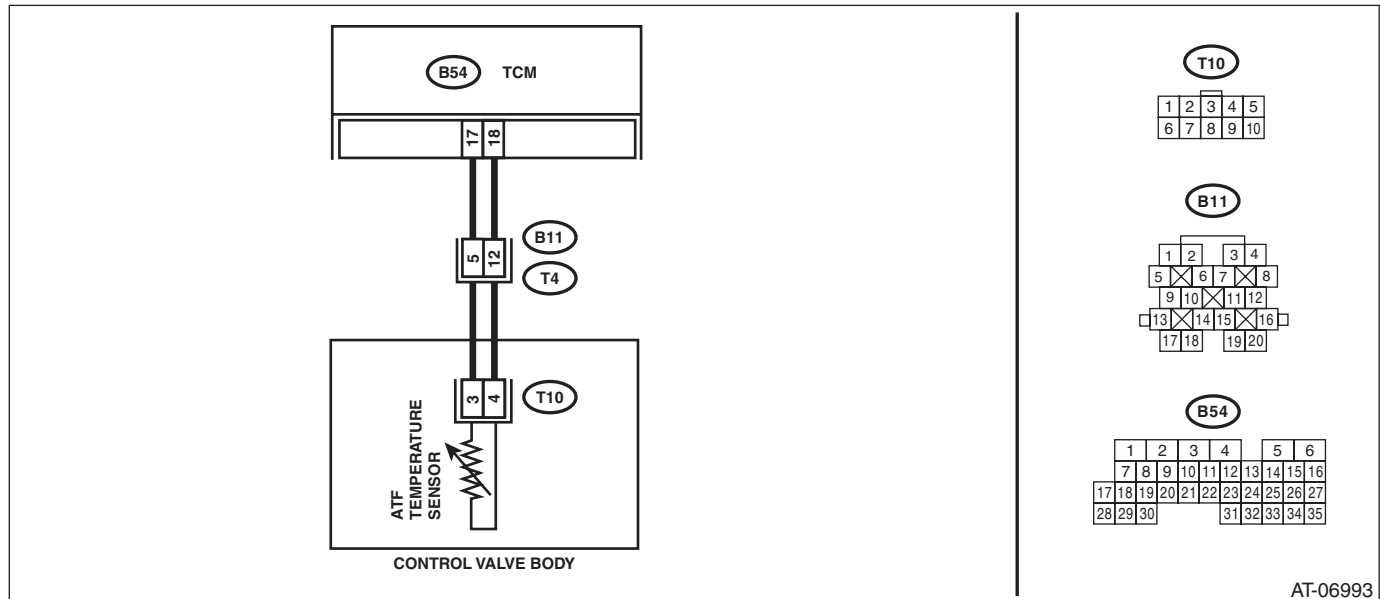
### DTC DETECTING CONDITION:

Input signal circuit to ATF temperature sensor is open.

### TROUBLE SYMPTOM:

Excessive shift shock

### WIRING DIAGRAM:



AT-06993

Step	Check	Yes	No
<b>1 CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and transmission. 3) Measure the resistance of harness between TCM connector and transmission connector. <b>Connector &amp; terminal</b> <b>(B54) No. 17 — (B11) No. 5:</b> <b>(B54) No. 18 — (B11) No. 12:</b>	Is the resistance less than 1 $\Omega$ ?	Go to step 2.	Repair the open circuit of harness between TCM and transmission connector.
<b>2 CHECK ATF TEMPERATURE SENSOR.</b> 1) Turn the ignition switch to OFF. 2) Connect the connectors to transmission and TCM. 3) Start the engine. 4) Warm up the transmission until the ATF temperature exceeds 80°C (176°F). 5) Disconnect the connector from transmission. 6) Measure the resistance between transmission connector terminals. <b>Connector &amp; terminal</b> <b>(T4) No. 5 — (T4) No. 12:</b>	Is the resistance 300 — 800 $\Omega$ ?	Go to step 3.	Go to step 5.
<b>3 CHECK ATF TEMPERATURE SENSOR.</b> Measure the resistance between transmission connector terminals. <b>Connector &amp; terminal</b> <b>(T4) No. 5 — (T4) No. 12:</b>	Does the resistance value increase while the ATF temperature decreases?	Go to step 4.	Go to step 5.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
<b>4 CHECK INPUT SIGNAL FOR TCM.</b> 1) Connect the connector. 2) Turn the ignition switch to ON. (engine OFF) 3) Read the data of «ATF Temp.» using the Subaru Select Monitor.	Does the ATF temperature gradually decrease?	Check for poor contact of the harness between the ATF temperature sensor and transmission connector, and repair the defective part.	Go to step 6.
<b>5 CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connector from transmission. 3) Remove the transmission connector from bracket. 4) Lift up the vehicle. 5) Drain the ATF. <b>CAUTION:</b> <b>Do not drain ATF until it cools down.</b> 6) Remove the oil pan. 7) Disconnect the connector from the control valve body. 8) Measure the resistance between transmission connector and control valve body connector. <i>Connector &amp; terminal</i> <i>(T4) No. 5 — (T10) No. 3:</i> <i>(T4) No. 12 — (T10) No. 4:</i>	Is the resistance less than 1 Ω?	Replace the control valve body. <Ref. to 5AT-52, Control Valve Body.>	Repair the open circuit of harness between transmission connector and control valve body connector.
<b>6 CHECK FOR POOR CONTACT.</b>	Is there poor contact of ATF temperature sensor circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 5AT-54, Transmission Control Module (TCM).>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

## C: DTC P0713 TRANSMISSION FLUID TEMPERATURE SENSOR CIRCUIT HIGH INPUT

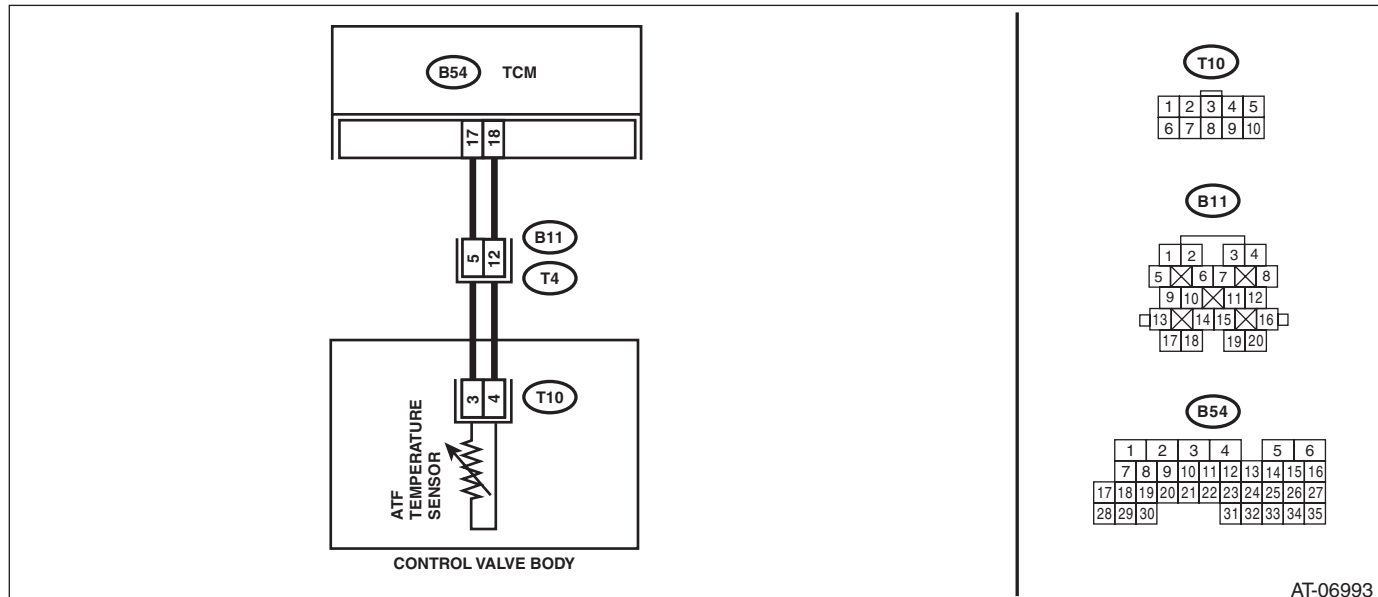
### DTC DETECTING CONDITION:

Input signal circuit to ATF temperature sensor is shorted.

### TROUBLE SYMPTOM:

Excessive shift shock

### WIRING DIAGRAM:



Step	Check	Yes	No
<b>1</b> <b>CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and transmission. 3) Measure the resistance of harness between TCM connector and chassis ground. <b>Connector &amp; terminal</b> <b>(B54) No. 17 — Chassis ground:</b> <b>(B54) No. 18 — Chassis ground:</b>	Is the resistance 1 M $\Omega$ or more?	Go to step 2.	Repair the short circuit of harness between TCM and transmission connector.
<b>2</b> <b>CHECK ATF TEMPERATURE SENSOR.</b> 1) Turn the ignition switch to OFF. 2) Connect the connectors to transmission and TCM. 3) Start the engine. 4) Warm up the transmission until the ATF temperature exceeds 80°C (176°F). 5) Disconnect the connector from transmission. 6) Measure the resistance between transmission connector terminals. <b>Connector &amp; terminal</b> <b>(T4) No. 5 — (T4) No. 12:</b>	Is the resistance 300 — 800 $\Omega$ ?	Go to step 3.	Go to step 5.
<b>3</b> <b>CHECK ATF TEMPERATURE SENSOR.</b> Measure the resistance between transmission connector terminals. <b>Connector &amp; terminal</b> <b>(T4) No. 5 — (T4) No. 12:</b>	Does the resistance value increase while the ATF temperature decreases?	Go to step 4.	Go to step 5.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
<p><b>4</b></p> <p><b>CHECK INPUT SIGNAL FOR TCM.</b></p> <p>1) Connect the connector.                      2) Turn the ignition switch to ON. (engine OFF)                      3) Read the data of «ATF Temp.» using the Subaru Select Monitor.</p>	<p>Does the ATF temperature gradually decrease?</p>	<p>Check for poor contact of the harness between the ATF temperature sensor and transmission connector, and repair the defective part.</p>	<p>Go to step 6.</p>
<p><b>5</b></p> <p><b>CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.</b></p> <p>1) Turn the ignition switch to OFF.                      2) Disconnect the connector from transmission.                      3) Remove the transmission connector from bracket.                      4) Lift up the vehicle.                      5) Drain the ATF.</p> <p><b>CAUTION:</b>  <b>Do not drain ATF until it cools down.</b></p> <p>6) Remove the oil pan.                      7) Disconnect the connector from the control valve body.                      8) Measure the resistance between chassis ground and control valve body connector.</p> <p><b>Connector &amp; terminal</b>  <i>(T10) No. 3 — Chassis ground:</i>  <i>(T10) No. 4 — Chassis ground:</i></p>	<p>Is the resistance 1 MΩ or more?</p>	<p>Replace the control valve body.                      &lt;Ref. to 5AT-52, Control Valve Body.&gt;</p>	<p>Repair the short circuit of harness between transmission connector and control valve body connector.</p>
<p><b>6</b></p> <p><b>CHECK FOR POOR CONTACT.</b></p>	<p>Is there poor contact of ATF temperature sensor circuit?</p>	<p>Repair the poor contact.</p>	<p>Replace the TCM.                      &lt;Ref. to 5AT-54, Transmission Control Module (TCM).&gt;</p>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

## D: DTC P0715 INPUT/TURBINE SPEED SENSOR CIRCUIT

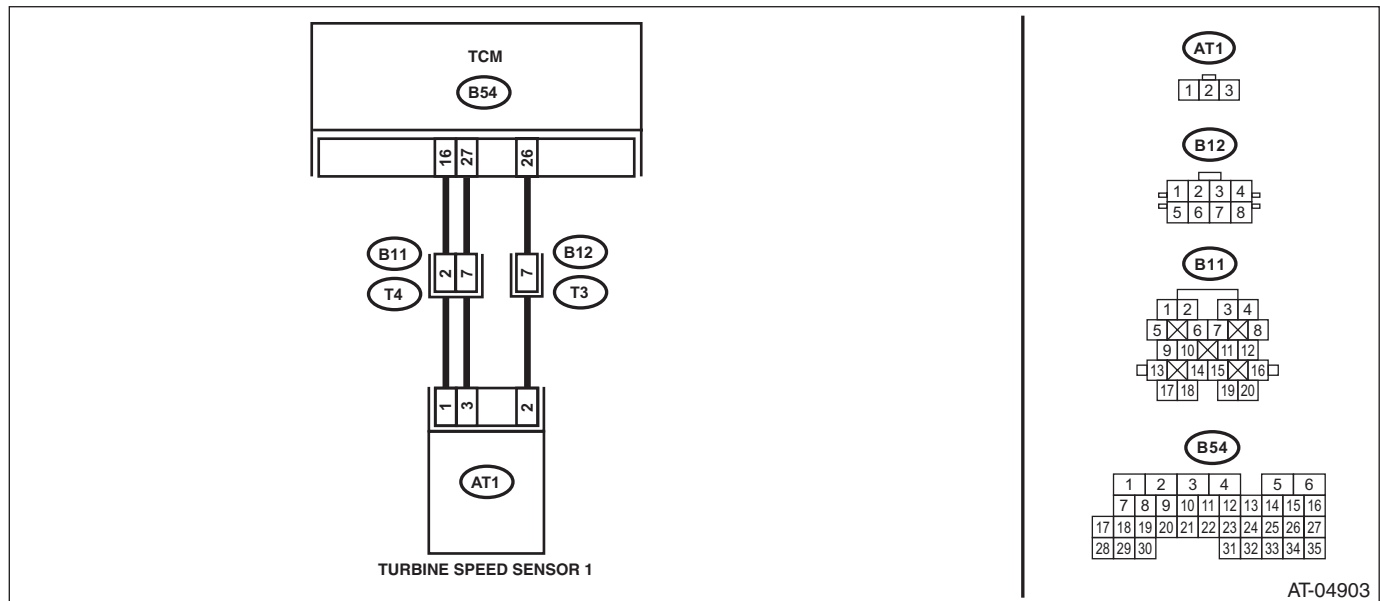
### DTC DETECTING CONDITION:

Input signal circuit of TCM is open or shorted.

### TROUBLE SYMPTOM:

- Excessive shift shock
- Does not shift to 5th.

### WIRING DIAGRAM:



Step	Check	Yes	No
<b>1 CHECK TCM I/O SIGNAL.</b> Check the power supply and ground I/O signals. <Ref. to 5AT(diag)-11, ELECTRICAL SPECIFICATION, Transmission Control Module (TCM) I/O Signal.>	Is TCM I/O signal OK?	Go to step 2.	Repair the open or short circuit for power supply and ground.
<b>2 CHECK TCM AND TRANSMISSION HARNESS CONNECTOR.</b> 1) Disconnect the connectors from TCM and transmission. 2) Measure the resistance of harness between TCM connector and transmission connector. <b>Connector &amp; terminal</b> (B54) No. 16 — (B11) No. 2: (B54) No. 26 — (B12) No. 7: (B54) No. 27 — (B11) No. 7:	Is the resistance less than 1 Ω?	Go to step 3.	Repair the open circuit of harness between TCM and transmission connector.
<b>3 CHECK TCM AND TRANSMISSION HARNESS CONNECTOR.</b> Measure the resistance of harness between TCM connector and chassis ground. <b>Connector &amp; terminal</b> (B54) No. 16 — Chassis ground: (B54) No. 26 — Chassis ground: (B54) No. 27 — Chassis ground:	Is the resistance less than 1 MΩ?	Go to step 4.	Repair the short circuit of harness between TCM and transmission connector.
<b>4 CHECK TCM POWER SUPPLY OUTPUT.</b> 1) Connect the connector to TCM. (Transmission connector is disconnected) 2) Turn the ignition switch to ON. (engine OFF) 3) Measure the voltage between transmission connector and chassis ground. <b>Connector &amp; terminal</b> (B11) No. 7 (+) — Chassis ground (-):	Is the voltage 10 — 13 V?	Go to step 5.	Replace the TCM. <Ref. to 5AT-54, Transmission Control Module (TCM).>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
<b>5 CHECK INPUT CIRCUIT OF TCM TURBINE SPEED SENSOR.</b> Measure the voltage between TCM connector terminals. <i>Connector &amp; terminal</i> <i>(B12) No. 7 (+) — (B11) No. 2 (-):</i>	Is the voltage 4 — 6 V?	Go to step 6.	Replace the TCM. <Ref. to 5AT-54, Transmission Control Module (TCM).>
<b>6 CHECK HARNESS ASSEMBLY (TURBINE SPEED SENSOR GROUND).</b> Check the installing condition of ground connecting harness of harness assembly (used for both of turbine speed sensor 1, rear vehicle speed sensor).	Is the ground connecting harness installed securely to the transmission body? Is there any serious damage in the harness and terminal?	Go to step 7.	When poor installation of ground occurs, install it securely. Replace the transmission assembly if the harness or terminal is damaged. <Ref. to 5AT-36, Automatic Transmission Assembly.>
<b>7 CHECK HARNESS ASSEMBLY.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connector from transmission. 3) Disconnect the connector from turbine speed sensor 1. 4) Measure the resistance between transmission connector and turbine speed sensor 1 connector. <i>Connector &amp; terminal</i> <i>(T3) No. 7 — (AT1) No. 2:</i> <i>(T4) No. 7 — (AT1) No. 3:</i> <i>(T4) No. 2 — (AT1) No. 1:</i> <i>(AT1) No. 1 — Chassis ground:</i>	Is the resistance less than 1 Ω?	Go to step 8.	Repair the open circuit of harness between TCM and transmission connector, or poor contact of connector.
<b>8 CHECK HARNESS ASSEMBLY.</b> Measure the resistance between transmission connector and chassis ground. <i>Connector &amp; terminal</i> <i>(T3) No. 7 — Chassis ground:</i> <i>(T4) No. 7 — Chassis ground:</i> <i>(T4) No. 2 — Chassis ground:</i>	Is the resistance 1 MΩ or more?	Go to step 9.	Repair the short circuit of harness between TCM and transmission connector.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
<p><b>9</b>      <b>CHECK INPUT SIGNAL FOR TCM.</b></p> <p>1) Connect all connectors. 2) Lift up the vehicle. 3) Start the engine. 4) Set the vehicle in 4th speed driving condition of manual mode.</p> <p>NOTE: Turbine speed sensor 1 signal can be measured only on 4th speed.</p> <p>5) Read the data of «AT Turbine Speed 1» and «AT Turbine Speed 2» using Subaru Select Monitor. &lt;Ref. to 5AT(diag)-16, READ CURRENT DATA, OPERATION, Subaru Select Monitor.&gt;</p> <p>NOTE: The speed difference between front and rear wheels lights the ABS warning light or the VDC warning light, but this does not indicate a malfunction. If the warning light illuminates, delete the ABS or VDC memory after completing the AT control diagnosis. &lt;Ref. to VDC(diag)-26, Clear Memory Mode.&gt;</p>	<p>Are the values of «AT Turbine Speed 1» and «AT Turbine Speed 2» almost the same?</p>	<p>Check for poor contact of the harness of the turbine speed sensor 1 circuit, and repair the faulty part.</p>	<p>Replace the turbine speed sensor 1. &lt;Ref. to 5AT-51, Turbine Speed Sensor 1.&gt;</p>



# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

## E: DTC P0719 BRAKE SWITCH CIRCUIT LOW

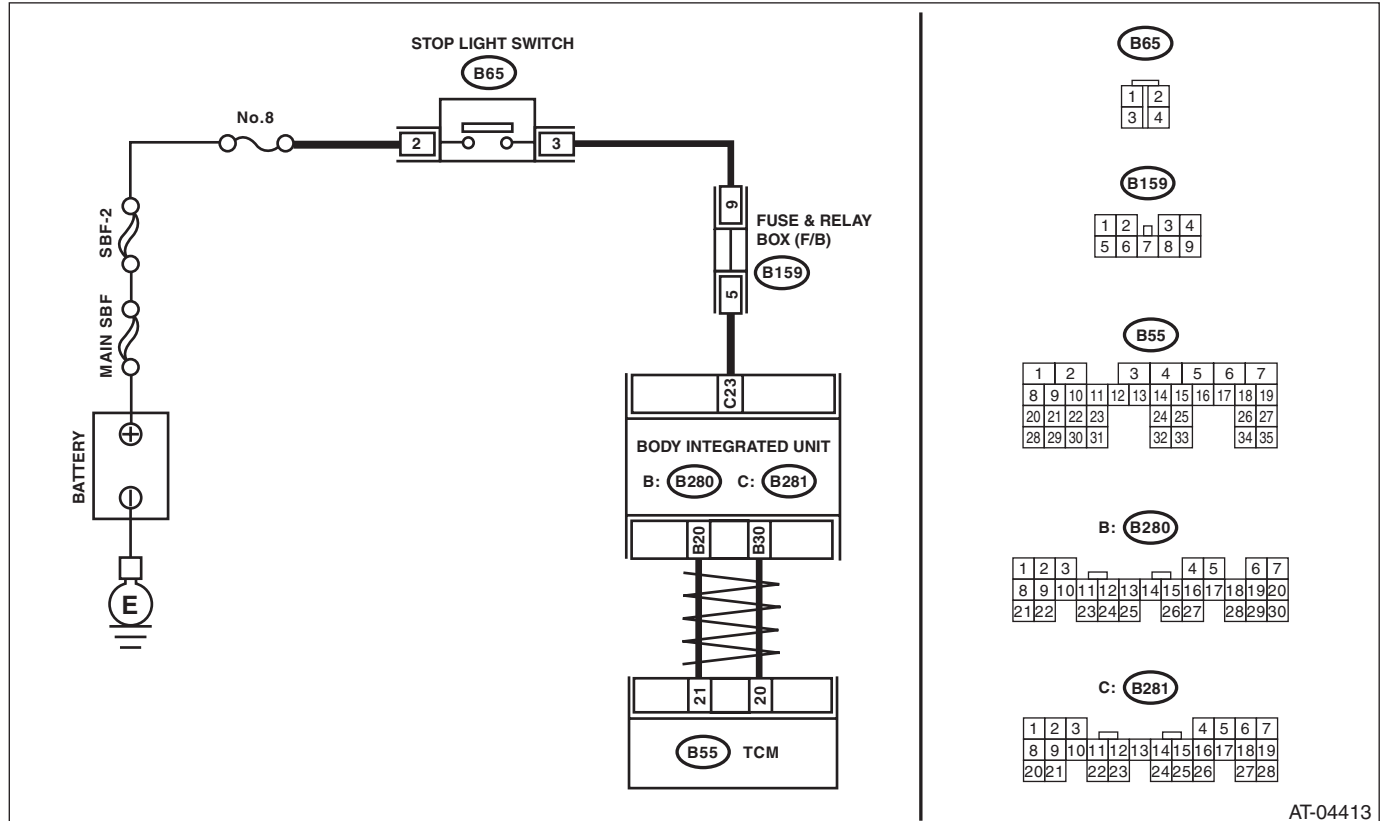
### DTC DETECTING CONDITION:

Brake switch malfunction, open input signal circuit

### TROUBLE SYMPTOM:

Gear is not shifted down when climbing a hill or driving down a hill.

### WIRING DIAGRAM:



AT-04413

Step	Check	Yes	No	
1	<b>CHECK DTC.</b>	Is any of following DTC displayed? / AT CAN Communication Circuit / Output Speed Sensor Circuit / AT Vehicle Speed Sensor Circuit Malfunction (Rear Wheel) / VDC Brake SW Circuit	Perform the diagnosis according to DTC.	Go to step 2.
2	<b>CHECK BODY INTEGRATED UNIT.</b> 1) Turn the ignition switch to OFF. 2) Connect the Subaru Select Monitor to data link connector. 3) Turn the ignition switch to ON. (engine OFF) 4) Run the Subaru Select Monitor. 5) Depress the brake pedal. 6) Read the data of «Stop Light Switch» using Subaru Select Monitor. <Ref. to LAN(diag)-13, DISPLAY OF CURRENT DATA, OPERATION, Subaru Select Monitor.>	Is "ON" displayed?	Go to step 3.	Go to step 4.
3	<b>CHECK TCM.</b> Read the data of «Stop Light Switch» using Subaru Select Monitor. <Ref. to 5AT(diag)-16, READ CURRENT DATA, OPERATION, Subaru Select Monitor.>	Is "ON" displayed?	A temporary poor contact of connector or harness may be the cause. Check the poor contact.	Replace the TCM. <Ref. to 5AT-54, Transmission Control Module (TCM).>

## Diagnostic Procedure with Diagnostic Trouble Code (DTC)

### AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
<b>4</b> <b>CHECK BODY INTEGRATED UNIT INPUT SIGNAL.</b> 1) Disconnect the connector from body integrated unit. 2) Depress the brake pedal. 3) Measure the voltage between body integrated unit connector and chassis ground. <b>Connector &amp; terminal</b> <b>(B281) No. 23 (+) — Chassis ground (-):</b>	Is the voltage 10 V or more?	Go to step 7.	Go to step 5.
<b>5</b> <b>CHECK HARNESS CONNECTOR BETWEEN BODY INTEGRATED UNIT AND STOP LIGHT SWITCH.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connector from stop light switch. 3) Measure the resistance of harness between body integrated unit and stop light switch. <b>Connector &amp; terminal</b> <b>(B281) No. 23 — (B65) No. 3:</b>	Is the resistance less than 1 $\Omega$ ?	Go to step 6.	Repair the open circuit of harness between body integrated unit and stop light switch.
<b>6</b> <b>CHECK HARNESS CONNECTOR BETWEEN BODY INTEGRATED UNIT AND STOP LIGHT SWITCH.</b> Measure the resistance of harness between body integrated unit connector and stop light switch. <b>Connector &amp; terminal</b> <b>(B281) No. 23 — Chassis ground:</b>	Is the resistance 1 M $\Omega$ or more?	Go to step 7.	Repair the short circuit of harness between body integrated unit and stop light switch.
<b>7</b> <b>CHECK FOR POOR CONTACT.</b>	Is there poor contact of input signal of brake switch?	Repair the poor contact.	Check body integrated unit.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

## F: DTC P0720 OUTPUT SPEED SENSOR CIRCUIT

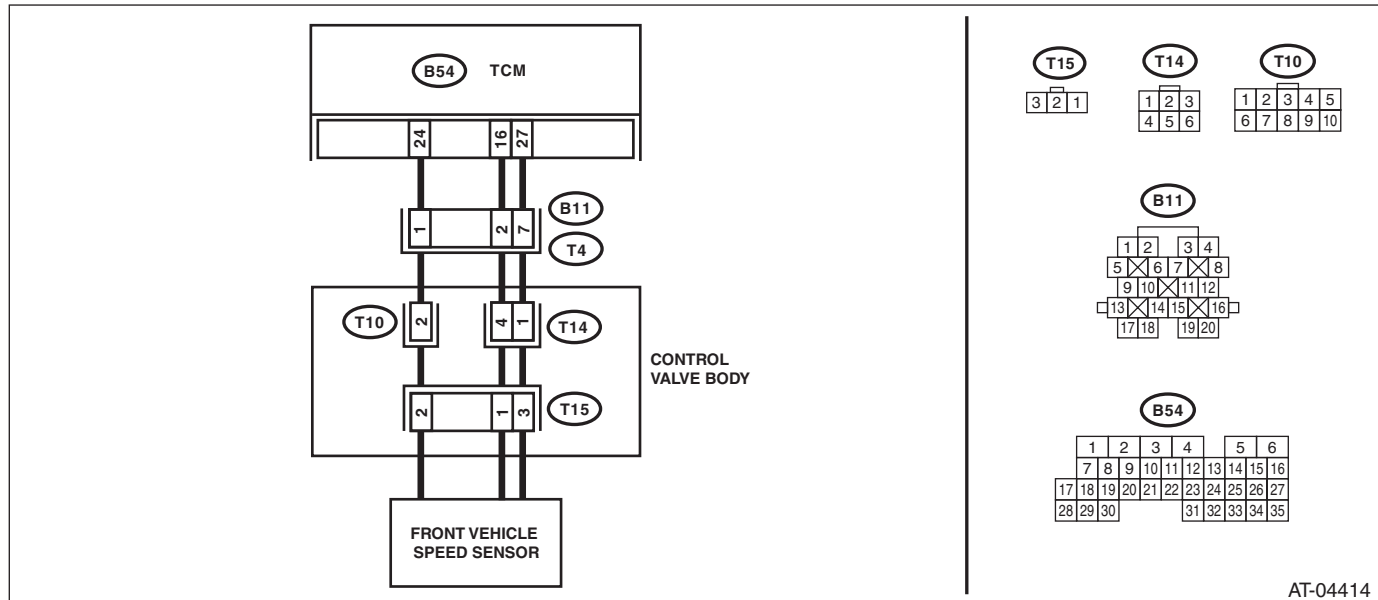
### DTC DETECTING CONDITION:

- AT vehicle speed signal is abnormal.
- The harness connector between TCM and vehicle speed sensor is shorted or open.

### TROUBLE SYMPTOM:

- Shifting quality malfunction
- Driving performance is poor.

### WIRING DIAGRAM:



Step	Check	Yes	No
<b>1 CHECK TCM I/O SIGNAL.</b> Check the power supply and ground I/O signals. <Ref. to 5AT(diag)-11, ELECTRICAL SPECIFICATION, Transmission Control Module (TCM) I/O Signal.>	Is TCM I/O signal OK?	Go to step 2.	Repair the open or short circuit for power supply and ground.
<b>2 CHECK TCM AND TRANSMISSION HARNESS CONNECTOR.</b> 1) Disconnect the connectors from TCM and transmission. 2) Measure the resistance of harness between TCM connector and transmission connector. <b>Connector &amp; terminal</b> (B54) No. 16 — (B11) No. 2: (B54) No. 24 — (B11) No. 1: (B54) No. 27 — (B11) No. 7:	Is the resistance less than 1 Ω?	Go to step 3.	Repair the open circuit of harness between TCM and transmission connector.
<b>3 CHECK TCM AND TRANSMISSION HARNESS CONNECTOR.</b> Measure the resistance of harness between TCM connector and chassis ground. <b>Connector &amp; terminal</b> (B54) No. 24 — Chassis ground:	Is the resistance less than 1 MΩ?	Go to step 4.	Repair the short circuit of harness between TCM and transmission connector.
<b>4 CHECK TCM POWER SUPPLY OUTPUT.</b> 1) Connect the connector to TCM. (Transmission connector is disconnected) 2) Turn the ignition switch to ON. (engine OFF) 3) Measure the voltage between transmission connector and chassis ground. <b>Connector &amp; terminal</b> (B11) No. 7 (+) — Chassis ground (-):	Is the voltage 10 — 13 V?	Go to step 5.	Replace the TCM. <Ref. to 5AT-54, Transmission Control Module (TCM).>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
<b>5 CHECK INPUT CIRCUIT OF TCM TURBINE SPEED SENSOR.</b> Measure the voltage variation between TCM connector terminals. <b>Connector &amp; terminal</b> <b>(B11) No. 1 (+) — (B11) No. 2 (-):</b>	Is the voltage 4 — 6 V?	Go to step 6.	Replace the TCM. <Ref. to 5AT-54, Transmission Control Module (TCM).>
<b>6 CHECK INPUT SIGNAL FOR TCM.</b> 1) Connect all connectors. 2) Lift up the vehicle. 3) Start the engine. 4) Read the data of «Front Wheel Speed» using Subaru Select Monitor. <Ref. to 5AT(diag)-16, READ CURRENT DATA, OPERATION, Subaru Select Monitor.> NOTE: The speed difference between front and rear wheels lights the ABS warning light or the VDC warning light, but this does not indicate a malfunction. If the warning light illuminates, delete the ABS or VDC memory after completing the AT control diagnosis. <Ref. to VDC(diag)-26, Clear Memory Mode.>	Does the speedometer indication increase as the «Front Wheel Speed» data increases?	Check the harness of the front vehicle speed sensor circuit, and repair the defective part.	Go to step 7.
<b>7 CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connector from transmission. 3) Remove the transmission connector from bracket. 4) Lift up the vehicle. 5) Drain the ATF. <b>CAUTION:</b> <b>Do not drain ATF until it cools down.</b> 6) Remove the oil pan. 7) Disconnect the connector from the control valve body. 8) Measure the resistance between transmission connector and control valve body connector. <b>Connector &amp; terminal</b> <b>(T4) No. 1 — (T10) No. 2:</b>	Is the resistance less than 1 $\Omega$ ?	Go to step 8.	Repair the open circuit of harness between control valve body connector and transmission connector.
<b>8 CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.</b> Measure the resistance between transmission ground and control valve body connector. <b>Connector &amp; terminal</b> <b>(T10) No. 2 — Transmission ground:</b>	Is the resistance 1 M $\Omega$ or more?	Go to step 9.	Repair the short circuit of harness between transmission connector and transmission ground.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
<p><b>9</b></p> <p><b>CHECK HARNESS CONNECTOR BETWEEN CONTROL VALVE BODY AND VEHICLE SPEED SENSOR.</b></p> <p>1) Disconnect the connector from vehicle speed sensor.</p> <p>2) Measure the resistance of harness between control valve body connector and vehicle speed sensor connector.</p> <p><b>Connector &amp; terminal</b>  <b>(T10) No. 2 — (T7) No. 2:</b>  <b>(T14) No. 1 — (T7) No. 3:</b>  <b>(T14) No. 4 — (T7) No. 1:</b></p>	<p>Is the resistance less than 1 <math>\Omega</math>?</p>	<p>Go to step 10.</p>	<p>Replace the control valve body.                      &lt;Ref. to 5AT-52, Control Valve Body.&gt;</p>
<p><b>10</b></p> <p><b>CHECK HARNESS CONNECTOR BETWEEN CONTROL VALVE BODY AND VEHICLE SPEED SENSOR.</b></p> <p>Measure the resistance of harness between control valve body connector and transmission ground.</p> <p><b>Connector &amp; terminal</b>  <b>(T10) No. 2 — Transmission ground:</b></p>	<p>Is the resistance 1 M<math>\Omega</math> or more?</p>	<p>Replace the front vehicle speed sensor.</p>	<p>Replace the control valve body.                      &lt;Ref. to 5AT-52, Control Valve Body.&gt;</p>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## AUTOMATIC TRANSMISSION (DIAGNOSTICS)

### G: DTC P0724 BRAKE SWITCH CIRCUIT HIGH

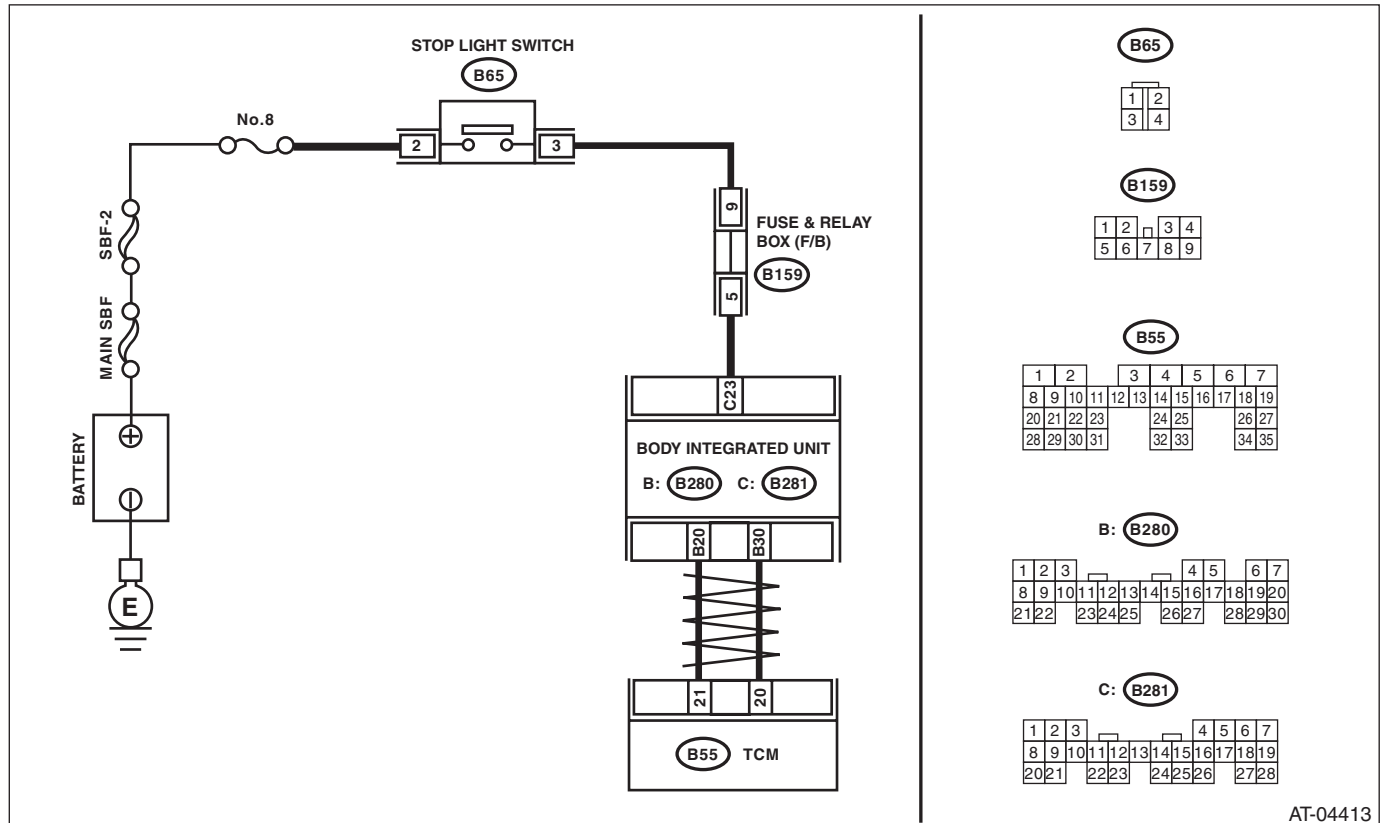
#### DTC DETECTING CONDITION:

Brake switch malfunction, open input signal circuit

#### TROUBLE SYMPTOM:

Gear is not shifted down when climbing a hill.

#### WIRING DIAGRAM:



AT-04413

Step	Check	Yes	No	
1	<b>CHECK DTC.</b>	Is any of following DTC detected? / AT CAN Communication Circuit / Output Speed Sensor Circuit / AT Vehicle Speed Sensor Circuit Malfunction (Rear Wheel) / VDC Brake SW Circuit	Perform the diagnosis according to DTC.	Go to step 2.
2	<b>CHECK BODY INTEGRATED UNIT.</b> 1) Turn the ignition switch to OFF. 2) Connect the Subaru Select Monitor to data link connector. 3) Turn the ignition switch to ON. (engine OFF) 4) Run the Subaru Select Monitor. 5) Read the data of «Stop Light Switch» using Subaru Select Monitor. <Ref. to LAN(diag)-13, DISPLAY OF CURRENT DATA, OPERATION, Subaru Select Monitor.>	Is "OFF" displayed?	Go to step 3.	Go to step 4.
3	<b>CHECK TCM.</b> Read the data of «Stop Light Switch» using Subaru Select Monitor. <Ref. to 5AT(diag)-16, READ CURRENT DATA, OPERATION, Subaru Select Monitor.>	Is "OFF" displayed?	A temporary poor contact of connector or harness may be the cause. Check the poor contact.	Replace the TCM. <Ref. to 5AT-54, Transmission Control Module (TCM).>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
<b>4</b> <b>CHECK BODY INTEGRATED UNIT INPUT SIGNAL.</b> 1) Disconnect the connector from body integrated unit. 2) Measure the voltage between body integrated unit connector and chassis ground. <b>Connector &amp; terminal</b> <b>(B281) No. 23 (+) — Chassis ground (-):</b>	Is the voltage 10 V or more?	Go to step 5.	Go to step 7.
<b>5</b> <b>CHECK STOP LIGHT SWITCH.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connector from stop light switch. 3) Measure the resistance of harness between stop light switch connectors. <b>Connector &amp; terminal</b> <b>(B65) No. 3 — (B65) No. 2:</b>	Is the resistance 1 M $\Omega$ or more?	Go to step 6.	Replace the stop light switch.
<b>6</b> <b>CHECK HARNESS CONNECTOR BETWEEN BODY INTEGRATED UNIT AND STOP LIGHT SWITCH.</b> 1) Turn the ignition switch to ON. 2) Measure the voltage of harness between body integrated unit connector and chassis ground. <b>Connector &amp; terminal</b> <b>(B281) No. 23 (+) — Chassis ground (-):</b>	Is the voltage less than 1 V?	Go to step 7.	Repair the short circuit of harness between body integrated unit and stop light switch.
<b>7</b> <b>CHECK FOR POOR CONTACT.</b>	Is there poor contact of input signal of stop light switch?	Repair the poor contact.	Check body integrated unit.

## H: DTC P0731 GEAR 1 INCORRECT RATIO

NOTE:

Refer to DTC P0736 for diagnostic procedure. <Ref. to 5AT(diag)-52, DTC P0736 REVERSE INCORRECT RATIO, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

## I: DTC P0732 GEAR 2 INCORRECT RATIO

NOTE:

Refer to DTC P0736 for diagnostic procedure. <Ref. to 5AT(diag)-52, DTC P0736 REVERSE INCORRECT RATIO, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

## J: DTC P0733 GEAR 3 INCORRECT RATIO

NOTE:

Refer to DTC P0736 for diagnostic procedure. <Ref. to 5AT(diag)-52, DTC P0736 REVERSE INCORRECT RATIO, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

## K: DTC P0734 GEAR 4 INCORRECT RATIO

NOTE:

Refer to DTC P0736 for diagnostic procedure. <Ref. to 5AT(diag)-52, DTC P0736 REVERSE INCORRECT RATIO, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

## L: DTC P0735 GEAR 5 INCORRECT RATIO

NOTE:

Refer to DTC P0736 for diagnostic procedure. <Ref. to 5AT(diag)-52, DTC P0736 REVERSE INCORRECT RATIO, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

## M: DTC P0736 REVERSE INCORRECT RATIO

### DTC DETECTING CONDITION:

Target gear ratio and actual gear ratio do not match.

### TROUBLE SYMPTOM:

- Shift point is too high or too low.
- Excessive shift shock
- Gear is not changed.
- The vehicle does not move in “D” or “R” range with the engine running at high speed.

Step	Check	Yes	No	
<b>1</b>	<b>CHECK DTC.</b>	Is any of the following DTCs displayed? P0751, P0753, P0756, P0758, P0761, P0763, P0766, P0768, P0771, P0773	Perform the diagnosis according to DTC.	Go to step 2.
<b>2</b>	<b>CHECK DTC.</b>	Is DTC P1718 displayed?	Perform the diagnosis according to DTC.	Go to step 3.
<b>3</b>	<b>CHECK AT TURBINE SPEED SENSOR CIRCUIT.</b> Perform diagnosis according to DTC P0715. <Ref. to 5AT(diag)-42, DTC P0715 INPUT/ TURBINE SPEED SENSOR CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Is there any trouble?	Check the turbine speed sensor 1 circuit.	Go to step 4.
<b>4</b>	<b>CHECK AT TURBINE SPEED SENSOR CIRCUIT.</b> Perform diagnosis according to DTC P1710. <Ref. to 5AT(diag)-90, DTC P1710 TORQUE CONVERTER TURBINE 2 SPEED SIGNAL CIRCUIT MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Is there any trouble?	Check the turbine speed sensor 2 circuit.	Go to step 5.
<b>5</b>	<b>CHECK AT VEHICLE SPEED SENSOR CIRCUIT.</b> Perform diagnosis according to DTC P0720. <Ref. to 5AT(diag)-47, DTC P0720 OUTPUT SPEED SENSOR CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Is there any trouble?	Check for poor contact of the front vehicle speed sensor circuit harness and repair the fault location.	Go to step 6.
<b>6</b>	<b>CHECK AT VEHICLE SPEED SENSOR CIRCUIT.</b> Perform diagnosis according to DTC P1706. <Ref. to 5AT(diag)-86, DTC P1706 AT VEHICLE SPEED SENSOR CIRCUIT MALFUNCTION (REAR WHEEL), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Is there any trouble?	Check for poor contact of the rear vehicle speed sensor circuit harness and repair the fault location.	Go to step 7.
<b>7</b>	<b>CHECK TRANSMISSION RANGE SENSOR CIRCUIT (PRNDL INPUT).</b> Perform diagnosis according to DTC P0705. <Ref. to 5AT(diag)-34, DTC P0705 TRANSMISSION RANGE SENSOR CIRCUIT (PRNDL INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Is there any trouble?	Check the inhibitor switch circuit.	There are malfunctions in TCM, TCM connector poor contact, or transmission assembly mechanical malfunction.



# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

## N: DTC P0741 TORQUE CONVERTER CLUTCH CIRCUIT PERFORMANCE OR STUCK OFF

### DTC DETECTING CONDITION:

- Lock up clutch malfunction
- Defective torque converter assembly
- Defective control valve
- Defective turbine speed sensor 1 or 2

### TROUBLE SYMPTOM:

No lock-up occurs. (After engine is warmed up)

Step	Check	Yes	No
1 <b>CHECK DTC OF TCM.</b>	Is any DTC of the followings detected? P0715, P0720, P0753, P0758, P0763, P0768, P0773, P0751, P0756, P0761, P0766, P0771, P1710, P1718	Perform the diagnosis according to each DTC.	Go to step 2.
2 <b>DRIVING CHECK FOR LOCK-UP CONDITION.</b> 1) Perform the Clear Memory Mode. 2) Maintain the value of «Accel. Opening Angle» displayed on Subaru Select Monitor and drive the vehicle at 85 km/h or more. 3) Make sure that «L/U Solenoid Current» is 0.6 A or more using Subaru Select Monitor. 4) Read the data of «Engine Speed» and «Turbine Revolution Speed» using Subaru Select Monitor.	Is the difference between «Engine Speed» and «Turbine Revolution Speed» within 100 rpm?	Temporary poor contact or open circuit occurs. Recheck that the harness connector has no faulty.	Replace the transmission assembly when the speed difference becomes 100 rpm or more or DTC P0741 is displayed. When DTC other than P0741 is displayed, perform the diagnosis corresponding to the DTC.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

## O: DTC P0743 TORQUE CONVERTER CLUTCH CIRCUIT ELECTRICAL

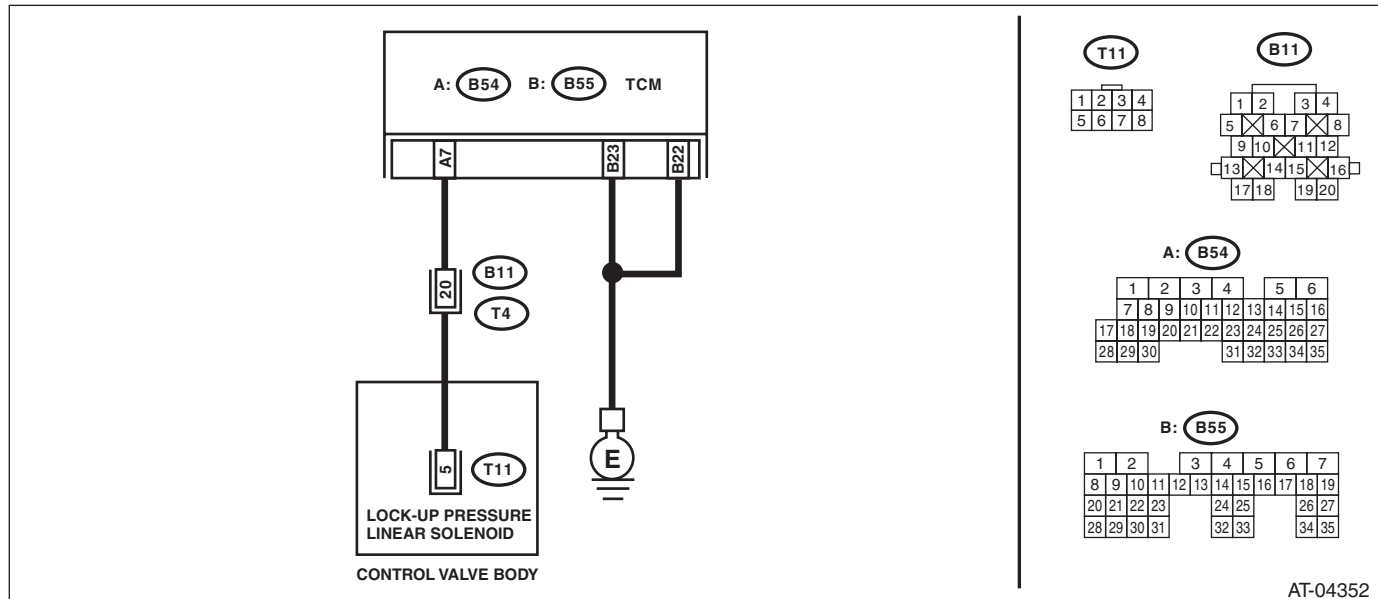
### DTC DETECTING CONDITION:

The output signal circuit of lock up solenoid is open or shorted.

### TROUBLE SYMPTOM:

No lock-up occurs. (After engine is warmed up)

### WIRING DIAGRAM:



Step	Check	Yes	No
<b>1</b> <b>CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and transmission. 3) Measure the resistance of harness between TCM connector and transmission connector. <b>Connector &amp; terminal</b> (B54) No. 7 — (B11) No. 20: (B55) No. 22 — Chassis ground: (B55) No. 23 — Chassis ground:	Is the resistance less than 1 Ω?	Go to step 2.	Repair the open circuit of harness between TCM connector and transmission connector.
<b>2</b> <b>CHECK HARNESS CONNECTOR BETWEEN TCM AND CHASSIS GROUND.</b> Measure the resistance of harness between TCM connector and chassis ground. <b>Connector &amp; terminal</b> (B54) No. 7 — Chassis ground:	Is the resistance 1 MΩ or more?	Go to step 3.	Repair the short circuit of harness between TCM connector and transmission connector.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
<b>3</b> <b>CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connector from transmission. 3) Remove the transmission connector from bracket. 4) Lift up the vehicle. 5) Drain the ATF. NOTE: Do not drain ATF until it cools down. 6) Remove the oil pan. 7) Disconnect the connector from the control valve body. 8) Measure the resistance between transmission connector and control valve body connector. <b>Connector &amp; terminal</b> <b>(T4) No. 20 — (T11) No. 5:</b>	Is the resistance less than 1 $\Omega$ ?	Go to step 4.	Repair the open circuit of harness between transmission connector and control valve body connector.
<b>4</b> <b>CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.</b> Measure the resistance between transmission ground and control valve body connector. <b>Connector &amp; terminal</b> <b>(T11) No. 5 — Transmission ground:</b>	Is the resistance 1 M $\Omega$ or more?	Repair the open circuit of harness between control valve body connector and transmission ground.	Go to step 5.
<b>5</b> <b>CHECK LOCK-UP SOLENOID.</b> Measure the resistance between transmission ground and control valve body connector. <b>Connector &amp; terminal</b> <b>(T11) No. 5 — Transmission ground:</b>	Is the resistance 3 — 9 $\Omega$ ?	Go to step 6.	Replace the control valve body. <Ref. to 5AT-52, Control Valve Body.>
<b>6</b> <b>CHECK FOR POOR CONTACT.</b> Check the TCM connector, transmission connector and control valve body connector.	Is there poor contact (loosing terminal, entering foreign matter, damaging connector body)?	Repair the poor contact.	Go to step 7.
<b>7</b> <b>CHECK AFTER REPAIR.</b> 1) Perform the Clear Memory Mode. 2) Drive for a while and read DTC.	Is DTC displayed?	Replace the TCM. <Ref. to 5AT-54, Transmission Control Module (TCM).>	Temporary poor contact or open circuit occurs. Recheck that the harness connector has no faulty.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

## P: DTC P0748 PRESSURE CONTROL SOLENOID "A" ELECTRICAL

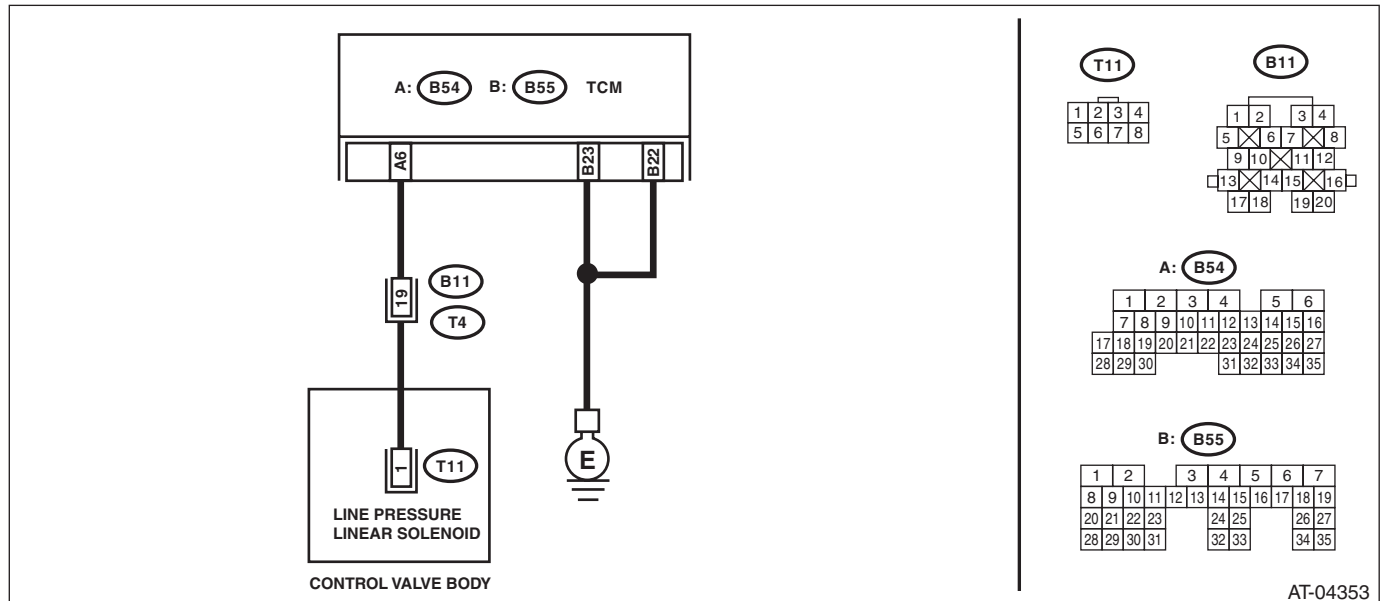
### DTC DETECTING CONDITION:

Output signal circuit of line pressure solenoid is open or shorted.

### TROUBLE SYMPTOM:

Excessive shift shock

### WIRING DIAGRAM:



Step	Check	Yes	No
<b>1</b> <b>CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and transmission. 3) Measure the resistance of harness between TCM connector and transmission connector. <i>Connector &amp; terminal</i> (B54) No. 6 — (B11) No. 19: (B55) No. 22 — Chassis ground: (B55) No. 23 — Chassis ground:	Is the resistance less than 1 Ω?	Go to step 2.	Repair the open circuit of harness between TCM connector and transmission connector.
<b>2</b> <b>CHECK HARNESS CONNECTOR BETWEEN TCM AND CHASSIS GROUND.</b> Measure the resistance between TCM connector and chassis ground. <i>Connector &amp; terminal</i> (B54) No. 6 — Chassis ground:	Is the resistance 1 MΩ or more?	Go to step 3.	Repair the short circuit of harness between TCM connector and transmission connector.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
<b>3</b> <b>CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connector from transmission. 3) Remove the transmission connector from bracket. 4) Lift up the vehicle. 5) Drain the ATF. <b>CAUTION:</b> <b>Do not drain ATF until it cools down.</b> 6) Remove the oil pan. 7) Disconnect the connector from the control valve body. 8) Measure the resistance between transmission connector and control valve body connector. <b>Connector &amp; terminal</b> <b>(T4) No. 19 — (T11) No. 1:</b>	Is the resistance less than 1 $\Omega$ ?	Go to step 4.	Repair the open circuit of harness between transmission connector and control valve body connector.
<b>4</b> <b>CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.</b> Measure the resistance between transmission ground and control valve body connector. <b>Connector &amp; terminal</b> <b>(T11) No. 1 — Transmission ground:</b>	Is the resistance 1 M $\Omega$ or more?	Repair the open circuit of harness between control valve body connector and transmission ground.	Go to step 5.
<b>5</b> <b>CHECK LINE PRESSURE SOLENOID.</b> Measure the resistance between transmission ground and control valve body connector. <b>Connector &amp; terminal</b> <b>(T11) No. 1 — Transmission ground:</b>	Is the resistance 3 — 9 $\Omega$ ?	Go to step 6.	Replace the control valve body. <Ref. to 5AT-52, Control Valve Body.>
<b>6</b> <b>CHECK FOR POOR CONTACT.</b> Check the TCM connector, transmission connector and control valve body connector.	Is there poor contact (loosing terminal, entering foreign matter, damaging connector body)?	Repair the poor contact.	Go to step 7.
<b>7</b> <b>CHECK AFTER REPAIR.</b> 1) Perform the Clear Memory Mode. 2) Drive for a while and read DTC.	Is DTC displayed?	Replace the TCM. <Ref. to 5AT-54, Transmission Control Module (TCM).>	Temporary poor contact or open circuit occurs. Recheck that the harness connector has no faulty.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

## Q: DTC P0751 SHIFT SOLENOID “A” PERFORMANCE OR STUCK OFF

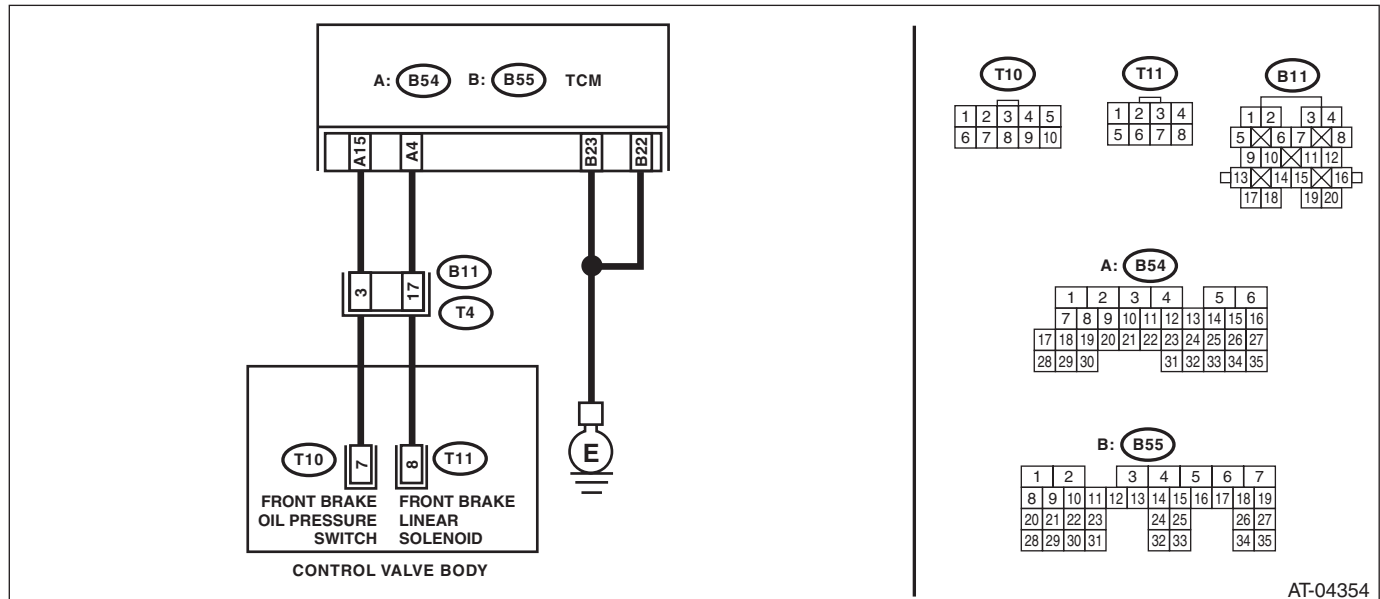
### DTC DETECTING CONDITION:

Output signal of front brake solenoid does not match with oil pressure.

### TROUBLE SYMPTOM:

Locked to 1st gear.

### WIRING DIAGRAM:



Step	Check	Yes	No
<b>1 CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and transmission. 3) Measure the resistance of harness between TCM connector and transmission connector. <b>Connector &amp; terminal</b> (B54) No. 4 — (B11) No. 17: (B54) No. 15 — (B11) No. 3: (B55) No. 22 — Chassis ground: (B55) No. 23 — Chassis ground:	Is the resistance less than 1 Ω?	Go to step 2.	Repair the open circuit of harness between TCM and transmission connector.
<b>2 CHECK HARNESS CONNECTOR BETWEEN TCM AND CHASSIS GROUND.</b> Measure the resistance of harness between TCM connector and chassis ground. <b>Connector &amp; terminal</b> (B54) No. 4 — Chassis ground:	Is the resistance 1 MΩ or more?	Go to step 3.	Repair the short circuit of harness between TCM and transmission connector.
<b>3 CHECK INPUT SIGNAL FOR TCM.</b> 1) Connect all connectors. 2) Turn the ignition switch to ON. (engine OFF) 3) Read the data of «F/B Fluid Pressure» using Subaru Select Monitor.	Is “OFF” displayed?	Go to step 4.	Go to step 6.
<b>4 CHECK INPUT SIGNAL FOR TCM.</b> 1) Turn the ignition switch to OFF. 2) Start the engine. 3) Shift to 1st speed while checking the current gear position using Subaru Select Monitor. 4) Read the data of «F/B Fluid Pressure» using Subaru Select Monitor.	Is “ON” displayed?	Check for poor contact of harness in the solenoid output and oil pressure SW input, and repair the defective part.	Go to step 5.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
<p><b>5</b></p> <p><b>CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.</b></p> <ol style="list-style-type: none"> <li>1) Turn the ignition switch to OFF.</li> <li>2) Disconnect the connector from transmission.</li> <li>3) Remove the transmission connector from bracket.</li> <li>4) Lift up the vehicle.</li> <li>5) Drain the ATF.</li> </ol> <p><b>CAUTION:</b> <b>Do not drain ATF until it cools down.</b></p> <ol style="list-style-type: none"> <li>6) Remove the oil pan.</li> <li>7) Disconnect the connector from the control valve body.</li> <li>8) Measure the resistance between transmission connector and control valve body connector.</li> </ol> <p><b>Connector &amp; terminal</b> <b>(B11) No. 3 — (T10) No. 7:</b> <b>(B11) No. 17 — (T11) No. 8:</b></p>	<p>Is the resistance less than 1 Ω?</p>	<p>Replace the control valve body. &lt;Ref. to 5AT-52, Control Valve Body.&gt;</p>	<p>Replace the transmission harness assembly.</p>
<p><b>6</b></p> <p><b>CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.</b></p> <ol style="list-style-type: none"> <li>1) Turn the ignition switch to OFF.</li> <li>2) Disconnect the connector from transmission.</li> <li>3) Remove the transmission connector from bracket.</li> <li>4) Lift up the vehicle.</li> <li>5) Drain the ATF.</li> </ol> <p><b>CAUTION:</b> <b>Do not drain ATF until it cools down.</b></p> <ol style="list-style-type: none"> <li>6) Remove the oil pan.</li> <li>7) Disconnect the connector from the control valve body.</li> <li>8) Measure the resistance between transmission ground and control valve body connector.</li> </ol> <p><b>Connector &amp; terminal</b> <b>(T10) No. 7 — Transmission ground:</b></p>	<p>Is the resistance 1 MΩ or more?</p>	<p>Replace the control valve body. &lt;Ref. to 5AT-52, Control Valve Body.&gt;</p>	<p>Replace the transmission harness assembly.</p>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

## R: DTC P0753 SHIFT SOLENOID "A" ELECTRICAL

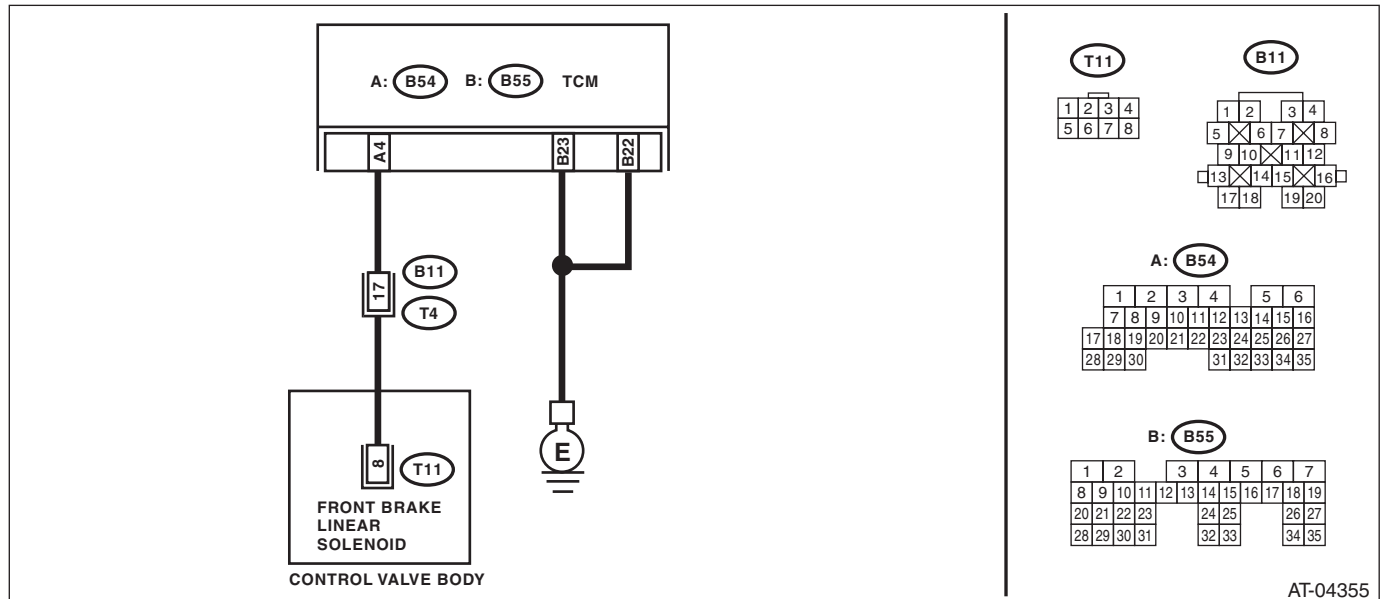
### DTC DETECTING CONDITION:

Output signal circuit of front brake solenoid is open or shorted.

### TROUBLE SYMPTOM:

Locked to 1st gear.

### WIRING DIAGRAM:



Step	Check	Yes	No
<b>1</b> <b>CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and transmission. 3) Measure the resistance of harness between TCM connector and transmission connector. <b>Connector &amp; terminal</b> (B54) No. 4 — (B11) No. 17: (B55) No. 22 — Chassis ground: (B55) No. 23 — Chassis ground:	Is the resistance less than 1 Ω?	Go to step 2.	Repair the open circuit of harness between TCM connector and transmission connector.
<b>2</b> <b>CHECK HARNESS CONNECTOR BETWEEN TCM AND CHASSIS GROUND.</b> Measure the resistance of harness between TCM connector and chassis ground. <b>Connector &amp; terminal</b> (B54) No. 4 — Chassis ground:	Is the resistance 1 MΩ or more?	Go to step 3.	Repair the short circuit of harness between TCM connector and transmission connector.



# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
<b>3</b> <b>CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connector from transmission. 3) Remove the transmission connector from bracket. 4) Lift up the vehicle. 5) Drain the ATF. <b>CAUTION:</b> <b>Do not drain ATF until it cools down.</b> 6) Remove the oil pan. 7) Disconnect the connector from the control valve body. 8) Measure the resistance between transmission connector and control valve body connector. <i>Connector &amp; terminal</i> <i>(T4) No. 17 — (T11) No. 8:</i>	Is the resistance less than 1 $\Omega$ ?	Go to step 4.	Repair the open circuit of harness between transmission connector and control valve body connector.
<b>4</b> <b>CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.</b> Measure the resistance between transmission ground and control valve body connector. <i>Connector &amp; terminal</i> <i>(T11) No. 8 — Transmission ground:</i>	Is the resistance 1 M $\Omega$ or more?	Repair the open circuit of harness between control valve body and transmission connector.	Go to step 5.
<b>5</b> <b>CHECK FRONT BRAKE SOLENOID.</b> Measure the resistance between transmission ground and control valve body connector. <i>Connector &amp; terminal</i> <i>(T11) No. 8 — Transmission ground:</i>	Is the resistance 3 — 9 $\Omega$ ?	Go to step 6.	Replace the control valve body. <Ref. to 5AT-52, Control Valve Body.>
<b>6</b> <b>CHECK FOR POOR CONTACT.</b> Check the TCM connector, transmission connector and control valve body connector.	Is there poor contact (loosing terminal, entering foreign matter, damaging connector body)?	Repair the poor contact.	Go to step 7.
<b>7</b> <b>CHECK AFTER REPAIR.</b> 1) Perform the Clear Memory Mode. 2) Drive for a while and read DTC.	Is DTC displayed?	Replace the TCM. <Ref. to 5AT-54, Transmission Control Module (TCM).>	Temporary poor contact or open circuit occurs. Recheck that the harness connector has no faulty.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

## S: DTC P0756 SHIFT SOLENOID “B” PERFORMANCE OR STUCK OFF

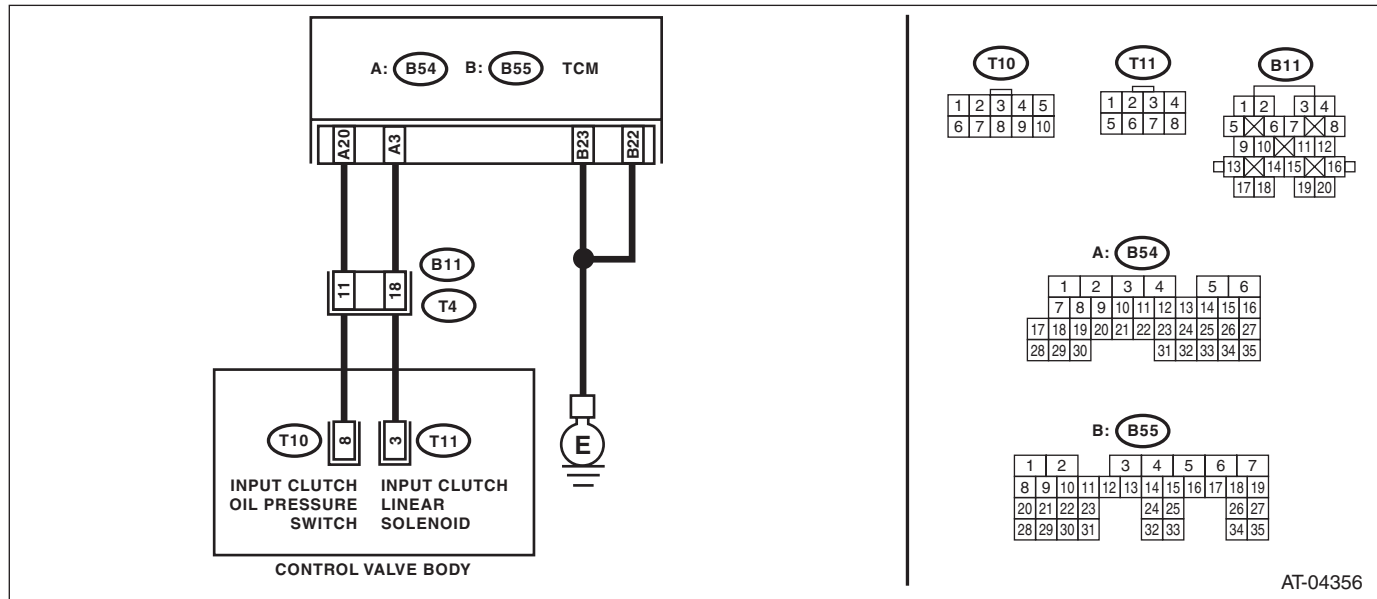
### DTC DETECTING CONDITION:

Output signal value of input clutch solenoid and oil pressure does not match.

### TROUBLE SYMPTOM:

Locked to 1st or 4th gear.

### WIRING DIAGRAM:



Step	Check	Yes	No
<b>1 CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and transmission. 3) Measure the resistance of harness between TCM connector and transmission connector. <b>Connector &amp; terminal</b> (B54) No. 3 — (B11) No. 18: (B54) No. 20 — (B11) No. 11: (B55) No. 22 — Chassis ground: (B55) No. 23 — Chassis ground:	Is the resistance less than 1 Ω?	Go to step 2.	Repair the open circuit of harness between TCM and transmission connector.
<b>2 CHECK HARNESS CONNECTOR BETWEEN TCM AND CHASSIS GROUND.</b> Measure the resistance of harness between TCM connector and chassis ground. <b>Connector &amp; terminal</b> (B54) No. 20 — Chassis ground:	Is the resistance 1 MΩ or more?	Go to step 3.	Repair the short circuit of harness between TCM and transmission connector.
<b>3 CHECK INPUT SIGNAL FOR TCM.</b> 1) Connect all connectors. 2) Turn the ignition switch to ON. (engine OFF) 3) Read the data of «I/C Fluid Pressure» using Subaru Select Monitor.	Is “OFF” displayed?	Go to step 4.	Go to step 6.
<b>4 CHECK INPUT SIGNAL FOR TCM.</b> 1) Turn the ignition switch to OFF. 2) Start the engine. 3) Drive the vehicle on 4th speed of manual mode with checking current gear position using Subaru Select Monitor. 4) Read the data of «I/C Fluid Pressure» using Subaru Select Monitor.	Is “ON” displayed?	Check for poor contact of harness in the solenoid output and oil pressure SW input, and repair the defective part.	Go to step 5.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
<p><b>5</b></p> <p><b>CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.</b></p> <ol style="list-style-type: none"> <li>1) Turn the ignition switch to OFF.</li> <li>2) Disconnect the connector from transmission.</li> <li>3) Remove the transmission connector from bracket.</li> <li>4) Lift up the vehicle.</li> <li>5) Drain the ATF.</li> </ol> <p><b>CAUTION:</b> <b>Do not drain ATF until it cools down.</b></p> <ol style="list-style-type: none"> <li>6) Remove the oil pan.</li> <li>7) Disconnect the connector from the control valve body.</li> <li>8) Measure the resistance between transmission connector and control valve body connector.</li> </ol> <p><b>Connector &amp; terminal</b> <b>(T4) No. 11 — (T10) No. 8:</b> <b>(T4) No. 18 — (T11) No. 3:</b></p>	<p>Is the resistance less than 1 Ω?</p>	<p>Replace the control valve body. &lt;Ref. to 5AT-52, Control Valve Body.&gt;</p>	<p>Replace the transmission harness assembly.</p>
<p><b>6</b></p> <p><b>CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.</b></p> <ol style="list-style-type: none"> <li>1) Turn the ignition switch to OFF.</li> <li>2) Disconnect the connector from transmission.</li> <li>3) Remove the transmission connector from bracket.</li> <li>4) Lift up the vehicle.</li> <li>5) Drain the ATF.</li> </ol> <p><b>CAUTION:</b> <b>Do not drain ATF until it cools down.</b></p> <ol style="list-style-type: none"> <li>6) Remove the oil pan.</li> <li>7) Disconnect the connector from the control valve body.</li> <li>8) Measure the resistance between transmission ground and control valve body connector.</li> </ol> <p><b>Connector &amp; terminal</b> <b>(T10) No. 8 — Transmission ground:</b></p>	<p>Is the resistance 1 MΩ or more?</p>	<p>Replace the control valve body. &lt;Ref. to 5AT-52, Control Valve Body.&gt;</p>	<p>Replace the transmission harness assembly.</p>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

## T: DTC P0758 SHIFT SOLENOID "B" ELECTRICAL

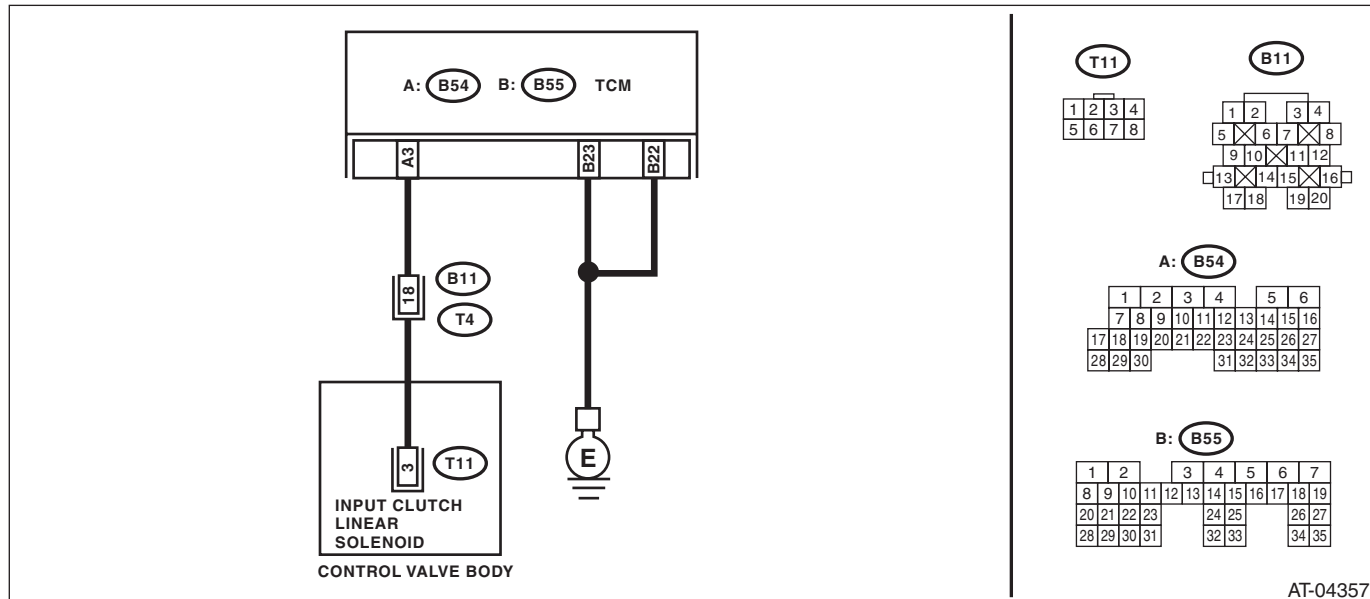
### DTC DETECTING CONDITION:

Output signal circuit of input clutch solenoid is open or shorted.

### TROUBLE SYMPTOM:

Locked to 1st or 4th gear.

### WIRING DIAGRAM:



Step	Check	Yes	No
<b>1</b> <b>CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and transmission. 3) Measure the resistance of harness between TCM connector and transmission connector. <i>Connector &amp; terminal</i> (B54) No. 3 — (B11) No. 18: (B55) No. 22 — Chassis ground: (B55) No. 23 — Chassis ground:	Is the resistance less than 1 Ω?	Go to step 2.	Repair the open circuit of harness between TCM and transmission connector.
<b>2</b> <b>CHECK HARNESS CONNECTOR BETWEEN TCM AND BODY HARNESS.</b> Measure the resistance of harness between TCM connector and body harness. <i>Connector &amp; terminal</i> (B54) No. 3 — Chassis ground:	Is the resistance 1 MΩ or more?	Go to step 3.	Repair the short circuit of harness between TCM and transmission connector.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
<b>3</b> <b>CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connector from transmission. 3) Remove the transmission connector from bracket. 4) Lift up the vehicle. 5) Drain the ATF. <b>CAUTION:</b> <b>Do not drain ATF until it cools down.</b> 6) Remove the oil pan. 7) Disconnect the connector from the control valve body. 8) Measure the resistance between transmission connector and control valve body connector. <b>Connector &amp; terminal</b> <b>(T4) No. 18 — (T11) No. 3:</b>	Is the resistance less than 1 $\Omega$ ?	Go to step 4.	Repair the open circuit of harness between transmission connector and control valve body connector.
<b>4</b> <b>CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.</b> Measure the resistance between transmission ground and control valve body connector. <b>Connector &amp; terminal</b> <b>(T11) No. 3 — Transmission ground:</b>	Is the resistance 1 M $\Omega$ or more?	Repair the open circuit of harness between transmission connector and control valve body connector.	Go to step 5.
<b>5</b> <b>CHECK INPUT CLUTCH SOLENOID.</b> Measure the resistance between transmission ground and control valve body connector. <b>Connector &amp; terminal</b> <b>(T11) No. 3 — Transmission ground:</b>	Is the resistance 3 — 9 $\Omega$ ?	Go to step 6.	Replace the control valve body. <Ref. to 5AT-52, Control Valve Body.>
<b>6</b> <b>CHECK FOR POOR CONTACT.</b> Check the TCM connector, transmission connector and control valve body connector.	Is there poor contact (loosing terminal, entering foreign matter, damaging connector body)?	Repair the poor contact.	Go to step 7.
<b>7</b> <b>CHECK AFTER REPAIR.</b> 1) Perform the Clear Memory Mode. 2) Drive for a while and read DTC.	Is DTC displayed?	Replace the TCM. <Ref. to 5AT-54, Transmission Control Module (TCM).>	Temporary poor contact or open circuit occurs. Recheck that the harness connector has no faulty.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

## U: DTC P0761 SHIFT SOLENOID “C” PERFORMANCE OR STUCK OFF

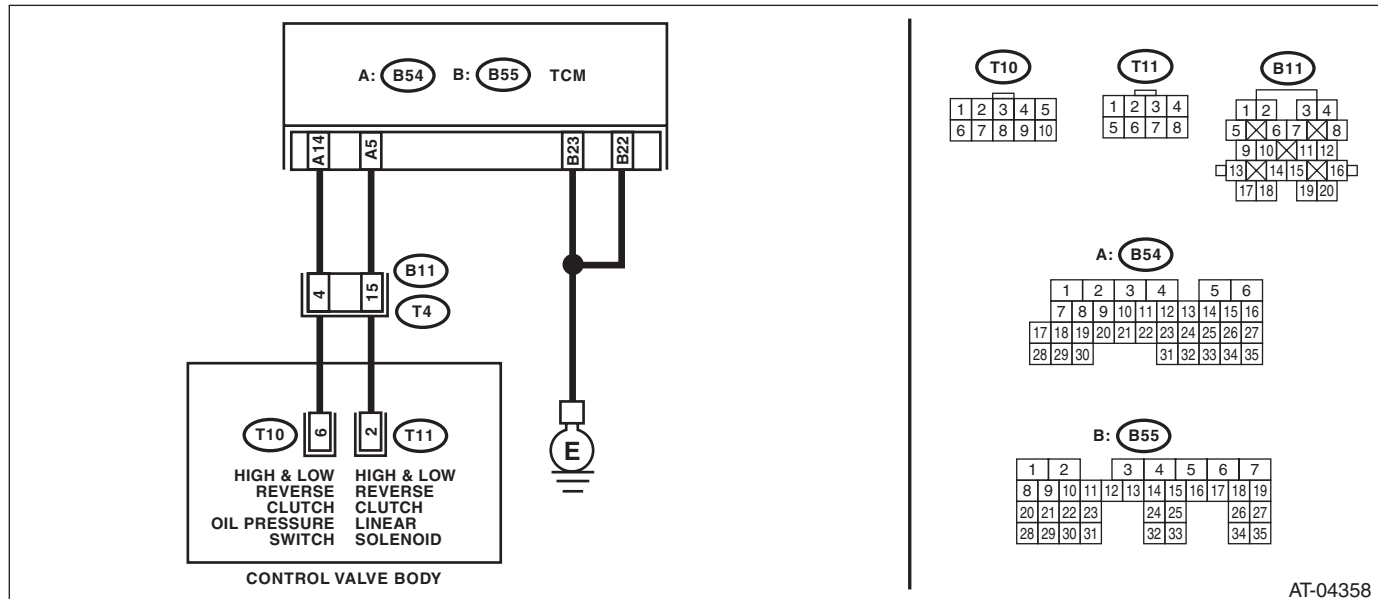
### DTC DETECTING CONDITION:

Output signal value of high & low reverse clutch solenoid and oil pressure does not match.

### TROUBLE SYMPTOM:

Locked to 1st gear.

### WIRING DIAGRAM:



Step	Check	Yes	No
<b>1 CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and transmission. 3) Measure the resistance of harness between TCM connector and transmission connector. <b>Connector &amp; terminal</b> (B54) No. 5 — (B11) No. 15: (B54) No. 14 — (B11) No. 4: (B55) No. 22 — Chassis ground: (B55) No. 23 — Chassis ground:	Is the resistance less than 1 Ω?	Go to step 2.	Repair the open circuit of harness between TCM and transmission connector.
<b>2 CHECK HARNESS CONNECTOR BETWEEN TCM AND CHASSIS GROUND.</b> Measure the resistance of harness between TCM connector and chassis ground. <b>Connector &amp; terminal</b> (B54) No. 14 — Chassis ground:	Is the resistance 1 MΩ or more?	Go to step 3.	Repair the short circuit of harness between TCM and transmission connector.
<b>3 CHECK INPUT SIGNAL FOR TCM.</b> 1) Connect all connectors. 2) Turn the ignition switch to ON. (engine OFF) 3) Read the data of «H&LR/C Oil Pressure Switch» using Subaru Select Monitor.	Is “OFF” displayed?	Go to step 4.	Go to step 6.
<b>4 CHECK INPUT SIGNAL FOR TCM.</b> 1) Turn the ignition switch to OFF. 2) Start the engine. 3) Set the select lever to “N” range while depressing the brake pedal. 4) Read the data of «H&LR/C Oil Pressure Switch» using Subaru Select Monitor.	Does the display show “OFF”?	Check for poor contact of harness in the solenoid output and oil pressure SW input, and repair the defective part.	Go to step 5.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
<p><b>5</b></p> <p><b>CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.</b></p> <ol style="list-style-type: none"> <li>1) Turn the ignition switch to OFF.</li> <li>2) Disconnect the connector from transmission.</li> <li>3) Remove the transmission connector from bracket.</li> <li>4) Lift up the vehicle.</li> <li>5) Drain the ATF.</li> </ol> <p><b>CAUTION:</b> <b>Do not drain ATF until it cools down.</b></p> <ol style="list-style-type: none"> <li>6) Remove the oil pan.</li> <li>7) Disconnect the connector from the control valve body.</li> <li>8) Measure the resistance between transmission connector and control valve body connector.</li> </ol> <p><b>Connector &amp; terminal</b> <b>(T4) No. 4 — (T10) No. 6:</b> <b>(T4) No. 15 — (T11) No. 2:</b></p>	<p>Is the resistance less than 1 Ω?</p>	<p>Replace the control valve body. &lt;Ref. to 5AT-52, Control Valve Body.&gt;</p>	<p>Replace the transmission harness assembly.</p>
<p><b>6</b></p> <p><b>CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.</b></p> <ol style="list-style-type: none"> <li>1) Turn the ignition switch to OFF.</li> <li>2) Disconnect the connector from transmission.</li> <li>3) Remove the transmission connector from bracket.</li> <li>4) Lift up the vehicle.</li> <li>5) Drain the ATF.</li> </ol> <p><b>CAUTION:</b> <b>Do not drain ATF until it cools down.</b></p> <ol style="list-style-type: none"> <li>6) Remove the oil pan.</li> <li>7) Disconnect the connector from the control valve body.</li> <li>8) Measure the resistance between transmission ground and control valve body connector.</li> </ol> <p><b>Connector &amp; terminal</b> <b>(T10) No. 6 — Transmission ground:</b></p>	<p>Is the resistance 1 MΩ or more?</p>	<p>Replace the control valve body. &lt;Ref. to 5AT-52, Control Valve Body.&gt;</p>	<p>Replace the transmission harness assembly.</p>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

## V: DTC P0763 SHIFT SOLENOID "C" ELECTRICAL

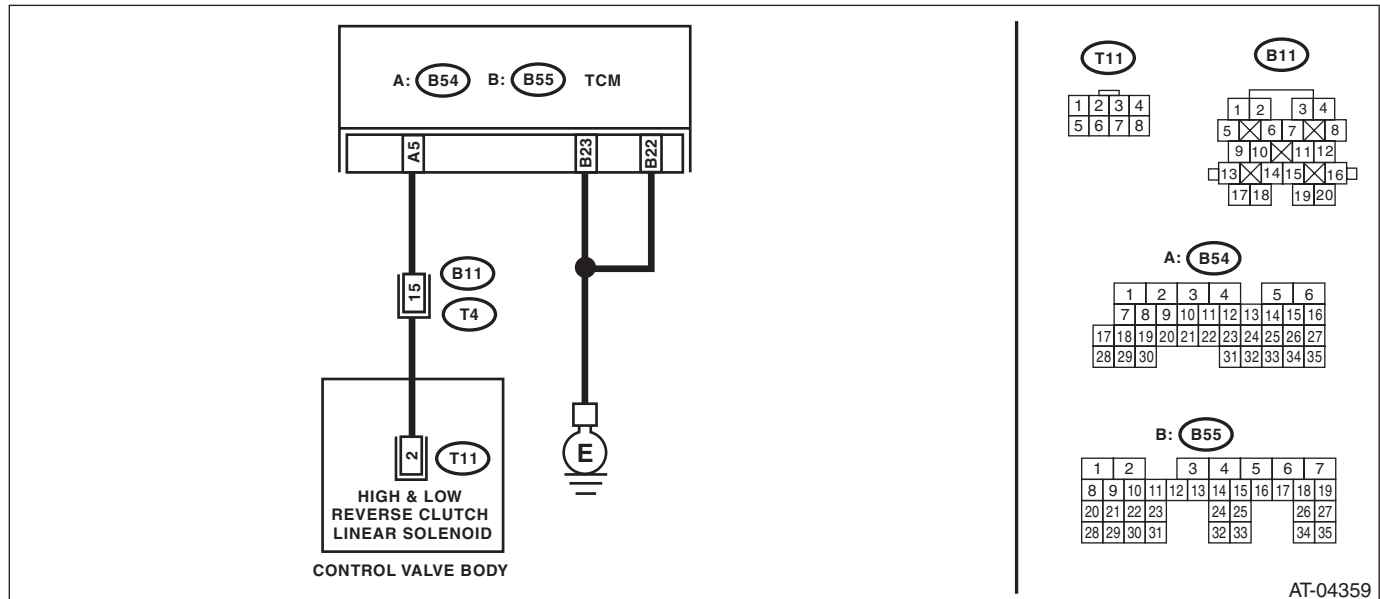
### DTC DETECTING CONDITION:

Output signal circuit of high & low reverse clutch solenoid is open or shorted.

### TROUBLE SYMPTOM:

Locked to 1st gear.

### WIRING DIAGRAM:



Step	Check	Yes	No
<b>1</b> <b>CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and transmission. 3) Measure the resistance of harness between TCM connector and transmission connector. <b>Connector &amp; terminal</b> (B54) No. 5 — (B11) No. 15: (B55) No. 22 — Chassis ground: (B55) No. 23 — Chassis ground:	Is the resistance less than 1 Ω?	Go to step 2.	Repair the open circuit of harness between TCM connector and transmission connector.
<b>2</b> <b>CHECK HARNESS CONNECTOR BETWEEN TCM AND CHASSIS GROUND.</b> Measure the resistance of harness between TCM connector and chassis ground. <b>Connector &amp; terminal</b> (B54) No. 5 — Chassis ground:	Is the resistance 1 MΩ or more?	Go to step 3.	Repair the short circuit of harness between TCM connector and transmission connector.



# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
<b>3</b> <b>CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connector from transmission. 3) Remove the transmission connector from bracket. 4) Lift up the vehicle. 5) Drain the ATF. <b>CAUTION:</b> <b>Do not drain ATF until it cools down.</b> 6) Remove the oil pan. 7) Disconnect the connector from the control valve body. 8) Measure the resistance between transmission connector and control valve body connector. <b>Connector &amp; terminal</b> <b>(T4) No. 15 — (T11) No. 2:</b>	Is the resistance less than 1 Ω?	Go to step 4.	Repair the open circuit of harness between transmission connector and control valve body connector.
<b>4</b> <b>CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.</b> Measure the resistance of harness connector between control valve body connector and transmission ground. <b>Connector &amp; terminal</b> <b>(T11) No. 2 — Transmission ground:</b>	Is the resistance 1 MΩ or more?	Repair the open circuit of harness between control valve body connector and transmission ground.	Go to step 5.
<b>5</b> <b>CHECK HIGH &amp; LOW REVERSE CLUTCH SOLENOID.</b> Measure the resistance between transmission ground and control valve body connector. <b>Connector &amp; terminal</b> <b>(T11) No. 2 — Transmission ground:</b>	Is the resistance 3 — 9 Ω?	Go to step 6.	Replace the control valve body. <Ref. to 5AT-52, Control Valve Body.>
<b>6</b> <b>CHECK FOR POOR CONTACT.</b> Check the TCM connector, transmission connector and control valve body connector.	Is there poor contact (loosing terminal, entering foreign matter, damaging connector body)?	Repair the poor contact.	Go to step 7.
<b>7</b> <b>CHECK AFTER REPAIR.</b> 1) Perform the Clear Memory Mode. 2) Drive for a while and read DTC.	Is DTC displayed?	Replace the TCM. <Ref. to 5AT-54, Transmission Control Module (TCM).>	Temporary poor contact or open circuit occurs. Recheck that the harness connector has no faulty.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

## W: DTC P0766 SHIFT SOLENOID “D” PERFORMANCE OR STUCK OFF

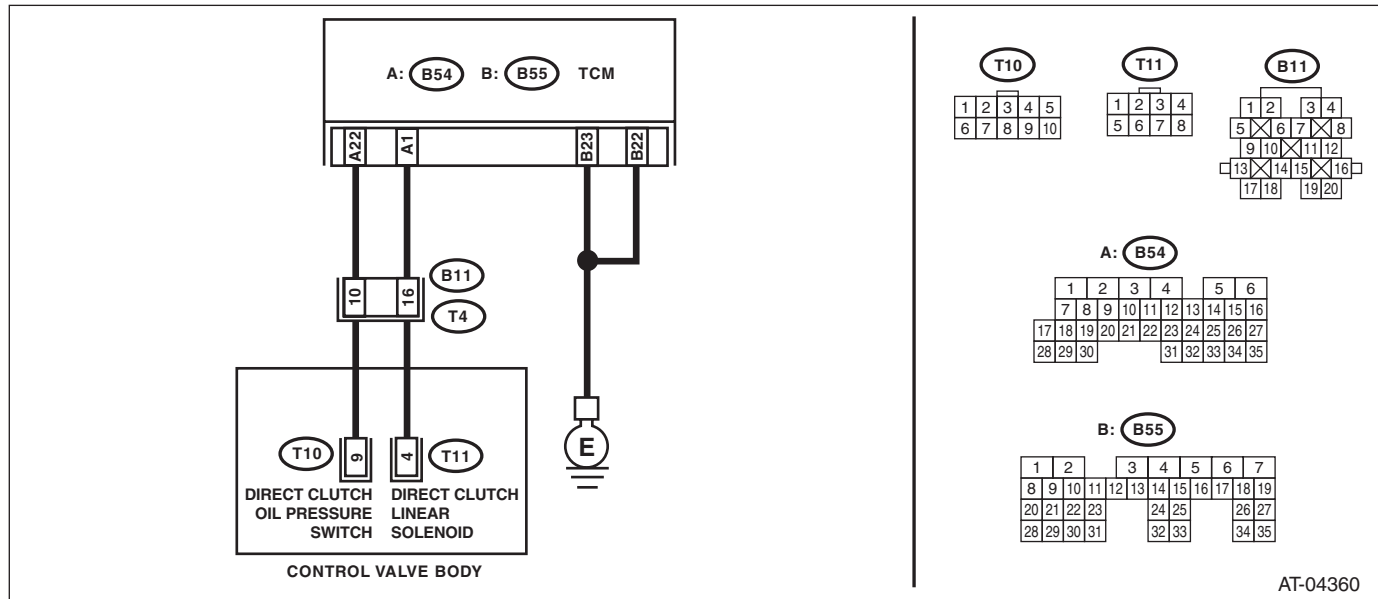
### DTC DETECTING CONDITION:

Output signal value of direct clutch solenoid and oil pressure does not match.

### TROUBLE SYMPTOM:

Locked to 1st or 4th gear.

### WIRING DIAGRAM:



Step	Check	Yes	No
<b>1 CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and transmission. 3) Measure the resistance of harness between TCM connector and transmission connector. <b>Connector &amp; terminal</b> <b>(B54) No. 1 — (B11) No. 16:</b> <b>(B54) No. 22 — (B11) No. 10:</b> <b>(B55) No. 22 — Chassis ground:</b> <b>(B55) No. 23 — Chassis ground:</b>	Is the resistance less than 1 Ω?	Go to step 2.	Repair the open circuit of harness between TCM and transmission connector.
<b>2 CHECK HARNESS CONNECTOR BETWEEN TCM AND BODY HARNESS.</b> Measure the resistance of harness between TCM connector and body harness. <b>Connector &amp; terminal</b> <b>(B54) No. 22 — Chassis ground:</b>	Is the resistance 1 MΩ or more?	Go to step 3.	Repair the short circuit of harness between TCM and transmission connector.
<b>3 CHECK INPUT SIGNAL FOR TCM.</b> 1) Connect all connectors. 2) Turn the ignition switch to ON. (engine OFF) 3) Read the data of «D/C Fluid Pressure» using Subaru Select Monitor.	Is “OFF” displayed?	Go to step 4.	Go to step 6.
<b>4 CHECK INPUT SIGNAL FOR TCM.</b> 1) Turn the ignition switch to OFF. 2) Start the engine. 3) Shift to 2nd speed of manual mode and depress the brake pedal while checking the current gear position using Subaru Select Monitor. 4) Read the data of «D/C Fluid Pressure» using Subaru Select Monitor.	Is “ON” displayed?	Check for poor contact of harness in the solenoid output and oil pressure SW input, and repair the defective part.	Go to step 5.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
<p><b>5</b></p> <p><b>CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.</b></p> <ol style="list-style-type: none"> <li>1) Turn the ignition switch to OFF.</li> <li>2) Disconnect the connector from transmission.</li> <li>3) Remove the transmission connector from bracket.</li> <li>4) Lift up the vehicle.</li> <li>5) Drain the ATF.</li> </ol> <p><b>CAUTION:</b> <b>Do not drain ATF until it cools down.</b></p> <ol style="list-style-type: none"> <li>6) Remove the oil pan.</li> <li>7) Disconnect the connector from the control valve body.</li> <li>8) Measure the resistance between transmission connector and control valve body connector.</li> </ol> <p><b>Connector &amp; terminal</b> <b>(T4) No. 10 — (T10) No. 9:</b> <b>(T4) No. 16 — (T11) No. 4:</b></p>	<p>Is the resistance less than 1 Ω?</p>	<p>Replace the control valve body. &lt;Ref. to 5AT-52, Control Valve Body.&gt;</p>	<p>Replace the transmission harness assembly.</p>
<p><b>6</b></p> <p><b>CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.</b></p> <ol style="list-style-type: none"> <li>1) Turn the ignition switch to OFF.</li> <li>2) Disconnect the connector from transmission.</li> <li>3) Remove the transmission connector from bracket.</li> <li>4) Lift up the vehicle.</li> <li>5) Drain the ATF.</li> </ol> <p><b>CAUTION:</b> <b>Do not drain ATF until it cools down.</b></p> <ol style="list-style-type: none"> <li>6) Remove the oil pan.</li> <li>7) Disconnect the connector from the control valve body.</li> <li>8) Measure the resistance between transmission ground and control valve body connector.</li> </ol> <p><b>Connector &amp; terminal</b> <b>(T10) No. 9 — Transmission ground:</b></p>	<p>Is the resistance 1 MΩ or more?</p>	<p>Replace the control valve body. &lt;Ref. to 5AT-52, Control Valve Body.&gt;</p>	<p>Replace the transmission harness assembly.</p>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

## X: DTC P0768 SHIFT SOLENOID “D” ELECTRICAL

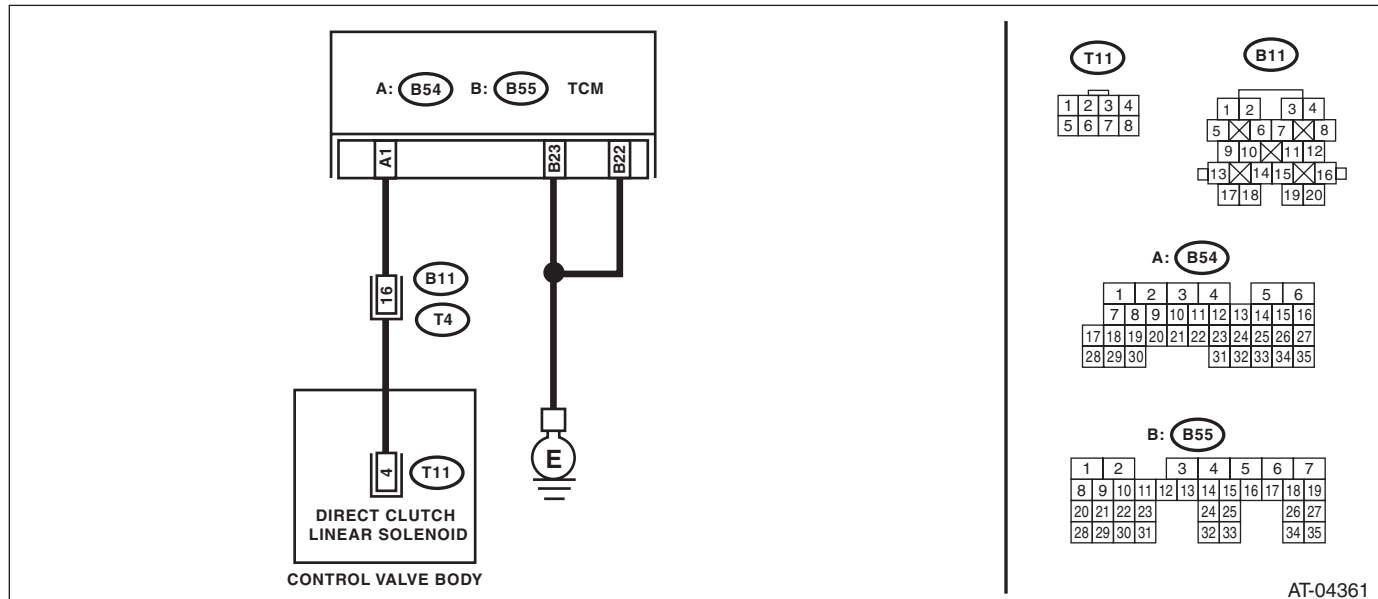
### DTC DETECTING CONDITION:

The output signal circuit of direct clutch solenoid is open or shorted.

### TROUBLE SYMPTOM:

Locked to 1st or 4th gear.

### WIRING DIAGRAM:



Step	Check	Yes	No
<b>1</b> <b>CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and transmission. 3) Measure the resistance of harness between TCM connector and transmission connector. <i>Connector &amp; terminal</i> (B54) No. 1 — (B11) No. 16: (B55) No. 22 — Chassis ground: (B55) No. 23 — Chassis ground:	Is the resistance less than 1 Ω?	Go to step 2.	Repair the open circuit of harness between TCM connector and transmission connector.
<b>2</b> <b>CHECK HARNESS CONNECTOR BETWEEN TCM AND CHASSIS GROUND.</b> Measure the resistance of harness between TCM connector and chassis ground. <i>Connector &amp; terminal</i> (B54) No. 1 — Chassis ground:	Is the resistance 1 MΩ or more?	Go to step 3.	Repair the short circuit of harness between TCM connector and transmission connector.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
<b>3</b> <b>CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connector from transmission. 3) Remove the transmission connector from bracket. 4) Lift up the vehicle. 5) Drain the ATF. <b>CAUTION:</b> <b>Do not drain ATF until it cools down.</b> 6) Remove the oil pan. 7) Disconnect the connector from the control valve body. 8) Measure the resistance between transmission connector and control valve body connector. <b>Connector &amp; terminal</b> <b>(T4) No. 16 — (T11) No. 4:</b>	Is the resistance less than 1 $\Omega$ ?	Go to step 4.	Repair the open circuit of harness between transmission connector and control valve body connector.
<b>4</b> <b>CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.</b> Measure the resistance between transmission ground and control valve body connector. <b>Connector &amp; terminal</b> <b>(T11) No. 4 — Transmission ground:</b>	Is the resistance 1 M $\Omega$ or more?	Repair the open circuit of harness between control valve body connector and transmission ground.	Go to step 5.
<b>5</b> <b>CHECK DIRECT CLUTCH SOLENOID.</b> Measure the resistance of harness connector between control valve body connector and transmission ground. <b>Connector &amp; terminal</b> <b>(T11) No. 4 — Transmission ground:</b>	Is the resistance 3 — 9 $\Omega$ ?	Go to step 6.	Replace the control valve body. <Ref. to 5AT-52, Control Valve Body.>
<b>6</b> <b>CHECK FOR POOR CONTACT.</b> Check the TCM connector, transmission connector and control valve body connector.	Is there poor contact (loosing terminal, entering foreign matter, damaging connector body)?	Repair the poor contact.	Go to step 7.
<b>7</b> <b>CHECK AFTER REPAIR.</b> 1) Perform the Clear Memory Mode. 2) Drive for a while and read DTC.	Is DTC displayed?	Replace the TCM. <Ref. to 5AT-54, Transmission Control Module (TCM).>	Temporary poor contact or open circuit occurs. Recheck that the harness connector has no faulty.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

## Y: DTC P0771 SHIFT SOLENOID "E" PERFORMANCE OR STUCK OFF

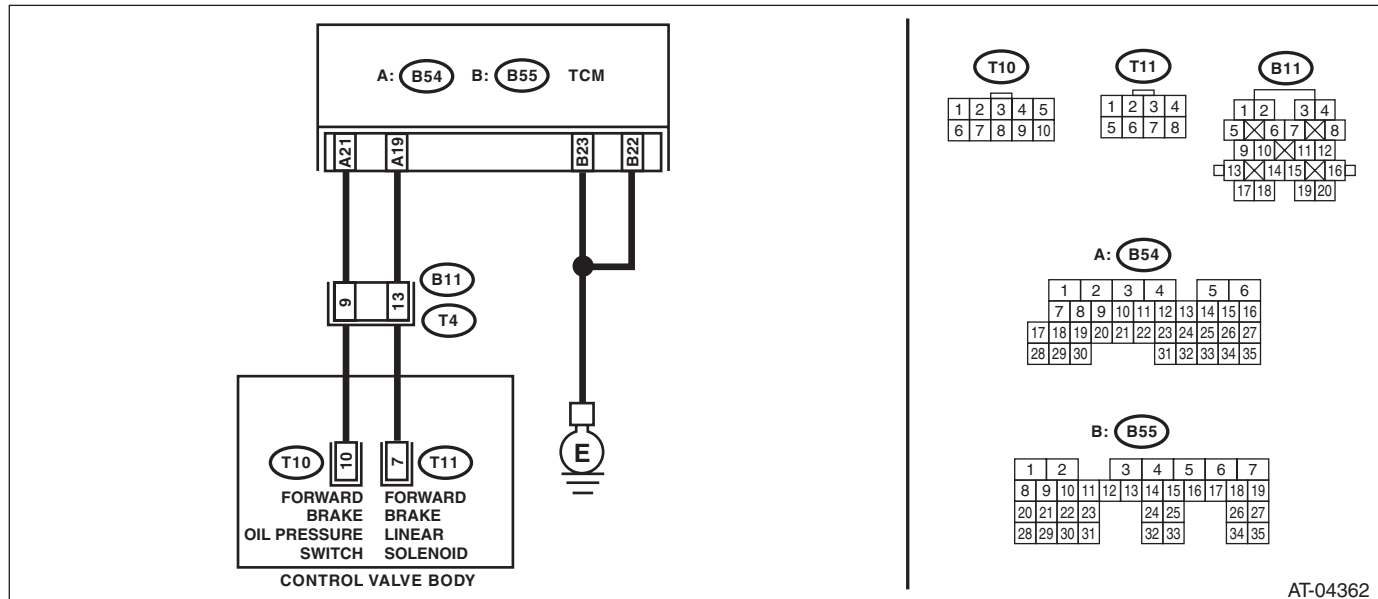
### DTC DETECTING CONDITION:

Output signal of forward brake solenoid does not match the oil pressure.

### TROUBLE SYMPTOM:

Locked to 2nd, 3rd or 4th gear.

### WIRING DIAGRAM:



AT-04362

Step	Check	Yes	No
<b>1 CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and transmission. 3) Measure the resistance of harness between TCM connector and transmission connector. <b>Connector &amp; terminal</b> (B54) No. 19 — (B11) No. 13: (B54) No. 21 — (B11) No. 9: (B55) No. 22 — Chassis ground: (B55) No. 23 — Chassis ground:	Is the resistance less than 1 Ω?	Go to step 2.	Repair the open circuit of harness between TCM and transmission connector.
<b>2 CHECK HARNESS CONNECTOR BETWEEN TCM AND CHASSIS GROUND.</b> Measure the resistance between TCM connector and chassis ground. <b>Connector &amp; terminal</b> (B54) No. 21 — Chassis ground:	Is the resistance 1 MΩ or more?	Go to step 3.	Repair the short circuit of harness between TCM and transmission connector.
<b>3 CHECK INPUT SIGNAL FOR TCM.</b> 1) Connect all connectors. 2) Turn the ignition switch to ON. (engine OFF) 3) Read the data of «Fwd/B hydraulic pressure SW» using Subaru Select Monitor.	Is "OFF" displayed?	Go to step 4.	Go to step 6.
<b>4 CHECK INPUT SIGNAL FOR TCM.</b> 1) Turn the ignition switch to OFF. 2) Start the engine. 3) Drive the vehicle on 2nd speed of manual mode at 15 km/h (9 MPH) with checking current gear position using Subaru Select Monitor. 4) Read the data of «Fwd/B hydraulic pressure SW» using Subaru Select Monitor.	Is "ON" displayed?	Check for poor contact of harness in the solenoid output and oil pressure SW input, and repair the defective part.	Go to step 5.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
<p><b>5</b></p> <p><b>CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.</b></p> <ol style="list-style-type: none"> <li>1) Turn the ignition switch to OFF.</li> <li>2) Disconnect the connector from transmission.</li> <li>3) Remove the transmission connector from bracket.</li> <li>4) Lift up the vehicle.</li> <li>5) Drain the ATF.</li> </ol> <p><b>CAUTION:</b> <b>Do not drain ATF until it cools down.</b></p> <ol style="list-style-type: none"> <li>6) Remove the oil pan.</li> <li>7) Disconnect the connector from the control valve body.</li> <li>8) Measure the resistance between transmission connector and control valve body connector.</li> </ol> <p><b>Connector &amp; terminal</b> <b>(T4) No. 9 — (T10) No. 10:</b> <b>(T4) No. 13 — (T11) No. 7:</b></p>	<p>Is the resistance less than 1 Ω?</p>	<p>Replace the control valve body. &lt;Ref. to 5AT-52, Control Valve Body.&gt;</p>	<p>Replace the transmission harness assembly.</p>
<p><b>6</b></p> <p><b>CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.</b></p> <ol style="list-style-type: none"> <li>1) Turn the ignition switch to OFF.</li> <li>2) Disconnect the connector from transmission.</li> <li>3) Remove the transmission connector from bracket.</li> <li>4) Lift up the vehicle.</li> <li>5) Drain the ATF.</li> </ol> <p><b>CAUTION:</b> <b>Do not drain ATF until it cools down.</b></p> <ol style="list-style-type: none"> <li>6) Remove the oil pan.</li> <li>7) Disconnect the connector from the control valve body.</li> <li>8) Measure the resistance between transmission ground and control valve body connector.</li> </ol> <p><b>Connector &amp; terminal</b> <b>(T10) No. 10 — Transmission ground:</b></p>	<p>Is the resistance 1 MΩ or more?</p>	<p>Replace the control valve body. &lt;Ref. to 5AT-52, Control Valve Body.&gt;</p>	<p>Replace the transmission harness assembly.</p>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

## Z: DTC P0773 SHIFT SOLENOID "E" ELECTRICAL

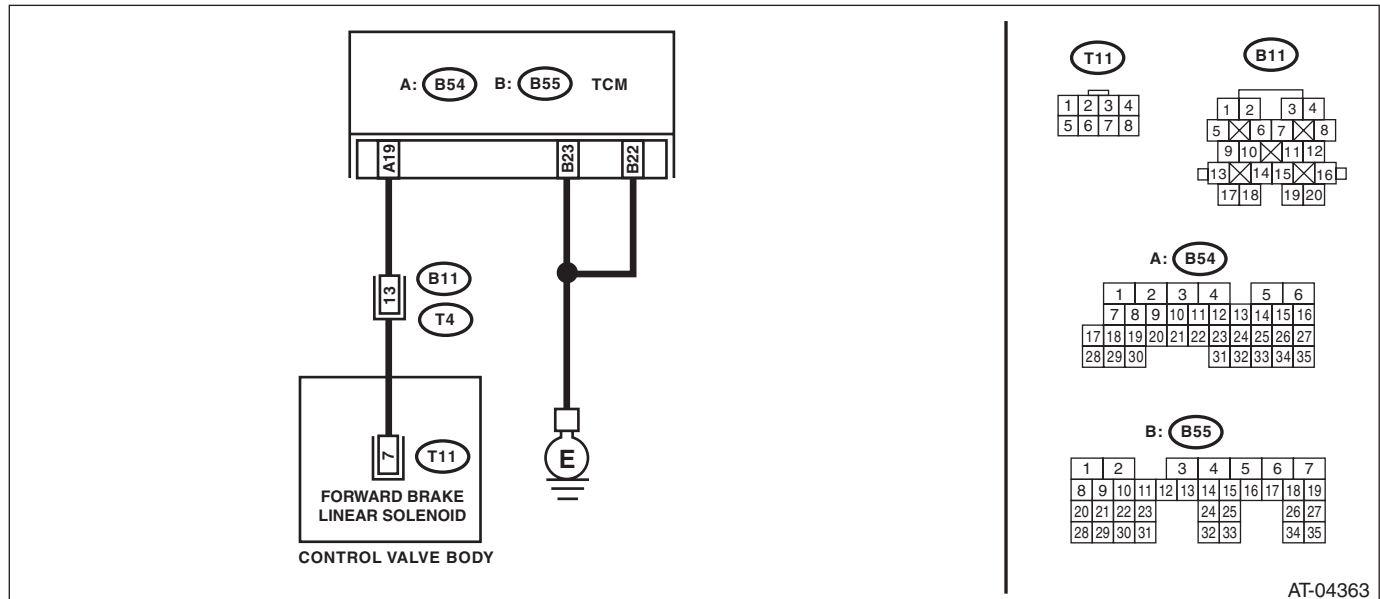
### DTC DETECTING CONDITION:

Output signal circuit of forward brake solenoid is open or shorted.

### TROUBLE SYMPTOM:

Locked to 2nd, 3rd or 4th gear.

### WIRING DIAGRAM:



Step	Check	Yes	No
<b>1</b> <b>CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and transmission. 3) Measure the resistance of harness between TCM connector and transmission connector. <b>Connector &amp; terminal</b> <b>(B54) No. 19 — (B11) No. 13:</b> <b>(B55) No. 22 — Chassis ground:</b> <b>(B55) No. 23 — Chassis ground:</b>	Is the resistance less than 1 Ω?	Go to step 2.	Repair the open circuit of harness between TCM connector and transmission connector.
<b>2</b> <b>CHECK HARNESS CONNECTOR BETWEEN TCM AND BODY HARNESS.</b> Measure the resistance of harness between TCM connector and body harness. <b>Connector &amp; terminal</b> <b>(B54) No. 19 — Chassis ground:</b>	Is the resistance 1 MΩ or more?	Go to step 3.	Repair the short circuit of harness between TCM connector and transmission connector.



# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
<b>3</b> <b>CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connector from transmission. 3) Remove the transmission connector from bracket. 4) Lift up the vehicle. 5) Drain the ATF. <b>CAUTION:</b> <b>Do not drain ATF until it cools down.</b> 6) Remove the oil pan. 7) Disconnect the connector from the control valve body. 8) Measure the resistance between transmission connector and control valve body connector. <i>Connector &amp; terminal</i> <i>(T4) No. 13 — (T11) No. 7:</i>	Is the resistance less than 1 $\Omega$ ?	Go to step 4.	Repair the open circuit of harness between transmission connector and control valve body connector.
<b>4</b> <b>CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.</b> Measure the resistance between transmission ground and control valve body connector. <i>Connector &amp; terminal</i> <i>(T11) No. 7 — Transmission ground:</i>	Is the resistance 1 M $\Omega$ or more?	Repair the open circuit of harness between control valve body connector and transmission ground.	Go to step 5.
<b>5</b> <b>CHECK FORWARD BRAKE SOLENOID.</b> Measure the resistance of harness connector between control valve body connector and transmission ground. <i>Connector &amp; terminal</i> <i>(T11) No. 7 — Transmission ground:</i>	Is the resistance 5 — 17 $\Omega$ ?	Go to step 6.	Replace the control valve body. <Ref. to 5AT-52, Control Valve Body.>
<b>6</b> <b>CHECK FOR POOR CONTACT.</b> Check the TCM connector, transmission connector and control valve body connector.	Is there poor contact (loosing terminal, entering foreign matter, damaging connector body)?	Repair the poor contact.	Go to step 7.
<b>7</b> <b>CHECK AFTER REPAIR.</b> 1) Perform the Clear Memory Mode. 2) Drive for a while and read DTC.	Is DTC displayed?	Replace the TCM. <Ref. to 5AT-54, Transmission Control Module (TCM).>	Temporary poor contact occurs. Recheck that the harness connector has no faulty.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

## AA:DTC P0801 REVERSE INHIBIT CONTROL CIRCUIT

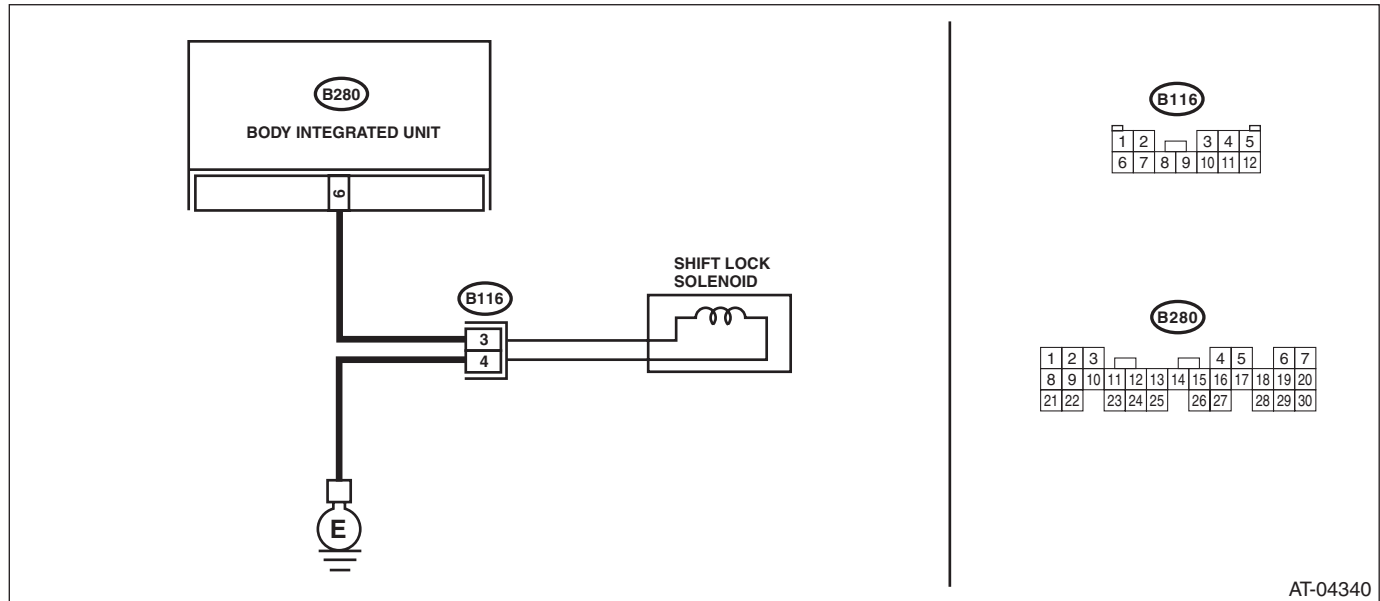
### DTC DETECTING CONDITION:

Shift lock solenoid malfunction, open or short reverse inhibitor control circuit

### TROUBLE SYMPTOM:

- Gear is shifted from “N” range to “R” range during driving at 20 km/h (12 MPH) or more.
- Gear can not be shifted from “N” range to “R” range though the vehicle is parked.

### WIRING DIAGRAM:



Step	Check	Yes	No
<b>1 CHECK SHIFT LOCK SOLENOID.</b> 1) Forcibly activate the body integrated unit to check the operation of shift lock solenoid. (<Ref. to LAN(diag)-12, OPERATION, Subaru Select Monitor.>) 2) Move the select lever without depressing the brake pedal.	Does the select lever shift?	Go to step 2.	Go to step 3.
<b>2 CHECK OUTPUT SIGNAL OF BODY INTEGRATED UNIT.</b> 1) Display the following items using Subaru Select Monitor. <Ref. to LAN(diag)-29, Read Current Data.> <ul style="list-style-type: none"> <li>• Key-lock warning SW</li> <li>• Shift position</li> <li>• P SW</li> <li>• Stop light switch</li> </ul> 2) With the brake pedal depressed, shift the select lever to “P” range.	Do the units of measure of items displayed change?	Go to step 3.	Check the circuits of the items whose values do not change.
<b>3 CHECK HARNESS CONNECTOR BETWEEN BODY INTEGRATED UNIT AND SHIFT LOCK SOLENOID.</b> Measure the harness resistance between the body integrated unit and chassis ground. <b>Connector &amp; terminal</b> <b>(B280) No. 6 — Chassis ground:</b>	Is the resistance 1 MΩ or more?	Go to step 4.	Repair the short circuit of harness between body integrated unit and shift lock solenoid connector.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
<p><b>4 CHECK HARNESS BETWEEN SHIFT LOCK SOLENOID AND CHASSIS GROUND TERMINAL.</b> Measure the resistance of harness between shift lock solenoid and chassis ground. <b>Connector &amp; terminal</b> <b>(B116) No. 4 — Chassis ground:</b></p>	Is the resistance less than 1 Ω?	Go to step 5.	Repair the open circuit of harness between chassis ground and shift lock solenoid connector.
<p><b>5 CHECK SHIFT LOCK SOLENOID.</b> Measure the resistance of shift lock solenoid terminals. <b>Connector &amp; terminal</b> <b>(B116) No. 3 — No. 4:</b></p>	Is the resistance 7 — 21 Ω?	Go to step 6.	Replace the shift lock solenoid.
<p><b>6 CHECK OUTPUT SIGNAL OF BODY INTEGRATED UNIT.</b> 1) Connect all connectors. 2) Turn the ignition switch to ON. 3) With the brake pedal depressed, shift the select lever to “D” range. 4) Measure the voltage between body integrated unit and chassis ground. <b>Connector &amp; terminal</b> <b>(B280) No. 6 (+) — Chassis ground (-):</b></p>	Is the voltage 10.5 V or more?	Go to step 7.	Go to step 8.
<p><b>7 CHECK OUTPUT SIGNAL OF BODY INTEGRATED UNIT.</b> 1) Lift up the vehicle. 2) Start the engine. 3) Shift the select lever to “D” range and slowly increase the vehicle speed to more than 20 km/h (12 MPH). NOTE: The speed difference between front and rear wheels lights the ABS warning light or the VDC warning light, but this does not indicate a malfunction. If the warning light illuminates, delete the ABS or VDC memory after completing the AT control diagnosis. &lt;Ref. to VDC(diag)-26, Clear Memory Mode.&gt; 4) Measure the voltage between body integrated unit and chassis ground. <b>Connector &amp; terminal</b> <b>(B280) No. 6 (+) — Chassis ground (-):</b></p>	Is the voltage less than 1 V?	Check the harnesses or connectors in reverse inhibitor control circuit, and repair the defective part.	Go to step 8.
<p><b>8 CHECK FOR POOR CONTACT.</b></p>	Is there poor contact of the reverse inhibitor control circuit?	Repair the poor contact.	Replace the body integrated unit. <Ref. to SL-48, Body Integrated Unit.>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## AUTOMATIC TRANSMISSION (DIAGNOSTICS)

### AB:DTC P0817 STARTER DISABLE CIRCUIT

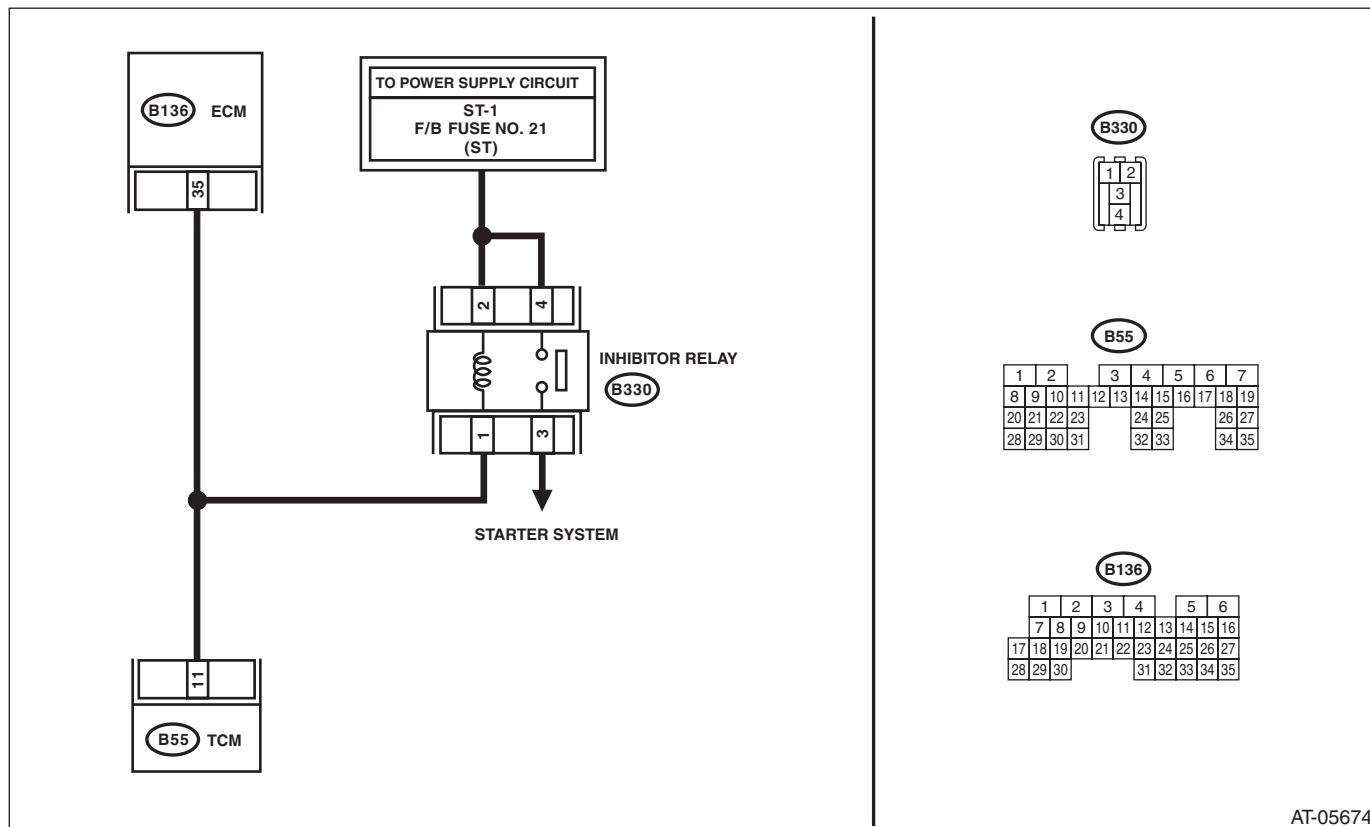
#### DTC DETECTING CONDITION:

Open or short in P/N signal output circuit

#### TROUBLE SYMPTOM:

- Engine can be started on other than “P” or “N” range
- Engine can not be started on “P” or “N” range.

#### WIRING DIAGRAM:



AT-05674

Step	Check	Yes	No	
1	<b>CHECK DTC OF TCM.</b>	Is DTC of Transmission Range Sensor Circuit (PRNDL Input) detected?	Perform the diagnosis according to DTC.	Go to step 2.
2	<b>CHECK ECM.</b>	Is the communication between Subaru Select Monitor and ECM normal?	Go to step 3.	Perform the diagnosis according to DTC of ECM.
3	<b>CHECK FUSE (NO. 21).</b> 1) Turn the ignition switch to OFF. 2) Remove the fuse.	Is the fuse (No. 21) blown out?	Replace the fuse (No. 21). If the replaced fuse (No. 21) has blown out easily, repair the short circuit of harness (No. 21) and inhibitor relay.	Go to step 4.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
<b>4 CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM, ECM and inhibitor relay. 3) Measure the resistance of harness between TCM connector and ECM connector. <b>Connector &amp; terminal</b> <b>(B55) No. 11 — (B136) No. 35</b>	Is the resistance less than 1 $\Omega$ ?	Go to step 5.	Repair the open circuit of harness between TCM and ECM connector, or poor contact of connector.
<b>5 CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR RELAY.</b> Measure the resistance of the harness between TCM and inhibitor relay. <b>Connector &amp; terminal</b> <b>(B55) No. 11 — (B330) No. 1:</b>	Is the resistance less than 1 $\Omega$ ?	Go to step 6.	Repair the open circuit of harness between TCM and inhibitor relay, or poor contact of connector.
<b>6 CHECK HARNESS CONNECTOR BETWEEN TCM AND CHASSIS GROUND.</b> Measure the resistance of harness between TCM connector and chassis ground. <b>Connector &amp; terminal</b> <b>(B55) No. 11 — Chassis ground:</b>	Is the resistance 1 M $\Omega$ or more?	Go to step 7.	Repair the short circuit of harness between transmission connector and chassis ground.
<b>7 CHECK OUTPUT SIGNAL OF TCM.</b> 1) Connect the TCM, ECM, and inhibitor relay connector. 2) Turn the ignition switch to ON. 3) Shift the select lever to "P" range. 4) Measure the voltage between TCM connector and chassis ground. <b>Connector &amp; terminal</b> <b>(B55) No. 11 (+) — Chassis ground (-):</b>	Is the voltage 1 V or less?	Go to step 8.	Replace the TCM. <Ref. to 5AT-54, Transmission Control Module (TCM).>
<b>8 CHECK OUTPUT SIGNAL OF TCM.</b> 1) Set the select lever to "D" range. 2) Measure the voltage between TCM connector and chassis ground. <b>Connector &amp; terminal</b> <b>(B55) No. 11 (+) — Chassis ground (-):</b>	Is the voltage 8 V or more?	Go to step 9.	Replace the TCM. <Ref. to 5AT-54, Transmission Control Module (TCM).>
<b>9 CHECK FOR POOR CONTACT.</b>	Is there any open or poor contact of connector (loosing terminal, entering foreign matter, damaging connector body)?	Repair the poor contact.	Check the neutral switch circuit of ECM.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

## AC:DTC P0957 BACKUP LIGHT RELAY CIRCUIT LOW

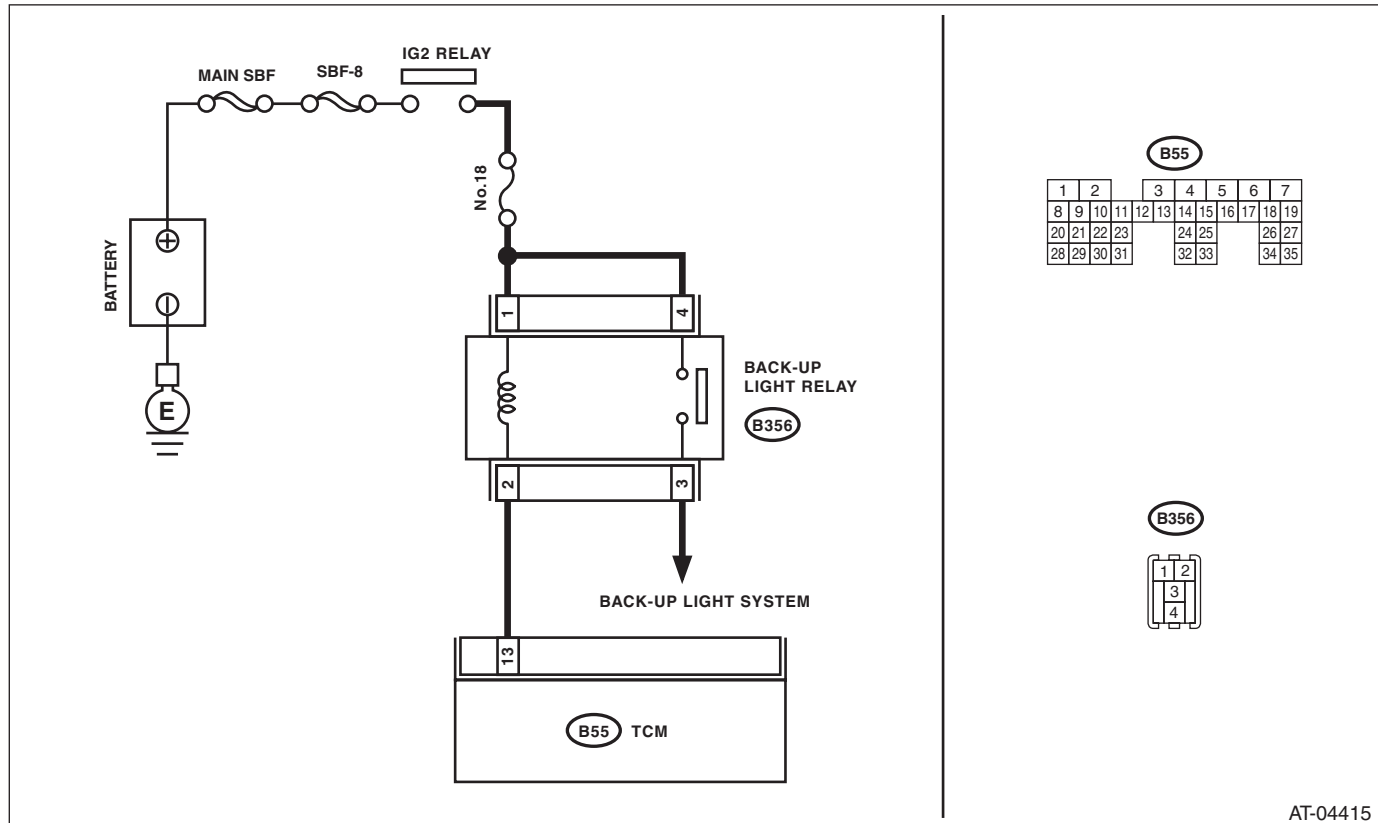
### DTC DETECTING CONDITION:

Open or short circuit of back-up light relay output circuit

### TROUBLE SYMPTOM:

Back-up light does not illuminate in "R" range.

### WIRING DIAGRAM:



AT-04415

Step	Check	Yes	No
1	<b>CHECK DTC OF TCM.</b> Is DTC of Transmission Range Sensor Circuit (PRNDL Input) detected?	Perform the diagnosis according to DTC.	Go to step 2.
2	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND BACK-UP LIGHT RELAY.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connector from TCM and back-up light relay. 3) Measure the resistance of harness between TCM connector and back-up light relay connector. <b>Connector &amp; terminal (B55) No. 13 — (B356) No. 2:</b>	Go to step 3.	Repair the open circuit of harness between TCM and transmission connector, or poor contact of connector.
3	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.</b> Measure the resistance of harness between TCM connector and chassis ground. <b>Connector &amp; terminal (B55) No. 13 — Chassis ground:</b>	Go to step 4.	Repair the short circuit of harness between TCM and transmission connector.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
<b>4 CHECK OUTPUT SIGNAL OF TCM.</b> 1) Turn the ignition switch to ON. (engine OFF) 2) Shift the select lever to "P" range. 3) Measure the voltage between TCM connector and chassis ground. <b>Connector &amp; terminal</b> <b>(B55) No. 13 (+) — Chassis ground (-):</b>	Is the voltage 8 V or more?	Go to step 5.	Replace the TCM. <Ref. to 5AT-54, Transmission Control Module (TCM).>
<b>5 CHECK OUTPUT SIGNAL OF TCM.</b> 1) Set the select lever to "R" range. 2) Measure the voltage between TCM connector and chassis ground. <b>Connector &amp; terminal</b> <b>(B55) No. 13 (+) — Chassis ground (-):</b>	Is the voltage 1 V or less?	Go to step 6.	Replace the TCM. <Ref. to 5AT-54, Transmission Control Module (TCM).>
<b>6 CHECK INPUT VOLTAGE FOR BACK-UP LIGHT RELAY.</b> Measure the voltage between back-up light relay and chassis ground.	Is the voltage 10 — 13 V?	Replace the back-up light relay.	Check open or short circuit of harness between fuse (No. 18) and back-up light relay.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

## AD:DTC P0958 BACKUP LIGHT RELAY CIRCUIT HIGH

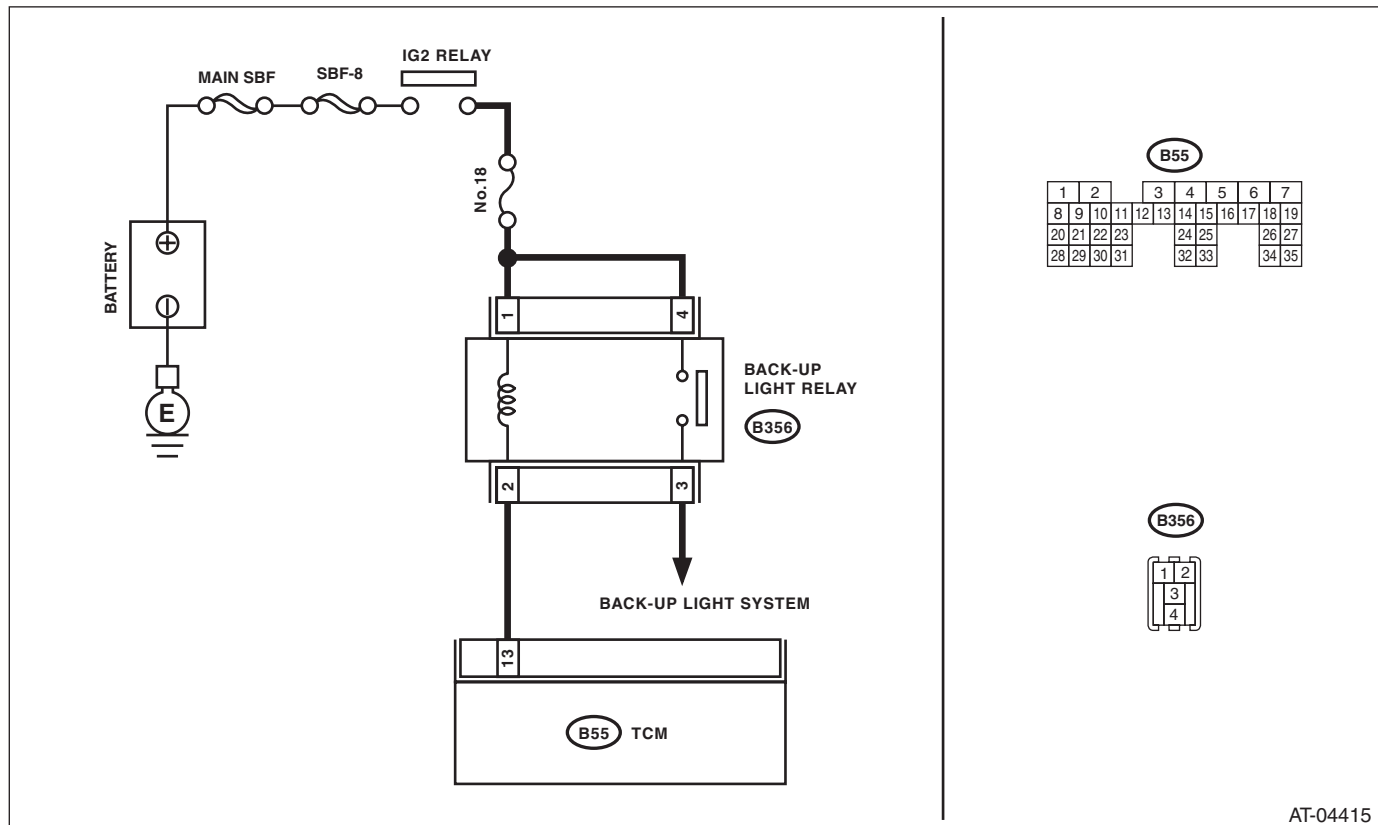
### DTC DETECTING CONDITION:

Open or short circuit of back-up light relay output circuit

### TROUBLE SYMPTOM:

Back-up light does not illuminate in "R" range.

### WIRING DIAGRAM:



AT-04415

Step	Check	Yes	No
1	<b>CHECK DTC OF TCM.</b> Is DTC of Transmission Range Sensor Circuit (PRNDL Input) detected?	Perform the diagnosis according to DTC.	Go to step 2.
2	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND BACK-UP LIGHT RELAY.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connector from TCM and back-up light relay. 3) Measure the resistance of harness between TCM connector and back-up light relay connector. <b>Connector &amp; terminal (B55) No. 13 — (B356) No. 2:</b>	Go to step 3.	Repair the open circuit of harness between TCM and transmission connector, or poor contact of connector.
3	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.</b> Measure the resistance of harness between TCM connector and chassis ground. <b>Connector &amp; terminal (B55) No. 13 — Chassis ground:</b>	Go to step 4.	Repair the short circuit of harness between TCM and transmission connector.



# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
<b>4</b> <b>CHECK OUTPUT SIGNAL OF TCM.</b> 1) Turn the ignition switch to ON. (engine OFF) 2) Shift the select lever to "P" range. 3) Measure the voltage between TCM connector and chassis ground. <b>Connector &amp; terminal</b> <b>(B55) No. 13 (+) — Chassis ground (-):</b>	Is the voltage 8 V or more?	Go to step 5.	Replace the TCM. <Ref. to 5AT-54, Transmission Control Module (TCM).>
<b>5</b> <b>CHECK OUTPUT SIGNAL OF TCM.</b> 1) Set the select lever to "R" range. 2) Measure the voltage between TCM connector and chassis ground. <b>Connector &amp; terminal</b> <b>(B55) No. 13 (+) — Chassis ground (-):</b>	Is the voltage 1 V or less?	Go to step 6.	Replace the TCM. <Ref. to 5AT-54, Transmission Control Module (TCM).>
<b>6</b> <b>CHECK INPUT VOLTAGE FOR BACK-UP LIGHT RELAY.</b> Measure the voltage between back-up light relay and chassis ground.	Is the voltage 10 — 13 V?	Replace the back-up light relay.	Check open or short circuit of harness between fuse (No. 18) and back-up light relay.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

## AE:DTC P1706 AT VEHICLE SPEED SENSOR CIRCUIT MALFUNCTION (REAR WHEEL)

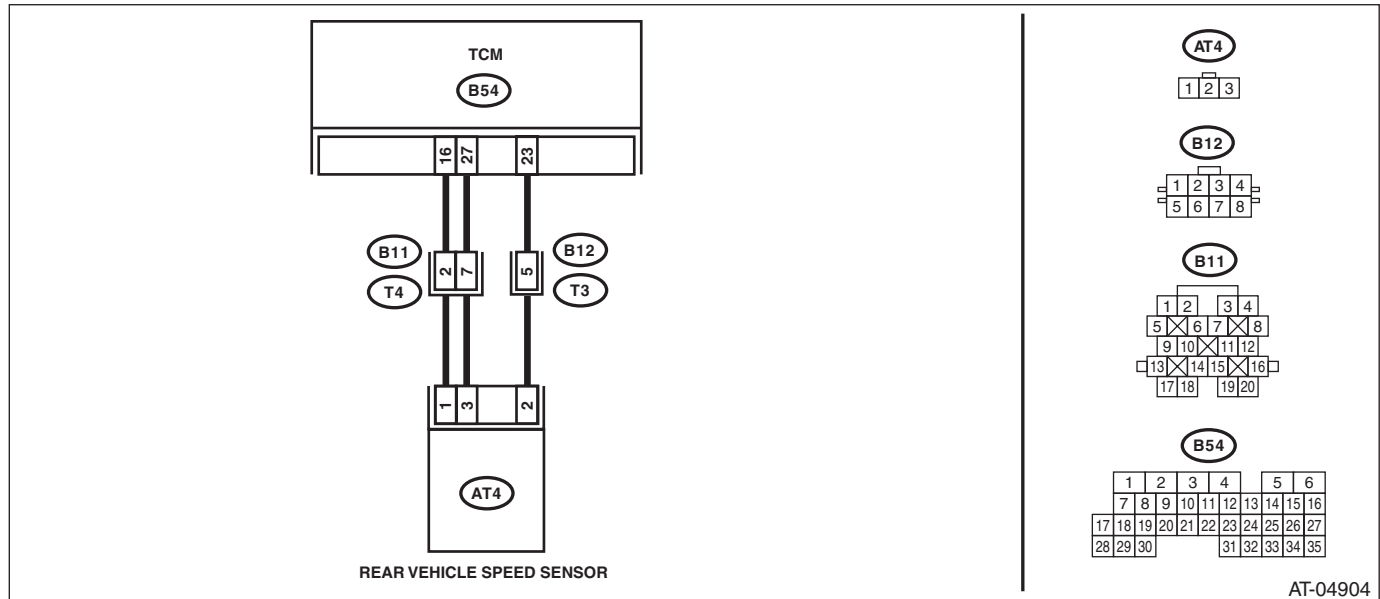
### DTC DETECTING CONDITION:

Input signal circuit of TCM is open or shorted.

### TROUBLE SYMPTOM:

- Shifting quality malfunction
- Tight corner braking phenomenon occurs.

### WIRING DIAGRAM:



Step	Check	Yes	No
<b>1 CHECK TCM I/O SIGNAL.</b> Check the power supply and ground I/O signals. <Ref. to 5AT(diag)-11, ELECTRICAL SPECIFICATION, Transmission Control Module (TCM) I/O Signal.>	Is TCM I/O signal OK?	Go to step 2.	Repair the open or short circuit for power supply and ground.
<b>2 CHECK TCM AND TRANSMISSION HARNESS CONNECTOR.</b> 1) Disconnect the connectors from TCM and transmission. 2) Measure the resistance of harness between TCM connector and transmission connector. <b>Connector &amp; terminal</b> (B54) No. 16 — (B11) No. 2: (B54) No. 23 — (B12) No. 5: (B54) No. 27 — (B11) No. 7:	Is the resistance less than 1 Ω?	Go to step 3.	Repair the open circuit of harness between TCM and transmission connector.
<b>3 CHECK TCM AND TRANSMISSION HARNESS CONNECTOR.</b> Measure the resistance of harness between TCM connector and chassis ground. <b>Connector &amp; terminal</b> (B54) No. 16 — Chassis ground: (B54) No. 23 — Chassis ground: (B54) No. 27 — Chassis ground:	Is the resistance 1 MΩ or more?	Go to step 4.	Repair the short circuit of harness between TCM and transmission connector.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
<b>4 CHECK TCM POWER SUPPLY OUTPUT.</b> 1) Connect the connector to TCM. (Transmission connector is disconnected) 2) Turn the ignition switch to ON. (engine OFF) 3) Measure the voltage between transmission connector and chassis ground. <b>Connector &amp; terminal</b> <b>(B11) No. 7 (+) — Chassis ground (-):</b>	Is the voltage 10 — 13 V?	Go to step 5.	Replace the TCM. <Ref. to 5AT-54, Transmission Control Module (TCM).>
<b>5 CHECK INPUT CIRCUIT OF TCM TURBINE SPEED SENSOR.</b> Measure the voltage variation between TCM connector terminals. <b>Connector &amp; terminal</b> <b>(B12) No. 5 (+) — (B11) No. 2 (-):</b>	Is the voltage 4 — 6 V?	Go to step 7.	Go to step 6.
<b>6 CHECK HARNESS ASSEMBLY (TURBINE SPEED SENSOR GROUND).</b> Check the installing condition of ground connecting harness (used for both of turbine speed sensor 1, rear vehicle speed sensor).	Is the ground connecting harness installed to transmission body correctly, or the harness and connector terminals not damaged?	Go to step 7.	When the poor installation of ground connecting harness, install it securely. Replace the transmission assembly when the harness is damaged. <Ref. to 5AT-36, Automatic Transmission Assembly.>
<b>7 CHECK INPUT SIGNAL FOR TCM.</b> 1) Connect all connectors. 2) Lift up the vehicle. 3) Start the engine. 4) Read the data of «Rear Wheel Speed» using Subaru Select Monitor. <Ref. to 5AT(diag)-16, READ CURRENT DATA, OPERATION, Subaru Select Monitor.> <b>NOTE:</b> The speed difference between front and rear wheels lights the ABS warning light or the VDC warning light, but this does not indicate a malfunction. If the warning light illuminates, delete the ABS or VDC memory after completing the AT control diagnosis. <Ref. to VDC(diag)-26, Clear Memory Mode.>	Does the speedometer indication in the combination meter change according to «Rear Wheel Speed» data?	Check for poor contact of rear vehicle speed sensor circuit harness, and repair the defective part.	Replace the transmission harness.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

## AF:DTC P1707 AT AWD SOLENOID VALVE CIRCUIT MALFUNCTION

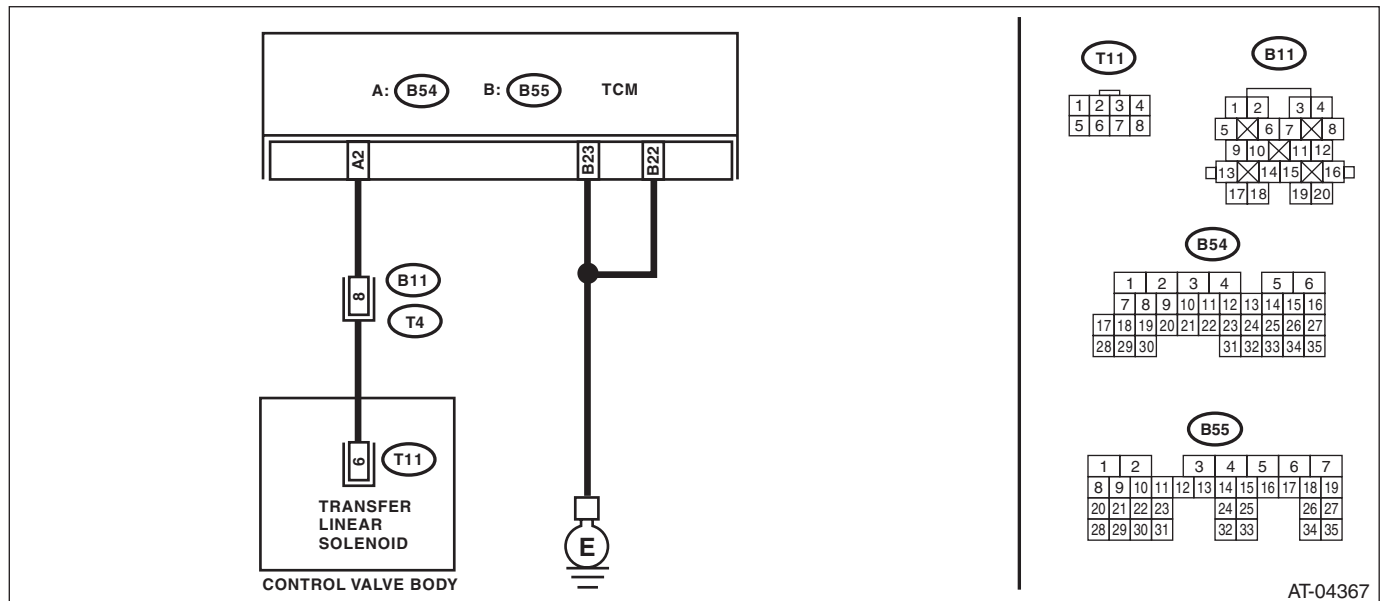
### DTC DETECTING CONDITION:

Output signal circuit of transfer solenoid is open or shorted.

### TROUBLE SYMPTOM:

- Tight corner braking phenomenon occurs.
- Drivability getting worse.

### WIRING DIAGRAM:



Step	Check	Yes	No
<b>1 CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and transmission. 3) Measure the resistance of harness between TCM connector and transmission connector. <b>Connector &amp; terminal</b> <b>(B54) No. 2 — (B11) No. 8:</b> <b>(B55) No. 22 — Chassis ground:</b> <b>(B55) No. 23 — Chassis ground:</b>	Is the resistance less than 1 Ω?	Go to step 2.	Repair the open circuit of harness between TCM connector and transmission connector.
<b>2 CHECK HARNESS CONNECTOR BETWEEN TCM AND CHASSIS GROUND.</b> Measure the resistance of harness between TCM connector and chassis ground. <b>Connector &amp; terminal</b> <b>(B55) No. 23 — Chassis ground:</b>	Is the resistance 1 MΩ or more?	Go to step 3.	Repair the short circuit of harness between TCM connector and transmission connector.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
<b>3</b> <b>CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connector from transmission. 3) Remove the transmission connector from bracket. 4) Lift up the vehicle. 5) Drain the ATF. <b>CAUTION:</b> <b>Do not drain ATF until it cools down.</b> 6) Remove the oil pan. 7) Disconnect the connector from the control valve body. 8) Measure the resistance between transmission connector and control valve body connector. <i>Connector &amp; terminal</i> <i>(T4) No. 8 — (T11) No. 6:</i>	Is the resistance less than 1 $\Omega$ ?	Go to step 4.	Repair the open circuit of harness between transmission connector and control valve body connector.
<b>4</b> <b>CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.</b> Measure the resistance between transmission ground and control valve body connector. <i>Connector &amp; terminal</i> <i>(T11) No. 6 — Transmission ground:</i>	Is the resistance 1 M $\Omega$ or more?	Repair the open circuit of harness between control valve body connector and transmission ground.	Go to step 5.
<b>5</b> <b>CHECK TRANSFER SOLENOID.</b> Measure the resistance between transmission ground and control valve body connector. <i>Connector &amp; terminal</i> <i>(T11) No. 6 — Transmission ground:</i>	Is the resistance 3 — 9 $\Omega$ ?	Go to step 6.	Replace the control valve body. <Ref. to 5AT-52, Control Valve Body.>
<b>6</b> <b>CHECK FOR POOR CONTACT.</b> Check the TCM connector, transmission connector and control valve body connector.	Is there poor contact (loosing terminal, entering foreign matter, damaging connector body)?	Repair the poor contact.	Go to step 7.
<b>7</b> <b>CHECK AFTER REPAIR.</b> 1) Perform the Clear Memory Mode. 2) Drive for a while and read DTC.	Is DTC displayed?	Replace the TCM. <Ref. to 5AT-54, Transmission Control Module (TCM).>	Temporary poor contact or open circuit occurs. Recheck that the harness connector has no faulty.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

## AG:DTC P1710 TORQUE CONVERTER TURBINE 2 SPEED SIGNAL CIRCUIT MALFUNCTION

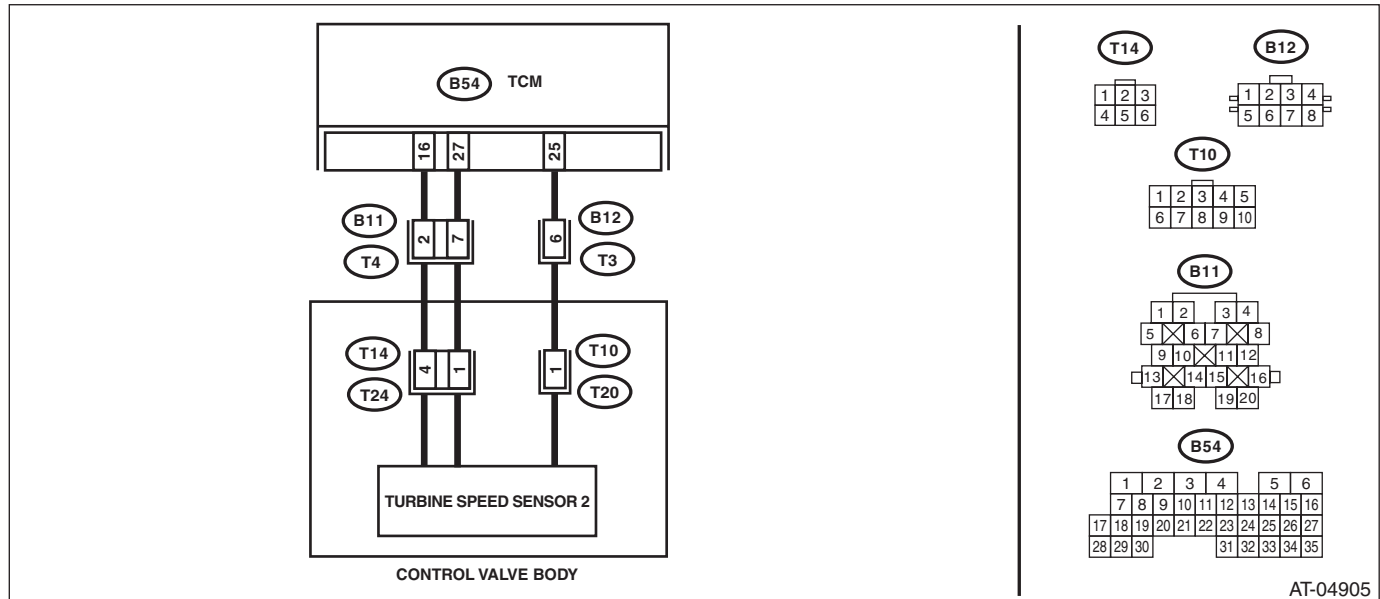
### DTC DETECTING CONDITION:

Input signal circuit of TCM is open or shorted.

### TROUBLE SYMPTOM:

- Excessive shift shock
- Does not shift to 5th.

### WIRING DIAGRAM:



AT-04905

Step	Check	Yes	No
<b>1 CHECK TCM I/O SIGNAL.</b> Check the power supply and ground I/O signals. <Ref. to 5AT(diag)-11, ELECTRICAL SPECIFICATION, Transmission Control Module (TCM) I/O Signal.>	Is TCM I/O signal OK?	Go to step 2.	Repair the open or short circuit for power supply and ground.
<b>2 CHECK TCM AND TRANSMISSION HARNESS CONNECTOR.</b> 1) Disconnect the connectors from TCM and transmission. 2) Measure the resistance of harness between TCM connector and transmission connector. <b>Connector &amp; terminal</b> (B54) No. 16 — (B11) No. 2: (B54) No. 25 — (B12) No. 6: (B54) No. 27 — (B11) No. 7:	Is the resistance less than 1 Ω?	Go to step 3.	Repair the open circuit of harness between TCM and transmission connector.
<b>3 CHECK TCM AND TRANSMISSION HARNESS CONNECTOR.</b> Measure the resistance of harness between TCM connector and chassis ground. <b>Connector &amp; terminal</b> (B54) No. 25 — Chassis ground:	Is the resistance less than 1 MΩ?	Go to step 4.	Repair the short circuit of harness between TCM and transmission connector.
<b>4 CHECK TCM POWER SUPPLY OUTPUT.</b> 1) Connect the connector to TCM. (Transmission connector is disconnected) 2) Turn the ignition switch to ON. (engine OFF) 3) Measure the voltage between transmission connector and chassis ground. <b>Connector &amp; terminal</b> (B11) No. 7 (+) — Chassis ground (-):	Is the voltage 10 — 13 V?	Go to step 5.	Replace the TCM. <Ref. to 5AT-54, Transmission Control Module (TCM).>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
<b>5 CHECK INPUT CIRCUIT OF TCM TURBINE SPEED SENSOR 2.</b> Measure the voltage between TCM connector terminals. <i>Connector &amp; terminal</i> <i>(B12) No. 6 (+) — (B11) No. 2 (-):</i>	Is the voltage 4 — 6 V?	Go to step 6.	Replace the TCM. <Ref. to 5AT-54, Transmission Control Module (TCM).>
<b>6 CHECK INPUT SIGNAL FOR TCM.</b> 1) Connect all connectors. 2) Lift up the vehicle. 3) Start the engine. 4) Drive at 1st of manual mode. 5) Read the data of «AT Turbine Speed 2» using Subaru Select Monitor. <Ref. to 5AT(diag)-16, READ CURRENT DATA, OPERATION, Subaru Select Monitor.> NOTE: The speed difference between front and rear wheels lights the ABS warning light or the VDC warning light, but this does not indicate a malfunction. If the warning light illuminates, delete the ABS or VDC memory after completing the AT control diagnosis. <Ref. to VDC(diag)-26, Clear Memory Mode.>	Does the speedometer indication in the combination meter change according to «AT Turbine Speed 2» data?	Check for poor contact of the harness between the turbine speed sensor 2 and transmission connector, and repair the defective part.	Go to step 7.
<b>7 CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connector from transmission. 3) Remove the transmission connector from bracket. 4) Lift up the vehicle. 5) Drain the ATF. CAUTION: Do not drain ATF until it cools down. 6) Remove the oil pan. 7) Disconnect the connector from the control valve body. 8) Measure the resistance between transmission connector and control valve body connector. <i>Connector &amp; terminal</i> <i>(T3) No. 6 — (T10) No. 1:</i>	Is the resistance less than 1 Ω?	Go to step 8.	Repair the open circuit of harness between transmission connector and control valve body connector.
<b>8 CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.</b> Measure the resistance between transmission ground and control valve body connector. <i>Connector &amp; terminal</i> <i>(T10) No. 1 — Transmission ground:</i>	Is the resistance 1 MΩ or more?	Replace the control valve body. <Ref. to 5AT-52, Control Valve Body.>	Repair the short circuit of harness between transmission connector and transmission ground.

## AH:DTC P1718 AT CAN COMMUNICATION CIRCUIT

NOTE:

Refer to “LAN SYSTEM” for diagnostic procedure. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

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## AI: DTC P1724 AT EEPROM ERROR

### DTC DETECTING CONDITION:

TCM EEPROM malfunction

### TROUBLE SYMPTOM:

- AT learning is not finished.
- Shock occurs when selecting N → D, N → R.

	Step	Check	Yes	No
1	<b>CHECK BATTERY.</b> 1) Turn the ignition switch to ON. 2) Read the data of «Battery voltage» using Subaru Select Monitor.	Is the «Battery voltage» 10 V or more?	Go to step 2.	Check the battery.
2	<b>CHECK DTC.</b> 1) Turn the ignition switch to OFF. 2) Turn the ignition switch to ON after one minute.	Is DTC P1724 displayed as a temporary code?	Replace the TCM. <Ref. to 5AT-54, Transmission Control Module (TCM).>	Current condition is normal. Check for poor contact of TCM connector or harness.



# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

## AJ:DTC P1817 SPORTS MODE SWITCH CIRCUIT (MANUAL SWITCH)

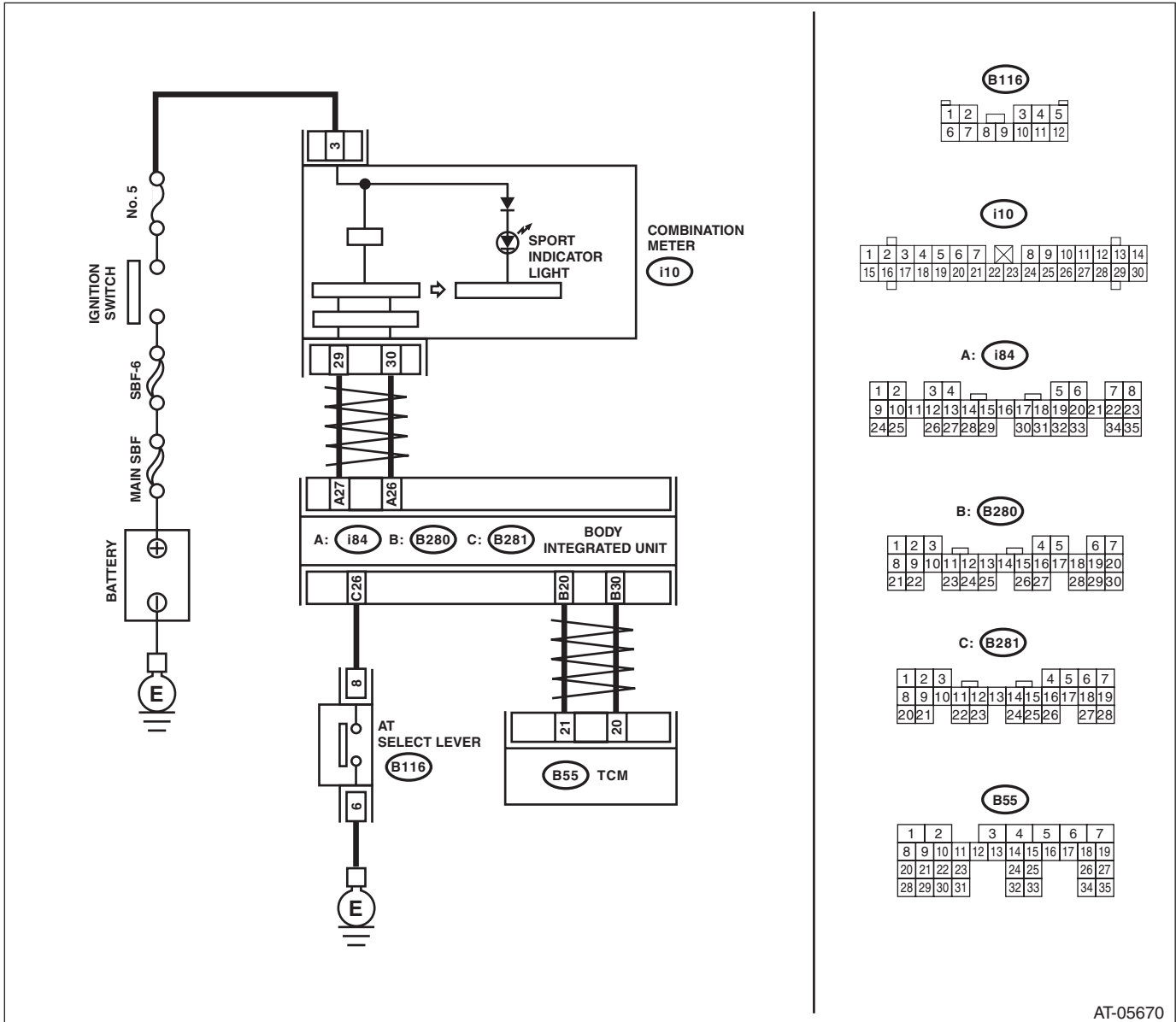
### DTC DETECTING CONDITION:

Input signal circuit of manual mode switch is open or shorted.

### TROUBLE SYMPTOM:

- Manual mode can not be set.
- Shift indicator light illuminates when shifting "N" → "D".

### WIRING DIAGRAM:



AT-05670

Step	Check	Yes	No
<b>1</b> <b>CHECK BODY INTEGRATED UNIT.</b> 1) Connect the Subaru Select Monitor to data link connector. 2) Turn the ignition switch to ON. (engine OFF) 3) Read the DTC of body integrated unit using Subaru Select Monitor. <Ref. to LAN(diag)-27, OPERATION, Read Diagnostic Trouble Code (DTC).>	Is DTC displayed?	Perform the diagnosis according to DTC.	Go to step 2.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
<b>2 CHECK BODY INTEGRATED UNIT INPUT SIGNAL.</b> 1) Shift the select lever to "P" range. 2) Read the «Tiptronic Mode Switch» data of the body integrated unit using the Subaru Select Monitor. <Ref. to LAN(diag)-13, DISPLAY OF CURRENT DATA, OPERATION, Subaru Select Monitor.>	Is "OFF" displayed?	Go to step 3.	Go to step 7.
<b>3 CHECK BODY INTEGRATED UNIT INPUT SIGNAL.</b> 1) Move the select lever from "P" to "D" range. 2) Read the «Tiptronic Mode Switch» data of the body integrated unit using the Subaru Select Monitor. <Ref. to LAN(diag)-13, DISPLAY OF CURRENT DATA, OPERATION, Subaru Select Monitor.>	Is the indication on each range OFF?	Go to step 4.	Replace the select lever assembly. <Ref. to CS-19, Select Lever.>
<b>4 CHECK BODY INTEGRATED UNIT INPUT SIGNAL.</b> 1) Shift the select lever to manual mode. 2) Shift the select lever to other than "D" range. 3) Read the «Tiptronic Mode Switch» data of the body integrated unit using the Subaru Select Monitor. <Ref. to LAN(diag)-13, DISPLAY OF CURRENT DATA, OPERATION, Subaru Select Monitor.>	Is "OFF" displayed?	Go to step 5.	Replace the select lever assembly. <Ref. to CS-19, Select Lever.>
<b>5 CHECK DTC OF TCM.</b>	Is DTC of Transmission Range Sensor Circuit (PRNDL Input) and AT CAN communication circuit displayed?	Perform the diagnosis according to each DTC.	Go to step 6.
<b>6 CHECK INPUT SIGNAL FOR TCM.</b> 1) Move the select lever from "P" to "D" range. 2) Read the «Tiptronic Mode Switch» data of the TCM using the Subaru Select Monitor. <Ref. to 5AT(diag)-16, READ CURRENT DATA, OPERATION, Subaru Select Monitor.>	Is the indication on each range OFF?	Check for poor contact in connectors or harnesses, and repair the defective part.	Replace the TCM. <Ref. to 5AT-54, Transmission Control Module (TCM).>
<b>7 CHECK HARNESS BETWEEN BODY INTEGRATED UNIT AND MANUAL MODE SWITCH.</b> 1) Turn the ignition switch to OFF. 2) Disconnect harness connector from body integrated unit and select lever. 3) Measure the harness resistance between the body integrated unit and chassis ground. <b>Connector &amp; terminal</b> <b>(i84) No. 27 — Chassis ground:</b>	Is the resistance 1 MΩ or more?	Go to step 8.	Repair the short circuit of the harness between the body integrated unit and manual mode switch.
<b>8 CHECK MANUAL MODE SWITCH.</b> 1) Shift the select lever to "P" range. 2) Measure the resistance between harness connector terminals of manual mode switch. <b>Connector &amp; terminal</b> <b>(B116) No. 6 — No. 8</b>	Is the resistance 1 MΩ or more?	Check body integrated unit.	Replace the select lever assembly. <Ref. to CS-19, Select Lever.>

## **AK:DTC P1840 TRANSMISSION FLUID PRESSURE SENSOR SWITCH A CIRCUIT**

### **DTC DETECTING CONDITION:**

Front brake oil pressure switch malfunction

### **TROUBLE SYMPTOM:**

Excessive shift shock

### **NOTE:**

Refer to DTC P0751 for diagnostic procedure. <Ref. to 5AT(diag)-58, DTC P0751 SHIFT SOLENOID "A" PERFORMANCE OR STUCK OFF, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

## **AL:DTC P1841 TRANSMISSION FLUID PRESSURE SENSOR SWITCH B CIRCUIT**

### **DTC DETECTING CONDITION:**

Forward brake oil pressure switch malfunction

### **TROUBLE SYMPTOM:**

Excessive shift shock

### **NOTE:**

Refer to DTC P0771 for diagnostic procedure. <Ref. to 5AT(diag)-74, DTC P0771 SHIFT SOLENOID "E" PERFORMANCE OR STUCK OFF, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

## **AM:DTC P1842 TRANSMISSION FLUID PRESSURE SENSOR SWITCH C CIRCUIT**

### **DTC DETECTING CONDITION:**

Input clutch oil pressure switch is malfunction.

### **TROUBLE SYMPTOM:**

Excessive shift shock

### **NOTE:**

Refer to DTC P0756 for diagnostic procedure. <Ref. to 5AT(diag)-62, DTC P0756 SHIFT SOLENOID "B" PERFORMANCE OR STUCK OFF, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

## **AN:DTC P1843 TRANSMISSION FLUID PRESSURE SENSOR SWITCH D CIRCUIT**

### **DTC DETECTING CONDITION:**

Direct clutch oil pressure switch malfunction.

### **TROUBLE SYMPTOM:**

Excessive shift shock

### **NOTE:**

Refer to DTC P0766 for diagnostic procedure. <Ref. to 5AT(diag)-70, DTC P0766 SHIFT SOLENOID "D" PERFORMANCE OR STUCK OFF, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

## **AO:DTC P1844 TRANSMISSION FLUID PRESSURE SENSOR SWITCH E CIRCUIT**

### **DTC DETECTING CONDITION:**

High & low reverse clutch oil pressure switch malfunction.

### **TROUBLE SYMPTOM:**

Excessive shift shock

### **NOTE:**

Refer to DTC P0761 for diagnostic procedure. <Ref. to 5AT(diag)-66, DTC P0761 SHIFT SOLENOID "C" PERFORMANCE OR STUCK OFF, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

# Diagnostic Procedure without Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

## 16. Diagnostic Procedure without Diagnostic Trouble Code (DTC)

### A: CHECK MANUAL MODE SWITCH

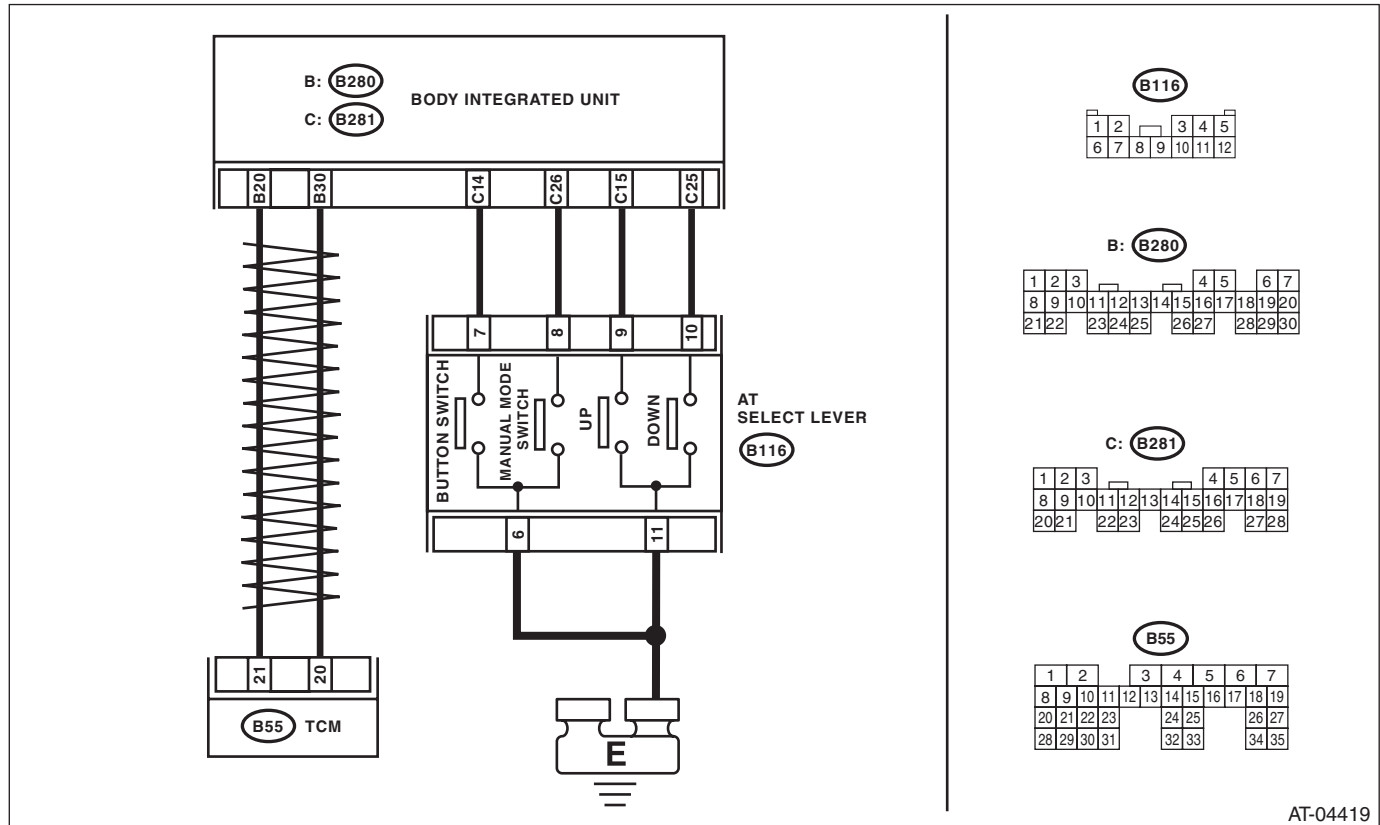
#### DIAGNOSIS:

Input signal circuit of manual mode switch is open or shorted.

#### TROUBLE SYMPTOM:

Does not shift on manual mode.

#### WIRING DIAGRAM:



AT-04419

Step	Check	Yes	No	
1	<b>CHECK BODY INTEGRATED UNIT.</b> 1) Perform ON/OFF operation on the manual mode switch. 2) Read the data of «Tiptronic Mode Switch» using Subaru Select Monitor.	Is the ON/OFF normally detected?	Go to step 2.	Go to step 7.
2	<b>CHECK BODY INTEGRATED UNIT DTC.</b>	Is DTC of CAN detected?	Perform the diagnosis according to DTC.	Go to step 3.
3	<b>CHECK TCM.</b> 1) Perform ON/OFF operation on the manual mode switch. 2) Read the data of «Tiptronic Mode Switch» using Subaru Select Monitor.	Is the ON/OFF normally detected?	Go to step 4.	Go to step 5.
4	<b>CHECK SHIFT INDICATOR OF COMBINATION METER.</b>	Is the shift indicator light OK?	Go to step 6.	Replace the combination meter assembly. <Ref. to IDI-11, Combination Meter.>

# Diagnostic Procedure without Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No	
5	<b>CHECK DTC OF TCM.</b>	Is DTC of CAN detected?	Perform the diagnosis according to DTC.	Replace the TCM. <Ref. to 5AT-54, Transmission Control Module (TCM).>
6	<b>CHECK METER DTC.</b>	Is DTC of CAN detected?	Perform the diagnosis according to DTC.	Replace the meter.
7	<b>CHECK GROUND CIRCUIT OF MANUAL MODE SWITCH.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connector from manual mode switch. 3) Measure the resistance of the harness between the manual mode switch connector and chassis ground. <b>Connector &amp; terminal</b> <b>(B116) No. 11 — Chassis ground:</b>	Is the resistance less than 1 Ω?	Go to step 8.	Repair the open circuit of the harness between the manual mode switch and chassis ground.
8	<b>CHECK MANUAL MODE SWITCH.</b> Measure the resistance between manual mode switch terminals. <b>Connector &amp; terminal</b> <b>(B116) No. 9 — No. 11:</b> <b>(B116) No. 10 — No. 11:</b>	Is the resistance 1 MΩ or more?	Go to step 9.	Replace the guide plate assembly.
9	<b>CHECK MANUAL MODE SWITCH.</b> 1) Move the select lever to manual mode. 2) Measure the resistance between manual mode switch terminals. <b>Connector &amp; terminal</b> <b>(B116) No. 9 — No. 11:</b> <b>(B116) No. 10 — No. 11:</b>	Is the resistance less than 1 Ω?	Go to step 10.	Replace the guide plate assembly.
10	<b>CHECK HARNESS CONNECTOR BETWEEN BODY INTEGRATED UNIT AND MANUAL MODE SWITCH.</b> 1) Disconnect the connector from body integrated unit. 2) Measure the resistance of harness between body integrated unit connector and manual mode switch connector. <b>Connector &amp; terminal</b> <b>(B116) No. 9 — (B281) No. 15:</b> <b>(B116) No. 10 — (B281) No. 25:</b>	Is the resistance less than 1 Ω?	Go to step 11.	Repair the open circuit of harness between the manual mode switch connector and body integrated unit connector, or poor contact of connector.
11	<b>CHECK HARNESS CONNECTOR BETWEEN BODY INTEGRATED UNIT AND MANUAL MODE SWITCH.</b> 1) Disconnect the connector from body integrated unit. 2) Measure the resistance of the harness between the manual mode switch connector and chassis ground. <b>Connector &amp; terminal</b> <b>(B116) No. 9 — Chassis ground:</b> <b>(B116) No. 10 — Chassis ground:</b>	Is the resistance 1 MΩ or more?	Go to step 12.	Repair the short circuit of harness between manual mode switch connector and body integrated unit connector.

# Diagnostic Procedure without Diagnostic Trouble Code (DTC)

## AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
<b>12 CHECK INPUT SIGNAL TO BODY INTEGRATED UNIT.</b> 1) Connect all connectors. 2) Turn the ignition switch to ON. (engine OFF) 3) Measure the voltage of signal to TCM. <b>Connector &amp; terminal</b> <b>(B281) No. 15 (+) — Chassis ground (-):</b> <b>(B281) No. 25 (+) — Chassis ground (-):</b>	Is the voltage 9 V or more?	Go to step 13.	Replace the body integrated unit. <Ref. to SL-48, Body Integrated Unit.>
<b>13 CHECK INPUT SIGNAL TO BODY INTEGRATED UNIT.</b> 1) Shift up and hold the select lever. 2) Measure the voltage of signal to TCM. <b>Connector &amp; terminal</b> <b>(B281) No. 15 (+) — Chassis ground (-):</b> <b>(B281) No. 25 (+) — Chassis ground (-):</b>	Is the voltage less than 1 V?	Go to step 14.	Replace the body integrated unit. <Ref. to SL-48, Body Integrated Unit.>
<b>14 CHECK GROUND CIRCUIT OF MANUAL MODE SWITCH.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connector from manual mode switch. 3) Measure the resistance of the harness between the manual mode switch connector and chassis ground. <b>Connector &amp; terminal</b> <b>(B116) No. 11 — Chassis ground:</b>	Is the resistance less than 1 $\Omega$ ?	Go to step 15.	Repair the open circuit of the harness between the manual mode switch and chassis ground.
<b>15 CHECK FOR POOR CONTACT.</b>	Is there poor contact of the manual mode switch circuit?	Repair the poor contact.	Temporary poor contact of the manual mode switch circuit connector or harness.

# Diagnostic Procedure without Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

## B: CHECK SHIFT INDICATOR

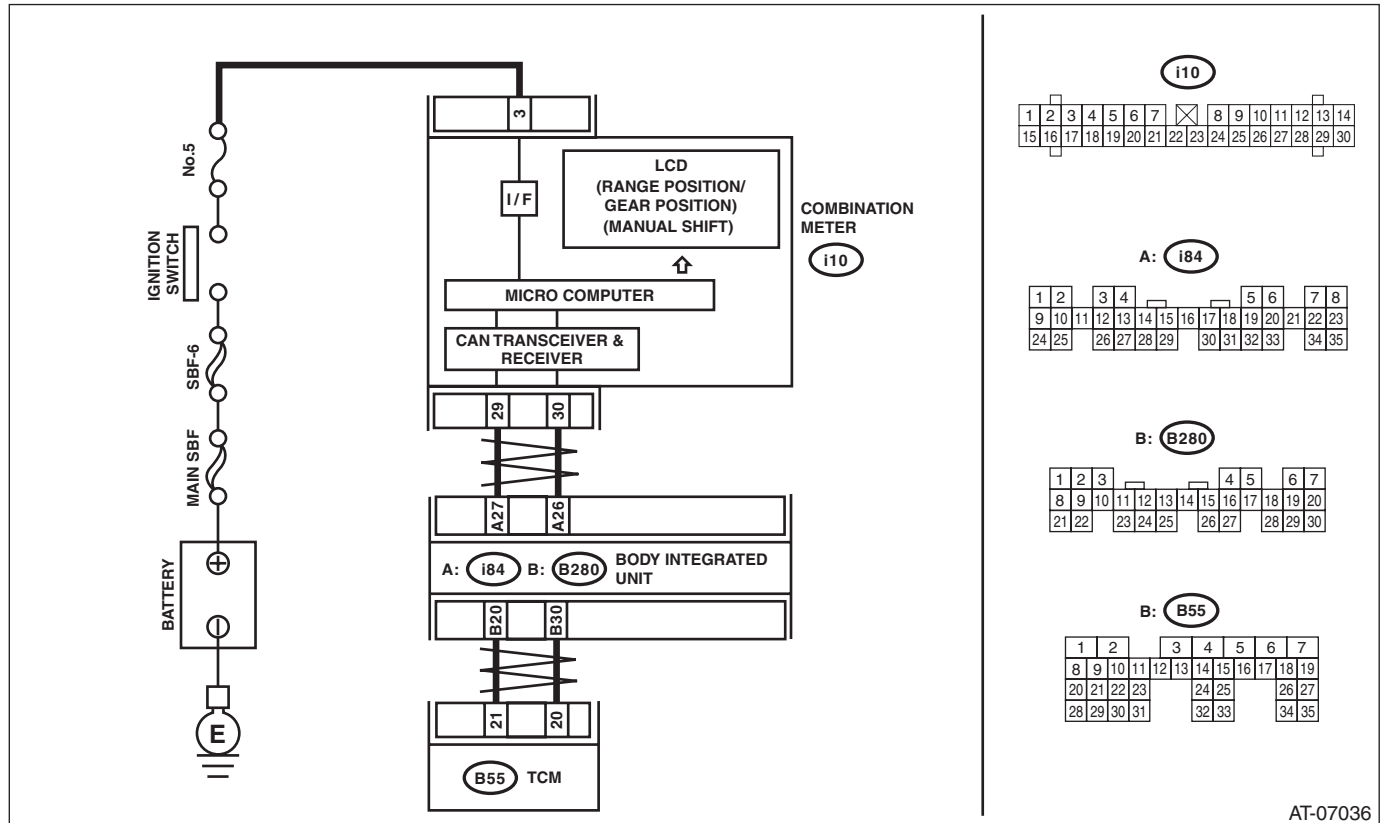
### DIAGNOSIS:

Output signal circuit of shift indicator is open or shorted.

### TROUBLE SYMPTOM:

- Shift indicator is not displayed.
- Shift indicator display does not change.
- Shift indicator remains displayed.

### WIRING DIAGRAM:



Step	Check	Yes	No	
1	<b>CHECK BODY INTEGRATED UNIT.</b> Check DTC of body integrated unit.	Is DTC of AT CAN communication circuit displayed?	Perform the diagnosis according to DTC.	Go to step 2.
2	<b>CHECK TCM.</b> Check DTC of TCM.	Is DTC of AT CAN communication circuit displayed?	Perform the diagnosis according to DTC.	Go to step 3.
3	<b>CHECK TCM.</b> 1) Turn the ignition switch to OFF. 2) Connect the Subaru Select Monitor to data link connector. 3) Turn the ignition switch to ON. (engine OFF) 4) Run the Subaru Select Monitor. 5) Shift the select lever to the manual mode side, and then downshift with the select lever. 6) Read the shift indicator.	Is the gear position at 1 and "▲" displayed?	Go to step 4.	Replace the TCM. <Ref. to 5AT-54, Transmission Control Module (TCM).>
4	<b>CHECK TCM.</b> 1) Shift up the select lever. 2) Read the indicator.	Is the gear position at 2 and "▼" displayed?	Go to step 5.	Replace the TCM. <Ref. to 5AT-54, Transmission Control Module (TCM).>

# Diagnostic Procedure without Diagnostic Trouble Code (DTC)

## AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
<b>5</b> <b>CHECK BODY INTEGRATED UNIT.</b> Read the data of «Shift Position» using Subaru Select Monitor.	Is "2" displayed?	Go to step 6.	Check body integrated unit. <Ref. to SL-48, Body Integrated Unit.>
<b>6</b> <b>CHECK COMBINATION METER.</b>	Is the shift indicator OK?	Refer to "General Diagnostic Table". <Ref. to 5AT(diag)-103, General Diagnostic Table.>	Replace the combination meter assembly. <Ref. to IDI-11, Combination Meter.>



# Diagnostic Procedure without Diagnostic Trouble Code (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

## C: CHECK BUZZER

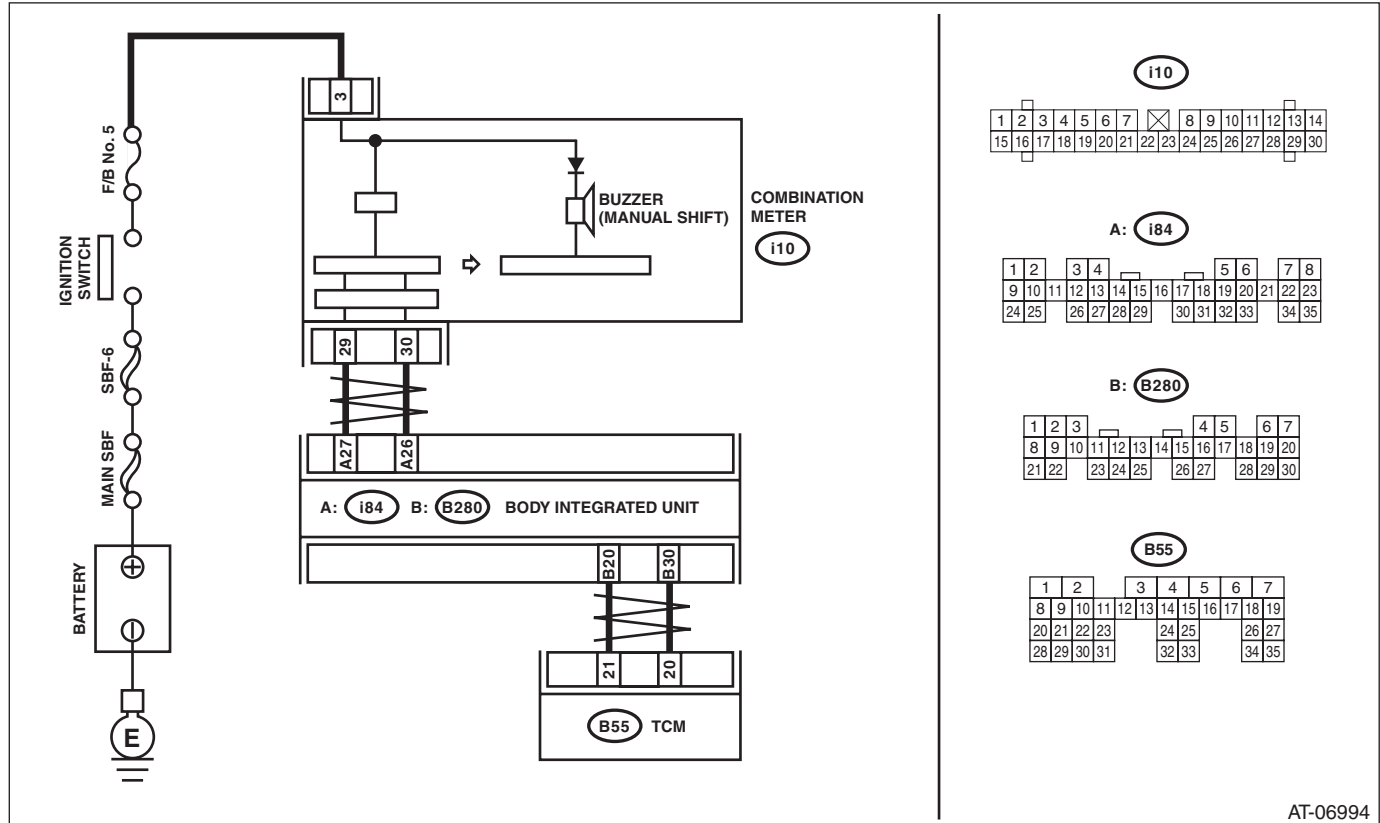
### DIAGNOSIS:

Output signal circuit of buzzer is open or shorted.

### TROUBLE SYMPTOM:

Buzzer remains beeping.

### WIRING DIAGRAM:



Step	Check	Yes	No	
1	<b>CHECK BODY INTEGRATED UNIT.</b> Check DTC of body integrated unit.	Is DTC of CAN communication displayed?	Perform the diagnosis according to DTC.	Go to step 2.
2	<b>CHECK TCM.</b> Check DTC of TCM.	Is DTC of CAN communication displayed?	Perform the diagnosis according to DTC.	Go to step 3.
3	<b>CHECK BUZZER STOP.</b> Disconnect the connector (B55).	Does the buzzer stop?	Replace the TCM. <Ref. to 5AT-54, Transmission Control Module (TCM).>	Go to step 4.
4	<b>CHECK BODY INTEGRATED UNIT.</b> 1) Turn the ignition switch to OFF. 2) Connect the Subaru Select Monitor to data link connector. 3) Turn the ignition switch to ON. (engine OFF) 4) Run the Subaru Select Monitor. 5) Read the «SPORT Shift (buzzer 1)» and «SPORT Shift (buzzer 2)» data using Subaru Select Monitor.	Is «ON» displayed?	Replace the body integrated unit. <Ref. to SL-48, Body Integrated Unit.>	Go to step 5.

# Diagnostic Procedure without Diagnostic Trouble Code (DTC)

## AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Check	Yes	No
5 <b>CHECK COMBINATION METER.</b>	Is the buzzer OK?	Refer to "General Diagnostic Table". <Ref. to 5AT(diag)-103, General Diagnostic Table.>	Replace the combination meter assembly. <Ref. to IDI-11, Combination Meter.>

# General Diagnostic Table

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

## 17. General Diagnostic Table

### A: INSPECTION

Symptoms	Faulty parts
Shifting vehicle speed is low on "D" range.	<ul style="list-style-type: none"> <li>• Front and rear vehicle speed sensors</li> <li>• Accelerator pedal position sensor</li> <li>• Throttle position sensor</li> <li>• ATF temperature sensor</li> <li>• CAN communication signal</li> </ul>
Shifting vehicle speed is high on "D" range.	<ul style="list-style-type: none"> <li>• Front and rear vehicle speed sensors</li> <li>• Accelerator pedal position sensor</li> <li>• Throttle position sensor</li> <li>• CAN communication signal</li> <li>• Brake switch signal</li> <li>• ATF temperature sensor</li> </ul>
Excessive shift shock ("N" → "D" range)	<ul style="list-style-type: none"> <li>• Engine idle speed</li> <li>• Engine speed signal</li> <li>• Accelerator pedal position sensor</li> <li>• Throttle position sensor</li> <li>• Control cable adjustment</li> <li>• ATF temperature sensor</li> <li>• Oil pressure switch 1 and front brake solenoid valve</li> <li>• CAN communication signal</li> <li>• Fluid level and condition</li> <li>• TCM power supply</li> </ul>
Excessive shift shock on 1st of "D" range → 2nd of "D" range or "1st of manual mode" → "2nd of manual mode".	<ul style="list-style-type: none"> <li>• Accelerator pedal position sensor</li> <li>• Throttle position sensor</li> <li>• Control cable adjustment</li> <li>• Oil pressure switch 4 and direct clutch solenoid valve</li> <li>• CAN communication signal</li> <li>• Engine speed signal</li> <li>• Turbine speed sensor 1 and turbine speed sensor 2</li> <li>• Front and rear vehicle speed sensors</li> <li>• Fluid level and condition</li> </ul>
Excessive shift shock on 2nd of "D" range → 3rd of "D" range or "2nd of manual mode" → "3rd of manual mode".	<ul style="list-style-type: none"> <li>• Accelerator pedal position sensor</li> <li>• Throttle position sensor</li> <li>• Control cable adjustment</li> <li>• Oil pressure switch 5 and high &amp; low reverse clutch solenoid valve</li> <li>• CAN communication signal</li> <li>• Engine speed signal</li> <li>• Turbine speed sensor 1 and turbine speed sensor 2</li> <li>• Front and rear vehicle speed sensors</li> <li>• Fluid level and condition</li> </ul>
Excessive shift shock on 3rd of "D" range → 4th of "D" range or "3rd of manual mode" → "4th of manual mode".	<ul style="list-style-type: none"> <li>• Accelerator pedal position sensor</li> <li>• Throttle position sensor</li> <li>• Control cable adjustment</li> <li>• Oil pressure switch 3 and input clutch solenoid valve</li> <li>• CAN communication signal</li> <li>• Engine speed signal</li> <li>• Turbine speed sensor 1 and turbine speed sensor 2</li> <li>• Front and rear vehicle speed sensors</li> <li>• Fluid level and condition</li> </ul>

# General Diagnostic Table

## AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Symptoms	Faulty parts
Excessive shift shock on 4th of "D" range → 5th of "D" range or "4th of manual mode" → "5th of manual mode".	<ul style="list-style-type: none"> <li>• Accelerator pedal position sensor</li> <li>• Throttle position sensor</li> <li>• Control cable adjustment</li> <li>• Oil pressure switch 1 and front brake solenoid valve</li> <li>• CAN communication signal</li> <li>• Engine speed signal</li> <li>• Turbine speed sensor 1 and turbine speed sensor 2</li> <li>• Front and rear vehicle speed sensors</li> <li>• Fluid level and condition</li> </ul>
Excessive shock at kick down.	<ul style="list-style-type: none"> <li>• Accelerator pedal position sensor</li> <li>• Throttle position sensor</li> <li>• Control cable adjustment</li> <li>• CAN communication signal</li> <li>• Engine speed signal</li> <li>• Turbine speed sensor 1 and turbine speed sensor 2</li> <li>• Front and rear vehicle speed sensors</li> <li>• Fluid level and condition</li> </ul>
Excessive shock at shift up.	<ul style="list-style-type: none"> <li>• Accelerator pedal position sensor</li> <li>• Throttle position sensor</li> <li>• Control cable adjustment</li> <li>• Engine speed signal</li> <li>• CAN communication signal</li> <li>• Turbine speed sensor 1 and turbine speed sensor 2</li> <li>• Front and rear vehicle speed sensors</li> <li>• Fluid level and condition</li> </ul>
Excessive shock at lock up.	<ul style="list-style-type: none"> <li>• Accelerator pedal position sensor</li> <li>• Throttle position sensor</li> <li>• Control cable adjustment</li> <li>• Engine speed signal</li> <li>• CAN communication signal</li> <li>• Turbine speed sensor 1 and turbine speed sensor 2</li> <li>• Lock up solenoid valve</li> <li>• Front and rear vehicle speed sensors</li> <li>• Fluid level and condition</li> </ul>
Excessive shock at engine brake.	<ul style="list-style-type: none"> <li>• Accelerator pedal position sensor</li> <li>• Throttle position sensor</li> <li>• Control cable adjustment</li> <li>• CAN communication signal</li> <li>• Fluid level and condition</li> <li>• Line pressure</li> <li>• Forward brake solenoid valve</li> </ul>
Judder is occurred at lock up.	<ul style="list-style-type: none"> <li>• Fluid level and condition</li> <li>• Engine speed signal</li> <li>• Turbine speed sensor 1 and turbine speed sensor 2</li> <li>• Front and rear vehicle speed sensors</li> <li>• Accelerator pedal position sensor</li> <li>• Throttle position sensor</li> <li>• Lock up solenoid valve</li> <li>• ATF temperature sensor</li> </ul>
Noise at "R", "N" and "D" range.	<ul style="list-style-type: none"> <li>• Fluid level and condition</li> <li>• Engine speed signal</li> <li>• ATF temperature sensor</li> </ul>
Hold at "D" range or 1st on manual mode.	<ul style="list-style-type: none"> <li>• Fluid level and condition</li> <li>• Front and rear vehicle speed sensors</li> <li>• Direct clutch solenoid valve</li> <li>• Line pressure</li> <li>• Up switch signal</li> <li>• CAN communication signal</li> <li>• Accelerator pedal position sensor</li> </ul>

# General Diagnostic Table

## AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Symptoms	Faulty parts
Hold at "D" range or 2nd on manual mode.	<ul style="list-style-type: none"> <li>• Fluid level and condition</li> <li>• Front and rear vehicle speed sensors</li> <li>• Forward brake solenoid valve</li> <li>• Line pressure</li> <li>• Up switch signal</li> <li>• Down switch signal</li> <li>• CAN communication signal</li> <li>• Accelerator pedal position sensor</li> </ul>
Hold at "D" range or 3rd on manual mode.	<ul style="list-style-type: none"> <li>• Fluid level and condition</li> <li>• Front and rear vehicle speed sensors</li> <li>• Line pressure</li> <li>• Up switch signal</li> <li>• Down switch signal</li> <li>• CAN communication signal</li> <li>• Accelerator pedal position sensor</li> </ul>
Hold at "D" range or 4th on manual mode.	<ul style="list-style-type: none"> <li>• Fluid level and condition</li> <li>• Front and rear vehicle speed sensors</li> <li>• Oil pressure switch 3 and input clutch solenoid valve</li> <li>• Oil pressure switch 4 and direct clutch solenoid valve</li> <li>• Oil pressure switch 5 and high &amp; low reverse clutch solenoid valve</li> <li>• Forward brake solenoid valve</li> <li>• Front brake solenoid valve</li> <li>• Line pressure</li> <li>• Up switch signal</li> <li>• Down switch signal</li> <li>• CAN communication signal</li> <li>• Accelerator pedal position sensor</li> <li>• TCM power supply</li> </ul>
Hold at "D" range or 5th on manual mode.	<ul style="list-style-type: none"> <li>• Fluid level and condition</li> <li>• Front and rear vehicle speed sensors</li> <li>• Oil pressure switch 1 and front brake solenoid valve</li> <li>• Line pressure</li> <li>• Down switch signal</li> <li>• CAN communication signal</li> <li>• Accelerator pedal position sensor</li> </ul>
Gear does not shift 1st of "D" range → 2nd of "D" range or "1st of manual mode" → "2nd of manual mode".	<ul style="list-style-type: none"> <li>• Fluid level and condition</li> <li>• Front and rear vehicle speed sensors</li> <li>• Oil pressure switch 4 and direct clutch solenoid valve</li> <li>• Line pressure</li> <li>• Up switch signal</li> <li>• CAN communication signal</li> <li>• Accelerator pedal position sensor</li> </ul>
Gear does not shift 2nd of "D" range → 3rd of "D" range or "2nd of manual mode" → "3rd of manual mode".	<ul style="list-style-type: none"> <li>• Fluid level and condition</li> <li>• Front and rear vehicle speed sensors</li> <li>• Oil pressure switch 5 and high &amp; low reverse clutch solenoid valve</li> <li>• Line pressure</li> <li>• Up switch signal</li> <li>• CAN communication signal</li> <li>• Accelerator pedal position sensor</li> </ul>
Gear does not shift 3rd of "D" range → 4th of "D" range or "3rd of manual mode" → "4th of manual mode".	<ul style="list-style-type: none"> <li>• Fluid level and condition</li> <li>• Front and rear vehicle speed sensors</li> <li>• Oil pressure switch 3 and input clutch solenoid valve</li> <li>• Oil pressure switch 1 and front brake solenoid valve</li> <li>• Line pressure</li> <li>• Up switch signal</li> <li>• CAN communication signal</li> <li>• Accelerator pedal position sensor</li> </ul>

## General Diagnostic Table

### AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Symptoms	Faulty parts
Gear does not shift 4th of "D" range → 5th of "D" range or "4th of manual mode" → "5th of manual mode".	<ul style="list-style-type: none"> <li>• Fluid level and condition</li> <li>• Front and rear vehicle speed sensors</li> <li>• Oil pressure switch 1 and front brake solenoid valve</li> <li>• Oil pressure switch 4 and direct clutch solenoid valve</li> <li>• Turbine speed sensor 1 and turbine speed sensor 2</li> <li>• ATF temperature sensor</li> <li>• Line pressure</li> <li>• Up switch signal</li> <li>• CAN communication signal</li> <li>• Accelerator pedal position sensor</li> </ul>
Gear does not shift down to 4th on "D" range or manual mode.	<ul style="list-style-type: none"> <li>• Fluid level and condition</li> <li>• Front and rear vehicle speed sensors</li> <li>• Oil pressure switch 1 and front brake solenoid valve</li> <li>• Oil pressure switch 4 and direct clutch solenoid valve</li> <li>• Line pressure</li> <li>• Down switch signal</li> <li>• CAN communication signal</li> <li>• Accelerator pedal position sensor</li> </ul>
Gear does not shift down to 3rd on "D" range or manual mode.	<ul style="list-style-type: none"> <li>• Fluid level and condition</li> <li>• Front and rear vehicle speed sensors</li> <li>• Oil pressure switch 3 and input clutch solenoid valve</li> <li>• Oil pressure switch 1 and front brake solenoid valve</li> <li>• Line pressure</li> <li>• Down switch signal</li> <li>• CAN communication signal</li> <li>• Accelerator pedal position sensor</li> <li>• TCM power supply</li> </ul>
Gear does not shift down to 2nd on "D" range or manual mode.	<ul style="list-style-type: none"> <li>• Fluid level and condition</li> <li>• Front and rear vehicle speed sensors</li> <li>• Oil pressure switch 5 and high &amp; low reverse clutch solenoid</li> <li>• Line pressure</li> <li>• Down switch signal</li> <li>• CAN communication signal</li> <li>• Accelerator pedal position sensor</li> </ul>
Gear does not shift down to 1st on "D" range or manual mode.	<ul style="list-style-type: none"> <li>• Fluid level and condition</li> <li>• Front and rear vehicle speed sensors</li> <li>• Oil pressure switch 4 and direct clutch solenoid valve</li> <li>• Line pressure</li> <li>• Down switch signal</li> <li>• CAN communication signal</li> <li>• Accelerator pedal position sensor</li> </ul>
No lock-up occurs.	<ul style="list-style-type: none"> <li>• Fluid level and condition</li> <li>• Line pressure</li> <li>• Engine speed signal</li> <li>• Turbine speed sensor 1 and turbine speed sensor 2</li> <li>• Lock up solenoid valve</li> <li>• CAN communication signal</li> <li>• ATF temperature sensor</li> <li>• Accelerator pedal position sensor</li> <li>• Brake switch signal</li> <li>• Range signal</li> </ul>
No shift shock occurred when shifting 1st of "D" range → 2nd of "D" range or "1st of manual mode" → "2nd of manual mode". Or clutch slipping occurred.	<ul style="list-style-type: none"> <li>• Fluid level and condition</li> <li>• Front and rear vehicle speed sensors</li> <li>• Oil pressure switch 4 and direct clutch solenoid valve</li> <li>• Line pressure</li> <li>• CAN communication signal</li> </ul>

# General Diagnostic Table

## AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Symptoms	Faulty parts
No shift shock occurred when shifting 2nd of "D" range → 3rd of "D" range or "2nd of manual mode" → "3rd of manual mode". Or clutch slipping occurred.	<ul style="list-style-type: none"> <li>• Fluid level and condition</li> <li>• Front and rear vehicle speed sensors</li> <li>• Oil pressure switch 5 and high &amp; low reverse clutch solenoid valve</li> <li>• Line pressure</li> <li>• CAN communication signal</li> </ul>
No shift shock occurred when shifting 3rd of "D" range → 4th of "D" range or "3rd of manual mode" → "4th of manual mode". Or clutch slipping occurred.	<ul style="list-style-type: none"> <li>• Fluid level and condition</li> <li>• Front and rear vehicle speed sensors</li> <li>• Oil pressure switch 3 and input clutch solenoid valve</li> <li>• Oil pressure switch 1 and front brake solenoid valve</li> <li>• Line pressure</li> <li>• CAN communication signal</li> </ul>
No shift shock occurred when shifting 4th of "D" range → 5th of "D" range or "4th of manual mode" → "5th of manual mode". Or clutch slipping occurred.	<ul style="list-style-type: none"> <li>• Fluid level and condition</li> <li>• Front and rear vehicle speed sensors</li> <li>• Oil pressure switch 1 and front brake solenoid valve</li> <li>• Oil pressure switch 4 and direct clutch solenoid valve</li> <li>• Line pressure</li> <li>• Accelerator pedal position sensor</li> <li>• Throttle position sensor</li> </ul>
Engine skids when shifting 5th of "D" range → 4th of "D" range or "5th of manual mode" → "4th of manual mode". Or slipping occurred.	<ul style="list-style-type: none"> <li>• Fluid level and condition</li> <li>• Front and rear vehicle speed sensors</li> <li>• Oil pressure switch 1 and front brake solenoid valve</li> <li>• Oil pressure switch 4 and direct clutch solenoid valve</li> <li>• Line pressure</li> <li>• Accelerator pedal position sensor</li> <li>• Throttle position sensor</li> </ul>
Engine skids when shifting 4th of "D" range → 3rd of "D" range or "4th of manual mode" → "3rd of manual mode". Or slipping occurred.	<ul style="list-style-type: none"> <li>• Fluid level and condition</li> <li>• Front and rear vehicle speed sensors</li> <li>• Oil pressure switch 3 and input clutch solenoid valve</li> <li>• Oil pressure switch 1 and front brake solenoid valve</li> <li>• Line pressure</li> <li>• Accelerator pedal position sensor</li> <li>• Throttle position sensor</li> </ul>
Engine skids when shifting 3rd of "D" range → 2nd of "D" range or "3rd of manual mode" → "2nd of manual mode". Or slipping occurred.	<ul style="list-style-type: none"> <li>• Fluid level and condition</li> <li>• Front and rear vehicle speed sensors</li> <li>• Oil pressure switch 5 and high &amp; low reverse clutch solenoid valve</li> <li>• Oil pressure switch 4 and direct clutch solenoid valve</li> <li>• Line pressure</li> <li>• Accelerator pedal position sensor</li> <li>• Throttle position sensor</li> </ul>
Engine skids when shifting 2nd of "D" range → 1st of "D" range or "2nd of manual mode" → "1st of manual mode". Or slipping occurred.	<ul style="list-style-type: none"> <li>• Fluid level and condition</li> <li>• Front and rear vehicle speed sensors</li> <li>• Oil pressure switch 4 and direct clutch solenoid valve</li> <li>• Line pressure</li> <li>• Accelerator pedal position sensor</li> <li>• Throttle position sensor</li> </ul>
Engine brake does not function at 5th → 4th of manual mode.	<ul style="list-style-type: none"> <li>• Inhibitor switch</li> <li>• Fluid level and condition</li> <li>• Control cable adjustment</li> <li>• Manual mode switch</li> <li>• Oil pressure switch 1</li> <li>• Down switch signal</li> </ul>
Engine brake does not function at 4th → 3rd of manual mode.	<ul style="list-style-type: none"> <li>• Inhibitor switch</li> <li>• Fluid level and condition</li> <li>• Control cable adjustment</li> <li>• Manual mode switch</li> <li>• Oil pressure switch 1 and oil pressure switch 3</li> <li>• Down switch signal</li> </ul>

# General Diagnostic Table

## AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Symptoms	Faulty parts
Engine brake does not function at 3rd → 2nd of manual mode.	<ul style="list-style-type: none"> <li>• Inhibitor switch</li> <li>• Fluid level and condition</li> <li>• Control cable adjustment</li> <li>• Manual mode switch</li> <li>• Oil pressure switch 5</li> <li>• Forward brake solenoid valve</li> </ul>
Engine brake does not function at 2nd → 1st of manual mode.	<ul style="list-style-type: none"> <li>• Inhibitor switch</li> <li>• Fluid level and condition</li> <li>• Control cable adjustment</li> <li>• Manual mode switch</li> <li>• Oil pressure switch 4</li> <li>• Forward brake solenoid valve</li> </ul>
Excessive acceleration failure on “D” range.	<ul style="list-style-type: none"> <li>• Fluid level and condition</li> <li>• Line pressure</li> <li>• Accelerator pedal position sensor</li> <li>• Throttle position sensor</li> <li>• CAN communication signal</li> <li>• Inhibitor switch</li> <li>• Control cable adjustment</li> <li>• Front and rear vehicle speed sensors</li> </ul>
Excessive acceleration failure in “R” range.	<ul style="list-style-type: none"> <li>• Fluid level and condition</li> <li>• Line pressure</li> <li>• Accelerator pedal position sensor</li> <li>• Throttle position sensor</li> <li>• Oil pressure switch 5 and high &amp; low reverse clutch solenoid valve</li> <li>• CAN communication signal</li> <li>• Inhibitor switch</li> <li>• Control cable adjustment</li> <li>• Front and rear vehicle speed sensors</li> </ul>
Engine skids when start driving (1st) the vehicle. Or slipping occurred.	<ul style="list-style-type: none"> <li>• Fluid level and condition</li> <li>• Line pressure</li> <li>• Accelerator pedal position sensor</li> <li>• Throttle position sensor</li> <li>• CAN communication signal</li> </ul>
Engine skids when driving at 2nd. Or slipping occurred.	<ul style="list-style-type: none"> <li>• Fluid level and condition</li> <li>• Line pressure</li> <li>• Accelerator pedal position sensor</li> <li>• Throttle position sensor</li> <li>• CAN communication signal</li> <li>• Oil pressure switch 4 and direct clutch solenoid valve</li> </ul>
Engine skids when driving at 3rd. Or slipping occurred.	<ul style="list-style-type: none"> <li>• Fluid level and condition</li> <li>• Line pressure</li> <li>• Accelerator pedal position sensor</li> <li>• Throttle position sensor</li> <li>• CAN communication signal</li> <li>• Oil pressure switch 5 and high &amp; low reverse clutch solenoid valve</li> </ul>
Engine skids when driving at 4th. Or slipping occurred.	<ul style="list-style-type: none"> <li>• Fluid level and condition</li> <li>• Line pressure</li> <li>• Accelerator pedal position sensor</li> <li>• Throttle position sensor</li> <li>• CAN communication signal</li> <li>• Oil pressure switch 3 and input clutch solenoid valve</li> </ul>



# General Diagnostic Table

## AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Symptoms	Faulty parts
Engine skids when driving at 5th. Or slipping occurred.	<ul style="list-style-type: none"> <li>• Fluid level and condition</li> <li>• Line pressure</li> <li>• Accelerator pedal position sensor</li> <li>• Throttle position sensor</li> <li>• CAN communication signal</li> <li>• Oil pressure switch 1 and front brake solenoid valve</li> </ul>
Slip at lock up.	<ul style="list-style-type: none"> <li>• Fluid level and condition</li> <li>• Line pressure</li> <li>• Engine speed signal</li> <li>• Turbine speed sensor 1 and turbine speed sensor 2</li> <li>• Lock up solenoid valve</li> <li>• CAN communication signal</li> </ul>
Maximum vehicle speed is low.	<ul style="list-style-type: none"> <li>• Fluid level and condition</li> <li>• Line pressure</li> <li>• Accelerator pedal position sensor</li> <li>• Throttle position sensor</li> <li>• CAN communication signal</li> <li>• Direct clutch solenoid valve</li> <li>• Front and rear vehicle speed sensors</li> </ul>
There is completely no creep.	<ul style="list-style-type: none"> <li>• Fluid level and condition</li> <li>• Engine speed signal</li> <li>• CAN communication signal</li> <li>• Oil pressure switch 4 and direct clutch solenoid valve</li> <li>• Line pressure</li> </ul>
Excessive large creep.	<ul style="list-style-type: none"> <li>• Engine speed signal</li> <li>• CAN communication signal</li> <li>• Oil pressure switch 4</li> </ul>
Vehicle cannot be parking condition on "P" range. Parking condition is not released though shifting to other ranges.	<ul style="list-style-type: none"> <li>• Inhibitor switch</li> <li>• Control cable adjustment</li> </ul>
Vehicle can drive on "P" range.	<ul style="list-style-type: none"> <li>• Inhibitor switch</li> <li>• Fluid level and condition</li> <li>• Control cable adjustment</li> <li>• Line pressure</li> </ul>
Vehicle can drive on "N" range.	<ul style="list-style-type: none"> <li>• Inhibitor switch</li> <li>• Fluid level and condition</li> <li>• Control cable adjustment</li> <li>• Line pressure</li> </ul>
Vehicle cannot drive at any range.	<ul style="list-style-type: none"> <li>• Fluid level and condition</li> <li>• Line pressure</li> <li>• Inhibitor switch</li> <li>• Control cable adjustment</li> <li>• Loosing or damaging of propeller shaft.</li> <li>• Loosing or damaging of drive shaft.</li> </ul>
Vehicle cannot drive on "D" range.	<ul style="list-style-type: none"> <li>• Fluid level and condition</li> <li>• Line pressure</li> <li>• Inhibitor switch</li> <li>• Control cable adjustment</li> <li>• Loosing or damaging of propeller shaft.</li> <li>• Loosing or damaging of drive shaft.</li> </ul>
Vehicle cannot drive on "R" range.	<ul style="list-style-type: none"> <li>• Fluid level and condition</li> <li>• Line pressure</li> <li>• Inhibitor switch</li> <li>• Control cable adjustment</li> <li>• Loosing or damaging of propeller shaft.</li> <li>• Loosing or damaging of drive shaft.</li> </ul>

# General Diagnostic Table

## AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Symptoms	Faulty parts
Engine cannot start on "N" or "P" range	<ul style="list-style-type: none"><li>• Push engine switch and starter</li><li>• Control cable adjustment</li><li>• Inhibitor switch</li><li>• CAN communication line</li><li>• TCM</li></ul>
Engine start other than "N" or "P" range	<ul style="list-style-type: none"><li>• Push engine switch and starter</li><li>• Control cable adjustment</li><li>• Inhibitor switch</li><li>• TCM</li></ul>
Engine stalls.	<ul style="list-style-type: none"><li>• Fluid level and condition</li><li>• Engine speed signal</li><li>• Turbine speed sensor 1 and turbine speed sensor 2</li><li>• Lock up solenoid valve</li><li>• Line pressure</li></ul>
Engine stalls when shifting to "N" → "D" and "R" range.	<ul style="list-style-type: none"><li>• Fluid level and condition</li><li>• Engine speed signal</li><li>• Turbine speed sensor 1 and turbine speed sensor 2</li><li>• Lock up solenoid valve</li><li>• Line pressure</li></ul>

## CHASSIS 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.

<b>FRONT SUSPENSION</b>	<b>FS</b>
<b>REAR SUSPENSION</b>	<b>RS</b>
<b>WHEEL AND TIRE SYSTEM</b>	<b>WT</b>
<b>TIRE PRESSURE MONITORING SYSTEM (DIAGNOSTICS)</b>	<b>TPM(diag)</b>
<b>DIFFERENTIALS</b>	<b>DI</b>
<b>TRANSFER CASE</b>	<b>TC</b>
<b>DRIVE SHAFT SYSTEM</b>	<b>DS</b>
<b>VEHICLE DYNAMICS CONTROL (VDC)</b>	<b>VDC</b>
<b>VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)</b>	<b>VDC(diag)</b>
<b>BRAKE</b>	<b>BR</b>
<b>BRAKE VACUUM CONTROL (BVC) (DIAGNOSTICS)</b>	<b>BVC(diag)</b>
<b>PARKING BRAKE</b>	<b>PB</b>
<b>POWER ASSISTED SYSTEM (POWER STEERING)</b>	<b>PS</b>



# FRONT SUSPENSION

# FS

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5. Front Ball Joint .....	16
6. Front Arm .....	17
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# General Description

## FRONT SUSPENSION

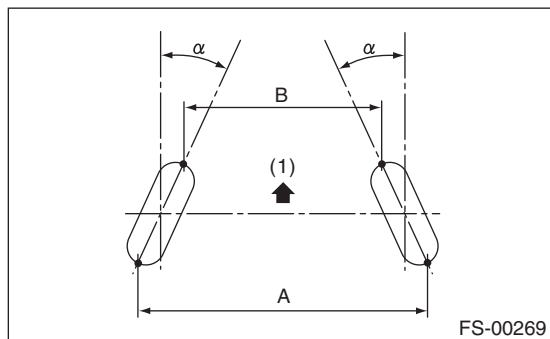
### 1. General Description

#### A: SPECIFICATION

Front	Wheel arch height (Tolerance: $+12\text{ mm}$ $-24\text{ mm}$ ( $+0.47\text{ in}$ $-0.94\text{ in}$ ))	mm (in)	452 (17.8)	
	Camber (Tolerance: $\pm 0^{\circ}45'$ Differences between RH and LH: 45' or less)		$0^{\circ}10'$	
	Caster (Referential Value)		$3^{\circ}40'$	
	Steering angle (Tolerance: $\pm 1.5^{\circ}$ )	Inner wheel		$37.0^{\circ}$
		Outer wheel		$32.0^{\circ}$
	Toe-in	mm (in)	$0\pm 3$ ( $0\pm 0.12$ )	Toe angle (sum of both wheels): $0^{\circ}\pm 0^{\circ}14'$
Kingpin angle (Referential Value)			$11^{\circ}58'$	
Rear	Wheel arch height (Tolerance: $+12\text{ mm}$ $-24\text{ mm}$ ( $+0.47\text{ in}$ $-0.94\text{ in}$ ))	mm (in)	449 (17.7)	
	Camber (Tolerance: $\pm 0^{\circ}45'$ Differences between RH and LH: 45' or less)		$-0^{\circ}15'$	
	Toe-in	mm (in)	$2\pm 2$ ( $0.08\pm 0.08$ )	Toe angle (sum of both wheels): $0^{\circ}10'\pm 0^{\circ}10'$
	Thrust angle (Tolerance: $\pm 0^{\circ}30'$ )			$0^{\circ}$

#### NOTE:

- Front and rear toe-in and front camber can be adjusted. Adjust if the toe-in or camber tolerance exceeds specifications.
- Other items indicated in the specifications table cannot be adjusted. If other items exceed specifications, check the suspension parts and connections for deformation, and replace with new parts as required.

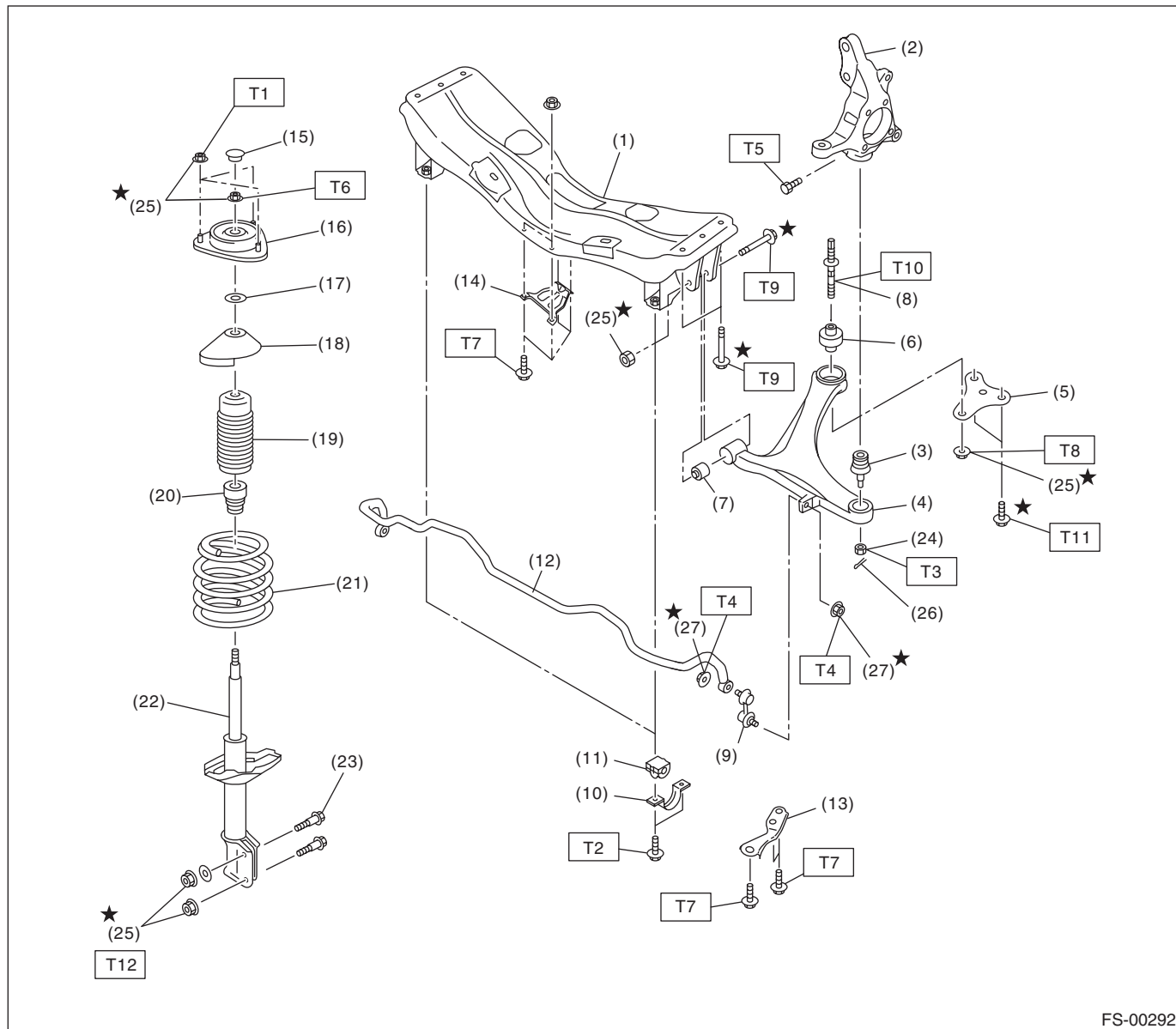


(1) Front

$A - B =$  Positive: Toe-in, Negative: Toe-out

$\alpha =$  Individual toe angles

### B: COMPONENT



FS-00292

- |                                |                        |
|--------------------------------|------------------------|
| (1) Front crossmember          | (15) Dust seal         |
| (2) Housing                    | (16) Strut mount       |
| (3) Ball joint                 | (17) Spacer            |
| (4) Front arm                  | (18) Upper spring seat |
| (5) Arm support plate          | (19) Dust cover        |
| (6) Rear bushing               | (20) Front helper      |
| (7) Front bushing              | (21) Front coil spring |
| (8) Stud bolt                  | (22) Front strut       |
| (9) Stabilizer link            | (23) Adjusting bolt    |
| (10) Stabilizer clamp          | (24) Castle nut        |
| (11) Stabilizer bushing        | (25) Self-locking nut  |
| (12) Front stabilizer          | (26) Cotter pin        |
| (13) Crossmember support plate | (27) Flange nut        |
| (14) Jack-up plate             |                        |

#### **Tightening torque: N-m (kgf-m, ft-lb)**

- |             |                          |
|-------------|--------------------------|
| <b>T1:</b>  | <b>20 (2.0, 14.5)</b>    |
| <b>T2:</b>  | <b>25 (2.5, 18.1)</b>    |
| <b>T3:</b>  | <b>45 (4.6, 33.2)</b>    |
| <b>T4:</b>  | <b>60 (6.1, 44.3)</b>    |
| <b>T5:</b>  | <b>50 (5.1, 36.9)</b>    |
| <b>T6:</b>  | <b>55 (5.6, 40.6)</b>    |
| <b>T7:</b>  | <b>60 (6.1, 44.3)</b>    |
| <b>T8:</b>  | <b>88 (9.0, 64.9)</b>    |
| <b>T9:</b>  | <b>95 (9.7, 70.1)</b>    |
| <b>T10:</b> | <b>110 (11.2, 81.1)</b>  |
| <b>T11:</b> | <b>150 (15.3, 110.6)</b> |
| <b>T12:</b> | <b>155 (15.8, 114.3)</b> |

# General Description

## FRONT SUSPENSION

### C: CAUTION

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

#### 1. OPERATION

- Wear appropriate work clothing, including a cap, protective goggles and protective shoes when performing any work.
- Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
- Use SUBARU genuine grease etc. or equivalent. Do not mix grease etc. of different grades or manufacturers.
- Before securing a part on a vise, place cushioning material such as wood blocks, aluminum plate, or cloth between the part and the vise.
- Be sure to tighten fasteners including bolts and nuts to the specified torque.
- Place shop jacks or rigid racks at the specified points.

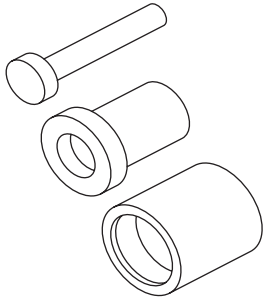
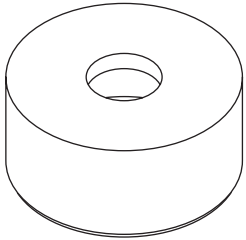
#### 2. OIL

When handling oil, follow the rules below to prevent unexpected accidents.

- Prepare container and waste cloths when performing work which oil could possibly spill. If oil spills, wipe it off immediately to prevent from penetrating into floor or flowing outside, for environmental protection.
- Follow all government and local regulations concerning waste disposal.

### D: PREPARATION TOOL

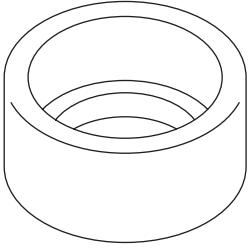
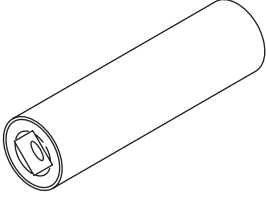
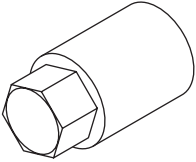
#### 1. SPECIAL TOOL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-927680000	927680000	INSTALLER & REMOVER SET	Used for replacing front arm front bushing.
 ST20299AG000	20299AG000	REMOVER	Used for replacing front arm rear bushing. Used together with BASE (20299AG010).



# General Description

FRONT SUSPENSION

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST20299AG010	20299AG010	BASE	Used for replacing front arm rear bushing. Used together with REMOVER (20299AG000).
 ST20299AG020	20299AG020	STUD BOLT SOCKET	Used for removing and installing the stud bolt for front arm installing portion.
 ST20399AG000	20399AG000	STRUT MOUNT SOCKET	Used for disassembling and assembling strut mount.

## 2. GENERAL TOOL

TOOL NAME	REMARKS
Alignment gauge	Used for measuring wheel alignment.
Alignment gauge adapter	Used for measuring wheel alignment.
Turning radius gauge	Used for measuring wheel alignment.
Toe-in gauge	Used for toe-in measurement.
Dial gauge	Used for damper strut measurement.
Coil spring compressor	Used for strut assembly/disassembly.

# Wheel Alignment

## FRONT SUSPENSION

## 2. Wheel Alignment

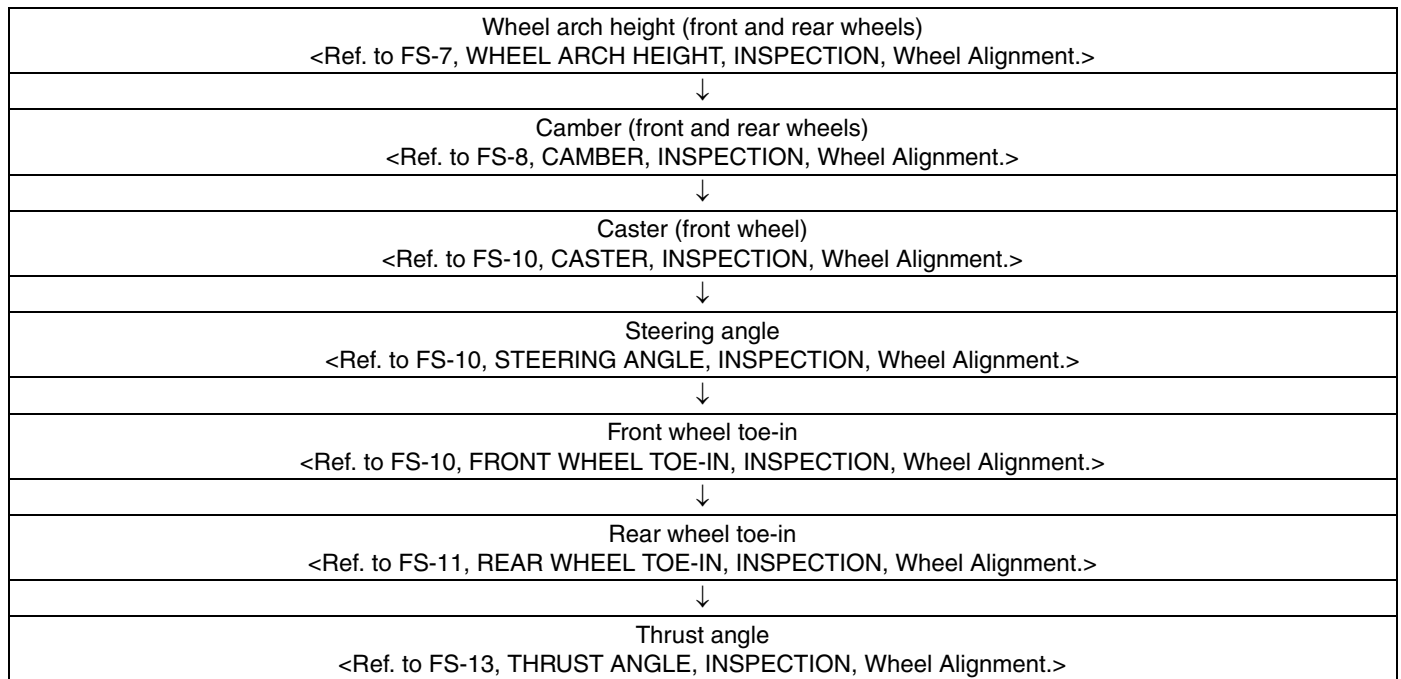
### A: INSPECTION

Check the following items before performing the wheel alignment measurement.

Check items before measuring wheel alignment:

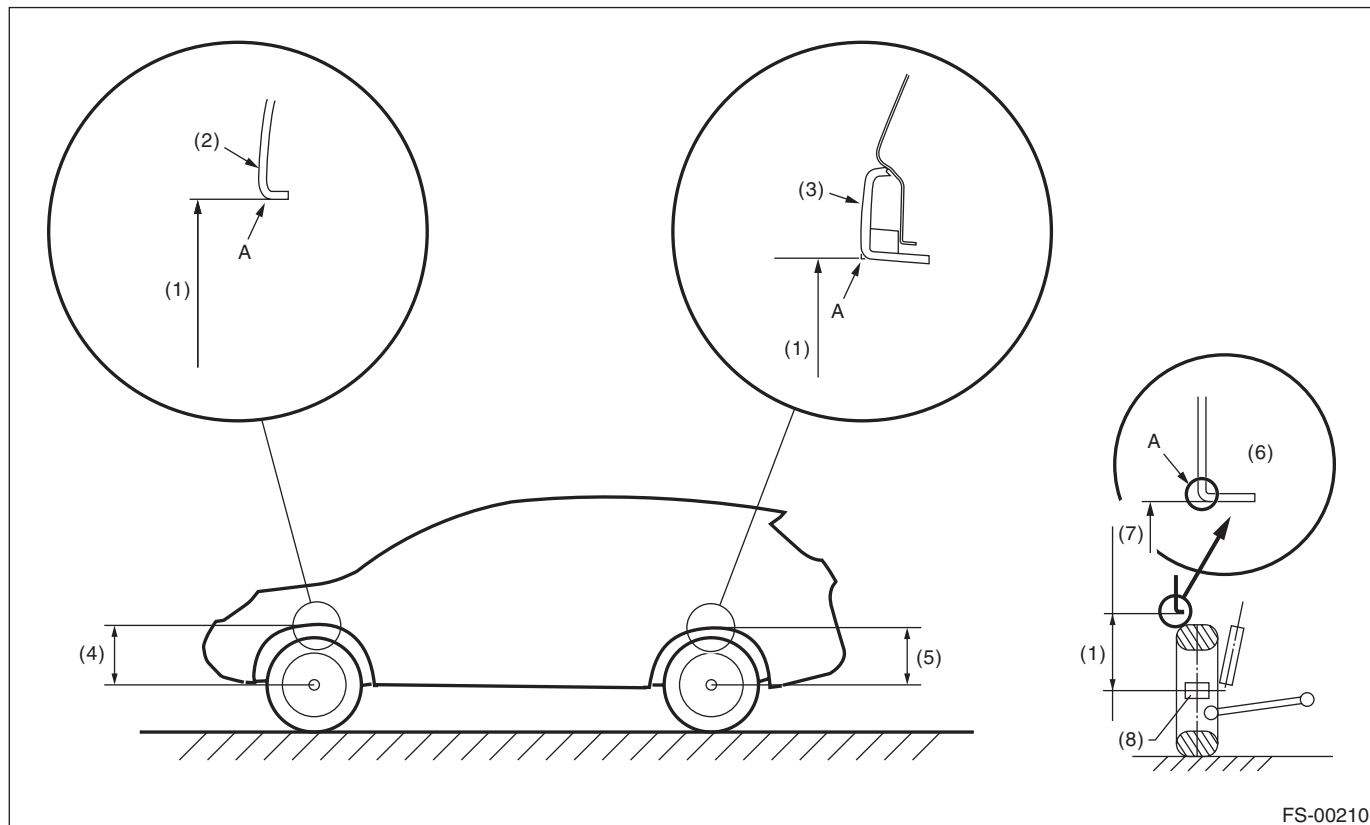
- Tire inflation pressure
- Uneven wear of RH and LH tires, or difference of sizes
- Tire runout
- Excessive play and wear of ball joint
- Excessive play and wear of tie-rod end
- Excessive play of wheel bearing
- Right and left wheel base imbalance
- Deformation and excessive play of steering link
- Deformation and excessive play of suspension parts

Check, adjust and measure the wheel alignment in accordance with the procedures indicated in the figure.



## 1. WHEEL ARCH HEIGHT

- 1) Park the vehicle on a level surface.
- 2) Empty the vehicle so that it is at “curb weight”. (Empty the luggage compartment, load the spare tire, jack and service tools, and fill up the fuel tank.)
- 3) Set the steering wheel in a straight-ahead position, and stabilize the suspension by moving the vehicle in a straight line for 5 m (16 ft) or more.
- 4) Suspend a thread from the wheel arch (point “A” in the figure below) and affix at a position directly above the center of wheel.
- 5) Measure the distance between the point “A” and the center of wheel.



FS-00210

- |                       |                             |                          |
|-----------------------|-----------------------------|--------------------------|
| (1) Wheel arch height | (4) Front wheel arch height | (7) Point of measurement |
| (2) Front fender      | (5) Rear wheel arch height  | (8) End of spindle       |
| (3) Rear quarter      | (6) Flange bend line        |                          |

Wheel arch height specification mm (in) (Tolerance: +12 mm -24 mm (+0.47 in -0.94 in))	
Front	452 (17.8)
Rear	449 (17.7)

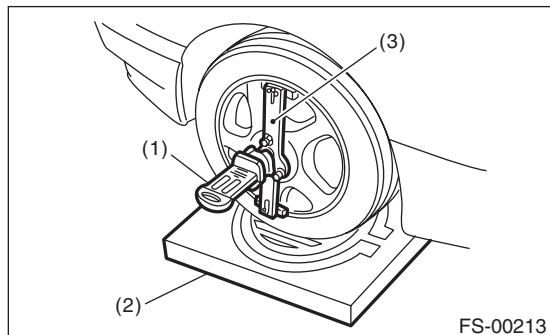
# Wheel Alignment

## FRONT SUSPENSION

### 2. CAMBER

#### • INSPECTION

- 1) Place the front wheel on the turning radius gauge. Make sure the ground contact surfaces of the front and rear wheels are at the same height.
- 2) Set the adapter into the center of wheel, and then set the wheel alignment gauge.



- (1) Alignment gauge
- (2) Turning radius gauge
- (3) Adapter

- 3) Measure the camber angle in accordance with the operation manual for wheel alignment gauge.

Camber (Difference between RH and LH 45' or less)
$0^{\circ}00' \pm 0^{\circ}45'$

#### • FRONT CAMBER ADJUSTMENT

- 1) When adjusting the camber, adjust it to the following value.

Camber (Difference between RH and LH 45' or less)
$0^{\circ}00' \pm 0^{\circ}30'$

- 2) Loosen the two self-locking nuts located at the front lower section of the strut.

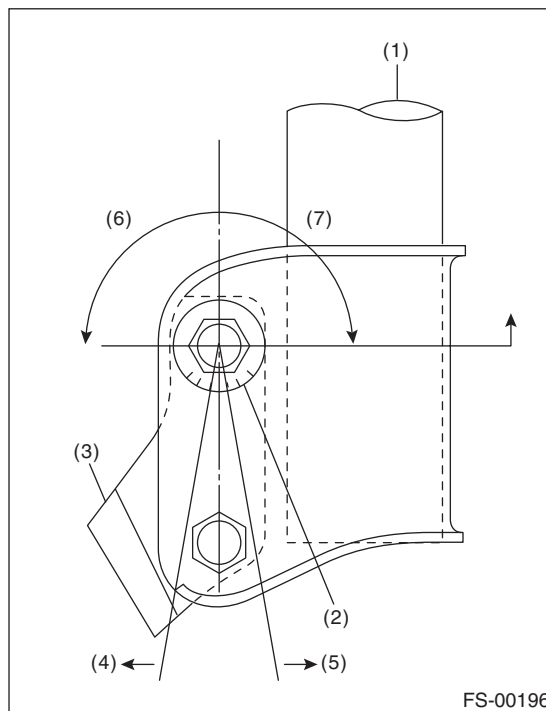
#### NOTE:

When the adjusting bolt needs to be loosened or tightened, hold its head with a wrench and turn the self-locking nut.

- 3) Turn the camber adjusting bolt so that the camber is set at specification.

#### NOTE:

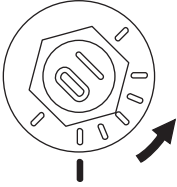
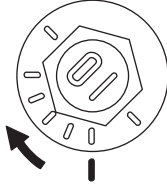
Moving the adjusting bolt by one scale changes the camber by approximately  $0^{\circ}10'$ .

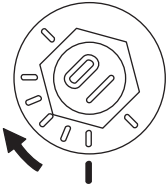
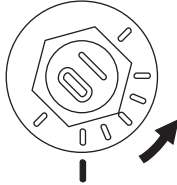


- (1) Strut
- (2) Adjusting bolt
- (3) Housing
- (4) Outer
- (5) Inner
- (6) Camber is increased.
- (7) Camber is decreased.

# Wheel Alignment

FRONT SUSPENSION

To increase camber.	
Rotate the left side counterclockwise.	Rotate the right side clockwise.
	
FS-00197	FS-00198

To decrease camber.	
Rotate the left side clockwise.	Rotate the right side counterclockwise.
	
FS-00198	FS-00197

4) Tighten two new self-locking nuts.

**Tightening torque:**

**155 N·m (15.8 kgf·m, 114.3 ft·lb)**

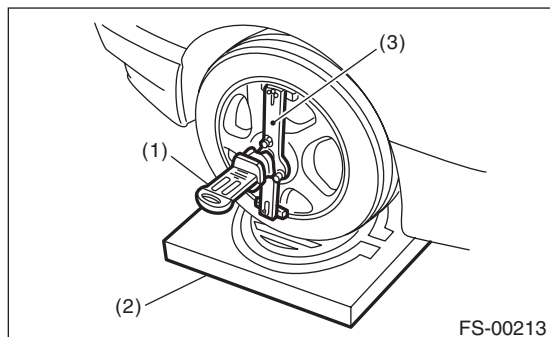
# Wheel Alignment

## FRONT SUSPENSION

### 3. CASTER

#### • INSPECTION

- 1) Place the front wheel on the turning radius gauge. Make sure the ground contact surfaces of the front and rear wheels are at the same height.
- 2) Set the adapter into the center of wheel, and then set the wheel alignment gauge.



- (1) Alignment gauge
- (2) Turning radius gauge
- (3) Adapter

- 3) Measure the caster angle in accordance with the operation manual for wheel alignment gauge.

Caster (Reference)
3°40'

### 4. STEERING ANGLE

#### • INSPECTION

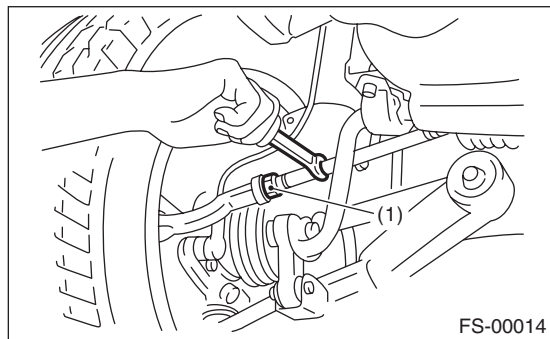
Inner wheel	Outer wheel
37.0°±1.5°	32.0°±1.5°

#### • ADJUSTMENT

- 1) Turn the tie-rod to adjust the steering angle of both inner and outer wheels.
- 2) Check the toe-in.

#### NOTE:

Correct the boot if it is twisted.



- (1) Lock nut

### 5. FRONT WHEEL TOE-IN

#### • INSPECTION

#### Toe-in

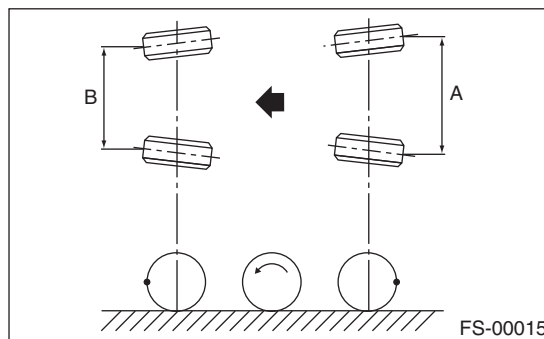
**0±3 mm (0±0.12 in)**

- 1) Set the toe-in gauge in the position at wheel axis center height behind the right and left front tires.
- 2) Place a mark at the center of both left and right tires, and measure distance "A" between the marks.
- 3) Move the vehicle forward to rotate the tires 180°.

#### NOTE:

- Be sure to rotate the tires in the forward direction.
- 4) Measure distance "B" between the left and right marks. Find toe-in using the following equation:

$$A - B = \text{Toe-in}$$



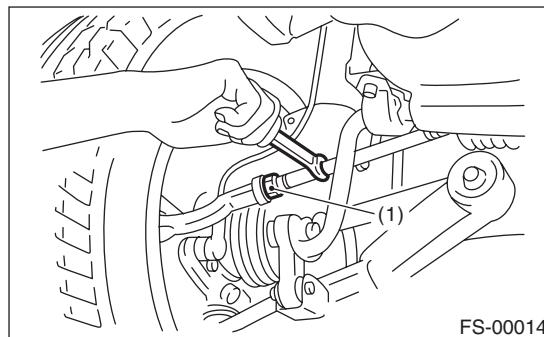
#### • ADJUSTMENT

When adjusting the toe-in, adjust it to the following value.

#### Toe-in

**0±2 mm (0±0.08 in)**

- 1) Check that the left and right wheel steering angles are within specification.
  - 2) Loosen the left and right side steering tie-rod lock nuts.
  - 3) Turn the left and right tie-rods by 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 by equal amount (viewing from the inside of vehicle).



- (1) Lock nut

4) Tighten the tie-rod lock nut.

**Tightening torque:**

**85 N·m (8.7 kgf·m, 62.7 ft·lb)**

NOTE:

Check and correct the tie-rod boot if twisted.

## 6. REAR WHEEL TOE-IN

### INSPECTION

**Toe-in:**

**$2 \pm 2$  mm (0.08  $\pm$  0.08 in)**

Refer to FRONT WHEEL TOE-IN for rear toe-in inspection procedures.

<Ref. to FS-10, FRONT WHEEL TOE-IN, INSPECTION, Wheel Alignment.>

### • ADJUSTMENT

When adjusting, adjust it to the following value.

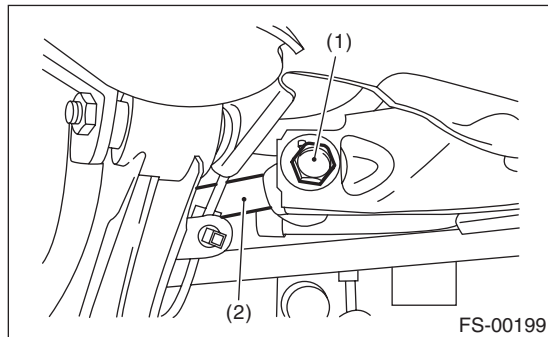
**Toe-in:**

**$2 \pm 1.5$  mm (0.08  $\pm$  0.06 in)**

1) Loosen the self-locking nut on the inner side of the front lateral link.

NOTE:

When loosening or tightening the adjusting bolt, hold the bolt head and turn the self-locking nut.



(1) Adjusting bolt

(2) Front lateral link

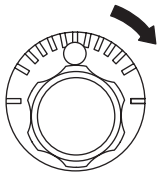
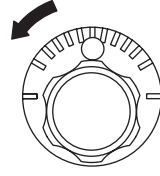
# Wheel Alignment

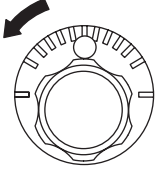
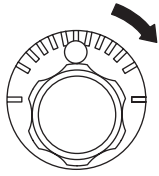
## FRONT SUSPENSION

2) Turn the adjusting bolt until toe-in is within the specification.

### NOTE:

When the left and right wheels are adjusted for toe-in at the same time, moving one mark on the scale changes toe-in by approx. 3 mm (0.12 in).

To increase toe-in.	
Rotate the left side clockwise.	Rotate the right side counterclockwise.
 FS-00018	 FS-00019

To decrease toe-in.	
Rotate the left side counterclockwise.	Rotate the right side clockwise.
 FS-00019	 FS-00018

3) Attach and tighten a new self-locking nut.

### Tightening torque:

**120 N·m (12.2 kgf·m, 88.5 ft·lb)**



### 7. THRUST ANGLE

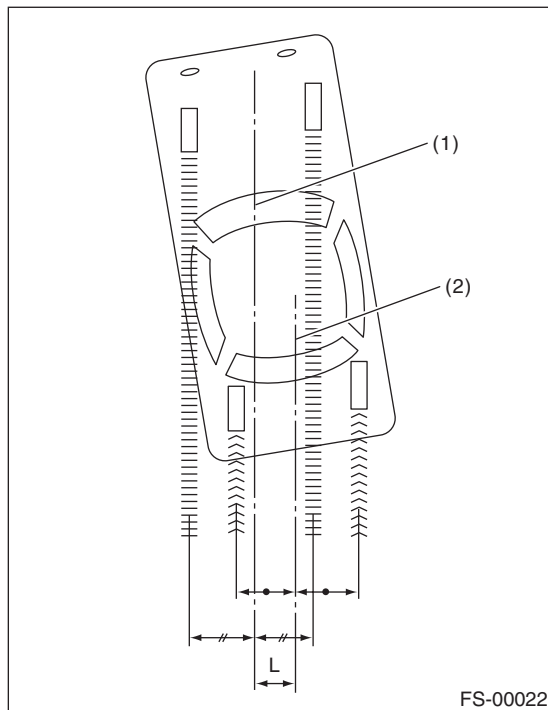
#### • INSPECTION

- 1) Park the vehicle on a level surface.
- 2) Move the vehicle 3 to 4 m (10 to 13 ft) straight forward.
- 3) Draw the center of loci for both the front and rear axles.
- 4) Measure distance "L" between the center lines of the axle loci.

#### **Thrust angle**

$0^{\circ} \pm 30'$

**Less than 30' when "L" is 24 mm (0.9 in) or less.**



- (1) Center line of loci (front axle)
- (2) Center line of loci (rear axle)

#### • ADJUSTMENT

When adjusting, adjust it to the following value.

#### **Thrust angle**

$0^{\circ} \pm 20'$

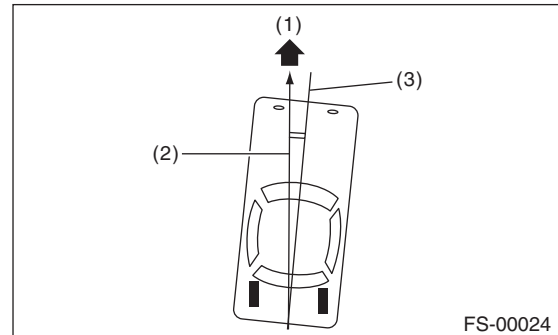
**Less than 20' when "L" is 16 mm (0.6 in) or less.**

- 1) Make thrust angle adjustments by turning the toe-in adjusting bolts of the 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 the thrust angle adjustment.

- 3) When the left and right adjusting bolts are turned by one graduation, the thrust angle will change approx. 19' ("L" is approx. 16 mm (0.63 in)).

#### NOTE:

Thrust angle is a mean value of left and right wheel toe angles in relation to the vehicle body center line. Vehicle is driven straight in the thrust angle direction while slanting in the oblique direction depending on the degree of the mean thrust angle.



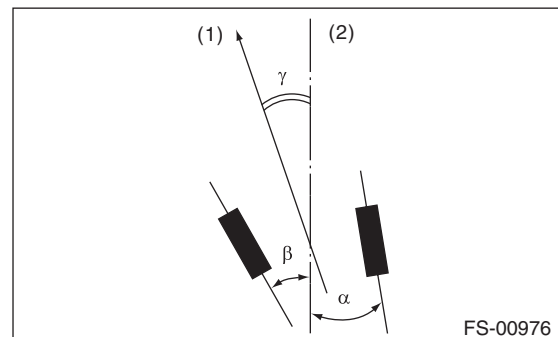
- (1) Front
- (2) Thrust angle
- (3) Body center line

#### **Thrust angle: $r = (\alpha - \beta)/2$**

$\alpha$ : Rear RH wheel toe-in angle

$\beta$ : Rear LH wheel toe-in angle

Substitute only the positive toe-in values from each wheel into  $\alpha$  and  $\beta$  in the equation.



- (1) Front
- (2) Body center line

# Front Crossmember Support Plate

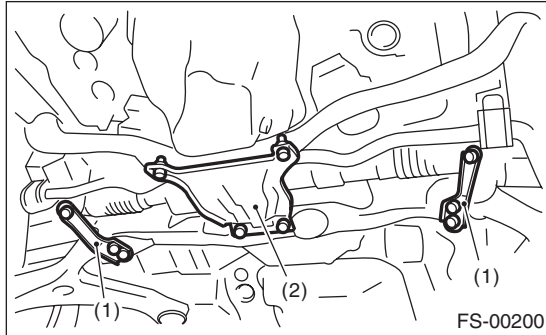
## FRONT SUSPENSION

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### 3. Front Crossmember Support Plate

#### A: REMOVAL

- 1) Lift up the vehicle.
- 2) Remove the front under cover. <Ref. to EI-18, REMOVAL, Front Under Cover.>
- 3) Remove the bolt and remove front crossmember support plate.



- (1) Crossmember support plate  
(2) Jack-up plate

#### B: INSTALLATION

Install in the reverse order of removal.

##### ***Tightening torque:***

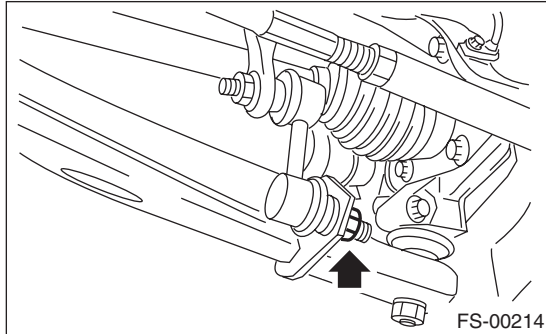
***Crossmember support plate***  
***60 N·m (6.1 kgf·m, 44.3 ft·lb)***

***Jack-up plate***  
***60 N·m (6.1 kgf·m, 44.3 ft·lb)***

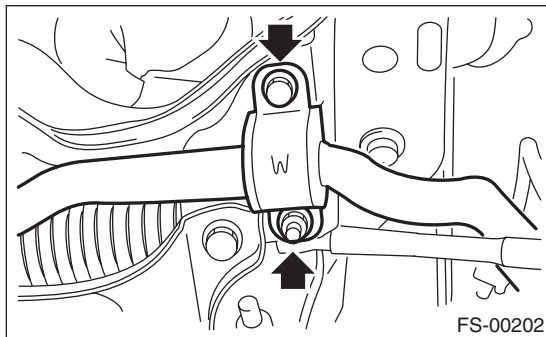
## 4. Front Stabilizer

### A: REMOVAL

- 1) Lift up the vehicle, and then remove the front wheels.
- 2) Remove the front under cover. <Ref. to EI-18, REMOVAL, Front Under Cover.>
- 3) Remove the front crossmember support plate. <Ref. to FS-14, REMOVAL, Front Crossmember Support Plate.>
- 4) Remove the stabilizer link.



- 5) Remove the stabilizer clamp.



### B: INSTALLATION

Install in the reverse order of removal.

#### CAUTION:

- Be sure to use a new flange nut.
- Install so that the paint mark on the stabilizer is on the left side of the vehicle.
- Install the stabilizer bushing (front crossmember side) while aligning it with the paint mark on stabilizer.

#### Tightening torque:

##### Stabilizer link:

60 N·m (6.1 kgf·m, 44.3 ft·lb)

##### Stabilizer clamp:

25 N·m (2.5 kgf·m, 18.1 ft·lb)

### C: INSPECTION

- 1) Check the bushing for cracks, fatigue or damage.
- 2) Check the stabilizer link for damage.

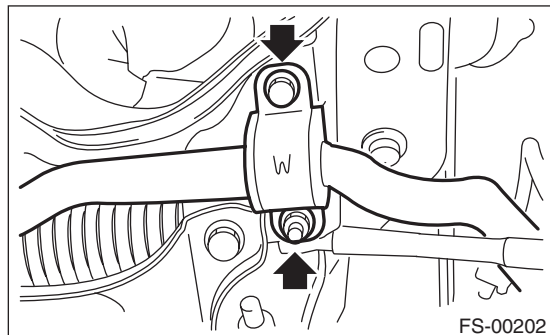
# Front Ball Joint

## FRONT SUSPENSION

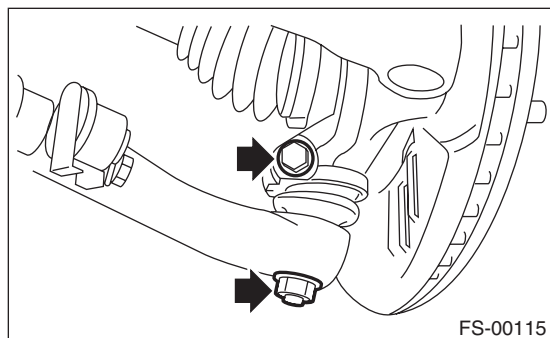
### 5. Front Ball Joint

#### A: REMOVAL

- 1) Lift up the vehicle, and remove the front wheels.
- 2) Remove the both sides of stabilizer bracket.



- 3) Pull out the pin from ball stud, remove the castle nut, and extract the ball stud from the front arm.
- 4) Remove the bolt attaching the ball joint to the housing.



- 5) Extract the ball joint from housing.

#### B: INSTALLATION

- 1) Insert the ball joint into housing.

##### **Tightening torque (Bolt):**

**50 N-m (5.1 kgf-m, 36.9 ft-lb)**

##### **CAUTION:**

**Do not apply grease to the tapered portion of ball stud.**

- 2) Install the ball joint into front arm.

##### **Tightening torque (castle nut):**

###### **Front arm:**

**45 N-m (4.6 kgf-m, 33.2 ft-lb)**

- 3) Retighten the castle nut further up to 60° until the hole in the ball stud is aligned with a slot in castle nut. Then, insert a new cotter pin and bend it around the castle nut.

- 4) Install the stabilizer bracket.

##### **Tightening torque:**

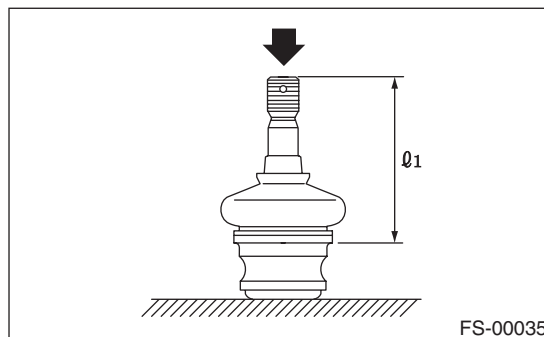
**25 N-m (2.5 kgf-m, 18.1 ft-lb)**

- 5) Install the front wheels.

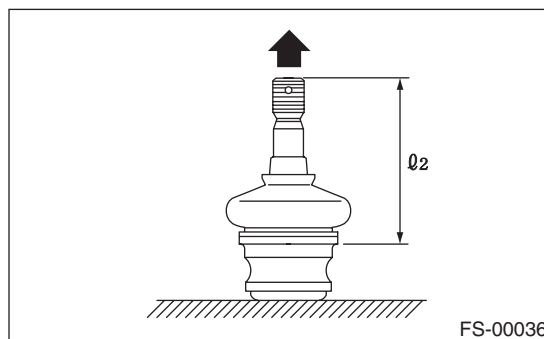
#### C: INSPECTION

- 1) Measure the play of the ball joint using the following procedures. Replace with a new part if the play exceeds specification.

- (1) With 980 N (100 kgf, 220 lb) loaded in direction shown in the figure, measure the length  $Q_1$ .



- (2) With 980 N (100 kgf, 220 lb) loaded in direction shown in the figure, measure the length  $Q_2$ .



- (3) Determine free play using the following formula.

$$S = Q_2 - Q_1$$

- (4) Replace with a new part if the play exceeds specification.

#### **FRONT BALL JOINT**

##### **Specification for replacement S:**

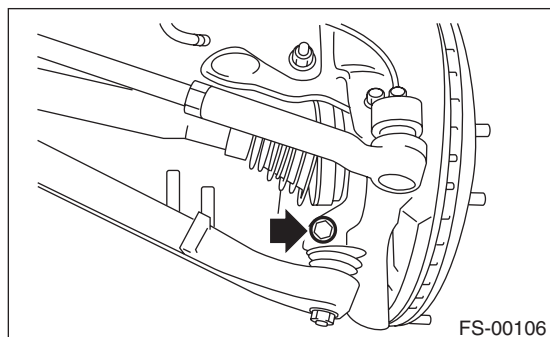
**Less than 0.3 mm (0.012 in)**

- 2) If the play is within specification, visually check the dust cover.
- 3) Remove the ball joint and cover, and check for wear, damage or cracks. If any damage is found, replace the corresponding part.
- 4) If the dust cover is damaged, replace with a new ball joint.

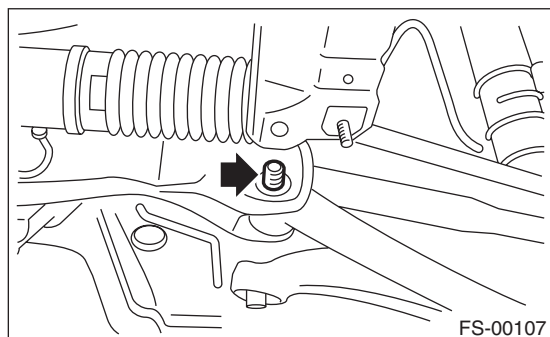
## 6. Front Arm

### A: REMOVAL

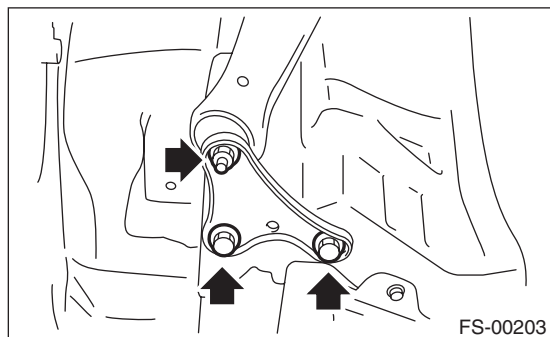
- 1) Lift up the vehicle, and then remove the front wheels.
- 2) Remove the front crossmember support plate. <Ref. to FS-14, REMOVAL, Front Crossmember Support Plate.>
- 3) Remove the front stabilizer. <Ref. to FS-15, REMOVAL, Front Stabilizer.>
- 4) Remove the ball joint of front arm.



- 5) Remove the nut securing the front arm to crossmember. (Do not remove the bolt.)



- 6) Remove the front arm support plate.

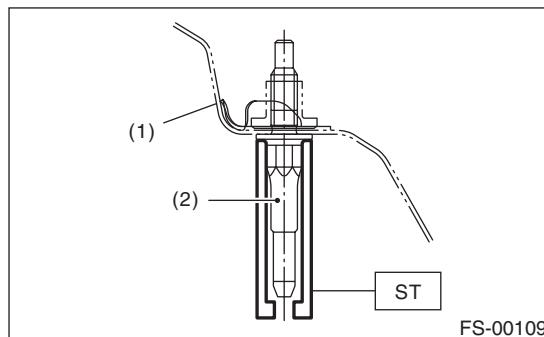


- 7) Remove the bolt securing front arm to crossmember and pull the front arm out of the crossmember.

- 8) To remove the stud bolt, use the ST.  
ST 20299AG020 STUD BOLT SOCKET

### CAUTION:

**Do not remove the stud bolt without necessity. Always replace the parts with new parts when removed.**



- (1) Vehicle body
- (2) Stud bolt

### B: INSTALLATION

- 1) Using the ST, install the stud bolt.  
ST 20299AG020 STUD BOLT SOCKET

#### Tightening torque:

**110 N·m (11.2 kgf-m, 81.1 ft-lb)**

- 2) Using new bolts and self-locking nuts, temporarily tighten the front arm to crossmember.
- 3) Secure the front arm to body, and then install the support plate with new bolts and self-locking nuts.

#### Tightening torque:

**Support plate to Front arm:**

**88 N·m (9.0 kgf-m, 64.9 ft-lb)**

**Support plate to Body:**

**150 N·m (15.3 kgf-m, 110.6 ft-lb)**

- 4) Install the ball joint into housing.

#### Tightening torque:

**50 N·m (5.1 kgf-m, 36.9 ft-lb)**

- 5) Install the stabilizer. <Ref. to FS-15, INSTALLATION, Front Stabilizer.>

- 6) Lower the vehicle from lift, and tighten the bolt which secures the front arm to crossmember with wheels in full contact with the ground and the vehicle at curb weight.

#### Tightening torque:

**95 N·m (9.7 kgf-m, 70.1 ft-lb)**

- 7) Inspect the wheel alignment and adjust if necessary.

# Front Arm

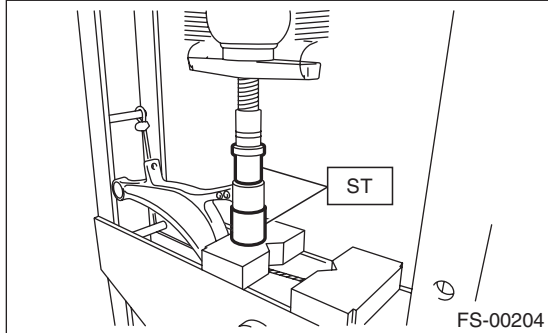
## FRONT SUSPENSION

### C: DISASSEMBLY

#### 1. FRONT BUSHING

Using the ST and a press, remove the front bushing.

ST 927680000 INSTALLER & REMOVER SET

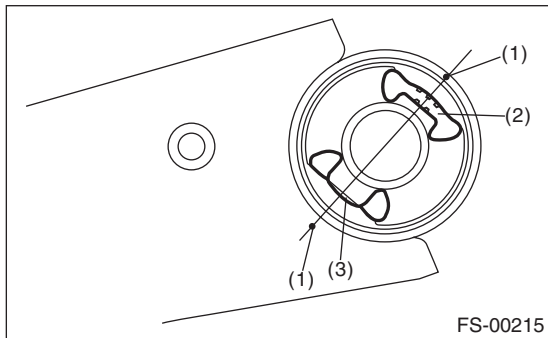


#### 2. REAR BUSHING

1) Put an alignment mark on the front arm based on the center of rear bushing recess portion.

#### CAUTION:

Always put an alignment mark for aligning the position on bushing installation.

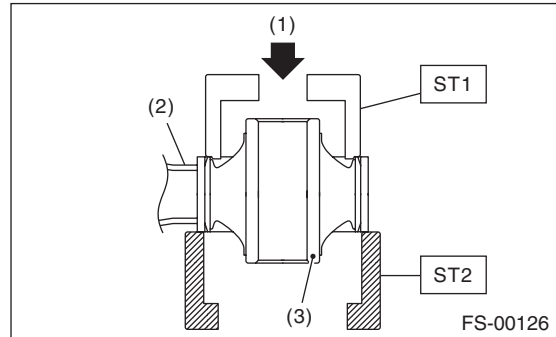


- (1) Put an alignment mark.
- (2) Recess portion (wide spacing)
- (3) Recess portion (narrow spacing)

2) Using the ST and a press, remove the rear bushing.

ST1 20299AG000 REMOVER

ST2 20299AG010 BASE



- (1) Press
- (2) Front arm
- (3) Rear bushing

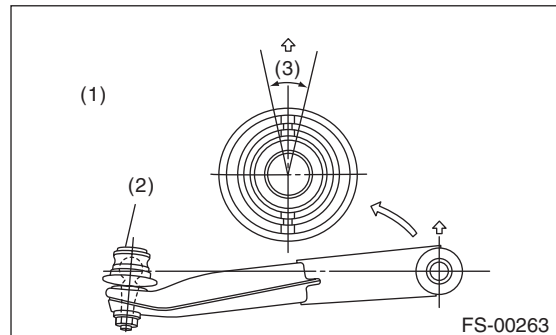
### D: ASSEMBLY

#### 1. FRONT BUSHING

Assemble in the reverse order of disassembly.

#### CAUTION:

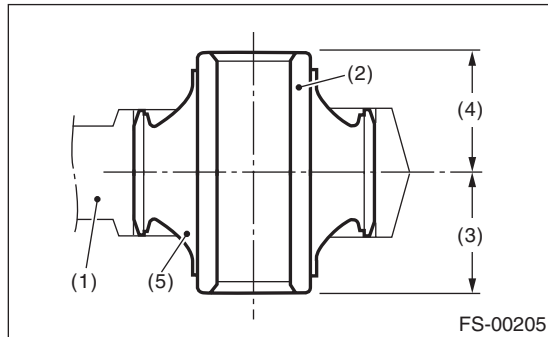
Install the front bushing in proper direction as shown in the figure.



- (1) Face the bushing toward the center of ball joint.
- (2) Ball joint
- (3)  $\pm 3^\circ$

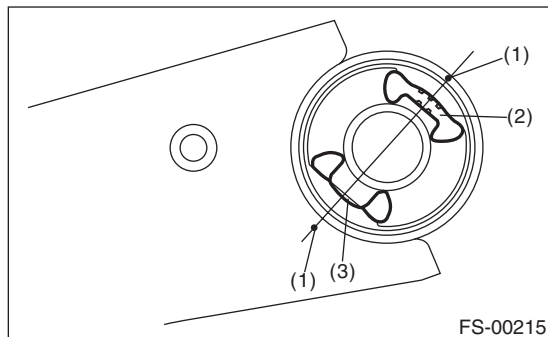
## 2. REAR BUSHING

1) As shown in the figure below, install the rear bushing with its longer inner cylinder facing downward and the shorter facing upward, with the identification paint marking pointed down.



- (1) Front arm
- (2) Bushing inner cylinder
- (3) Longer
- (4) Shorter
- (5) Identification paint

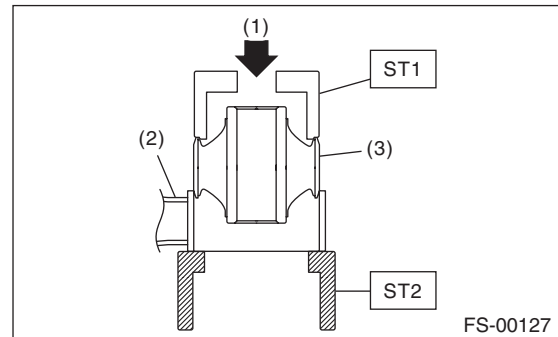
2) Align the center of rear bushing recess portion with the aligning mark on the front arm.



- (1) Alignment mark
- (2) Recess portion (wide spacing)
- (3) Recess portion (narrow spacing)

3) Using the ST and a press, install the rear bushing.

- ST1 20299AG000 REMOVER
- ST2 20299AG010 BASE



- (1) Press
- (2) Front arm
- (3) Rear bushing

## E: INSPECTION

- 1) Check the front arm for wear, damage or cracks, and correct or replace if defective.
- 2) Check the bushing for crack, fatigue or damage.

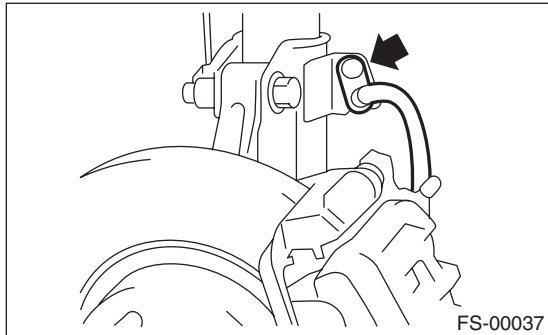
# Front Strut

## FRONT SUSPENSION

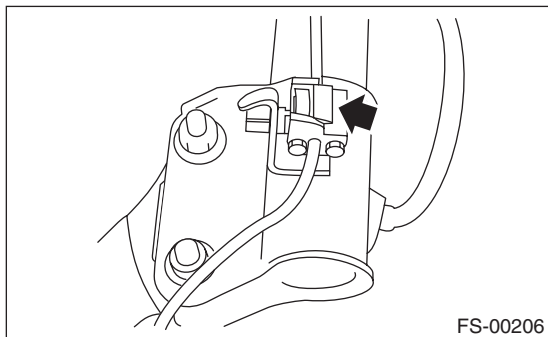
### 7. Front Strut

#### A: REMOVAL

- 1) Lift up the vehicle, and then remove the front wheels.
- 2) Place an alignment mark on the camber adjusting bolt and strut.
- 3) Remove the bolt securing the brake hose from the strut.



- 4) Remove the clip securing the ABS wheel speed sensor harness.

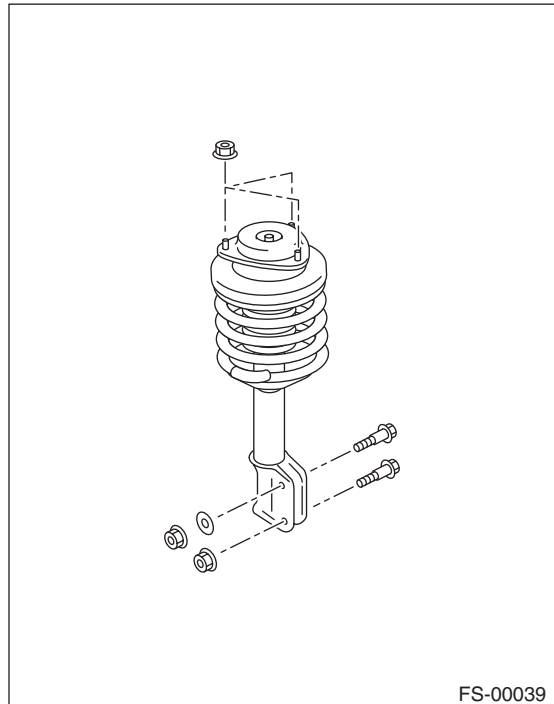


- 5) Remove the two bolts securing the housing to the strut.

#### NOTE:

While holding the head of the adjusting bolt, loosen the self-locking nut.

- 6) Remove the three nuts securing strut mount to body.



#### B: INSTALLATION

- 1) Install the strut mount at the upper side of strut to body, and tighten it with new self-locking nuts.

#### **Tightening torque:**

**20 N·m (2.0 kgf-m, 14.5 ft-lb)**

- 2) Align alignment marks on the camber adjusting bolt and strut.

Using new self-locking nuts, install the strut to the housing.

#### NOTE:

While holding the head of adjusting bolt, tighten the self-locking nut.

#### **Tightening torque:**

**155 N·m (15.8 kgf-m, 114.3 ft-lb)**

- 3) Secure the ABS wheel speed sensor harness to the strut.

- 4) Install the bolts which secure the brake hose to the strut.

#### **Tightening torque:**

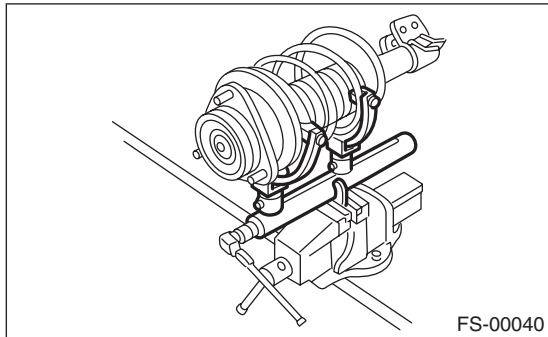
**33 N·m (3.4 kgf-m, 24.3 ft-lb)**

- 5) Install the front wheels.
- 6) Inspect the wheel alignment and adjust if necessary.

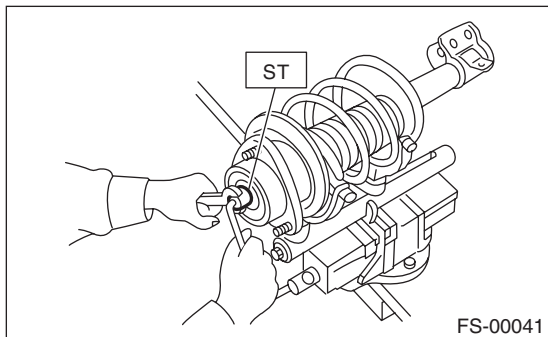


## C: DISASSEMBLY

- 1) Using a coil spring compressor, compress the coil spring.



- 2) Using the ST, remove the self-locking nut.  
ST 20399AG000 STRUT MOUNT SOCKET



- 3) Remove the strut mount, spacer and upper spring seat from strut.
- 4) Gradually decrease the compression force of compressor, and remove the coil spring.
- 5) Remove the dust cover and helper spring.

## D: ASSEMBLY

- 1) Before installing the coil spring, strut mount, etc. on strut, check for the presence of air in the dampening force generating mechanism of the strut since air prevents proper dampening force production.
- 2) Checking for 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 fingers, move the rod up and down.
  - (4) If the piston rod moves 10 mm (0.39 in) or more 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 retract the piston rod.

- (5) Repeat 3 or 4 times from the step (1).

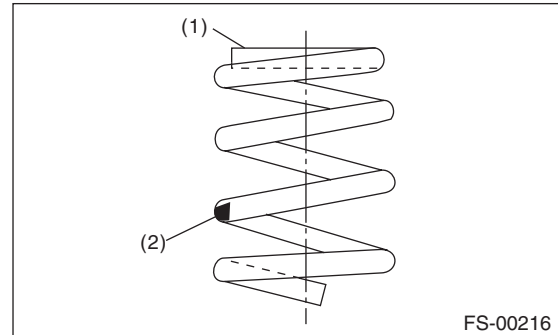
### NOTE:

After purging air from the strut, be sure to place the strut with the piston rod facing up. If the strut is laid down for any reason, check for the entry of air in accordance with "Checking for presence of air"

- 4) Using a coil spring compressor, compress the coil spring.

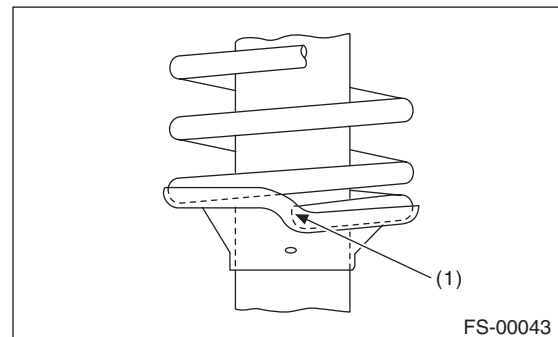
### NOTE:

Make sure that the vertical install direction of the coil spring is as shown in the figure.



- (1) Place the flat end on the top side.
- (2) Identification point

- 5) Set the coil spring correctly so that its end face seats well in the spring seat as shown in the figure.



- (1) Coil spring end face

- 6) Install the helper and dust cover to the piston rod.

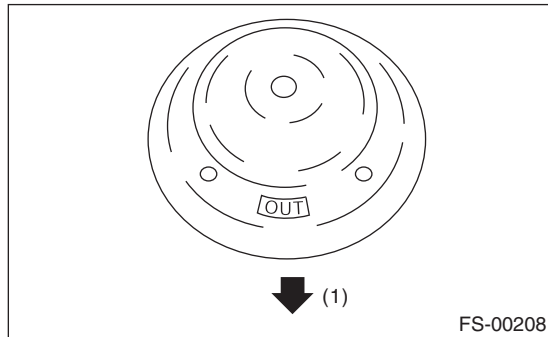
# Front Strut

## FRONT SUSPENSION

7) Pull the piston rod fully upward, and install the spring seat.

### NOTE:

Position the upper spring seat as shown in the figure.



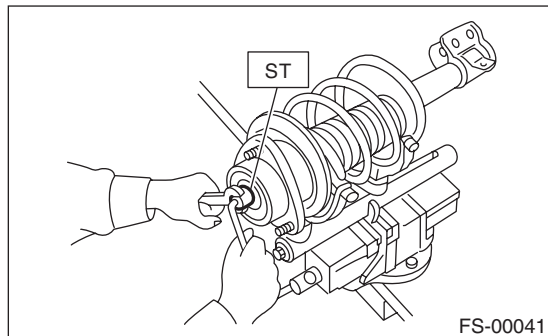
(1) Outside of body

8) Install spacer and the strut mount to piston rod, and tighten a new self-locking nut temporarily.  
9) Using a hexagon wrench to prevent strut rod from turning, tighten the new self-locking nut with ST.

ST 20399AG000 STRUT MOUNT SOCKET

### Tightening torque:

**55 N·m (5.6 kgf-m, 40.6 ft-lb)**



10) Loosen the coil spring compressor carefully.

## E: INSPECTION

Check the removed part for wear, damage and cracks, and then repair or replace it if defective.

### 1. STRUT

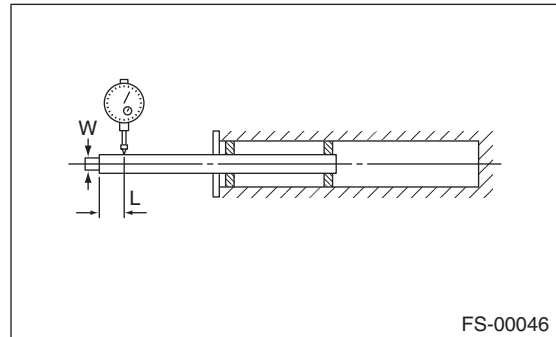
1) Check for oil leaks.

2) Move the piston rod up and down to check that it operates smoothly without any hitch.

3) Piston rod play

- Measure the play as follows:

Fix the outer shell in place and fully extend the rod. Set a dial gauge at the end of rod L [10 mm (0.39 in)], and then read the dial gauge indication  $P_1$  while applying a force of W [20 N (2 kgf, 4 lb)] to the threaded portion. Apply a force of 20 N (2 kgf, 4 lb) from the opposite direction of "W", and then read the dial gauge indication  $P_2$ .



**Play limit ( $P_1 + P_2$ ):**

**0.8 mm (0.031 in)**

If the play exceeds limit, replace the strut.

### 2. STRUT MOUNT

Check the rubber part for deformation, cracks or deterioration, and then replace it with a new part if defective.

### 3. DUST COVER

If any cracks or damage are found, replace it with a new part.

### 4. COIL SPRING

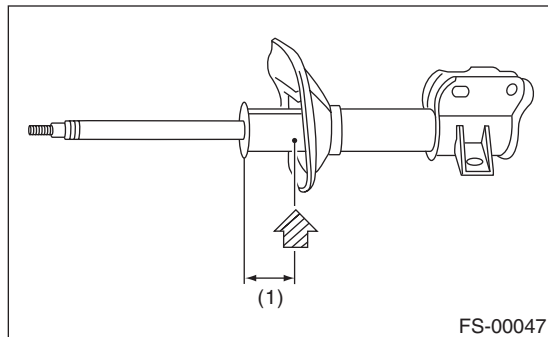
If a permanent strain is found, replaced it with a new part.

### 5. HELPER

Replace it with a new part if cracked or damaged.

**F: DISPOSAL****CAUTION:**

- Before handling struts, be sure to wear goggles to protect eyes from gas, oil and cutting powder.
  - Do not disassemble the strut damper or throw into flames.
  - When discarding gas filled struts, drill holes in them to purge the gas.
- 1) Place the strut on a level surface with the piston rod fully expanded.
  - 2) Using a 2 — 3 mm (0.08 — 0.12 in) dia. drill, make holes in areas shown in the figure.

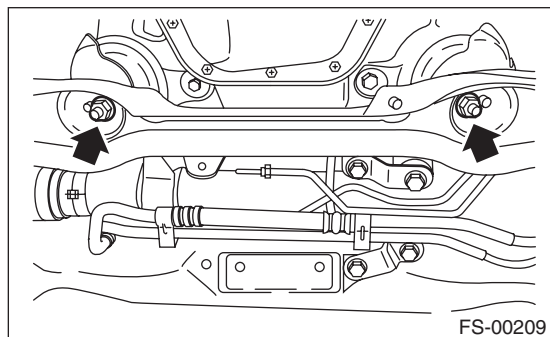


(1) 40 mm (1.57 in)

### 8. Front Crossmember

#### A: REMOVAL

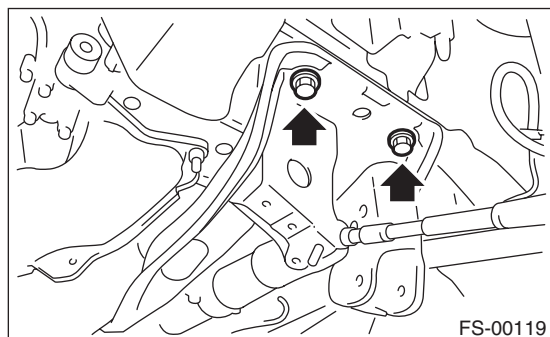
- 1) Lift up the vehicle, and then remove the front wheels.
- 2) Remove the front exhaust pipe.
- 3) Remove the front crossmember support plate. <Ref. to FS-14, REMOVAL, Front Crossmember Support Plate.>
- 4) Remove the front stabilizer. <Ref. to FS-15, REMOVAL, Front Stabilizer.>
- 5) Disconnect the tie-rod end from housing.
- 6) Remove the front arm. <Ref. to FS-17, REMOVAL, Front Arm.>
- 7) Remove the nuts attaching the engine mount cushion rubber to crossmember.



- 8) Remove the steering universal joint.
- 9) Disconnect the power steering hose from steering gearbox.
- 10) Lift the engine approx. 10 mm (0.39 in) using a chain block.
- 11) Support the crossmember with a jack, remove the bolts securing crossmember to body, and then gradually lower the crossmember with steering gearbox as a unit.

#### CAUTION:

**When removing the crossmember downward, be careful that the tie-rod end does not interfere with drive shaft boot.**



#### B: INSTALLATION

- 1) Install in the reverse order of removal.

#### CAUTION:

- Use a new bolt and self-locking nut. For parts which are not reusable, refer to COMPONENT. <Ref. to FS-3, COMPONENT, General Description.>
- Always tighten the bushing in the state where the vehicle is at curb weight and the wheels are in full contact with the ground.

#### Tightening torque:

##### Crossmember to Body:

95 N·m (9.7 kgf-m, 70.1 ft-lb)

##### Engine mounting to Crossmember:

75 N·m (7.6 kgf-m, 55.3 ft-lb)

##### Front arm to Crossmember:

95 N·m (9.7 kgf-m, 70.1 ft-lb)

##### Front arm to Support plate:

88 N·m (9.0 kgf-m, 64.9 ft-lb)

##### Support plate to Body:

150 N·m (15.3 kgf-m, 110.6 ft-lb)

##### Tie-rod end to Housing:

27 N·m (2.8 kgf-m, 19.9 ft-lb)

After tightening to the specified torque, tighten the castle nut further but within 60° until the hole in the ball stud is aligned with a slot in castle nut.

##### Universal joint:

24 N·m (2.4 kgf-m, 17.4 ft-lb)

##### Stabilizer clamp:

25 N·m (2.5 kgf-m, 18.1 ft-lb)

##### Stabilizer link:

60 N·m (6.1 kgf-m, 44.3 ft-lb)

##### Power steering hose to Steering gearbox:

15 N·m (1.5 kgf-m, 11 ft-lb)

- 2) Purge air from the power steering system.
- 3) Inspect the wheel alignment and adjust if necessary.

#### C: INSPECTION

Check the crossmember for wear, damage or cracks, and then repair or replace if faulty.

## 9. General Diagnostic Table

### A: INSPECTION

#### 1. IMPROPER VEHICLE POSTURE OR IMPROPER WHEEL ARCH HEIGHT

Possible cause	Corrective action
(1) Permanent distortion or damage of the coil spring	Replace.
(2) Rough operation of strut or shock absorber	Replace.
(3) Improper installation of strut or shock absorber	Replace with appropriate parts.
(4) Installation of the wrong coil spring	Replace with appropriate parts.

#### 2. POOR RIDE COMFORT

- 1) Large rebound shock
- 2) Rocking of the vehicle continues too long after running over bump and hump.
- 3) Excessive shock in bumping

Possible cause	Corrective action
(1) Damaged coil spring	Replace.
(2) Overinflation of tires	Adjust.
(3) Improper wheel arch height	Replace the coil springs with new parts.
(4) Fault in operation of strut or shock absorber	Replace.
(5) Damage or deformation of strut mount or shock absorber mount	Replace.
(6) Unsuitable length (maximum or minimum) of strut or shock absorber	Replace with appropriate parts.
(7) Deformation or loss of bushing	Replace.
(8) Deformation or damage of helper in strut assembly or shock absorber	Replace.
(9) Oil leakage from the strut or shock absorber	Replace.

#### 3. NOISE

Possible cause	Corrective action
(1) Wear or damage of strut or shock absorber component parts	Replace.
(2) Loosening of the suspension link installing bolt	Tighten to the specified torque.
(3) Deformation or loss of bushing	Replace.
(4) Improper length (maximum or minimum) of strut or shock absorber	Replace with appropriate parts.
(5) Damaged coil spring	Replace.
(6) Wear or damage of the ball joint	Replace.
(7) Deformation of the stabilizer clamp	Replace.

# General Diagnostic Table

FRONT SUSPENSION

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# REAR SUSPENSION

# RS

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	<b>Page</b>
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4. Rear Trailing Link .....	9
5. Upper Arm .....	12
6. Rear Shock Absorber .....	13
7. Front Lateral Link .....	15
8. Rear Lateral Link .....	16
9. Rear Sub Frame .....	17
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# General Description

## REAR SUSPENSION

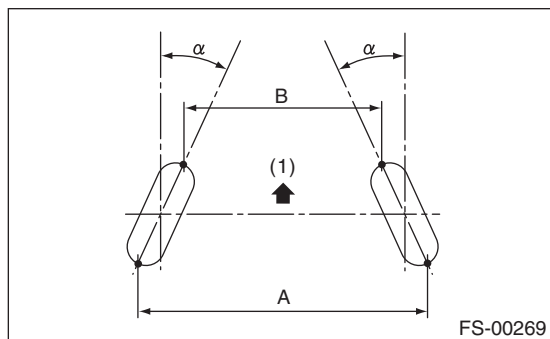
### 1. General Description

#### A: SPECIFICATION

Refer to "FS" section for rear suspension specifications. <Ref. to FS-2, SPECIFICATION, General Description.>

#### NOTE:

- Front and rear toe-in and front camber can be adjusted. Adjust if the toe-in or camber tolerance exceeds specifications.
- Other items indicated in the specifications table cannot be adjusted. If other items exceed specifications, check the suspension parts and connections for deformation, and replace with new parts as required.



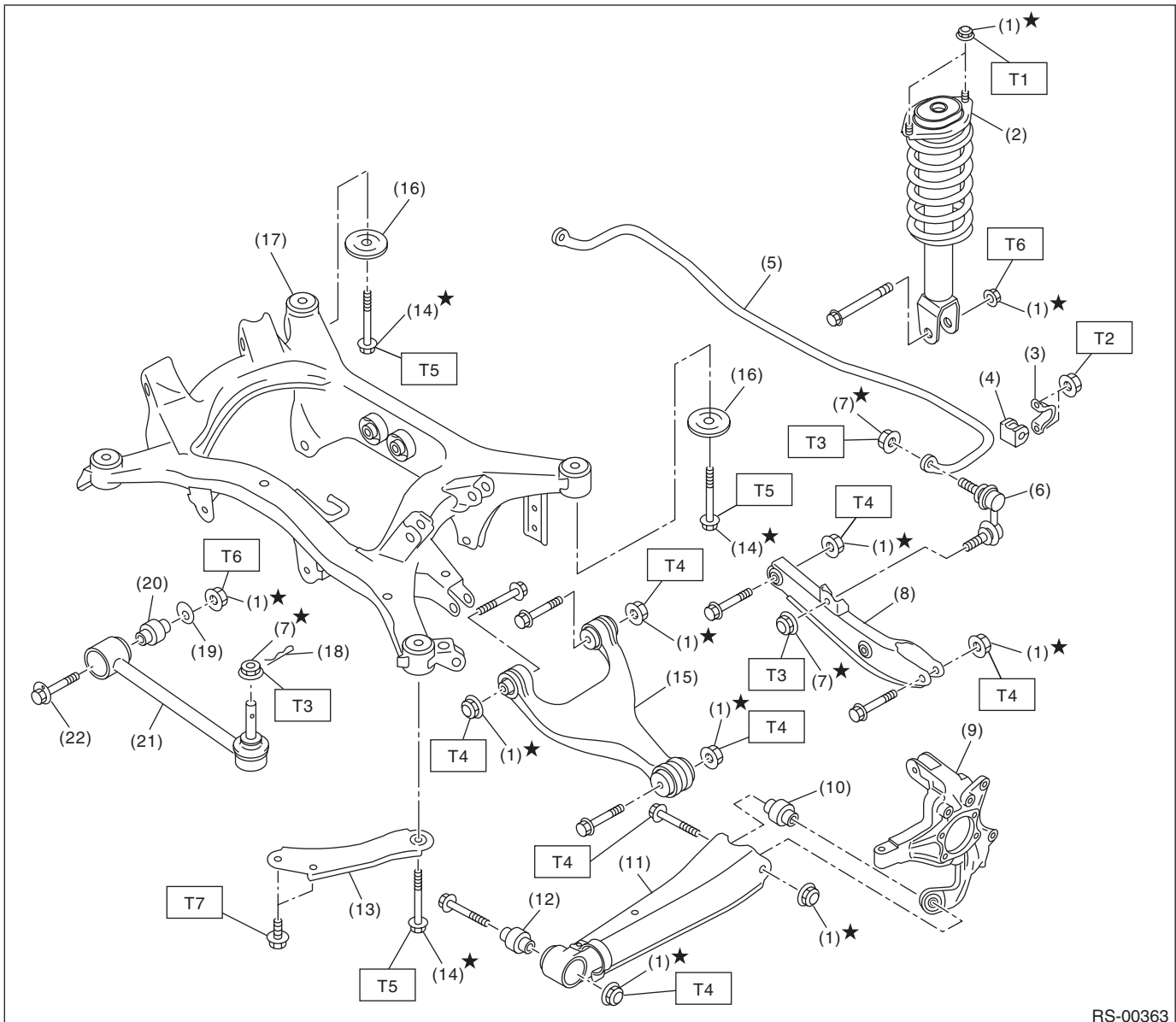
(1) Front

A – B = Positive: Toe-in, Negative: Toe-out  
 $\alpha$  = Individual toe angles



### B: COMPONENT

#### 1. REAR SUSPENSION



RS-00363

- |                           |                                    |
|---------------------------|------------------------------------|
| (1) Self-locking nut      | (12) Trailing link bushing         |
| (2) Shock absorber        | (13) Front sub frame support plate |
| (3) Stabilizer clamp      | (14) Bolt                          |
| (4) Stabilizer bushing    | (15) Upper arm                     |
| (5) Rear stabilizer       | (16) Rear sub frame stopper plate  |
| (6) Stabilizer link       | (17) Rear sub frame                |
| (7) Flange nut            | (18) Snap pin                      |
| (8) Rear lateral link     | (19) Adjusting washer              |
| (9) Rear housing          | (20) Front lateral link bushing    |
| (10) Rear housing bushing | (21) Front lateral link            |
| (11) Trailing link        | (22) Adjusting bolt                |

#### **Tightening torque: N·m (kgf·m, ft·lb)**

**T1: 30 (3.1, 22.4)**

**T2: 38 (3.9, 28)**

**T3: 60 (6.1, 44)**

**T4: 80 (8.2, 59)**

**T5: 95 (9.7, 70)**

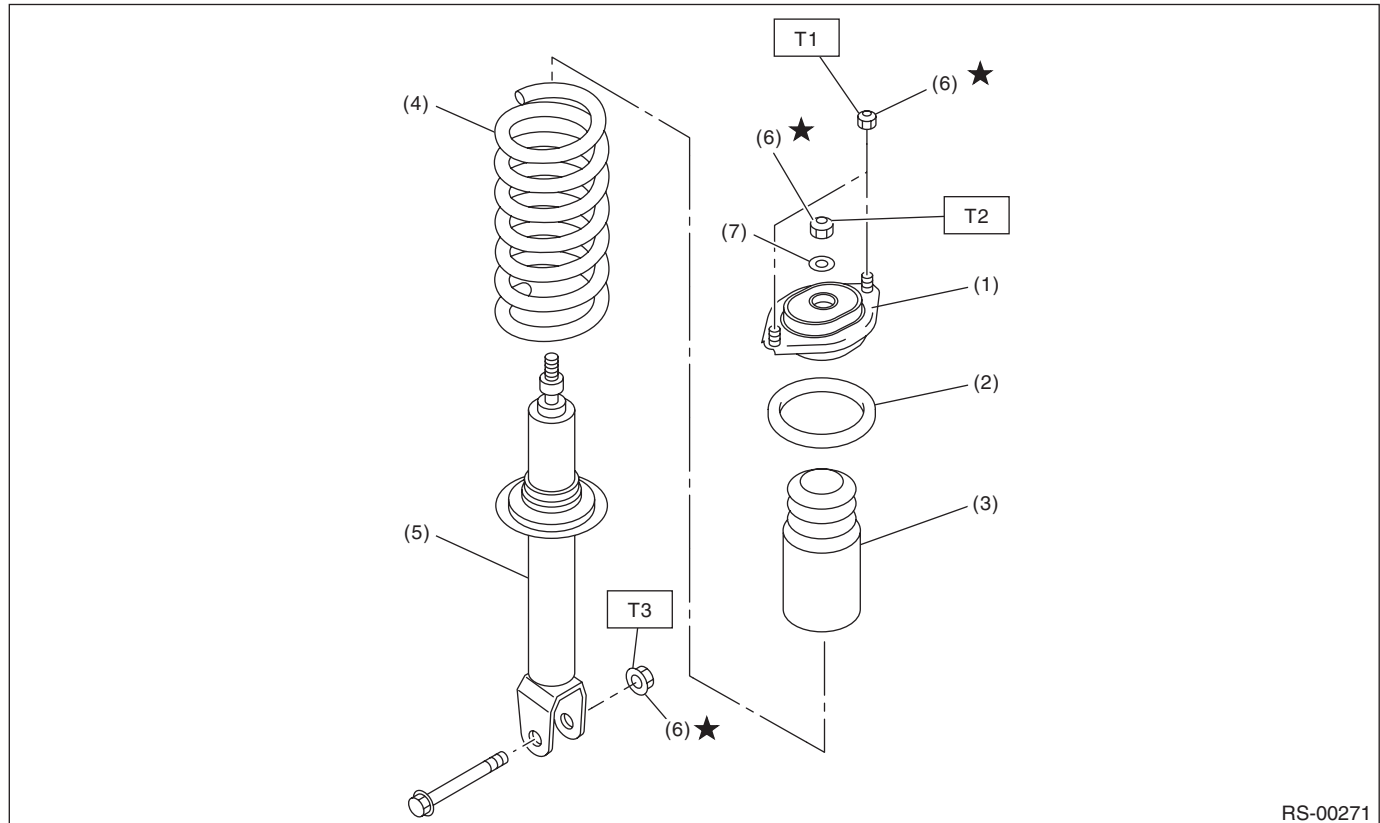
**T6: 120 (12.2, 89)**

**T7: 125 (12.7, 92)**

# General Description

## REAR SUSPENSION

### 2. SHOCK ABSORBER



- |                        |                      |
|------------------------|----------------------|
| (1) Mount              | (5) Shock absorber   |
| (2) Upper rubber sheet | (6) Self-locking nut |
| (3) Dust cover         | (7) Washer           |
| (4) Coil spring        |                      |

**Tightening torque: N·m (kgf-m, ft-lb)**

**T1: 30 (3.1, 22.4)**

**T2: 35 (3.6, 26)**

**T3: 120 (12.2, 89)**

### C: CAUTION

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. OPERATION

- Wear appropriate work clothing, including a cap, protective goggles and protective shoes when performing any work.
- Before disposing of shock absorbers, be sure to bleed the gas out completely. Also, do not expose to flames or fire.
- Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
- Use SUBARU genuine grease etc. or equivalent. Do not mix grease etc. of different grades or manufacturers.
- Before securing a part on a vise, place cushioning material such as wood blocks, aluminum plate, or cloth between the part and the vise.
- Be sure to tighten fasteners including bolts and nuts to the specified torque.
- Place shop jacks or rigid racks at the specified points.

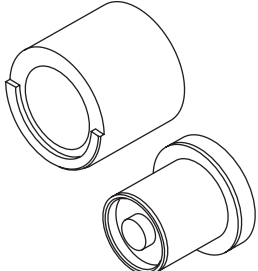
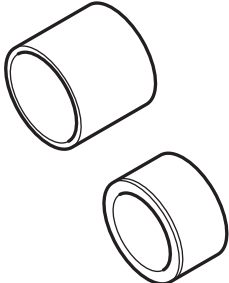
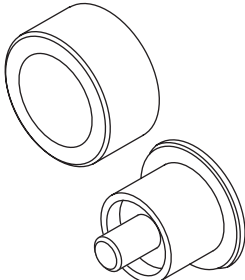
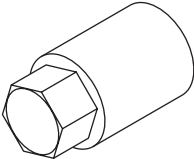
#### 2. OIL

When handling oil, adhere to the following to prevent unexpected accident.

- Prepare container and waste cloths when performing work which oil could possibly spill. If oil spills, wipe it off immediately to prevent from penetrating into floor or flowing outside, for environmental protection.
- Follow all government regulations concerning disposal of refuse when disposing.

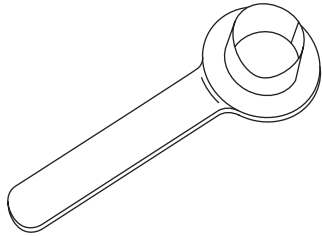
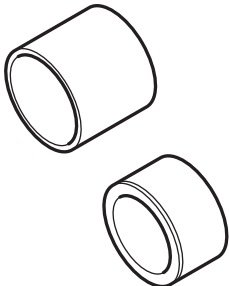
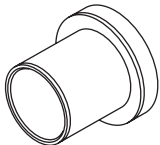
## D: PREPARATION TOOL

### 1. SPECIAL TOOL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p style="text-align: center;">ST20099AE000</p>	20099AE000	INSTALLER & REMOVER	Used for replacing the front lateral link bushing.
 <p style="text-align: center;">ST20099PA010</p>	20099PA010	INSTALLER & REMOVER	Used for replacing the rear trailing link bushing.
 <p style="text-align: center;">ST20099AE040</p>	20099AE040	INSTALLER & REMOVER SET	Used for replacing the rear trailing link bushing.
 <p style="text-align: center;">ST20399AG000</p>	20399AG000	STRUT MOUNT SOCKET	Used for removing and installing shock mount.

# General Description

## REAR SUSPENSION

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST28099PA090	28099PA090	OIL SEAL PROTECTOR	<ul style="list-style-type: none"> <li>• Used for installing the rear drive shaft to the rear differential.</li> <li>• For oil seal protection.</li> </ul>
 ST20099PA010	20099PA010	INSTALLER & REMOVER	<ul style="list-style-type: none"> <li>• Used for replacing rear housing bushing.</li> <li>• Used together with the BUSHING REMOVER (20099FG000).</li> </ul>
 ST20099FG000	20099FG000	BUSHING REMOVER	<ul style="list-style-type: none"> <li>• Used for replacing rear housing bushing.</li> <li>• Used together with INSTALLER &amp; REMOVER (20099PA010) base.</li> </ul>

## 2. GENERAL TOOL

TOOL NAME	REMARKS
Alignment tester	Used for measuring wheel alignment.
Toe-in gauge	Used for toe-in measurement.
Jack	Used for removing and installing suspension.
Bearing puller	Used for removing bushings.
Coil spring compressor	Used for disassembling and assembling shock absorber.

## 2. Wheel Alignment

### A: INSPECTION

NOTE:

Measure and adjust the front and rear wheel alignment at a time. Refer to the section "FS" for measurement and adjustment of wheel alignment. <Ref. to FS-6, INSPECTION, Wheel Alignment.>

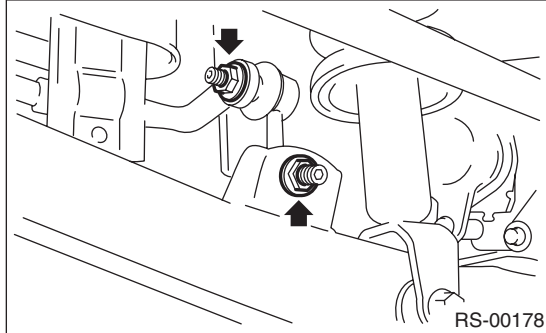
# Rear Stabilizer

## REAR SUSPENSION

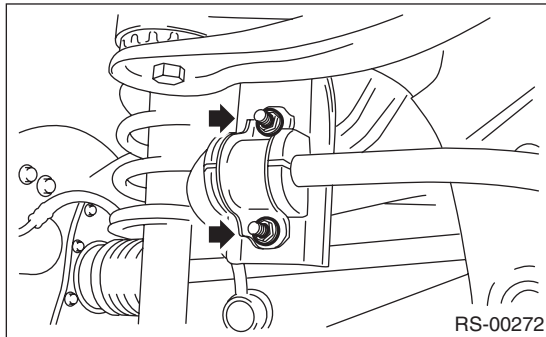
### 3. Rear Stabilizer

#### A: REMOVAL

- 1) Lift up the vehicle, and then remove the rear wheels.
- 2) Remove the stabilizer link.



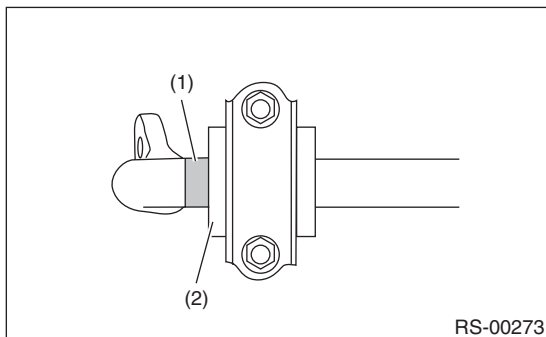
- 3) Remove the stabilizer clamp.



#### B: INSTALLATION

##### CAUTION:

- Be sure to use a new flange nut.
- Always tighten bushings with wheels in full contact with the ground and the vehicle at curb weight.
- When installing, align the edge of identification paint on the stabilizer to the end face of the bushing.



- (1) Identification paint
- (2) Bushing

Install in the reverse order of removal.

##### Tightening torque:

###### Stabilizer link

60 N·m (6.1 kgf-m, 44 ft-lb)

###### Stabilizer clamp

38 N·m (3.9 kgf-m, 28 ft-lb)

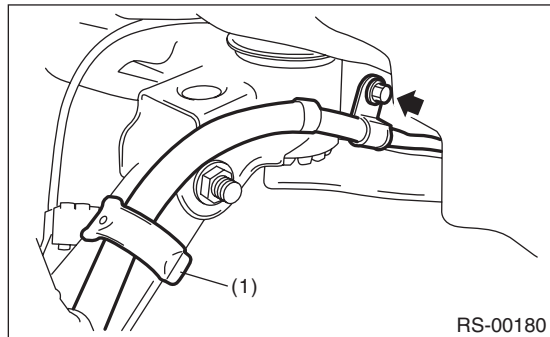
#### C: INSPECTION

- 1) Check the bushing for cracks, fatigue or damage.
- 2) Check the stabilizer link for damage.

## 4. Rear Trailing Link

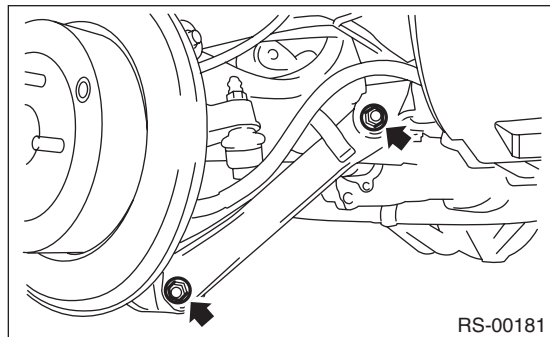
### A: REMOVAL

- 1) Lift up the vehicle, and then remove the rear wheels.
- 2) Remove the bracket, and remove the parking brake cable from the guide.



(1) Guide

- 3) Remove the ABS wheel speed sensor harness from the trailing link.
- 4) Remove the trailing link.



RS-00181

### B: INSTALLATION

#### CAUTION:

- Be sure to use a new self-locking nut.
- Always tighten bushings with wheels in full contact with the ground and the vehicle at curb weight.

Install in the reverse order of removal.

#### Tightening torque:

##### Trailing link

**80 N·m (8.2 kgf-m, 59 ft-lb)**

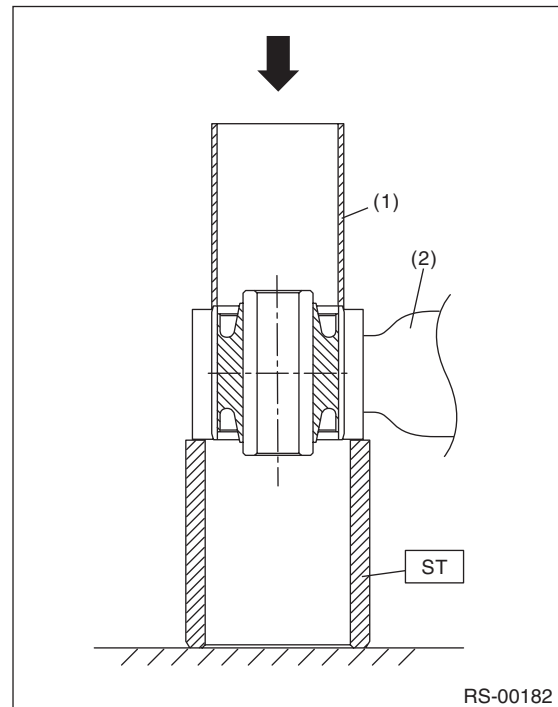
##### Parking Brake Cable bracket

**33 N·m (3.4 kgf-m, 24 ft-lb)**

### C: DISASSEMBLY

#### 1. REAR TRAILING LINK BUSHING

Using the ST and a pipe, press the bushing out.  
ST 20099PA010 INSTALLER & REMOVER



RS-00182

- (1) 39 mm (1.54 in) dia., 50 mm (1.97 in) length pipe
- (2) Trailing link

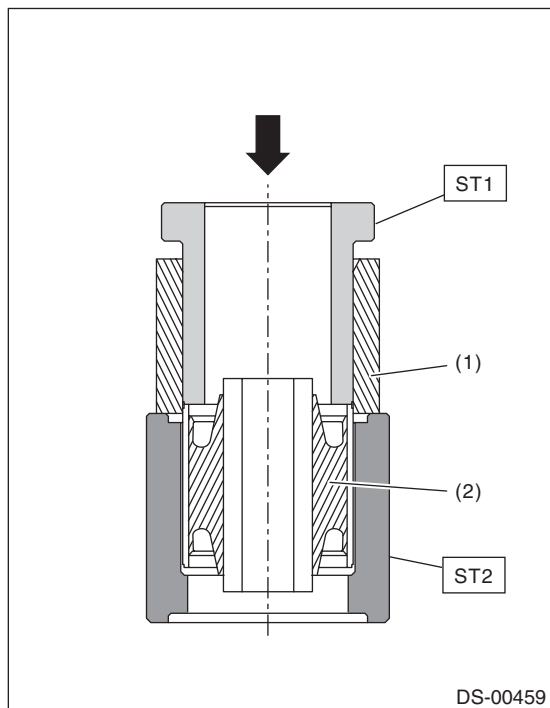
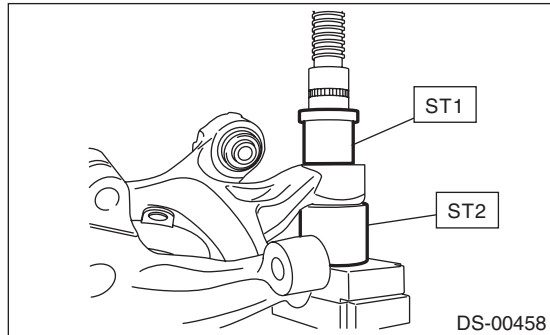
# Rear Trailing Link

## REAR SUSPENSION

### 2. REAR HOUSING BUSHING

- 1) Remove the rear housing. <Ref. to DS-17, REMOVAL, Rear Axle.>
- 2) Using the ST and a hydraulic press, push out the bushing.

ST1 20099FG000 BUSHING REMOVER  
ST2 20099PA110 INSTALLER & REMOVER  
(BASE)



- (1) Rear housing
- (2) Bushing

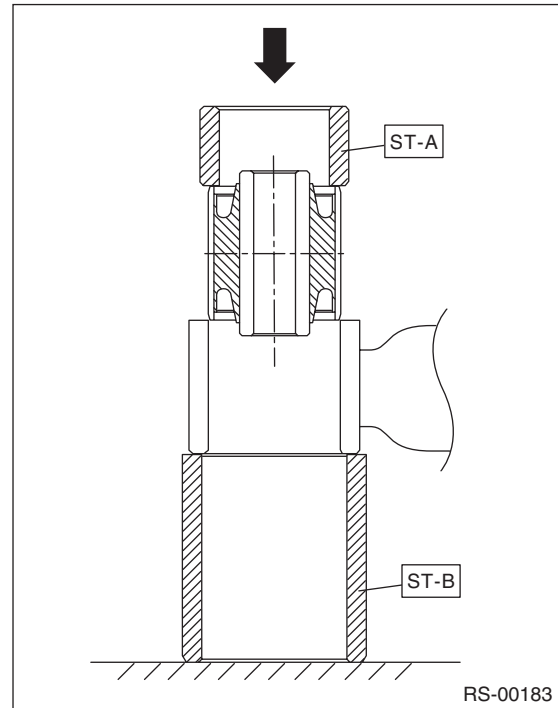
### D: ASSEMBLY

#### 1. REAR TRAILING LINK BUSHING

Using the ST A and ST B, press-fit the bushing.  
STA 20099AE040 INSTALLER & REMOVER  
STB 20099PA010 INSTALLER & REMOVER

#### CAUTION:

Press the bushing straight in.





## 2. REAR HOUSING BUSHING

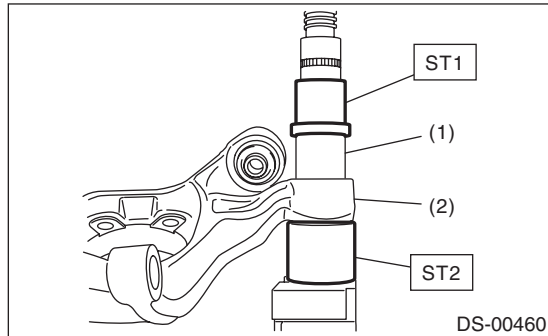
Using the ST and a hydraulic press, press the bushing into place.

ST1 20099FG000 BUSHING REMOVER

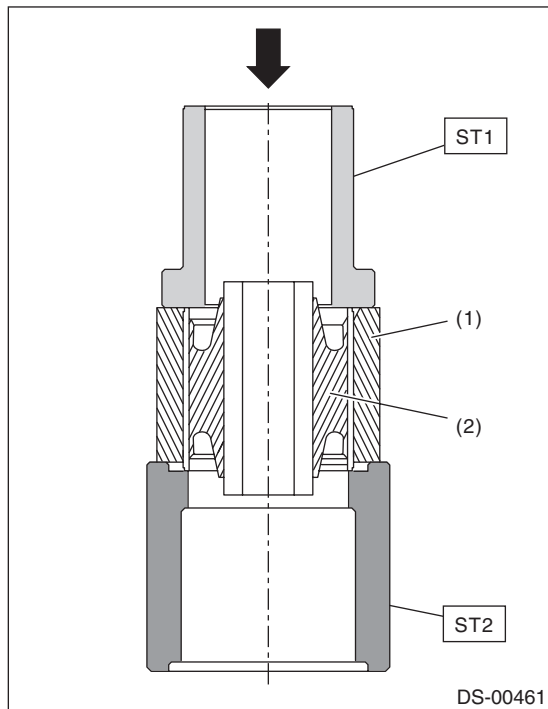
ST2 20099PA110 INSTALLER & REMOVER  
(BASE)

### CAUTION:

Press the bushing straight in.



- (1) Bushing
- (2) Rear housing



- (1) Rear housing
- (2) Bushing

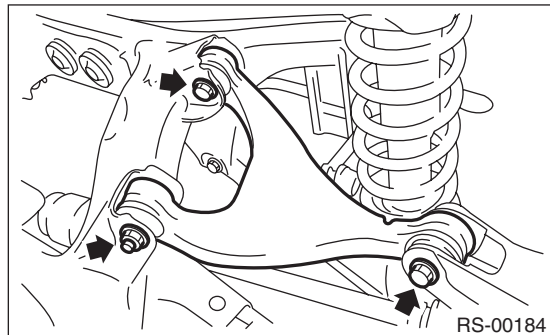
## E: INSPECTION

Check the trailing link for bending, corrosion or damage.

### 5. Upper Arm

#### A: REMOVAL

- 1) Lift up the vehicle, and then remove the rear wheels.
- 2) Remove the bolts, and then remove the upper arm.



#### B: INSTALLATION

##### CAUTION:

- Be sure to use a new self-locking nut.
- Always tighten the bushing in the state where the vehicle is at curb weight and the wheels are in full contact with the ground.

- 1) Install in the reverse order of removal.
- 2) Inspect the wheel alignment and adjust if necessary.

##### *Tightening torque:*

**80 N·m (8.2 kgf·m, 59 ft·lb)**

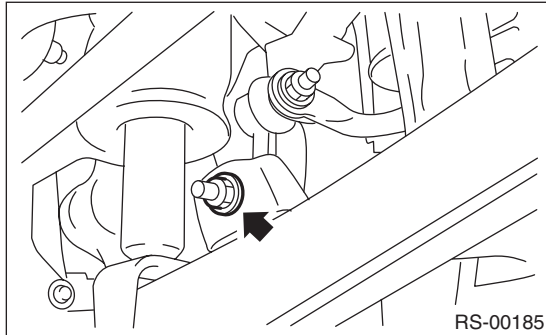
#### C: INSPECTION

- 1) Visually check the upper arm for damage and deformation.
- 2) Visually check the bushing for crack, damage and fatigue.

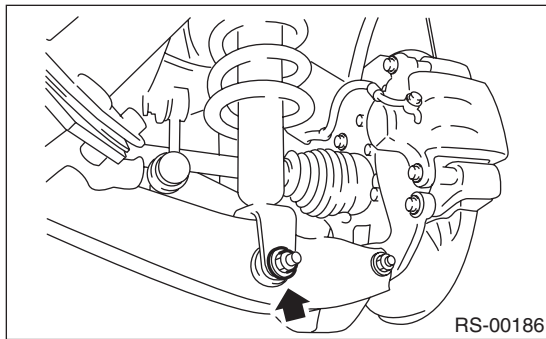
## 6. Rear Shock Absorber

### A: REMOVAL

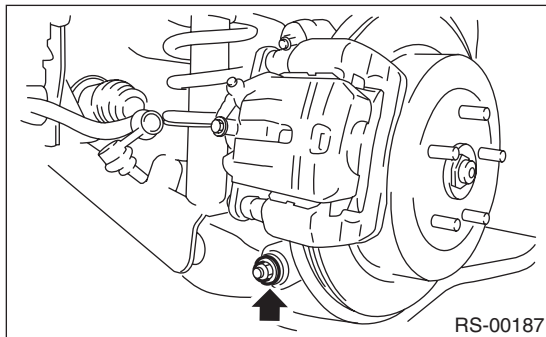
- 1) Remove the strut cap of quarter trim.
- 2) Lift up the vehicle, and then remove the rear wheels.
- 3) Remove the nut and disconnect the rear stabilizer link.



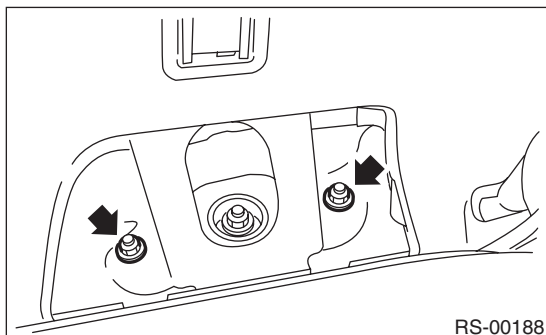
- 4) Remove the bolts on the bottom side of the shock absorber.



- 5) Detach the rear lateral link.



- 6) Remove the nuts of the shock absorber mount.



- 7) Remove the shock absorber.

### B: INSTALLATION

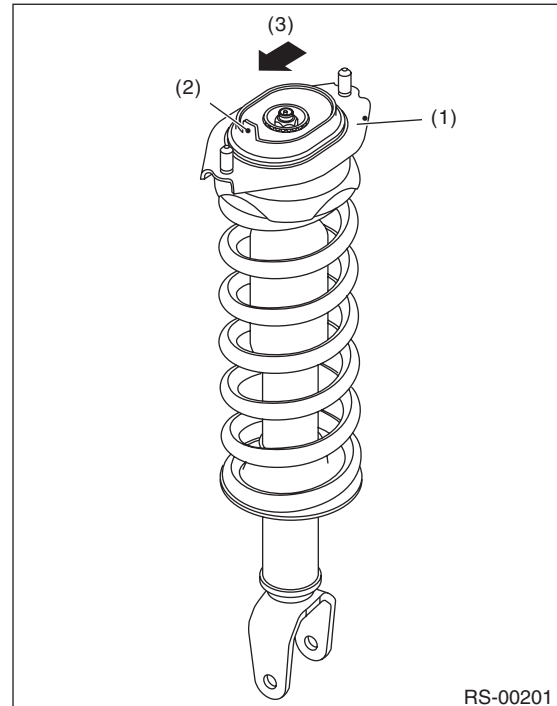
#### CAUTION:

- Be sure to use a new self-locking nut.
- Always tighten the bushing in the state where the vehicle is at curb weight and the wheels are in full contact with the ground.

- 1) Install in the reverse order of removal.

#### CAUTION:

Attach so that the protrusion on the top of the mount is pointed towards the front of the vehicle.



- (1) Mount
- (2) Protrusion portion
- (3) Front side of vehicle

#### Tightening torque:

Refer to "COMPONENT" of "General Description" for the tightening torque. <Ref. to RS-3, COMPONENT, General Description.>

- 2) Check the wheel alignment and adjust it if necessary.

### C: DISASSEMBLY

Refer to "Front Strut" for disassembly procedure. <Ref. to FS-21, DISASSEMBLY, Front Strut.>

### D: ASSEMBLY

Refer to "Front Strut" for installation procedures. <Ref. to FS-21, ASSEMBLY, Front Strut.>

### E: INSPECTION

Refer to "Front Strut" for inspection procedures. <Ref. to FS-22, INSPECTION, Front Strut.>

# Rear Shock Absorber

REAR SUSPENSION

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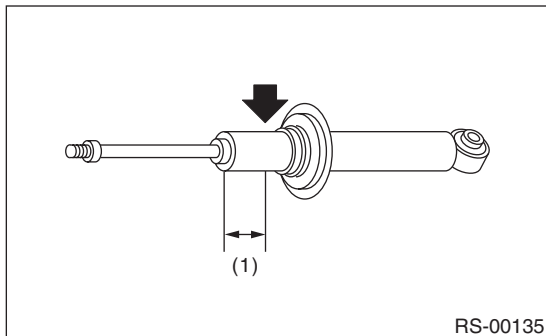
## F: DISPOSAL

### CAUTION:

- Before handling the shock absorber, be sure to wear goggles to protect eyes from gas, oil and cutting powder.
- Do not disassemble the shock absorber or place it into a fire.
- Drill a hole into shock absorbers in case of discarding shock absorbers filled with gas.

1) Place the shock absorber on a level surface with the piston rod fully expanded.

2) Make a hole into the specified position 30 mm (1.18 in) deep using a drill with 2 — 3 mm (0.08 — 0.12 in) diameter.

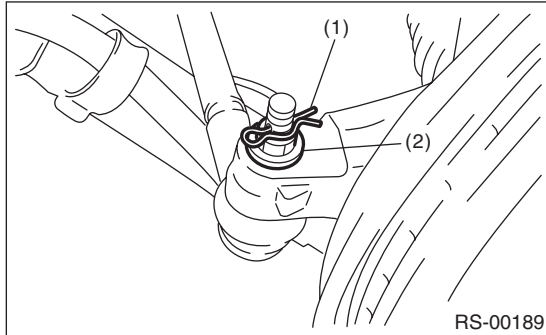


(1) 40 mm (1.57 in)

## 7. Front Lateral Link

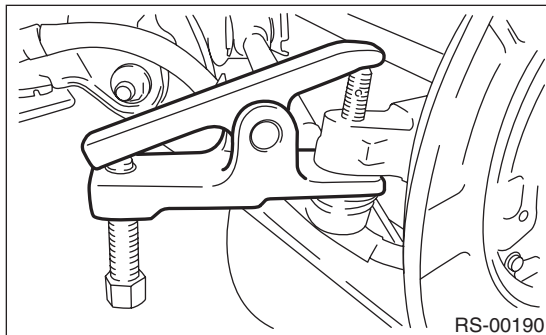
### A: REMOVAL

- 1) Lift up the vehicle, and then remove the rear wheels.
- 2) Remove the snap pin and nut.



- (1) Snap pin
- (2) Nut

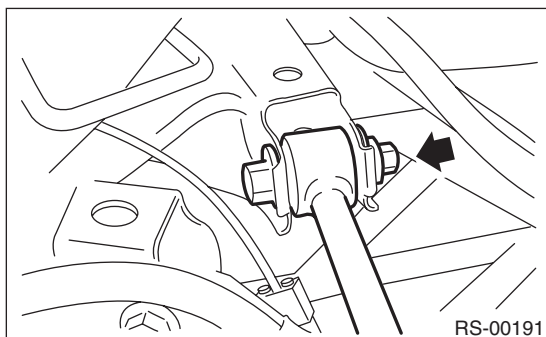
- 3) Use a puller to detach the ball joint.



- 4) Scribe an alignment mark on the front lateral link adjustment bolt and the rear sub frame.
- 5) Remove the adjusting bolt, and then remove the front lateral link.

### CAUTION:

**When removing the adjusting bolt, loosen the nut with the bolt head secured.**



### B: INSTALLATION

#### CAUTION:

- Be sure to use a new self-locking nut.
- Always tighten the bushing in the state where the vehicle is at curb weight and the wheels are in full contact with the ground.

- 1) Install in the reverse order of removal.

#### Tightening torque:

**Front lateral link — Sub frame**  
**120 N·m (12.2 kgf-m, 89 ft-lb)**

**Front lateral link — Rear axle housing**  
**60 N·m (6.1 kgf-m, 44 ft-lb)**

- 2) Inspect the wheel alignment and adjust if necessary.

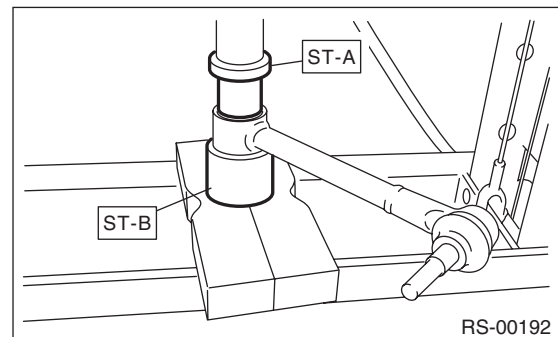
### C: INSPECTION

Visually check the front lateral link for damage or deformation.

### D: DISASSEMBLY

Using the ST A and ST B, press the bushing out.

- STA 20099AE000 INSTALLER & REMOVER  
 STB 20099AE000 INSTALLER & REMOVER



### E: ASSEMBLY

Using the ST A and ST B, press-fit the bushing.

- STA 20099AE000 INSTALLER & REMOVER  
 STB 20099AE000 INSTALLER & REMOVER

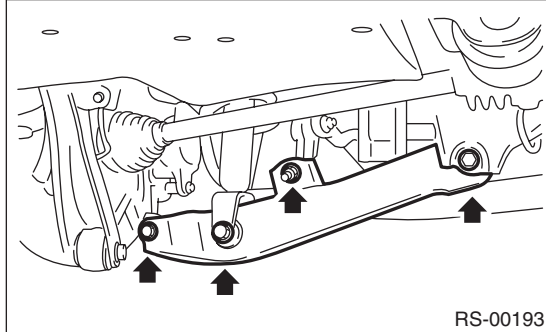
#### CAUTION:

**Press the bushing straight in.**

### 8. Rear Lateral Link

#### A: REMOVAL

- 1) Lift up the vehicle, and then remove the rear wheels.
- 2) Remove the nut and detach the stabilizer link.
- 3) Remove the bolts on the bottom side of the shock absorber.
- 4) Remove the bolt to remove the rear lateral link.



#### B: INSTALLATION

##### CAUTION:

- Be sure to use a new self-locking nut.
- Always tighten bushings with wheels in full contact with the ground and the vehicle at curb weight.

- 1) Install in the reverse order of removal.

##### *Tightening torque:*

###### *Rear lateral link*

**80 N·m (8.2 kgf·m, 59 ft·lb)**

###### *Shock absorber*

**120 N·m (12.2 kgf·m, 89 ft·lb)**

###### *Stabilizer link*

**60 N·m (6.1 kgf·m, 44 ft·lb)**

- 2) Inspect the wheel alignment and adjust if necessary.

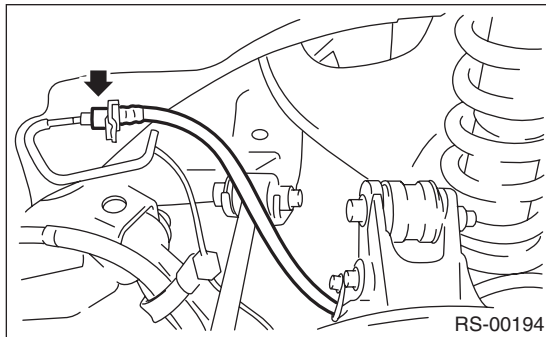
#### C: INSPECTION

Visually check the rear lateral link for damage and deformation.

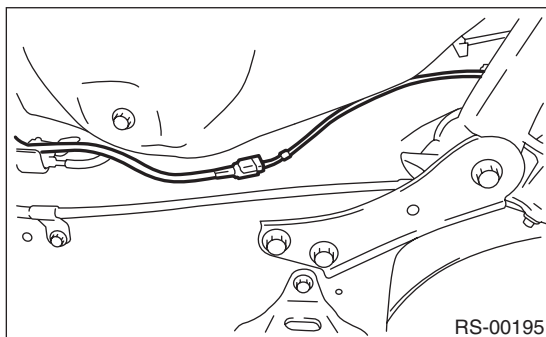
## 9. Rear Sub Frame

### A: REMOVAL

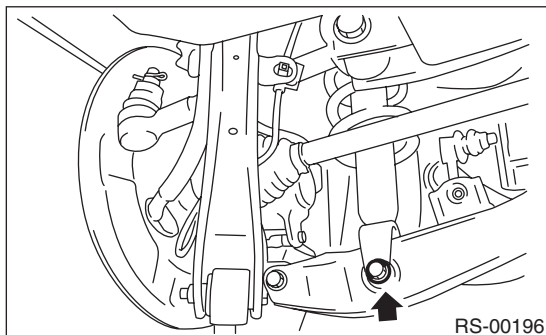
- 1) Separate the front exhaust pipe and rear exhaust pipe.
- 2) Remove the rear exhaust pipe and muffler.
- 3) Remove the propeller shaft.  
<Ref. to DS-10, REMOVAL, Propeller Shaft.>
- 4) Remove the spare tire hoist. <Ref. to WT-11, REMOVAL, Spare Tire Hoist.>
- 5) Remove the rear parking brake cable from the parking brake assembly. <Ref. to PB-7, REMOVAL, Parking Brake Assembly (Rear Disc Brake).>
- 6) Detach the brake hose, and remove the rear brake caliper from the vehicle.



- 7) Disconnect the ABS wheel speed sensor connector.

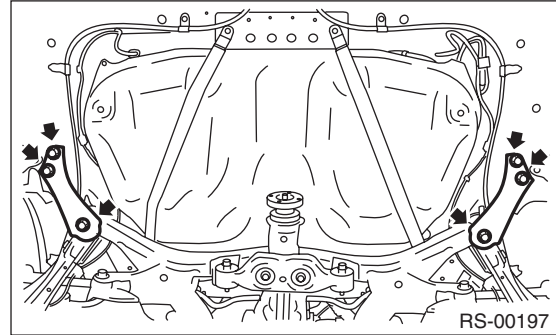


- 8) Remove the bolts on the bottom side of the shock absorber.

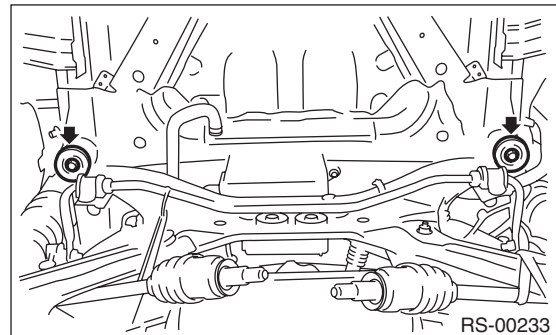


- 9) Support the sub frame using a jack.

- 10) Remove the front sub frame.



- 11) Remove the rear sub frame.



### B: INSTALLATION

#### CAUTION:

- Be sure to use a new self-locking nut.
- Always tighten bushings with wheels in full contact with the ground and the vehicle at curb weight.

- 1) Install in the reverse order of removal.

#### Tightening torque:

Refer to "COMPONENT" of "General Description" for the tightening torque. <Ref. to RS-3, COMPONENT, General Description.>

- 2) Bleed air from brake system.
- 3) Inspect the wheel alignment and adjust if necessary.

### C: INSPECTION

Check the removed parts for wear, damage and crack, and repair or replace them if faulty.

# General Diagnostic Table

## REAR SUSPENSION

### 10. General Diagnostic Table

#### A: INSPECTION

##### 1. IMPROPER VEHICLE POSTURE OR IMPROPER WHEEL ARCH HEIGHT

Possible cause	Corrective action
(1) Permanent distortion or damaged coil spring	Replace.
(2) Rough operation of strut or shock absorber	Replace.
(3) Improper installation of strut or shock absorber	Replace with proper parts.
(4) Installation of the wrong coil spring	Replace with proper parts.

##### 2. POOR RIDE COMFORT

- 1) Large rebound shock
- 2) Rocking of the vehicle continues too long after running over bump and hump.
- 3) Excessive shock in bumping

Possible cause	Corrective action
(1) Damaged coil spring	Replace.
(2) Overinflation of tires	Adjust.
(3) Improper wheel arch height	Replace the coil springs with new parts.
(4) Fault in operation of strut or shock absorber	Replace.
(5) Damage or deformation of strut mount or shock absorber mount	Replace.
(6) Unsuitable length (maximum or minimum) of strut or shock absorber	Replace with appropriate parts.
(7) Deformation or loss of bushing	Replace.
(8) Deformation or damage of helper in strut assembly or shock absorber	Replace.
(9) Oil leakage from the strut or shock absorber	Replace.

##### 3. NOISE

Possible cause	Corrective action
(1) Wear or damage of strut or shock absorber component parts	Replace.
(2) Loosening of the suspension link installing bolt	Tighten to the specified torque.
(3) Deformation or loss of bushing	Replace.
(4) Unsuitable length (maximum or minimum) of strut or shock absorber	Replace with appropriate parts.
(5) Damaged coil spring	Replace.
(6) Wear or damage of the ball joint	Replace.
(7) Deformation of the stabilizer clamp	Replace.



# WHEEL AND TIRE SYSTEM

# WT

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	<b>Page</b>
1. General Description .....	2
2. Tire and Wheel .....	5
3. "T-type" Tire .....	8
4. Tire Pressure Monitoring System .....	9
5. Spare Tire Hoist .....	11
6. General Diagnostic Table .....	12

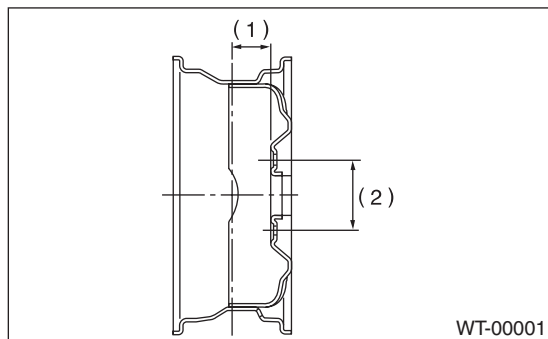
# General Description

## WHEEL AND TIRE SYSTEM

### 1. General Description

#### A: SPECIFICATION

##### 1. WHEEL AND TIRE SIZE



- (1) Offset
- (2) P.C.D.

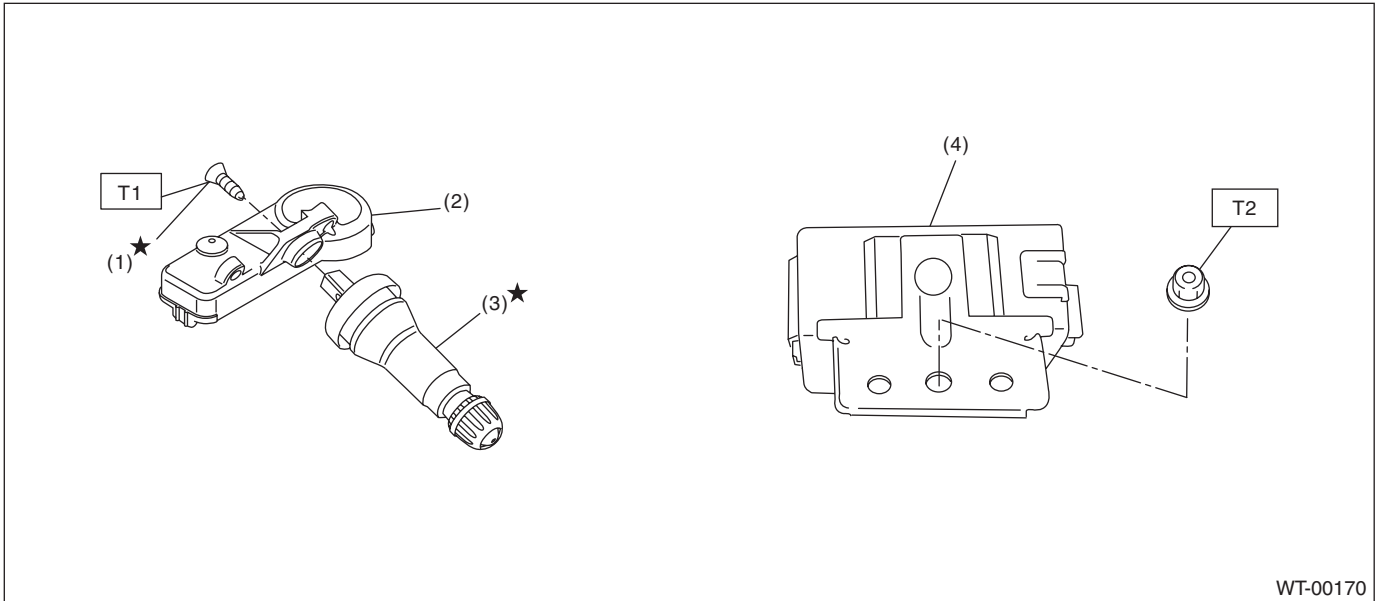
Specifications	Tire size	Wheel size	Offset mm (in)	P.C.D. mm (in)	Tire inflation pressure kPa (kgf/cm <sup>2</sup> , psi)	
					Front wheel	Rear wheel
Standard type	P255/55R18 104H	18 × 8JJ	55 (2.17)	114.3 (4.50)	230 (2.3, 33)	220 (2.2, 32)
"T-type" Tire	T165/80R17 104M	17 × 4T	40 (1.57)		—	420 (4.2, 60)

##### 2. SERVICE DATA

Part	Axial runout	Radial runout
Aluminum wheel	1.0 mm (0.039 in)	

## B: COMPONENT

### 1. TIRE PRESSURE MONITORING SYSTEM



(1) Screw

(2) Transmitter (Snap in type)

(3) Valve

(4) TPMS & keyless entry control module

**Tightening torque: N·m (kgf-m, ft-lb)**

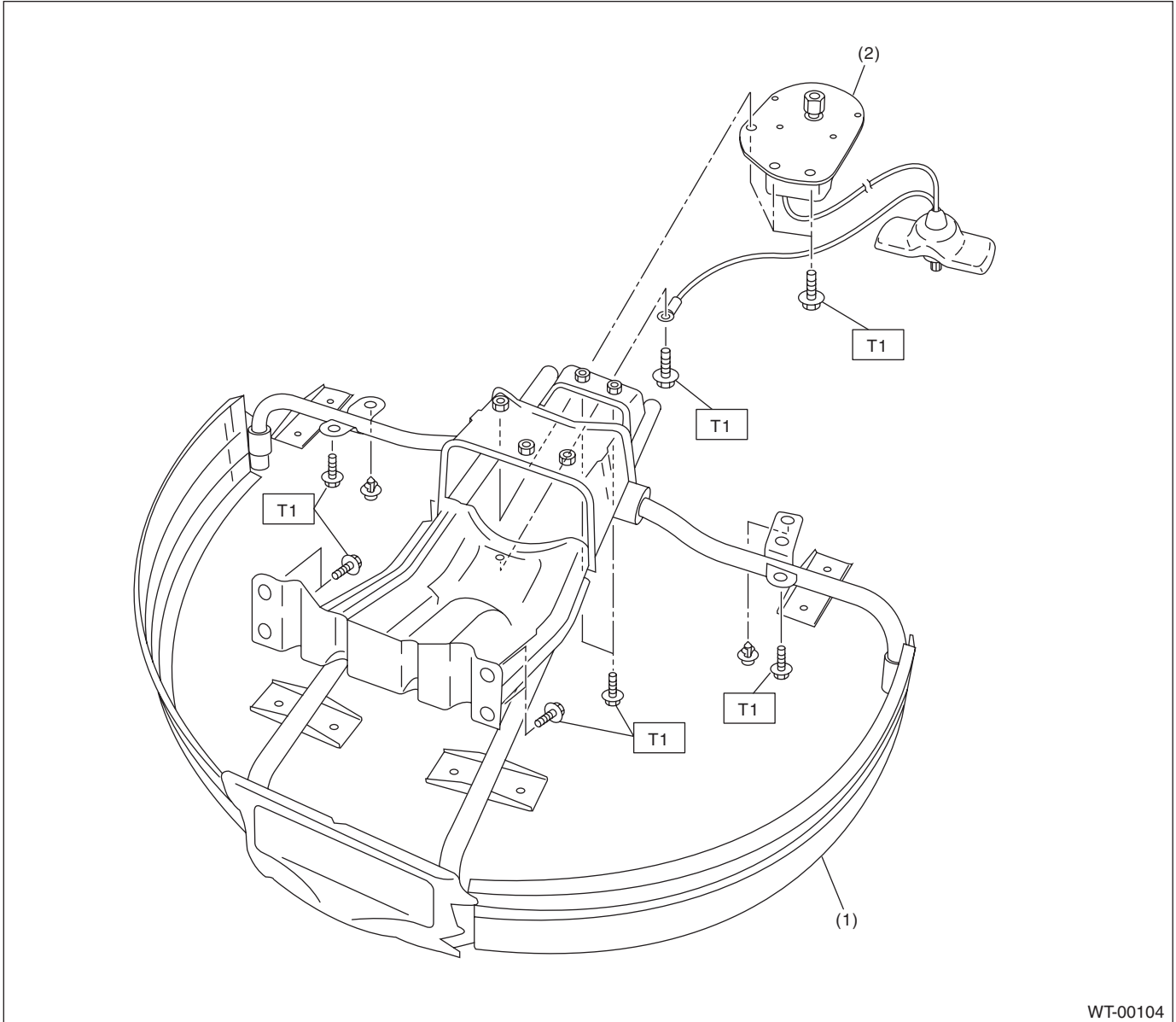
**T1: 1.4 (0.14, 1)**

**T2: 7.5 (0.76, 5.5)**

# General Description

## WHEEL AND TIRE SYSTEM

### 2. SPARE TIRE HOIST



WT-00104

- (1) Spare tire guide
- (2) Spare tire hoist

**Tightening torque: N·m (kgf·m, ft·lb)**

**T1: 33 (3.7, 24.3)**

## C: PREPARATION TOOL

### 1. GENERAL TOOL

TOOL NAME	REMARKS
Air pressure gauge	Used for measuring tire air pressure.
Dial gauge with magnet stand	Used for measuring wheel runout.
Wheel balancer	Used for adjusting wheel balance.

## 2. Tire and Wheel

### A: REMOVAL

- 1) Lift up the vehicle.
- 2) Remove the wheel nut.
- 3) Remove the wheels.

#### CAUTION:

When removing the wheels, be careful not to damage the hub bolts.

### B: INSTALLATION

- 1) Install the wheels to vehicle.
- 2) Tighten the wheel nuts to the specified torque.

#### Tightening torque:

##### Chromed plated wheel

150 N·m (15.3 kgf·m, 110.6 ft·lb)

##### Other than above

120 N·m (12.2 kgf·m, 88.5 ft·lb)

### C: INSPECTION

#### 1. TIRES

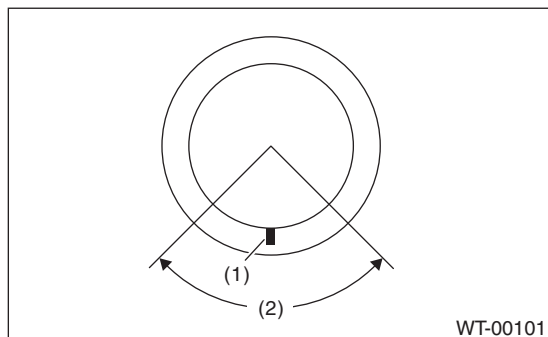
#### CAUTION:

When replacing a tire, make sure to use only tires of the same size, construction and load range as originally installed.

- 1) Tire size and tire inflation pressure check <Ref. to WT-2, SPECIFICATION, General Description.>
- 2) Check for cracks, damage and wear. Replace tires in the following cases.

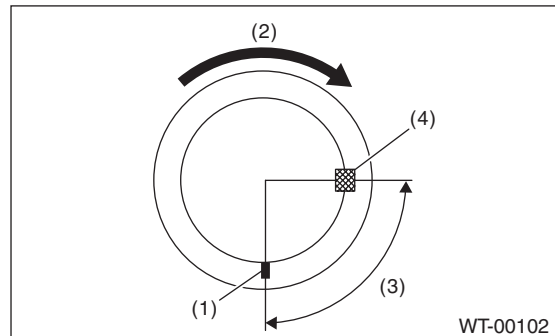
#### CAUTION:

- When replacing a tire, make sure to use only tires of the same size, construction and load range as originally installed.
- Use a tire changer when removing the tire from the wheel.
- On models equipped with tire pressure monitoring systems, do not use the bead breaker in a 90° area centered on the transmitter to prevent damaging the transmitter.



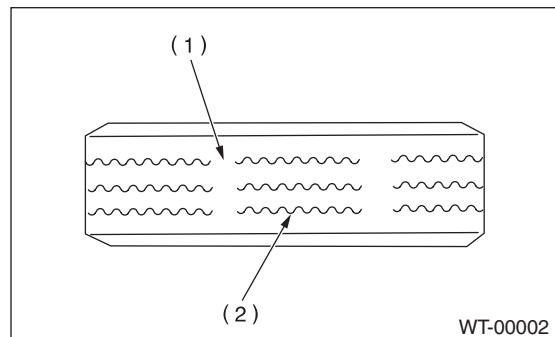
- (1) Transmitter
- (2) 90°(use of a bead breaker is prohibited in this area.)

- To prevent damaging the transmitter, set the tire changer boom in the position as shown in the figure.



- (1) Transmitter
- (2) Direction of turn table rotation
- (3) 90°
- (4) Tire changer boom

- (1) If large cracks on side wall, damage or cracks on the tread is found.
- (2) When the "tread wear indicator" appears as a solid band across the tread.



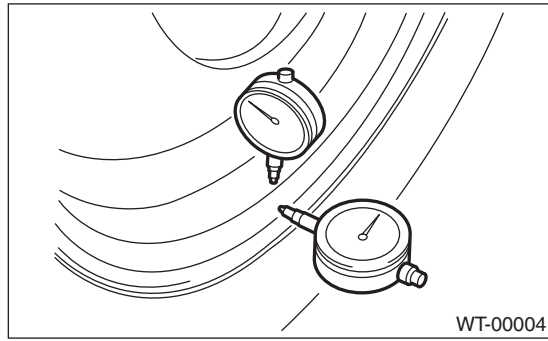
- (1) Tread wear indicator
- (2) Tire tread

- 3) When a crack on tire valve is found, replace the tire valve.
- 4) Tire runout check
  - (1) Lift up the vehicle.

# Tire and Wheel

## WHEEL AND TIRE SYSTEM

(2) Slowly rotate the wheel to check rim “runout” using a dial gauge.



Axial runout limit	Radial runout limit
1.0 mm (0.039 in)	

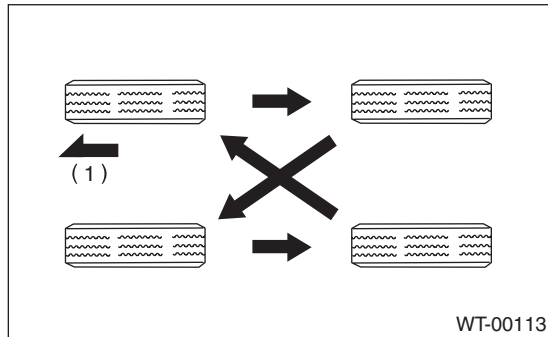
(3) If the rim runout exceeds service limit, replace the wheel.

## 2. TIRE ROTATION

### NOTE:

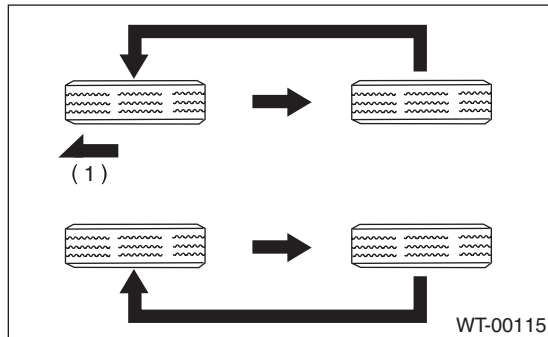
Rotate tires periodically (12,500 km/7,500 miles) in order to prolong life and to prevent uneven wear. Rotate tires as shown in the figure depending on whether or not the direction of the tire rotation is specified.

- When the direction of tire rotation is not specified



(1) Front side of vehicle

- When the direction of tire rotation is specified



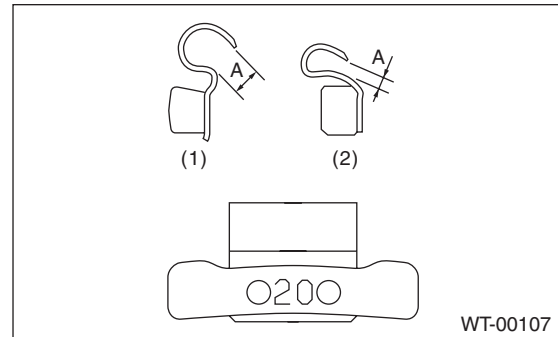
(1) Front side of vehicle

## 3. WHEEL BALANCING

- Using the wheel balancer, measure wheel balance.
- Adjust the wheel balancing.

### NOTE:

- Unbalance after adjusting the wheel balancing should be 5 g (0.18 oz) or less.
- When using the adhesive type weight, degrease the surface where the adhesive type weight will be applied securely.
- After applying the adhesive type weight, apply a force to the weight and attain full adhesion.
- Using the knock-on type weight, check the size of the knock-on part.



- Knock-on type weight for aluminum wheel
- Knock-on type weight for steel wheel

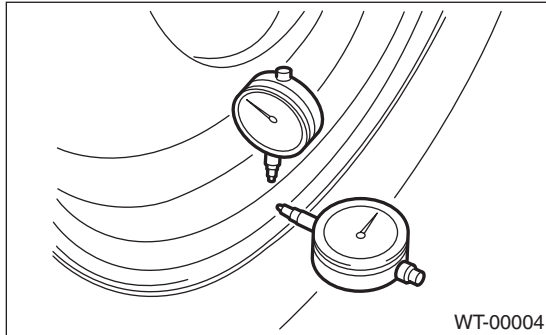
### Service limit A:

**Knock-on type weight for steel wheel:**  
2.0 mm (0.079 in)

**Knock-on type weight for aluminum wheel:**  
5.0 mm (0.197 in)

## 4. ALUMINUM WHEEL

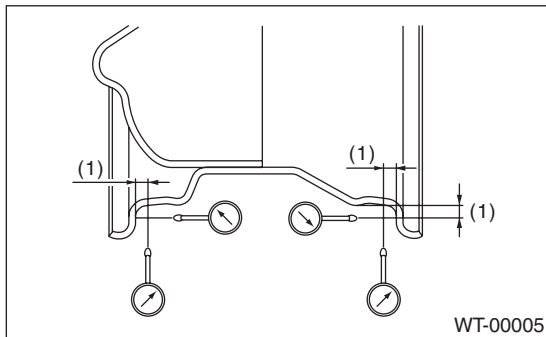
- 1) Deformation or damage to the rim may cause air leakage. Check the rim flange for deformation, cracks or damage, and repair or replace as necessary.
- 2) Jack-up the vehicle until wheels clear the floor.
- 3) Slowly rotate the wheel to check rim "runout" using a dial gauge.



### **Rim runout:**

Axial runout limit	Vertical run-out limit
1.0 mm (0.039 in)	

- 4) If the rim runout exceeds specifications, remove the tire from wheel and check runout while attaching dial gauge to positions shown in the figure.



(1) Approx. 7 mm (0.28 in)

- 5) If the measured runout still exceeds specifications, replace the wheel.

### 3. “T-type” Tire

#### A: NOTE

##### CAUTION:

- The “T-type” tire is only for temporary use. Replace with a conventional tire as soon as possible.
- Do not drive at a speed greater than 80 km/h (50 MPH).
- For the model with tire pressure monitoring system, the indicator light may illuminate after blinking 25 times when running with the T-type tire.

“T-type” tire for temporary use is equipped as a spare tire.

#### B: REPLACEMENT

##### CAUTION:

The “T-type” tire is only for temporary use. Replace with a conventional tire as soon as possible.

Refer to “Tire & Wheels” for removal and installation procedures of the “T-type” tire. <Ref. to WT-5, Tire and Wheel.>

#### C: INSPECTION

- 1) Check the tire air pressure.

##### **Specifications:**

**420 kPa (4.2 kg/cm<sup>2</sup>, 60 psi)**

- 2) Take stones, glass, nails, etc. out of the tread groove.
- 3) Check the tires for deformation, cracks, partial wear, or wear.

##### CAUTION:

Replace the tire with a new part if defective.



## 4. Tire Pressure Monitoring System

### A: REMOVAL

#### 1. TRANSMITTER (SNAP IN TYPE)

- 1) Remove the wheels from the vehicle. <Ref. to WT-5, REMOVAL, Tire and Wheel.>
- 2) Remove the tires from wheels.

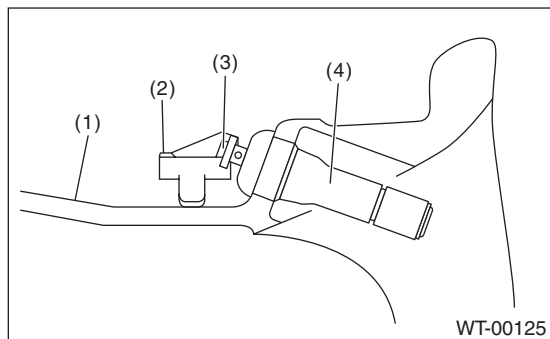
**CAUTION:**

**Use a tire changer when removing the tire from the wheel.**

- 3) Loosen the screw to remove the transmitter from the valve stem.

**NOTE:**

Replace the valve and screw with a new part when reusing transmitter.



- (1) Wheel
- (2) Transmitter
- (3) Screw
- (4) Valve

- 4) Remove the valve from the wheel.

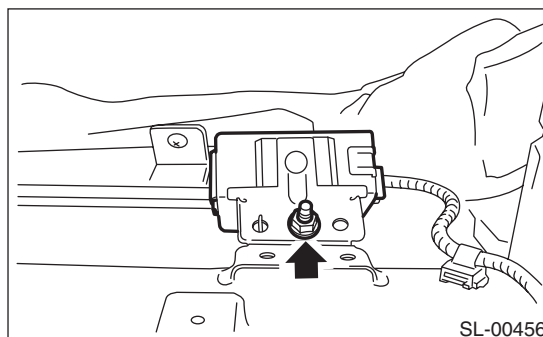
#### 2. TPMS & keyless entry control module

**NOTE:**

TPMS control module is integrated into keyless entry control module.

- 1) Disconnect the ground cable from battery.
- 2) Remove the glove box. <Ref. to EI-38, REMOVAL, Glove Box.>

- 3) Remove the nut, disconnect the connector, and then remove the TPMS & keyless entry control module.



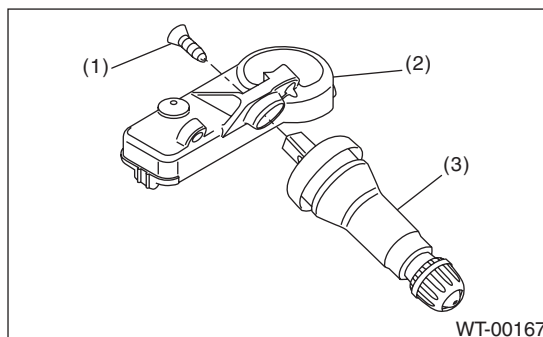
### B: INSTALLATION

#### 1. TRANSMITTER (SNAP IN TYPE)

**CAUTION:**

**Use the new transmitter assembly or replace the new valve and screw, when installing.**

- 1) Replace the valve and screw with a new part when reusing transmitter.



- (1) Screw
- (2) Transmitter
- (3) Valve

**Tightening torque:**

**1.4 N·m (0.14 kgf·m, 1 ft·lb)**

- 2) Install the transmitter to the wheel by aligning it with valve hole.

**NOTE:**

When using the jig that pulls the valve cap by hooking its neck part, use another short-type cap.

# Tire Pressure Monitoring System

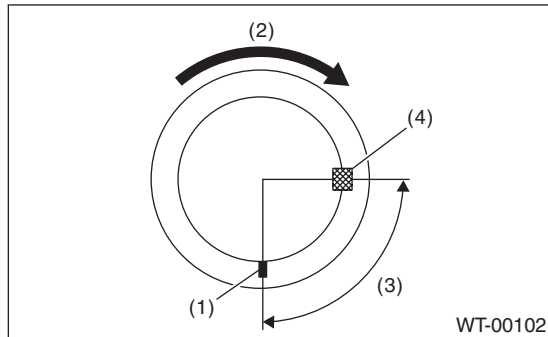
## WHEEL AND TIRE SYSTEM

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3) Install the tires to wheels.

### CAUTION:

- Use a tire changer when installing tire to wheel.
- To prevent damaging the transmitter, set the tire changer boom in the position as shown in the figure.



- (1) Transmitter
- (2) Direction of turn table rotation
- (3) 90°
- (4) Tire changer boom

4) Install the wheels to vehicle. <Ref. to WT-5, INSTALLATION, Tire and Wheel.>

5) Register the transmitter ID to the TPMS & keyless entry control module. <Ref. to TPM(diag)-9, REGISTER TRANSMITTER (ID), OPERATION, Subaru Select Monitor.>

## 2. TPMS & keyless entry control module

Install each part in the reverse order of removal.

### Tightening torque:

**7.5 N·m (0.76 kgf·m, 5.5 ft·lb)**

## C: ADJUSTMENT

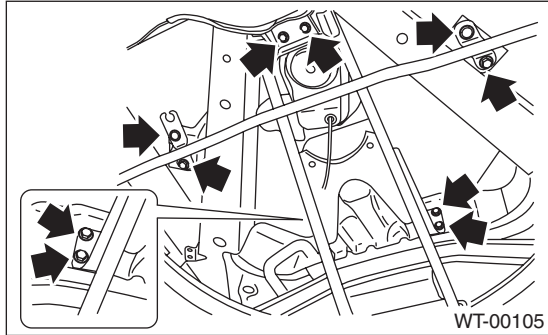
Re-register the transmitter ID when transmitter has been replaced. <Ref. to TPM(diag)-9, REGISTER TRANSMITTER (ID), OPERATION, Subaru Select Monitor.>

Re-register the keyless transmitter when TPMS & keyless entry control module has been replaced. <Ref. to SL-49, REGISTRATION OF KEYLESS TRANSMITTER WITH SUBARU SELECT MONITOR, REPLACEMENT, Transmitter.>

## 5. Spare Tire Hoist

### A: REMOVAL

- 1) Remove the spare tire from the vehicle.
- 2) Lift up the vehicle.
- 3) Remove the spare tire guide.



### B: INSTALLATION

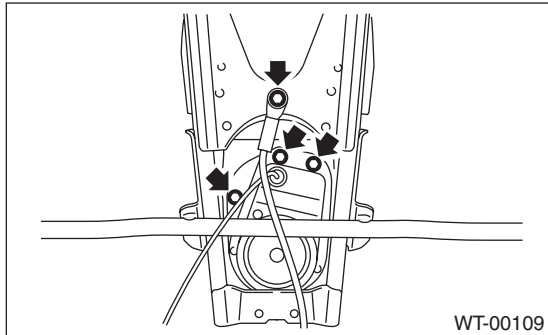
Install each part in the reverse order of removal.

#### *Tightening torque:*

**33 N·m (3.7 kgf·m, 24.3 ft·lb)**

### C: DISASSEMBLY

Remove the spare tire hoist.



### D: ASSEMBLY

Assemble each part in the reverse order of disassembly.

#### *Tightening torque:*

**33 N·m (3.7 kgf·m, 24.3 ft·lb)**

# General Diagnostic Table

## WHEEL AND TIRE SYSTEM

### 6. General Diagnostic Table

#### A: INSPECTION

Symptoms	Possible cause	Corrective action
Wheel is out of balance.	Improperly inflated tire.	Adjust the tire pressure.
	Uneven wear	Check the tire referring to abnormal tire wear in this table, carry out the procedure and replace the tire.
	Front wheel alignment	Check the front wheel alignment. <Ref. to FS-6, INSPECTION, Wheel Alignment.>
	Rear wheel alignment	Check the rear wheel alignment. <Ref. to RS-7, INSPECTION, Wheel Alignment.>
	Front strut	Check the front strut. <Ref. to FS-22, INSPECTION, Front Strut.>
	Rear shock absorber	Check the rear shock absorber. <Ref. to RS-13, INSPECTION, Rear Shock Absorber.>
	Front axle	Check the front axle. <Ref. to DS-16, INSPECTION, Front Axle.>
	Front hub unit bearing	Check the front hub unit bearing. <Ref. to DS-21, INSPECTION, Front Hub Unit Bearing.>
	Rear hub unit bearing	Check the rear hub unit bearing. <Ref. to DS-24, INSPECTION, Rear Hub Unit Bearing.>
Vehicle is abnormally out of balance.	Improperly inflated tire.	Adjust the tire pressure.
	Uneven wear	Check the tire referring to abnormal tire wear in this table, carry out the procedure and replace the tire.
	Front stabilizer	Inspect the front stabilizer. <Ref. to FS-15, INSPECTION, Front Stabilizer.>
	Front wheel alignment	Check the front wheel alignment. <Ref. to FS-6, INSPECTION, Wheel Alignment.>
	Rear wheel alignment	Check the rear wheel alignment. <Ref. to RS-7, INSPECTION, Wheel Alignment.>
Abnormal wheel vibration	Improperly inflated tire.	Adjust the tire pressure.
	Uneven wear	Check the tire referring to abnormal tire wear in this table, carry out the procedure and replace the tire.
	Improper wheel balancing	Check the wheel balance. <Ref. to WT-6, WHEEL BALANCING, INSPECTION, Tire and Wheel.>
	Front axle	Check the front axle. <Ref. to DS-16, INSPECTION, Front Axle.>
	Front hub unit bearing	Check the front hub unit bearing. <Ref. to DS-21, INSPECTION, Front Hub Unit Bearing.>
	Rear hub unit bearing	Check the rear hub unit bearing. <Ref. to DS-24, INSPECTION, Rear Hub Unit Bearing.>
Abnormal tire wear	Improperly inflated tire.	Adjust the tire pressure.
	Improper wheel balancing	Check the wheel balance. <Ref. to WT-6, WHEEL BALANCING, INSPECTION, Tire and Wheel.>
	Front wheel alignment	Check the front wheel alignment. <Ref. to FS-6, INSPECTION, Wheel Alignment.>
	Rear wheel alignment	Check the rear wheel alignment. <Ref. to RS-7, INSPECTION, Wheel Alignment.>

# TIRE PRESSURE MONITORING SYSTEM (DIAGNOSTICS)

## *TPM(diag)*

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2. General Description .....	3
3. Electrical Component Location .....	5
4. Control Module I/O Signal .....	6
5. Subaru Select Monitor .....	7
6. Read Diagnostic Trouble Code (DTC) .....	12
7. Inspection Mode .....	13
8. Clear Memory Mode .....	14
9. Tire Pressure Warning Light / Trouble Indicator Light Illumination Pattern ....	15
10. List of Diagnostic Trouble Code (DTC) .....	20
11. Diagnostic Procedure with Diagnostic Trouble Code (DTC) .....	22
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# Basic Diagnostic Procedure

## TIRE PRESSURE MONITORING SYSTEM (DIAGNOSTICS)

### 1. Basic Diagnostic Procedure

#### A: PROCEDURE

##### CAUTION:

Remove foreign matter (dust, water, oil etc.) from the TPMS & keyless entry control module connector when removing and installing.

##### NOTE:

To check harness for open or short circuits, shake the suspected trouble spot or connector.

Step	Check	Yes	No
<b>1</b> <b>CHECK PRE-INSPECTION.</b> 1) Check with the user regarding when the warning light lit or started blinking. 2) Before performing diagnostics, check all components which may adversely affect the tire pressure monitor system. <Ref. to TPM(diag)-3, INSPECTION, General Description.>	Is the component that might affect the tire pressure monitor system normal?	Go to step 2.	Repair or replace each component.
<b>2</b> <b>CHECK DIAGNOSTIC TROUBLE CODE (DTC).</b> 1) Turn the ignition switch to OFF. 2) Connect the Subaru Select Monitor to data link connector. 3) Turn the ignition switch to ON and run the Subaru Select Monitor. <b>NOTE:</b> If the communication function of the Subaru Select Monitor cannot be executed normally, check the communication circuit. <Ref. to TPM(diag)-10, COMMUNICATION FOR INITIALIZING IMPOSSIBLE, INSPECTION, Subaru Select Monitor.> 4) Read the DTC. <Ref. to TPM(diag)-12, OPERATION, Read Diagnostic Trouble Code (DTC).>	Is DTC displayed?	Go to step 4.	Go to step 3.
<b>3</b> <b>PERFORM GENERAL DIAGNOSTICS.</b> 1) Perform the inspection by referring to "General Diagnostic Table". <Ref. to TPM(diag)-32, General Diagnostic Table.> 2) Perform the Clear Memory Mode. <Ref. to TPM(diag)-8, CLEAR MEMORY, OPERATION, Subaru Select Monitor.> 3) Perform the Inspection Mode. <Ref. to TPM(diag)-13, Inspection Mode.> 4) Read the DTC. <Ref. to TPM(diag)-7, READ DIAGNOSTIC TROUBLE CODE (DTC), OPERATION, Subaru Select Monitor.> Check the DTC is not displayed.	Does the tire pressure warning light illuminates for about 2 seconds and then goes off after turning on the ignition switch, and then go out?	Finish the diagnosis.	Check "Tire inflation pressure warning light blinking patterns". <Ref. to TPM(diag)-15, INSPECTION, Tire Pressure Warning Light / Trouble Indicator Light Illumination Pattern.>
<b>4</b> <b>PERFORM DIAGNOSIS.</b> 1) Refer to "List of Diagnostic Trouble Code (DTC)". 2) Correct the cause of trouble. 3) Perform the Clear Memory Mode. <Ref. to TPM(diag)-8, CLEAR MEMORY, OPERATION, Subaru Select Monitor.> 4) Perform the drive test. Drive the vehicle at 40 km/h (25 MPH) or faster for at least 10 minutes. 5) Read the DTC. <Ref. to TPM(diag)-7, READ DIAGNOSTIC TROUBLE CODE (DTC), OPERATION, Subaru Select Monitor.>	Is DTC displayed?	Repeat steps 1 to 4 until DTC is not shown.	Finish the diagnosis.

# General Description

## TIRE PRESSURE MONITORING SYSTEM (DIAGNOSTICS)

### 2. General Description

#### A: CAUTION

##### 1. SRS AIRBAG SYSTEM

Airbag system wiring harness is routed near the TPM control module.

##### CAUTION:

- Do not use electrical test equipment on any of the airbag system wiring harness circuits.
- Be careful not to damage the wiring harness of the airbag system when servicing the TPMS & keyless entry control module.

##### 2. TPMS & KEYLESS ENTRY CONTROL MODULE

- The location of the valve (transmitter) with the ID registered is not shown on the Select Monitor display.
- If the transmitter is replaced, ID registration for the transmitter is required. <Ref. to TPM(diag)-9, REGISTER TRANSMITTER (ID), OPERATION, Subaru Select Monitor.>
- When adjusting tire pressure indoors in winter, there is a big temperature difference between the indoor facilities and outside. Once the car is outside where the temperature is lower, the tire pressure will drop, causing the tire pressure warning light to come on, even if the tire pressure was adjusted to standard values indoors. To avoid this, it is necessary to adjust the tire pressure to the high side in consideration of the difference in temperature between inside and outside.

Temperature °C (°F)	Indoor temperature	15.6 (60)			
	Ambient temperature	15.6 (60)	-1 (30)	-12 (10)	-23 (-10)
Reference for adjusting tire pressure kPa (psi)	Front	230 (33)	250 (36)	265 (38)	280 (40)
	Rear	220 (32)	240 (35)	255 (37)	270 (39)

#### B: INSPECTION

Before performing diagnosis, check the following item which might affect the quality of the tire pressure monitoring system.

##### 1. TIRE

- Inspect that the tire pressure is within the specification while the tire is cool. (Refer to Tire Caution Label.)
- Check the tires for damage or the insertion of foreign matters.

##### 2. BATTERY

Check that amount of battery fluid, gravity and voltage are within the specifications.

**Standard voltage: 12 V or more**

**Specific gravity: 1.260 or more**

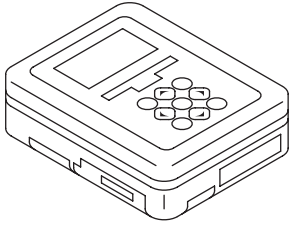
## General Description

TIRE PRESSURE MONITORING SYSTEM (DIAGNOSTICS)

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### C: PREPARATION TOOL

#### 1. SPECIAL TOOL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST1B022XU0	1B022XU0	SUBARU SELECT MONITOR III KIT	Used for troubleshooting the electrical system.

#### 2. GENERAL TOOL

TOOL NAME	REMARKS
Circuit tester	Used for measuring resistance, voltage and current.
Transmitter registration tool	Used to register the transmitter ID. Manufacturer: Kent-Moore Item number: J45295

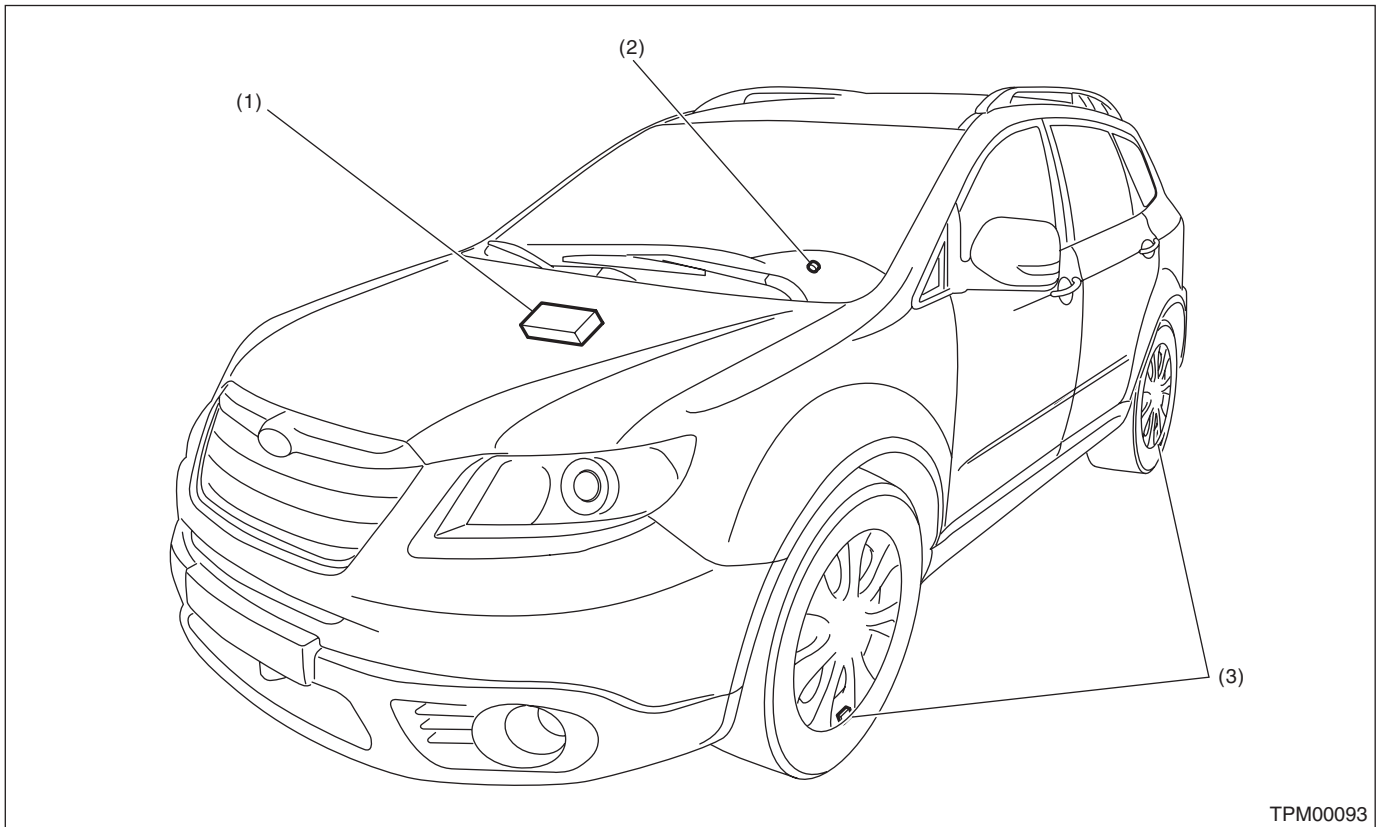


# Electrical Component Location

## TIRE PRESSURE MONITORING SYSTEM (DIAGNOSTICS)

### 3. Electrical Component Location

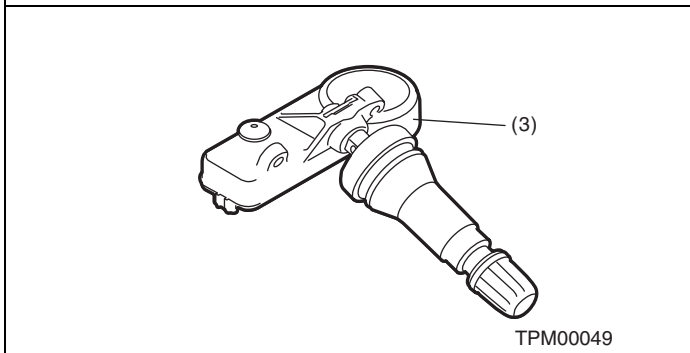
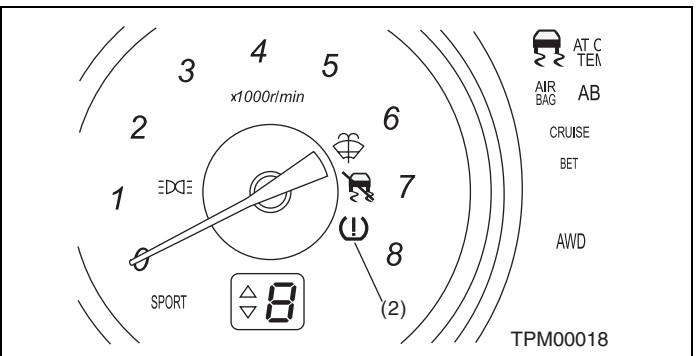
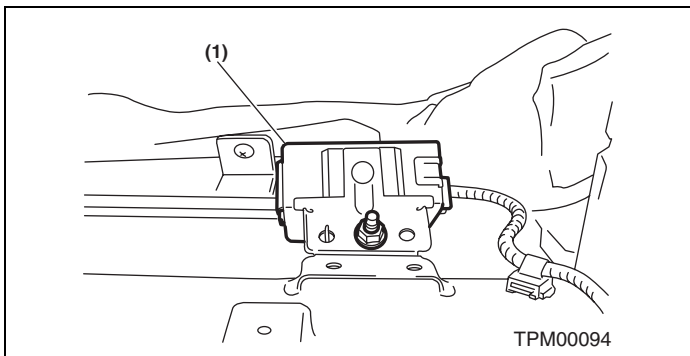
#### A: LOCATION



(1) TPMS & keyless entry control module

(2) Tire pressure warning light

(3) Transmitter 1 — 4



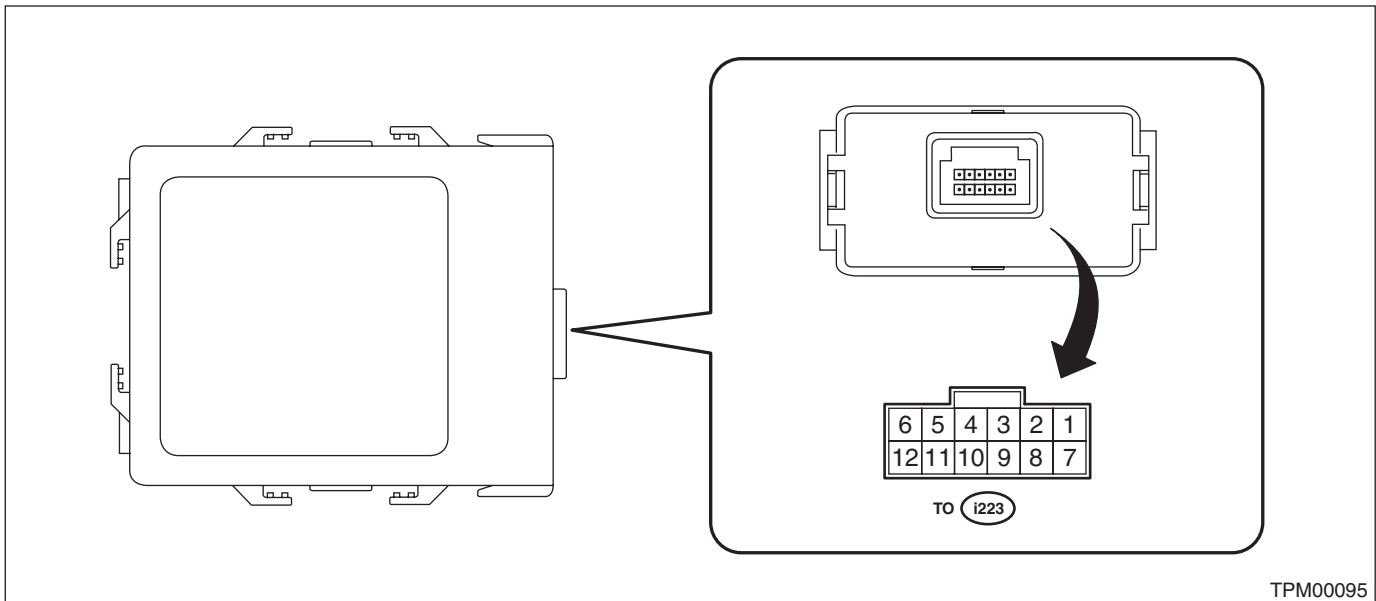
SUBARU.

# Control Module I/O Signal

TIRE PRESSURE MONITORING SYSTEM (DIAGNOSTICS)

## 4. Control Module I/O Signal

### A: ELECTRICAL SPECIFICATION



TPM00095

Terminal No.	Content	Measured value and measuring conditions	Remarks
1	—	—	—
2	Tire pressure warning light output	Illuminate when malfunction occurs, or tire pressure decreases	System failure: blinks 25 times → illuminates Tire pressure decreases: turns on
3	Speed sensor signal	While driving (Pulse signal)	Change according to vehicle speed
4	Ignition power supply	IG switch ON (Battery voltage)	—
5	GND	0 V (Always)	—
6	Battery power supply	Battery voltage (Always)	—
7	—	—	—
8	—	—	—
9	—	—	—
10	—	—	—
11	Body integrated unit	—	—
12	Select monitor communication	Serial communication	—

### B: WIRING DIAGRAM

<Ref. to WI-62, WIRING DIAGRAM, Tire Pressure Monitoring System.>

### 5. Subaru Select Monitor

#### A: OPERATION

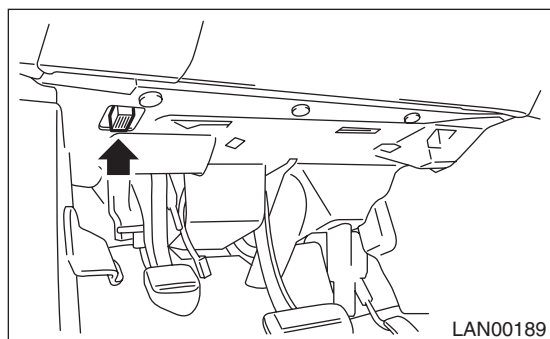
##### 1. READ DIAGNOSTIC TROUBLE CODE (DTC)

1) Prepare the Subaru Select Monitor kit. <Ref. to TPM(diag)-4, SPECIAL TOOL, PREPARATION TOOL, General Description.>

2) Connect the diagnosis cable to Subaru Select Monitor.

3) Connect the Subaru Select Monitor to data link connector.

(1) Data link connector is located in the lower portion of instrument panel (on the driver's side).



(2) Connect the diagnosis cable to data link connector.

#### CAUTION:

**Do not connect scan tools other than the Subaru Select Monitor.**

4) Turn the ignition switch to ON and run the Subaru Select Monitor.

5) On «Main Menu» display, select {Each System Check}.

6) On «System Selection Menu» display, select {Tire pressure monitor}.

7) After {System Name} is displayed, select [OK].

8) On «Tire pressure monitor diagnosis» display, select {Diagnostic Code(s) Display}.

#### NOTE:

- For detailed operation procedures, refer to “PC application help for Subaru Select Monitor”.
- For details concerning DTCs, refer to List of Diagnostic Trouble Code (DTC). <Ref. to TPM(diag)-20, List of Diagnostic Trouble Code (DTC).>
- All DTCs detected will be displayed.
- If a particular DTC is not properly stored in memory (due to a voltage drop of the TPMS & keyless entry control module power supply, etc.) when a problem occurs, a DTC suffixed with a question mark will appear on the Subaru Select Monitor display. This shows it may be an unreliable reading.

9) If TPMS & keyless entry control module and Subaru Select Monitor cannot communicate, check the communication circuit. <Ref. to TPM(diag)-10, COMMUNICATION FOR INITIALIZING IMPOSSIBLE, INSPECTION, Subaru Select Monitor.>

10) When DTC is not displayed, check the indicator circuit and communication circuit. <Ref. to TPM(diag)-15, Tire Pressure Warning Light / Trouble Indicator Light Illumination Pattern.>

# Subaru Select Monitor

## TIRE PRESSURE MONITORING SYSTEM (DIAGNOSTICS)

### 2. DATA DISPLAY

- 1) On «Main Menu» display, select {Each System Check}.
  - 2) On «System Selection Menu» display, select {Tire pressure monitor}.
  - 3) After the {Tire pressure monitor} is displayed, select [OK].
  - 4) On «Tire pressure monitor diagnosis» display, select {Data Display}, and then necessary data will be displayed.
- A list of the support data is shown in the following table.

Display	Contents to be displayed	Unit of measure
Tire 1 FN code	LEARN, LOW BAT, OFF, WAKE, RE ME, NORMAL	LEARN: Transmitted transmitter ID using the transmitter registration tool LOW BAT: Transmitter battery voltage running low OFF: Transmitter function stops (no data transmission) RE ME: Tire air changes $\pm 8.4$ kPa WAKE: When data transmission is started from a stopped state. NORMAL: Conditions other than above
Tire 2 FN code		
Tire 3 FN code		
Tire 4 FN code		
Tire 1 air pressure	Value converted to tire pressure from data delivered from transmitter is displayed. (The figure may differ from the actual measured values.)	kPa, psig, mmHg, inHg
Tire 2 air pressure		kPa, psig, mmHg, inHg
Tire 3 air pressure		kPa, psig, mmHg, inHg
Tire 4 air pressure		kPa, psig, mmHg, inHg
Vehicle Speed	Vehicle speed signal which is input in control module	km/h, MPH
Pressure warning	Threshold where tire pressure warning light illuminates	kPa, psig, mmHg, inHg
Return pressure	Threshold where tire pressure warning light goes out	kPa, psig, mmHg, inHg

### 3. CLEAR MEMORY

- 1) On «Main Menu» display, select {Each System Check}.
- 2) On «System Selection Menu» display, select {Tire pressure monitor}.
- 3) After the {Tire pressure monitor} is displayed, select [OK].
- 4) On «Tire pressure monitor diagnosis» display, select {Clear Memory}.
- 5) When “Done” “Turn ignition switch to OFF” are shown on the display screen, end the Subaru Select Monitor and turn the ignition switch to OFF.

#### NOTE:

For details concerning the operation procedure, refer to “PC application help for Subaru Select Monitor”.

# Subaru Select Monitor

## TIRE PRESSURE MONITORING SYSTEM (DIAGNOSTICS)

### 4. REGISTER TRANSMITTER (ID)

Perform the registration procedure of the transmitter in the following cases:

- Transmitter replaced.
- TPMS & keyless entry control module replaced.

NOTE:

- If registration of the transmitter ID is not possible after 2 attempts, replace TPMS & keyless entry control module. <Ref. to WT-9, TPMS & keyless entry control module, REMOVAL, Tire Pressure Monitoring System.>

- If the ignition switch is turned OFF or the Subaru Select Monitor is shut down while registering the transmitter, or if the registration is not performed for 5 minutes or more, the registration mode is cancelled.

- When rotating tires, there is no affect on the performance or functions of the tire pressure monitoring control module even if the transmitter (ID) is not registered, however, the tire position displayed on the Subaru Select Monitor will be incorrect.

1) Adjust all tire pressures to the specifications.

NOTE:

Refer to the tire caution label on the driver's side door for the correct tire pressure.

2) Connect Subaru Select Monitor and select the {Each System Check} on the «Main Menu».

3) On «System Selection Menu» display, select {Tire pressure monitor}.

4) After the {Tire pressure monitor} is displayed, select [OK].

5) On «Tire pressure monitor diagnosis» display, select {Transmitter ID regist confirm}.

6) {ID registration mode When execute Registered ID is deleted. Continue?} is displayed, select [OK].

7) Contact the transmitter registration tool to the side wall area near the air valve on the tire, and press the switch. The transmitter ID is sent to the TPMS & keyless entry control module. (At this time, the tire pressure warning light blinks to confirm that the registration has started.)

NOTE:

- The registration order of transmitter ID is not specified.

- The transmitter registration tool is used by touching the side wall area near the transmitter.

- If registration procedure stop in the halfway (turning ignition switch to OFF, wrong registration order, etc), proceed from step 5).

8) When ID registration is completed, the tire pressure warning light remains lit for approximately 2 seconds, to end the registration. Switch to the screen displaying the transmitter ID on the Subaru Select Monitor display. <Ref. to TPM(diag)-9, DISPLAY TRANSMITTER (ID), OPERATION, Subaru Select Monitor.>

9) Check the transmitter ID that was registered, then perform a driving test. <Ref. to TPM(diag)-13, PROCEDURE, Inspection Mode.>

### 5. DISPLAY TRANSMITTER (ID)

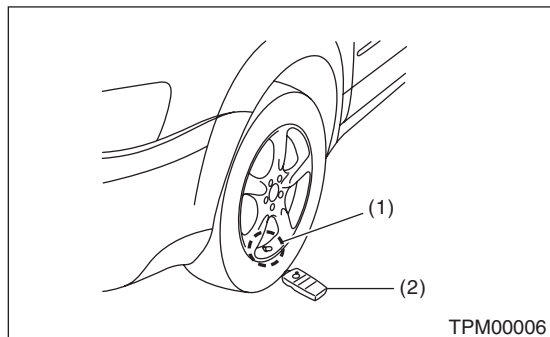
1) On the «Main Menu», select {Each System Check}.

2) On the «System Selection Menu», select {Tire pressure monitor}.

3) After the {Tire pressure monitor} is displayed, select [OK].

4) On the «Tire pressure monitor diagnosis», select {Transmitter ID regist confirm}.

5) Select the {Transmitter ID data monitor} to display the transmitter ID.



(1) Air valve (transmitter)

(2) Transmitter registration tool

# Subaru Select Monitor

## TIRE PRESSURE MONITORING SYSTEM (DIAGNOSTICS)

### B: INSPECTION

#### 1. COMMUNICATION FOR INITIALIZING IMPOSSIBLE

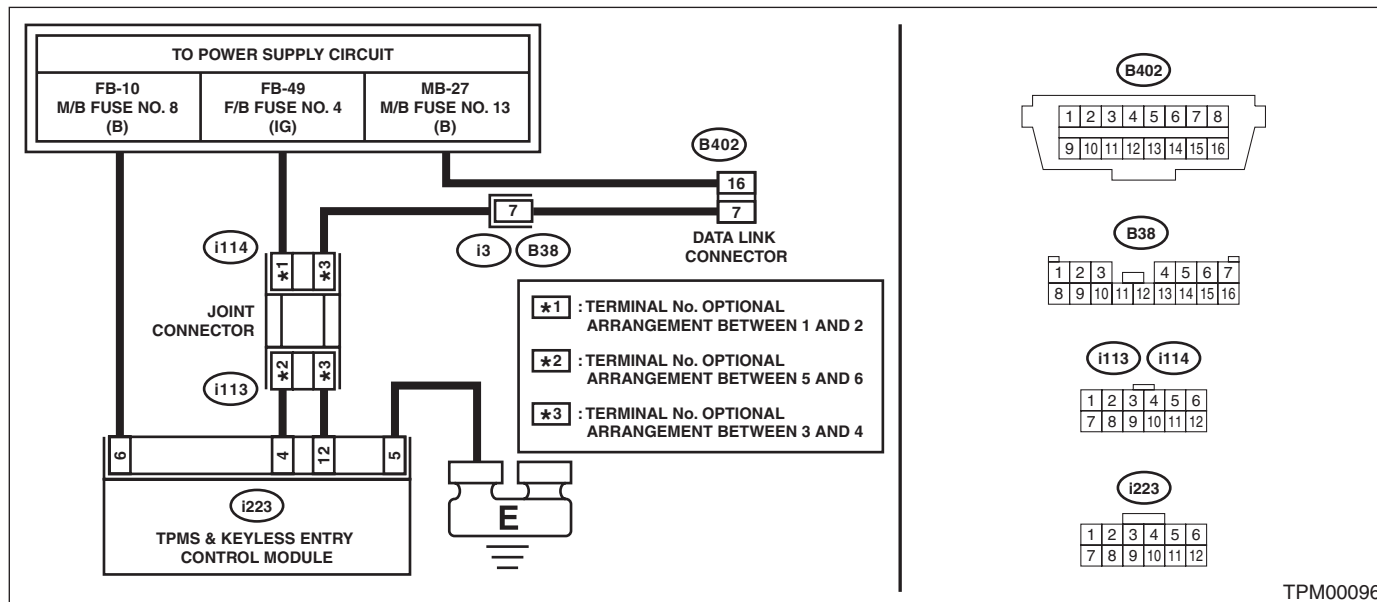
##### DETECTING CONDITION:

Defective harness connector

##### TROUBLE SYMPTOM:

Communication is impossible between the TPMS & keyless entry control module and the Subaru Select Monitor.

##### WIRING DIAGRAM:



TPM00096

Step	Check	Yes	No
1	<b>CHECK IGNITION SWITCH.</b> Is the ignition switch ON?	Go to step 2.	Turn the ignition switch to ON, and select TPM mode using Subaru Select Monitor.
2	<b>CHECK BATTERY.</b> Is the voltage 11 V or more?	Go to step 3.	Charge or replace the battery.
3	<b>CHECK BATTERY TERMINAL.</b> Is there poor contact at battery terminal?	Repair or tighten the battery terminal.	Go to step 4.
4	<b>CHECK SUBARU SELECT MONITOR COMMUNICATION.</b> 1) Turn the ignition switch to ON. 2) Using the Subaru Select Monitor, check whether communication to other systems can be executed normally. Is the system name displayed on Subaru Select Monitor?	Go to step 8.	Go to step 5.
5	<b>CHECK SUBARU SELECT MONITOR COMMUNICATION.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the TPMS & keyless entry control module connector. 3) Turn the ignition switch to ON. 4) Check whether communication to other systems can be executed normally. Is the system name displayed on Subaru Select Monitor?	Replace the TPMS & keyless entry control module. <Ref. to WT-9, TPMS & keyless entry control module, REMOVAL, Tire Pressure Monitoring System.>	Go to step 6.

# Subaru Select Monitor

## TIRE PRESSURE MONITORING SYSTEM (DIAGNOSTICS)

Step	Check	Yes	No
<b>6 CHECK HARNESS CONNECTOR BETWEEN EACH CONTROL MODULE AND DATA LINK CONNECTOR.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the TPMS & keyless entry control module. 3) Measure the resistance between data link connector and chassis ground. <b>Connector &amp; terminal</b> <b>(B402) No. 7 — Chassis ground:</b>	Is the resistance 1 M $\Omega$ or more?	Go to step 7.	Repair the harness and connector between each control module and data link connector.
<b>7 CHECK OUTPUT SIGNAL TO TPMS &amp; KEYLESS ENTRY CONTROL MODULE.</b> 1) Turn the ignition switch to ON. 2) Measure the voltage between TPMS & keyless entry control module and chassis ground. <b>Connector &amp; terminal</b> <b>(B402) No. 7 (+) — Chassis ground (-):</b>	Is the voltage less than 1 V?	Go to step 8.	Repair the harness and connector between each control module and data link connector.
<b>8 CHECK HARNESS CONNECTOR BETWEEN TPMS &amp; KEYLESS ENTRY CONTROL MODULE AND DATA LINK CONNECTOR.</b> Measure the resistance between the TPMS & keyless entry control module connector and the data link connector. <b>Connector &amp; terminal</b> <b>(i223) No. 12 — (B402) No. 7:</b>	Is the resistance less than 0.5 $\Omega$ ?	Go to step 9.	Repair the harness and connector between TPMS & keyless entry control module and data link connector.
<b>9 CHECK TPMS &amp; KEYLESS ENTRY CONTROL MODULE CONNECTOR.</b> Turn the ignition switch to OFF.	Is TPMS & keyless entry control module connector inserted into TPMS & keyless entry control module until the connector is locked?	Go to step 10.	Insert the TPMS & keyless entry control module connector into the TPMS & keyless entry control module.
<b>10 CHECK POWER SUPPLY CIRCUIT.</b> 1) Turn the ignition switch to ON. 2) Measure the ignition power supply voltage between TPMS & keyless entry control module connector and chassis ground. <b>Connector &amp; terminal</b> <b>(i223) No. 4 (+) — Chassis ground (-):</b>	Is the voltage 10 — 15 V?	Go to step 11.	Repair open circuit of the harness between TPMS & keyless entry control module and battery.
<b>11 CHECK HARNESS CONNECTOR BETWEEN TPMS &amp; KEYLESS ENTRY CONTROL MODULE AND CHASSIS GROUND.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connector from the TPMS & keyless entry control module. 3) Measure the resistance of harness between TPMS & keyless entry control module and chassis ground. <b>Connector &amp; terminal</b> <b>(i223) No. 5 — Chassis ground:</b>	Is the resistance less than 0.5 $\Omega$ ?	Go to step 12.	Repair open circuit of the harness of the TPMS & keyless entry control module.
<b>12 CHECK POOR CONTACT OF CONNECTOR.</b>	Is there poor contact of TPMS & keyless entry control module power supply, ground circuit and data link connector?	Repair the connector.	Replace the TPMS & keyless entry control module. <Ref. to WT-9, TPMS & keyless entry control module, REMOVAL, Tire Pressure Monitoring System.>

## Read Diagnostic Trouble Code (DTC)

TIRE PRESSURE MONITORING SYSTEM (DIAGNOSTICS)

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### 6. Read Diagnostic Trouble Code (DTC)

#### A: OPERATION

For details about reading DTCs, refer to “Subaru Select Monitor”. <Ref. to TPM(diag)-7, Subaru Select Monitor.>



### 7. Inspection Mode

#### A: PROCEDURE

Reproduce the malfunction occurrence condition as possible. Drive the vehicle at 40 km/h (25 MPH) or faster for at least ten minutes.

## Clear Memory Mode

TIRE PRESSURE MONITORING SYSTEM (DIAGNOSTICS)

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### 8. Clear Memory Mode

#### A: OPERATION

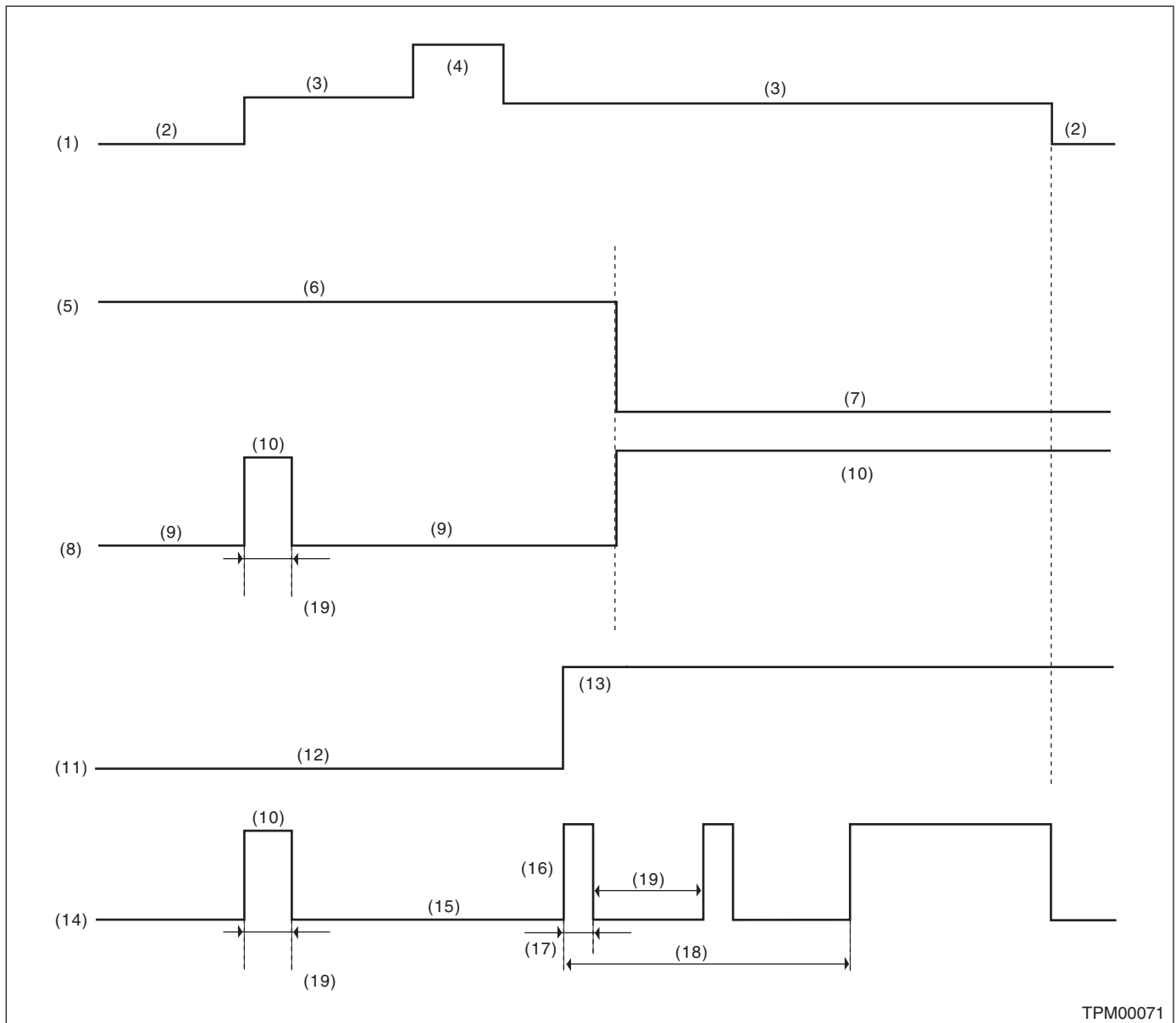
For details concerning DTC clear operation, refer to "Subaru Select Monitor". <Ref. to TPM(diag)-7, Subaru Select Monitor.>

# Tire Pressure Warning Light / Trouble Indicator Light Illumination Pattern

TIRE PRESSURE MONITORING SYSTEM (DIAGNOSTICS)

## 9. Tire Pressure Warning Light / Trouble Indicator Light Illumination Pattern

### A: INSPECTION



TPM00071

- |   |   |   |
|---|---|---|
| (1) Ignition switch   | (8) Tire pressure warning light (tire pressure condition) | (14) Tire inflation pressure warning light (system condition) |
| (2) OFF   | (9) Light OFF   | (15) Light OFF  |
| (3) ON  | (10) Light ON   | (16) Blink  |
| (4) Start   | (11) System status  | (17) 1 seconds  |
| (5) Tire inflation pressure condition   | (12) Normal   | (18) Blinks 25 times  |
| (6) Meet the specification  | (13) Malfunction  | (19) 2 seconds  |
| (7) Less than standard value<br>(For the pressure warning level, refer to "CURRENT DATA".) <Ref. to TPM(diag)-8, DATA DISPLAY, OPERATION, Subaru Select Monitor.> |   |   |

## **Tire Pressure Warning Light / Trouble Indicator Light Illumination Pattern**

### **TIRE PRESSURE MONITORING SYSTEM (DIAGNOSTICS)**

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1) When the tire pressure warning light does not illuminate in accordance with this illumination pattern, there must be an electrical malfunction.

2) If the tire pressure warning light does not go off, check the TPMS & keyless entry control module/warning light circuit and the combination meter circuit. <Ref. to TPM(diag)-17, TIRE PRESSURE WARNING LIGHT DOES NOT COME OFF, Tire Pressure Warning Light / Trouble Indicator Light Illumination Pattern.>

#### **NOTE:**

If the problem is fixed while driving at approximately 40 km/h (25 MPH) after the tire pressure warning light blinks/lights, the warning light goes out and the tire pressure monitor system operates normally. (If there is a decrease in tire pressure, or a malfunction of the system, the malfunction history is displayed.)

# Tire Pressure Warning Light / Trouble Indicator Light Illumination Pattern

TIRE PRESSURE MONITORING SYSTEM (DIAGNOSTICS)

## B: TIRE PRESSURE WARNING LIGHT DOES NOT COME ON

### DETECTING CONDITION:

Defective combination meter

### TROUBLE SYMPTOM:

When the ignition switch is turned to ON, the tire pressure warning light does not turn on (for approx. 2 seconds).

Step	Check	Yes	No	
1	<b>CHECK DIAGNOSTIC TROUBLE CODE (DTC).</b> Connect the Subaru Select Monitor, and read the Diagnostic Trouble Code. <Ref. to TPM(diag)-7, READ DIAGNOSTIC TROUBLE CODE (DTC), OPERATION, Subaru Select Monitor.>	Is diagnostics code (DTC) displayed?	Perform the diagnosis according to the DTC. <Ref. to TPM(diag)-20, List of Diagnostic Trouble Code (DTC).>	Replace the combination meter. <Ref. to IDI-11, REMOVAL, Combination Meter.>

## C: TIRE PRESSURE WARNING LIGHT DOES NOT COME OFF

### DETECTING CONDITION:

- Defective combination meter
- Tires pressure drop
- Transmitter ID not registered

### TROUBLE SYMPTOM:

Tire pressure warning light remains illuminating after engine starts.

Step	Check	Yes	No	
1	<b>CHECK DTC.</b> Connect the Subaru Select Monitor, and read the Diagnostic Trouble Code. <Ref. to TPM(diag)-7, READ DIAGNOSTIC TROUBLE CODE (DTC), OPERATION, Subaru Select Monitor.>	Is a DTC displayed?	Perform the diagnosis according to the DTC. <Ref. to TPM(diag)-20, List of Diagnostic Trouble Code (DTC).>	Go to step 2.
2	<b>CHECK TRANSMITTER (ID).</b> Display the transmitter ID of the tire pressure monitor system. <Ref. to TPM(diag)-9, DISPLAY TRANSMITTER (ID), OPERATION, Subaru Select Monitor.>	Is the transmitter ID registered?	Go to step 3.	Register the transmitter ID. <Ref. to TPM(diag)-9, REGISTER TRANSMITTER (ID), OPERATION, Subaru Select Monitor.>
3	<b>CHECK TRANSMITTER DATA OUTPUT.</b> 1) Select data display of the tire pressure monitoring. 2) Start the engine and check the tire pressure warning light output.	Is the warning light output ON?	Replace the TPMS & keyless entry control module. <Ref. to WT-9, TPMS & keyless entry control module, REMOVAL, Tire Pressure Monitoring System.>	Replace the combination meter. <Ref. to IDI-11, REMOVAL, Combination Meter.>

# Tire Pressure Warning Light / Trouble Indicator Light Illumination Pattern

## TIRE PRESSURE MONITORING SYSTEM (DIAGNOSTICS)

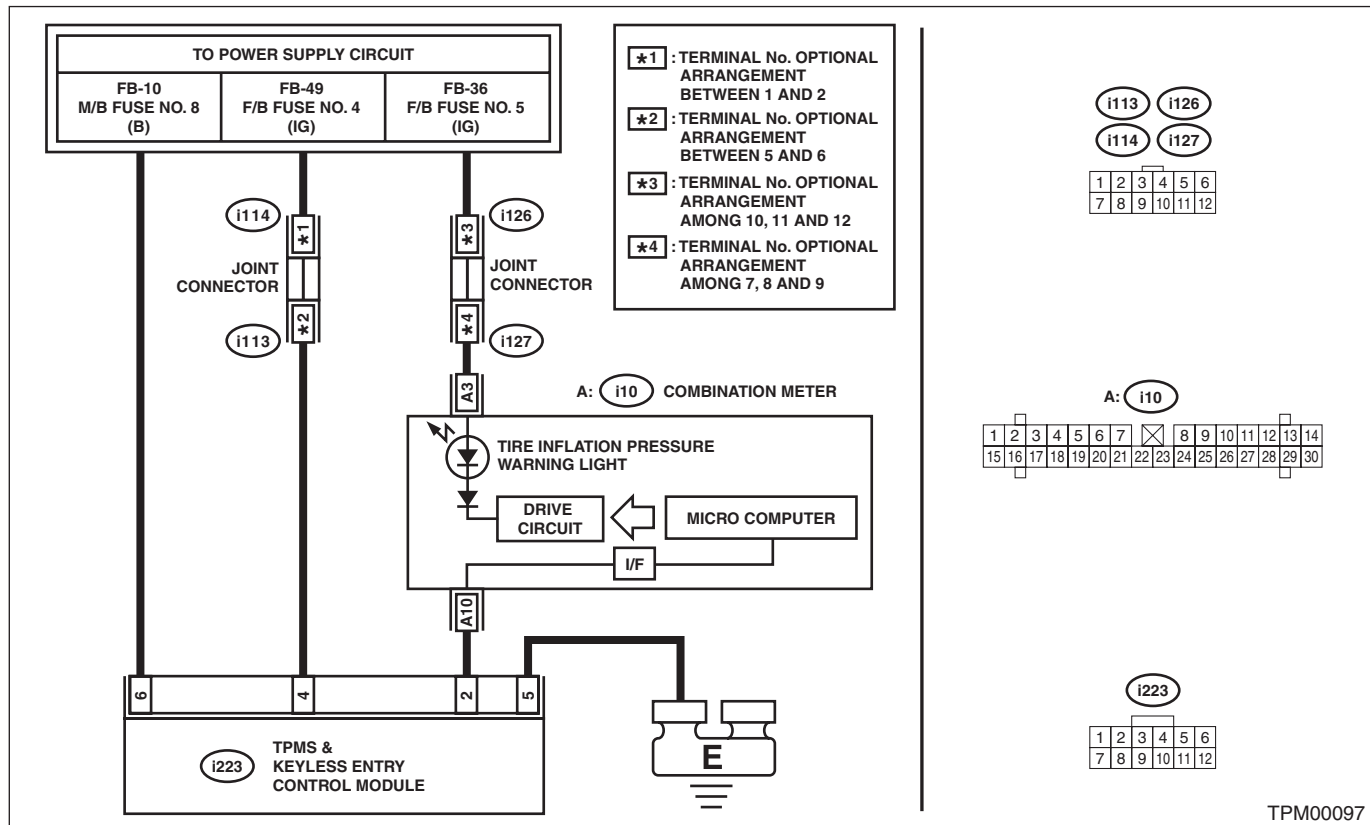
### D: TIRE PRESSURE WARNING LIGHT IS 25 TIMES BLINKING AND TURN ON DETECTING CONDITION:

- Defective TPMS & keyless entry control module
- Defective harness
- Transmitter is faulty.

### TROUBLE SYMPTOM:

Every time the engine starts, tire pressure warning light blinks 25 times and then illuminates.

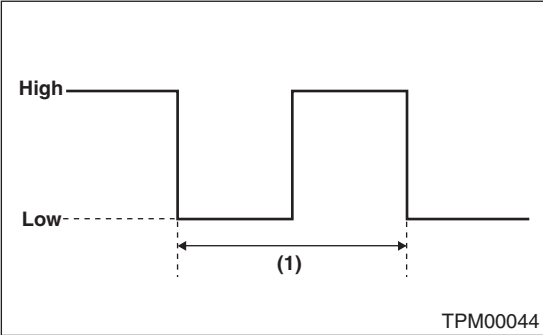
### WIRING DIAGRAM:



Step	Check	Yes	No	
1	<b>CHECK DTC.</b> Connect the Subaru Select Monitor, and read the Diagnostic Trouble Code. <Ref. to TPM(diag)-7, READ DIAGNOSTIC TROUBLE CODE (DTC), OPERATION, Subaru Select Monitor.>	Is diagnostics code (DTC) displayed?	Perform the diagnosis according to the DTC. <Ref. to TPM(diag)-20, List of Diagnostic Trouble Code (DTC).>	Go to step 2.
2	<b>CHECK HARNESS.</b> 1) Connect the Subaru Select Monitor to the terminal No. 2 of the TPMS & keyless entry control module connector (i223). <b>Connector &amp; terminal</b> <b>(i223) No. 2 (+) — Chassis ground (-):</b> 2) Turn the ignition switch to ON, and select "Oscilloscope" from the Main Menu of Subaru Select Monitor. 3) Check the voltage displayed.	Is the voltage 10 V or more?	Go to step 3.	Go to step 4.

# Tire Pressure Warning Light / Trouble Indicator Light Illumination Pattern

## TIRE PRESSURE MONITORING SYSTEM (DIAGNOSTICS)

Step	Check	Yes	No
<p><b>3</b></p> <p><b>CHECK HARNESS.</b></p> <p>1) Check the output waveform displayed in the oscilloscope of Subaru Select Monitor.</p>  <p style="text-align: right;">TPM00044</p>	<p>Is the pattern the same output waveform as shown in the figure?</p> <p>(1) 400±9 ms Duty 50 %</p> <p>High: Battery voltage</p> <p>Low: 1.5 V or less</p>	<p>Check the combination meter.</p>	<p>Replace the TPMS &amp; keyless entry control module.</p> <p>&lt;Ref. to WT-9, REMOVAL, Tire Pressure Monitoring System.&gt;</p>
<p><b>4</b></p> <p><b>CHECK HARNESS.</b></p> <p>1) Disconnect the TPMS &amp; keyless entry control module connector.</p> <p>2) Connect the Subaru Select Monitor to the terminal No. 2 of the TPMS &amp; keyless entry control module connector (i223).</p> <p><b>Connector &amp; terminal</b></p> <p><b>(i223) No. 2 (+) — Chassis ground (-):</b></p> <p>3) Turn the ignition switch to ON, and select "Oscilloscope" from the Main Menu of Subaru Select Monitor.</p> <p>4) Check the voltage displayed.</p>	<p>Is the voltage 10 V or more?</p>	<p>Replace the TPMS &amp; keyless entry control module.</p> <p>&lt;Ref. to WT-9, REMOVAL, Tire Pressure Monitoring System.&gt;</p>	<p>The harness between the combination meter connector and the TPMS &amp; keyless entry control module connector is shorted or open.</p> <p>Repair or replace the harness.</p>

## List of Diagnostic Trouble Code (DTC)

TIRE PRESSURE MONITORING SYSTEM (DIAGNOSTICS)

### 10. List of Diagnostic Trouble Code (DTC)

#### A: LIST

DTC	Item	Contents of diagnosis	Remarks
11	Tire 1 Air Pressure Decrease	FL tire pressure is reduced.	<Ref. to TPM(diag)-22, DTC 11 TIRE 1 AIR PRESSURE DECREASE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
12	Tire 2 Air Pressure Decrease	FR tire pressure is reduced.	<Ref. to TPM(diag)-22, DTC 12 TIRE 2 AIR PRESSURE DECREASE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
13	Tire 3 Air Pressure Decrease	RR tire pressure is reduced.	<Ref. to TPM(diag)-22, DTC 13 TIRE 3 AIR PRESSURE DECREASE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
14	Tire 4 Air Pressure Decrease	RL tire pressure is reduced.	<Ref. to TPM(diag)-23, DTC 14 TIRE 4 AIR PRESSURE DECREASE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
21	Transmitter 1 No Data	Data cannot be received from FL sensor.	<Ref. to TPM(diag)-23, DTC 21 TRANSMITTER 1 NO DATA, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
22	Transmitter 2 No Data	Data cannot be received from FR sensor.	<Ref. to TPM(diag)-23, DTC 22 TRANSMITTER 2 NO DATA, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
23	Transmitter 3 No Data	Data cannot be received from RR sensor.	<Ref. to TPM(diag)-23, DTC 23 TRANSMITTER 3 NO DATA, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
24	Transmitter 4 No Data	Data cannot be received from RL sensor.	<Ref. to TPM(diag)-24, DTC 24 TRANSMITTER 4 NO DATA, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
31	Transmitter 1 Pressure Data Abnormal	FL sensor data contents are abnormal.	<Ref. to TPM(diag)-25, DTC 31 TRANSMITTER 1 PRESSURE DATA ABNORMAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
32	Transmitter 2 Pressure Data Abnormal	FR sensor data contents are abnormal.	<Ref. to TPM(diag)-25, DTC 32 TRANSMITTER 2 PRESSURE DATA ABNORMAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
33	Transmitter 3 Pressure Data Abnormal	RR sensor data contents are abnormal.	<Ref. to TPM(diag)-25, DTC 33 TRANSMITTER 3 PRESSURE DATA ABNORMAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
34	Transmitter 4 Pressure Data Abnormal	RL sensor data contents are abnormal.	<Ref. to TPM(diag)-26, DTC 34 TRANSMITTER 4 PRESSURE DATA ABNORMAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>



# List of Diagnostic Trouble Code (DTC)

## TIRE PRESSURE MONITORING SYSTEM (DIAGNOSTICS)

DTC	Item	Contents of diagnosis	Remarks
41	Transmitter 1 Function Code Abnormal	Function code has error.	<Ref. to TPM(diag)-27, DTC 41 TRANSMITTER 1 FUNCTION CODE ABNORMAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
42	Transmitter 2 Function Code Abnormal	Function code has error.	<Ref. to TPM(diag)-27, DTC 42 TRANSMITTER 2 FUNCTION CODE ABNORMAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
43	Transmitter 3 Function Code Abnormal	Function code has error.	<Ref. to TPM(diag)-27, DTC 43 TRANSMITTER 3 FUNCTION CODE ABNORMAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
44	Transmitter 4 Function Code Abnormal	Function code has error.	<Ref. to TPM(diag)-28, DTC 44 TRANSMITTER 4 FUNCTION CODE ABNORMAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
51	Transmitter 1 Battery Voltage Decrease	Transmitter battery voltage is low.	<Ref. to TPM(diag)-29, DTC 51 TRANSMITTER 1 BATTERY VOLTAGE DECREASE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
52	Transmitter 2 Battery Voltage Decrease	Transmitter battery voltage is low.	<Ref. to TPM(diag)-29, DTC 52 TRANSMITTER 2 BATTERY VOLTAGE DECREASE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
53	Transmitter 3 Battery Voltage Decrease	Transmitter battery voltage is low.	<Ref. to TPM(diag)-29, DTC 53 TRANSMITTER 3 BATTERY VOLTAGE DECREASE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
54	Transmitter 4 Battery Voltage Decrease	Transmitter battery voltage is low.	<Ref. to TPM(diag)-30, DTC 54 TRANSMITTER 4 BATTERY VOLTAGE DECREASE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
61	Vehicle Speed is Abnormal	Vehicle speed signal is not input to the control module when the vehicle speed is 6 km/h (3.7 MPH) or more.	<Ref. to TPM(diag)-31, DTC 61 VEHICLE SPEED IS ABNORMAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

## Diagnostic Procedure with Diagnostic Trouble Code (DTC)

TIRE PRESSURE MONITORING SYSTEM (DIAGNOSTICS)

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### 11. Diagnostic Procedure with Diagnostic Trouble Code (DTC)

#### **A: DTC 11 TIRE 1 AIR PRESSURE DECREASE**

NOTE:

Refer to DTC 14 for diagnostic procedure. <Ref. to TPM(diag)-23, DTC 14 TIRE 4 AIR PRESSURE DECREASE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

#### **B: DTC 12 TIRE 2 AIR PRESSURE DECREASE**

NOTE:

Refer to DTC 14 for diagnostic procedure. <Ref. to TPM(diag)-23, DTC 14 TIRE 4 AIR PRESSURE DECREASE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

#### **C: DTC 13 TIRE 3 AIR PRESSURE DECREASE**

NOTE:

Refer to DTC 14 for diagnostic procedure. <Ref. to TPM(diag)-23, DTC 14 TIRE 4 AIR PRESSURE DECREASE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

TIRE PRESSURE MONITORING SYSTEM (DIAGNOSTICS)

## D: DTC 14 TIRE 4 AIR PRESSURE DECREASE

### DTC DETECTING CONDITION:

Inflation pressure of tires dropped below the specified value.

### NOTE:

For the specifications, refer to "CURRENT DATA". <Ref. to TPM(diag)-8, DATA DISPLAY, OPERATION, Subaru Select Monitor.>

### TROUBLE SYMPTOM:

Tire pressure warning light illuminates.

Step	Check	Yes	No
<b>1</b> <b>CHECK TIRES.</b> Lift up the vehicle and check for damage in the tires.	Are there cracks or damage?	Repair or replace the tire. <Ref. to WT-5, Tire and Wheel.>	Go to step 2.
<b>2</b> <b>CHECK TIRES.</b> Check the tire air pressure.	Is the tire pressure in the specifications?	Go to step 3.	Adjust the air pressure.
<b>3</b> <b>CHECK TRANSMITTER.</b> Drive the vehicle at 40 km/h (25 MPH) or faster and compare the data from the transmitter on the four wheels.	Is there a transmitter with different data?	Replace the transmitter (tire pressure sensor). <Ref. to WT-9, Tire Pressure Monitoring System.>	Go to step 4.
<b>4</b> <b>PERFORM DRIVING TEST.</b> 1) Perform the Clear Memory Mode. <Ref. to TPM(diag)-8, CLEAR MEMORY, OPERATION, Subaru Select Monitor.> 2) Perform a driving test. <Ref. to TPM(diag)-13, PROCEDURE, Inspection Mode.> 3) Read the DTC. <Ref. to TPM(diag)-7, READ DIAGNOSTIC TROUBLE CODE (DTC), OPERATION, Subaru Select Monitor.>	Is DTC displayed?	Record the DTC. Perform the repair according to DTC. <Ref. to TPM(diag)-20, List of Diagnostic Trouble Code (DTC).>	Finish the diagnosis.

### CAUTION:

When driving vehicle to perform driving test, there should be always 2 persons (driver and checker) to check.

## E: DTC 21 TRANSMITTER 1 NO DATA

### NOTE:

Refer to DTC 24 for diagnostic procedure. <Ref. to TPM(diag)-24, DTC 24 TRANSMITTER 4 NO DATA, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

## F: DTC 22 TRANSMITTER 2 NO DATA

### NOTE:

Refer to DTC 24 for diagnostic procedure. <Ref. to TPM(diag)-24, DTC 24 TRANSMITTER 4 NO DATA, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

## G: DTC 23 TRANSMITTER 3 NO DATA

### NOTE:

Refer to DTC 24 for diagnostic procedure. <Ref. to TPM(diag)-24, DTC 24 TRANSMITTER 4 NO DATA, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## TIRE PRESSURE MONITORING SYSTEM (DIAGNOSTICS)

### H: DTC 24 TRANSMITTER 4 NO DATA

#### DTC DETECTING CONDITION:

Data from each transmitter is not received for 8 minutes.

#### TROUBLE SYMPTOM:

Tire pressure warning light blinks 25 times and then illuminates.

	Step	Check	Yes	No
1	<b>START FL TRANSMITTER.</b> 1) Connect the Subaru Select Monitor and then turn the ignition switch to ON. 2) Select "Transmit ID Monitor". <Ref. to TPM(diag)-9, DISPLAY TRANSMITTER (ID), OPERATION, Subaru Select Monitor.> 3) Use the transmitter registration tool and transmit the ID from the FL transmitter to check "Latest reception ID".	Is "Latest reception ID" updated?	Go to step 2.	Replace front left transmitter. <Ref. to WT-9, REMOVAL, Tire Pressure Monitoring System.>
2	<b>CHECK FL TRANSMITTER ID.</b> Check the ID displayed in the updated ID display and the tire 1 registered ID.	Are the two IDs same?	Go to step 3.	Record the received ID update as the FL transmitter. Go to step 3.
3	<b>START FR TRANSMITTER.</b> Use the transmitter registration tool and transmit the ID from the FR transmitter to check "Latest reception ID".	Is "Latest reception ID" updated?	Go to step 4.	Replace the front right transmitter. <Ref. to WT-9, REMOVAL, Tire Pressure Monitoring System.>
4	<b>CHECK FR TRANSMITTER ID.</b> Check the ID displayed in the updated ID display and the tire 2 registered ID.	Are the two IDs same?	Go to step 5.	Record the received ID update as the FR transmitter. Go to step 5.
5	<b>START RR TRANSMITTER.</b> Use the transmitter registration tool and transmit the ID from the RR transmitter to check "Latest reception ID".	Is "Latest reception ID" updated?	Go to step 6.	Replace the RR transmitter. <Ref. to WT-9, REMOVAL, Tire Pressure Monitoring System.>
6	<b>CHECK RR TRANSMITTER ID.</b> Check the ID displayed in the updated ID display and the tire 3 registered ID.	Are the two IDs same?	Go to step 7.	Record the received ID update as the RR transmitter. Go to step 7.
7	<b>START RL TRANSMITTER.</b> Use the transmitter registration tool and transmit the ID from the RL transmitter to check "Latest reception ID".	Is "Latest reception ID" updated?	Go to step 8.	Replace the RL transmitter. <Ref. to WT-9, REMOVAL, Tire Pressure Monitoring System.>
8	<b>CHECK RL TRANSMITTER ID.</b> Check the ID displayed in the updated ID display and the tire 4 registered ID.	Are the two IDs same?	Go to step 9.	Record the received ID update as the RL transmitter. Go to step 9.
9	<b>CHECK MALFUNCTION TRANSMITTER.</b>	Is ID recorded by this procedure?	Go to step 10.	Go to step 1.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## TIRE PRESSURE MONITORING SYSTEM (DIAGNOSTICS)

Step	Check	Yes	No
<b>10</b> <b>CHECK MALFUNCTION TRANSMITTER.</b> Check the registered ID of the transmitter indicated by DTC.	Is there checked ID in the record?	Replace the transmitter of the recorded position. <Ref. to WT-9, REMOVAL, Tire Pressure Monitoring System.>	Replace the transmitter showing the latest ID that is not included in the registered IDs. <Ref. to WT-9, REMOVAL, Tire Pressure Monitoring System.>

### CAUTION:

When driving vehicle to perform driving test, there should be always 2 persons (driver and checker) to check.

### I: DTC 31 TRANSMITTER 1 PRESSURE DATA ABNORMAL

#### NOTE:

Refer to DTC 34 for diagnostic procedure. <Ref. to TPM(diag)-26, DTC 34 TRANSMITTER 4 PRESSURE DATA ABNORMAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

### J: DTC 32 TRANSMITTER 2 PRESSURE DATA ABNORMAL

#### NOTE:

Refer to DTC 34 for diagnostic procedure. <Ref. to TPM(diag)-26, DTC 34 TRANSMITTER 4 PRESSURE DATA ABNORMAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

### K: DTC 33 TRANSMITTER 3 PRESSURE DATA ABNORMAL

#### NOTE:

Refer to DTC 34 for diagnostic procedure. <Ref. to TPM(diag)-26, DTC 34 TRANSMITTER 4 PRESSURE DATA ABNORMAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## TIRE PRESSURE MONITORING SYSTEM (DIAGNOSTICS)

### L: DTC 34 TRANSMITTER 4 PRESSURE DATA ABNORMAL

#### DTC DETECTING CONDITION:

- When comparing the data from each transmitter to the previous data, the change is large.
- The pressure exceeds what the transmitter can measure. (Excessive pressure)

#### TROUBLE SYMPTOM:

Tire pressure warning light blinks 25 times and then illuminates.

Step	Check	Yes	No
<b>1 START FL TRANSMITTER.</b> 1) Connect the Subaru Select Monitor and then turn the ignition switch to ON. 2) Select "Transmitter ID data monitor". <Ref. to TPM(diag)-9, DISPLAY TRANSMITTER (ID), OPERATION, Subaru Select Monitor.> 3) Use the transmitter registration tool and transmit the ID from the FL transmitter to check "Latest reception ID".	Is "Latest reception ID" updated?	Go to step 2.	Replace front left transmitter. <Ref. to WT-9, REMOVAL, Tire Pressure Monitoring System.>
<b>2 CHECK FL TRANSMITTER ID.</b> Check the ID displayed in the updated ID display and the tire 1 registered ID.	Are the two IDs same?	Go to step 3.	Record the received ID update as the FL transmitter. Go to step 3.
<b>3 START FR TRANSMITTER.</b> Use the transmitter registration tool and transmit the ID from the FR transmitter to check "Latest reception ID".	Is "Latest reception ID" updated?	Go to step 4.	Replace the front right transmitter. <Ref. to WT-9, REMOVAL, Tire Pressure Monitoring System.>
<b>4 CHECK FR TRANSMITTER ID.</b> Check the ID displayed in the updated ID display and the tire 2 registered ID.	Are the two IDs same?	Go to step 5.	Record the received ID update as the FR transmitter. Go to step 5.
<b>5 START RR TRANSMITTER.</b> Use the transmitter registration tool and transmit the ID from the RR transmitter to check "Latest reception ID".	Is "Latest reception ID" updated?	Go to step 6.	Replace the RR transmitter. <Ref. to WT-9, REMOVAL, Tire Pressure Monitoring System.>
<b>6 CHECK RR TRANSMITTER ID.</b> Check the ID displayed in the updated ID display and the tire 3 registered ID.	Are the two IDs same?	Go to step 7.	Record the received ID update as the RR transmitter. Go to step 7.
<b>7 START RL TRANSMITTER.</b> Use the transmitter registration tool and transmit the ID from the RL transmitter to check "Latest reception ID".	Is "Latest reception ID" updated?	Go to step 8.	Replace the RL transmitter. <Ref. to WT-9, REMOVAL, Tire Pressure Monitoring System.>
<b>8 CHECK RL TRANSMITTER ID.</b> Check the ID displayed in the updated ID display and the tire 4 registered ID.	Are the two IDs same?	Go to step 9.	Record the received ID update as the RL transmitter. Go to step 9.
<b>9 CHECK MALFUNCTION TRANSMITTER.</b>	Is ID recorded by this procedure?	Go to step 10.	Go to step 1.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## TIRE PRESSURE MONITORING SYSTEM (DIAGNOSTICS)

Step	Check	Yes	No
<b>10</b> <b>CHECK MALFUNCTION TRANSMITTER.</b> Check the registered ID of the transmitter indicated by DTC.	Is there checked ID in the record?	Replace the transmitter of the recorded position. <Ref. to WT-9, REMOVAL, Tire Pressure Monitoring System.>	Replace the transmitter showing the latest ID that is not included in the registered IDs. <Ref. to WT-9, REMOVAL, Tire Pressure Monitoring System.>

### **M: DTC 41 TRANSMITTER 1 FUNCTION CODE ABNORMAL**

**NOTE:**

Refer to DTC 44 for diagnostic procedure. <Ref. to TPM(diag)-28, DTC 44 TRANSMITTER 4 FUNCTION CODE ABNORMAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

### **N: DTC 42 TRANSMITTER 2 FUNCTION CODE ABNORMAL**

**NOTE:**

Refer to DTC 44 for diagnostic procedure. <Ref. to TPM(diag)-28, DTC 44 TRANSMITTER 4 FUNCTION CODE ABNORMAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

### **O: DTC 43 TRANSMITTER 3 FUNCTION CODE ABNORMAL**

**NOTE:**

Refer to DTC 44 for diagnostic procedure. <Ref. to TPM(diag)-28, DTC 44 TRANSMITTER 4 FUNCTION CODE ABNORMAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

## Diagnostic Procedure with Diagnostic Trouble Code (DTC)

### TIRE PRESSURE MONITORING SYSTEM (DIAGNOSTICS)

#### **P: DTC 44 TRANSMITTER 4 FUNCTION CODE ABNORMAL**

##### **DTC DETECTING CONDITION:**

Unexpected function codes received from each transmitter.

##### **TROUBLE SYMPTOM:**

Tire pressure warning light blinks 25 times and then illuminates.

Step	Check	Yes	No
<b>1 START FL TRANSMITTER.</b> 1) Connect the Subaru Select Monitor and then turn the ignition switch to ON. 2) Select "Transmit ID Monitor". <Ref. to TPM(diag)-9, DISPLAY TRANSMITTER (ID), OPERATION, Subaru Select Monitor.> 3) Use the transmitter registration tool and transmit the ID from the FL transmitter to check "Latest reception ID".	Is "Latest reception ID" updated?	Go to step 2.	Replace front left transmitter. <Ref. to WT-9, REMOVAL, Tire Pressure Monitoring System.>
<b>2 CHECK FL TRANSMITTER ID.</b> Check the ID displayed in the updated ID display and the tire 1 registered ID.	Are the two IDs same?	Go to step 3.	Record the received ID update as the FL transmitter. Go to step 3.
<b>3 START FR TRANSMITTER.</b> Use the transmitter registration tool and transmit the ID from the FR transmitter to check "Latest reception ID".	Is "Latest reception ID" updated?	Go to step 4.	Replace the front right transmitter. <Ref. to WT-9, REMOVAL, Tire Pressure Monitoring System.>
<b>4 CHECK FR TRANSMITTER ID.</b> Check the ID displayed in the updated ID display and the tire 2 registered ID.	Are the two IDs same?	Go to step 5.	Record the received ID update as the FR transmitter. Go to step 5.
<b>5 START RR TRANSMITTER.</b> Use the transmitter registration tool and transmit the ID from the RR transmitter to check "Latest reception ID".	Is "Latest reception ID" updated?	Go to step 6.	Replace the RR transmitter. <Ref. to WT-9, REMOVAL, Tire Pressure Monitoring System.>
<b>6 CHECK RR TRANSMITTER ID.</b> Check the ID displayed in the updated ID display and the tire 3 registered ID.	Are the two IDs same?	Go to step 7.	Record the received ID update as the RR transmitter. Go to step 7.
<b>7 START RL TRANSMITTER.</b> Use the transmitter registration tool and transmit the ID from the RL transmitter to check "Latest reception ID".	Is "Latest reception ID" updated?	Go to step 8.	Replace the RL transmitter. <Ref. to WT-9, REMOVAL, Tire Pressure Monitoring System.>
<b>8 CHECK RL TRANSMITTER ID.</b> Check the ID displayed in the updated ID display and the tire 4 registered ID.	Are the two IDs same?	Go to step 9.	Record the received ID update as the RL transmitter. Go to step 9.
<b>9 CHECK MALFUNCTION TRANSMITTER.</b>	Is ID recorded by this procedure?	Go to step 10.	Go to step 1.



# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## TIRE PRESSURE MONITORING SYSTEM (DIAGNOSTICS)

Step	Check	Yes	No
<b>10</b> <b>CHECK MALFUNCTION TRANSMITTER.</b> Check the registered ID of the transmitter indicated by DTC.	Is there checked ID in the record?	Replace the transmitter of the recorded position. <Ref. to WT-9, REMOVAL, Tire Pressure Monitoring System.>	Replace the transmitter showing the latest ID that is not included in the registered IDs. <Ref. to WT-9, REMOVAL, Tire Pressure Monitoring System.>

### **Q: DTC 51 TRANSMITTER 1 BATTERY VOLTAGE DECREASE**

**NOTE:**

Refer to DTC 54 for diagnostic procedure. <Ref. to TPM(diag)-30, DTC 54 TRANSMITTER 4 BATTERY VOLTAGE DECREASE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

### **R: DTC 52 TRANSMITTER 2 BATTERY VOLTAGE DECREASE**

**NOTE:**

Refer to DTC 54 for diagnostic procedure. <Ref. to TPM(diag)-30, DTC 54 TRANSMITTER 4 BATTERY VOLTAGE DECREASE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

### **S: DTC 53 TRANSMITTER 3 BATTERY VOLTAGE DECREASE**

**NOTE:**

Refer to DTC 54 for diagnostic procedure. <Ref. to TPM(diag)-30, DTC 54 TRANSMITTER 4 BATTERY VOLTAGE DECREASE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

TIRE PRESSURE MONITORING SYSTEM (DIAGNOSTICS)

---

## T: DTC 54 TRANSMITTER 4 BATTERY VOLTAGE DECREASE

### DTC DETECTING CONDITION:

Low battery signals received 20 times from each transmitter.

### TROUBLE SYMPTOM:

Tire pressure warning light blinks 25 times and then illuminates.

	Step	Check	Yes	No
1	<b>CHECK TRANSMITTER.</b> 1) Replace all transmitters and register their IDs. <Ref. to WT-9, TRANSMITTER (SNAP IN TYPE), REMOVAL, Tire Pressure Monitoring System.> <Ref. to TPM(diag)-9, REGISTER TRANSMITTER (ID), OPERATION, Subaru Select Monitor.> 2) Perform the Clear Memory Mode, and perform driving test.	Is the fault eliminated?	Internal battery of the transmitter had worn out. <Ref. to WT-9, TRANSMITTER (SNAP IN TYPE), REMOVAL, Tire Pressure Monitoring System.>	Replace the TPMS & keyless entry control module. <Ref. to WT-9, TPMS & keyless entry control module, REMOVAL, Tire Pressure Monitoring System.>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

TIRE PRESSURE MONITORING SYSTEM (DIAGNOSTICS)

## U: DTC 61 VEHICLE SPEED IS ABNORMAL

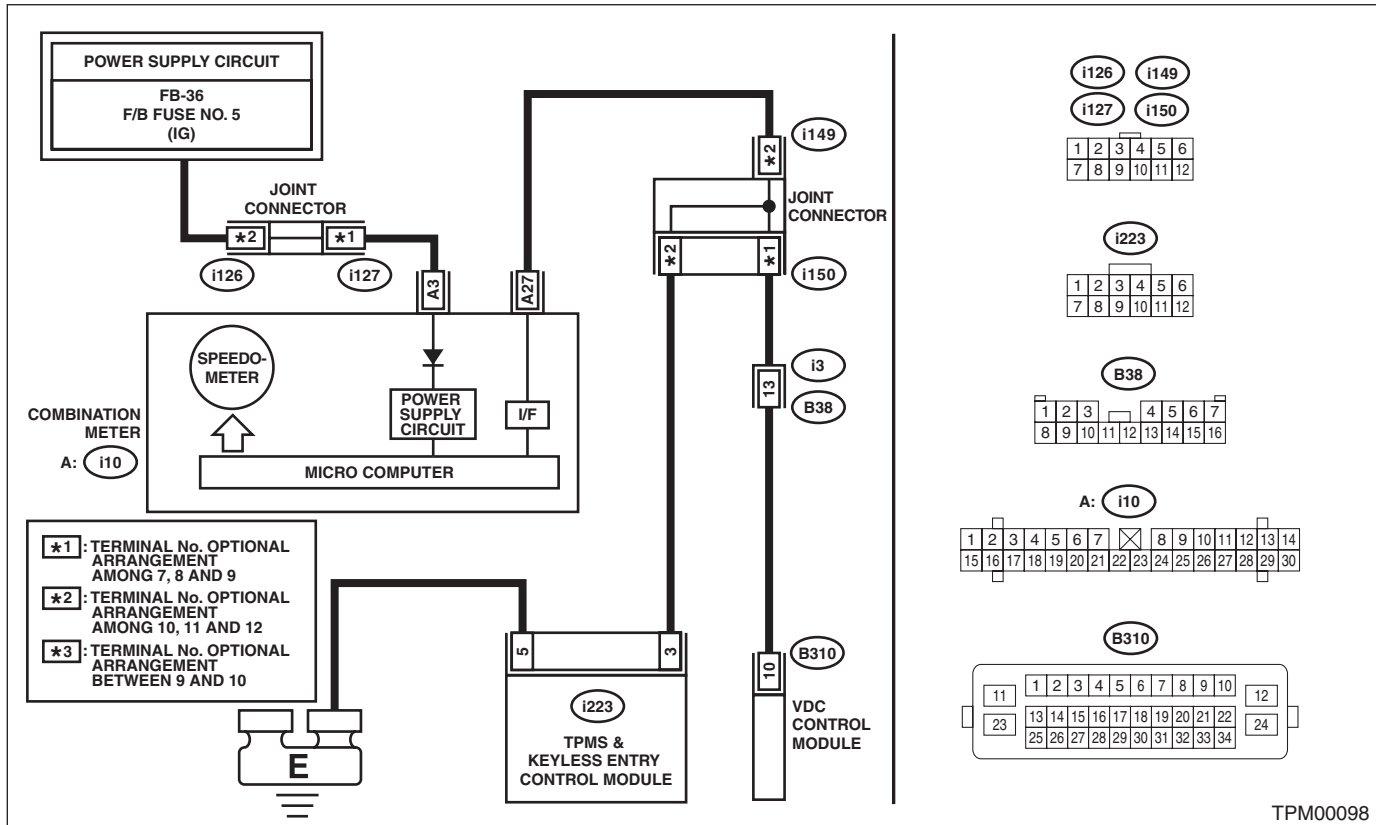
### DTC DETECTING CONDITION:

Vehicle speed function codes were received from the transmitter, but the vehicle speed signal was not input to the module.

### TROUBLE SYMPTOM:

Tire pressure warning light blinks.

### WIRING DIAGRAM:



Step	Check	Yes	No
<b>1</b> <b>CHECK TPMS &amp; KEYLESS ENTRY CONTROL MODULE.</b> 1) Connect an oscilloscope to the terminal No. 3 of the TPMS & keyless entry control module connector (i223). <i>Connector &amp; terminal (i223) No. 3 (+) — Chassis ground (-):</i> 2) Lift up the vehicle and then drive the vehicle at 40 km/h (25 MPH) and check the vehicle speed signal at that time.	Is the vehicle speed being input?	Replace the TPMS & keyless entry control module. <Ref. to WT-9, REMOVAL, Tire Pressure Monitoring System.>	Go to step 2.
<b>2</b> <b>CHECK HARNESS.</b> 1) Disconnect the combination meter connector (i10). 2) Connect the tester to the TPMS & keyless entry control module connector (i223) and combination meter connector (i10), and measure the resistance. <i>Connector &amp; terminal (i223) No. 3 — (i10) No. 27:</i>	Is the resistance less than 0.5 Ω?	Check the combination meter. <Ref. to IDI-11, REMOVAL, Combination Meter.>	Repair or replace the open circuit of the harness.

# General Diagnostic Table

TIRE PRESSURE MONITORING SYSTEM (DIAGNOSTICS)

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## 12.General Diagnostic Table

### A: INSPECTION

Symptoms		Faulty parts
Tire pressure warning light illuminates.	Tire pressure is reduced.	<ul style="list-style-type: none"><li>• Improper tire pressure adjustment.</li><li>• Punctured tire</li></ul>
Tire pressure warning light blinks 25 times and then illuminates.	Tire pressure monitoring system has malfunction.	<ul style="list-style-type: none"><li>• Air pressure sensor malfunction</li><li>• Air pressure sensor is out of battery.</li><li>• Defective TPMS &amp; keyless entry control module</li><li>• Defective combination meter</li><li>• Defective vehicle harness</li></ul>
Tire pressure is dropping but the warning light does not illuminate.	Tire pressure warning light does not illuminate.	<ul style="list-style-type: none"><li>• Air pressure sensor is faulty.</li><li>• Defective TPMS &amp; keyless entry control module</li><li>• Defective combination meter</li></ul>

# DIFFERENTIALS

# *DI*

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# General Description

## DIFFERENTIALS

### 1. General Description

#### A: SPECIFICATION

##### 1. REAR DIFFERENTIAL

When replacing a rear differential assembly, select the correct one according to the following table.

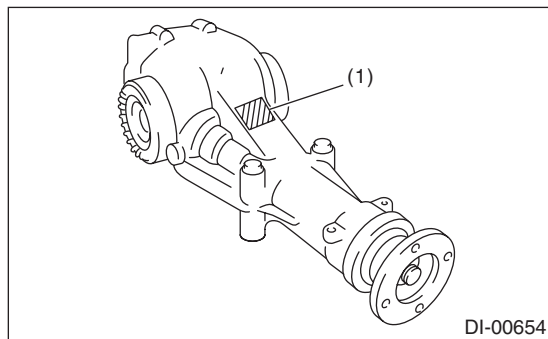
NOTE:

- Using a different rear differential assembly will cause the drive train and tires to drag or emit abnormal noise.
- For option code, refer to “ID” section. <Ref. to ID-2, IDENTIFICATION, Identification.>

Rear differential type	VA2-type
Identification	XB
LSD type	—
Type of gear	Hypoid gear
Gear ratio (Number of gear teeth)	3.583 (43/12)
Oil capacity	0.8 ℓ (0.8 US qt, 0.7 Imp qt)
Rear differential gear oil	GL-5

##### 2. IDENTIFICATION

Identification positions are shown in the following figures. For details concerning identification, refer to the “ID” section.



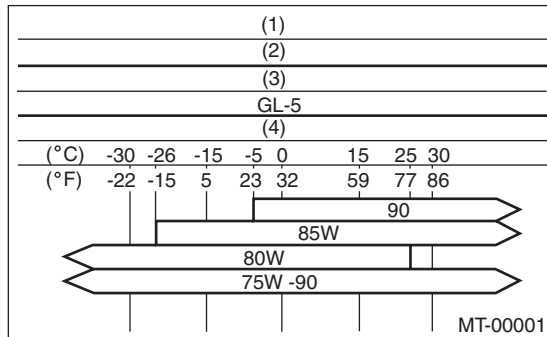
(1) Identification

### 3. REAR DIFFERENTIAL GEAR OIL

**Recommended gear oil:**  
**GL-5 (75W-90)**

**CAUTION:**

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



- (1) Item
- (2) Rear differential gear oil
- (3) API classification
- (4) SAE viscosity No. and applicable temperature

### 4. SERVICE DATA

Drive pinion bearing preload	Measure with spring measurement. (Measured from the companion flange bolt) N (kgf, lb)	12.7 — 32.2 (1.3 — 3.3, 2.9 — 7.2)
	Measure with torque wrench N·m (kgf-m, ft-lb)	0.48 — 1.22 (0.05 — 0.12, 0.35 — 0.90)
Side gear backlash	mm (in)	0.13 — 0.18 (0.005 — 0.007)
Hypoid driven gear to drive pinion backlash	mm (in)	0.10 — 0.15 (0.004 — 0.006)

# General Description

## DIFFERENTIALS

### 5. ADJUSTING PARTS

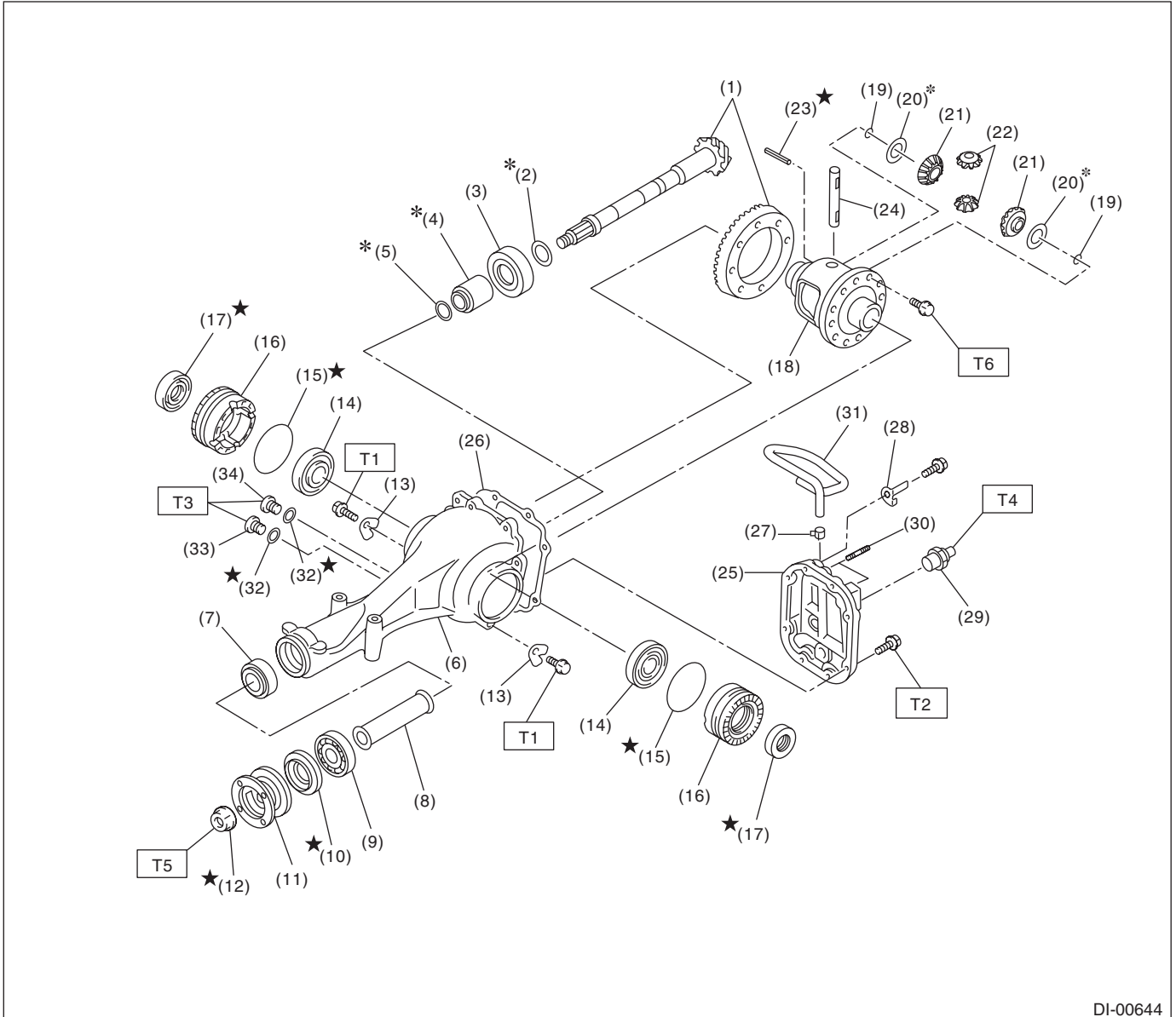
Drive pinion bearing preload	Measure with spring scale. (Measured at the companion flange bolt hole) N (kgf, lb)	12.7 — 32.2 (1.3 — 3.3, 2.9 — 7.2)
	Measure with torque wrench N-m (kgf-m, ft-lb)	0.48 — 1.22 (0.05 — 0.12, 0.35 — 0.90)
Preload adjusting spacer	Part No.	Length mm (in)
	31454AA250	51.05 (2.010)
	31454AA260	51.25 (2.018)
	31454AA270	51.35 (2.022)
	31454AA280	51.45 (2.026)
	31454AA290	51.55 (2.030)
	31454AA300	51.65 (2.033)
	31454AA310	51.75 (2.037)
	31454AA320	51.85 (2.041)
	31454AA330	52.05 (2.049)

Preload adjusting washer	Part No.	Thickness mm (in)
	38336AA430	1.500 (0.0591)
	38336AA440	1.513 (0.0596)
	38336AA450	1.525 (0.0600)
	38336AA460	1.538 (0.0606)
	38336AA470	1.550 (0.0610)
	38336AA480	1.563 (0.0615)
	38336AA490	1.575 (0.0620)
	38336AA500	1.588 (0.0625)
	38336AA510	1.600 (0.0630)
	38336AA520	1.613 (0.0635)
	38336AA530	1.625 (0.0640)
	38336AA540	1.638 (0.0645)
	38336AA550	1.650 (0.0650)
	38336AA560	1.663 (0.0655)
	38336AA570	1.675 (0.0659)
	38336AA580	1.688 (0.0665)
	38336AA590	1.700 (0.0669)
	38336AA600	1.713 (0.0674)
	38336AA610	1.725 (0.0679)
38336AA620	1.738 (0.0684)	
38336AA630	1.750 (0.0689)	
38336AA640	1.763 (0.0694)	
38336AA650	1.775 (0.0699)	
Pinion height adjusting washer	Part No.	Thickness mm (in)
	32295AA350	0.150 (0.0059)
	32295AA360	0.175 (0.0069)
	32295AA370	0.200 (0.0079)
	32295AA380	0.225 (0.0089)
	32295AA390	0.250 (0.0098)
32295AA400	0.275 (0.0108)	
Hypoid driven gear to drive pinion backlash	Limit mm (in)	0.10 — 0.15 (0.004 — 0.006)



### B: COMPONENT

#### 1. REAR DIFFERENTIAL (VA2-TYPE)



DI-00644

# General Description

## DIFFERENTIALS

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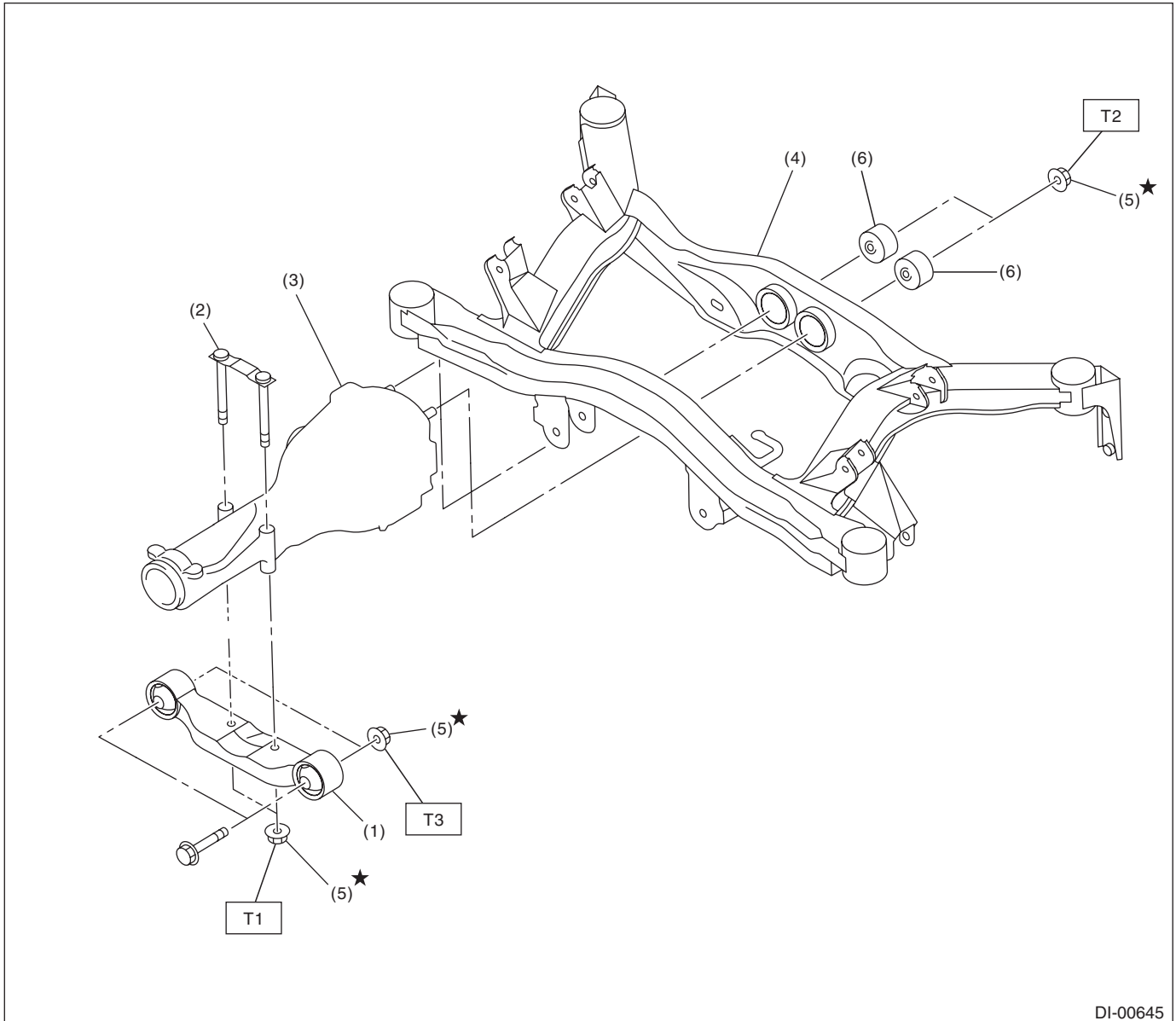
(1) Hypoid driven gear and drive pinion set	(16) Side retainer	(31) Air breather hose
(2) Pinion height adjusting washer	(17) Side oil seal	(32) Gasket
(3) Rear bearing	(18) Differential case	(33) Oil filler plug
(4) Bearing preload adjusting spacer	(19) Circlip	(34) Oil drain plug
(5) Bearing preload adjusting washer	(20) Side gear thrust washer	
(6) Differential carrier	(21) Side gear	
(7) Front bearing	(22) Pinion mate gear	
(8) Spacer	(23) Spring pin	
(9) Pilot bearing	(24) Pinion mate shaft	
(10) Front oil seal	(25) Rear cover	
(11) Companion flange	(26) Gasket	
(12) Self-locking nut	(27) Clip	
(13) Lock plate	(28) Stay ground	
(14) Side bearing	(29) Rear differential oil temperature switch	
(15) O-ring	(30) Stud bolt	

---

**Tightening torque:N-m (kgf-m, ft-lb)****T1: 25 (2.5, 18.4)****T2: 34 (3.5, 25.1)****T3: 50 (5.1, 36.9)****T4: 60 (6.1, 44.3)****T5: 191 (19.5, 140.9)****T6: <Ref. to DI-25, ASSEMBLY, Rear Differential (VA-type).>**

---

## 2. REAR DIFFERENTIAL MOUNTING SYSTEM



DI-00645

- |                                    |                                     |
|------------------------------------|-------------------------------------|
| (1) Rear differential front member | (4) Sub frame                       |
| (2) Rear differential member plate | (5) Self-locking nut                |
| (3) Rear differential ASSY         | (6) Rear differential mount bushing |

**Tightening torque: N·m (kgf-m, ft-lb)**

**T1: 50 (5.1, 36.9)**

**T2: 70 (7.1, 51.6)**

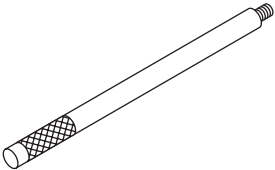
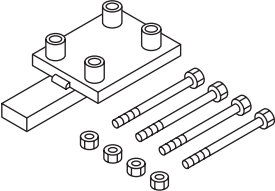
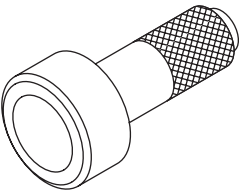
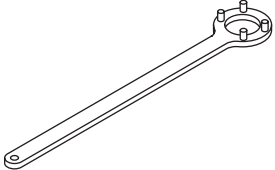
**T3: 110 (11.2, 81.1)**

#### **C: CAUTION**

- Wear appropriate work clothing, including a cap, protective goggles and protective shoes when performing any work.
- 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.
- Vehicle components are extremely hot after driving. Be wary of receiving burns from heated parts.
- Use SUBARU genuine gear oil, grease etc. or equivalent. Do not mix gear oil, grease, etc. of different grades or manufacturers.
- Be sure to tighten fasteners including bolts and nuts to the specified torque.
- Place shop jacks or rigid racks at the specified points.
- Apply gear oil onto sliding or revolving surfaces before installation.
- Before installing the O-ring or snap ring, apply a 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 cloth between the part and the vise.
- Avoid damaging the mating surface of the case.

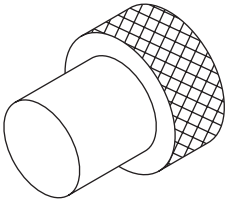
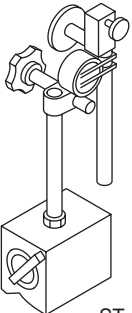
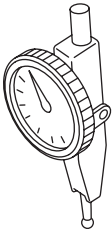
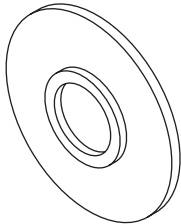
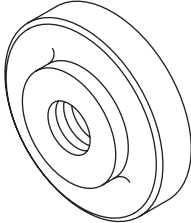
## D: PREPARATION TOOL

### 1. SPECIAL TOOL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p style="text-align: center;">ST-398477701</p>	398477701	HANDLE	Used for installing the front and rear bearing cones.
 <p style="text-align: center;">ST-398217700</p>	398217700	ATTACHMENT SET	Stand for rear differential carrier disassembly and assembly.
 <p style="text-align: center;">ST-498447120</p>	498447120	INSTALLER	Used for installing the front oil seal.
 <p style="text-align: center;">ST-498427200</p>	498427200	FLANGE WRENCH	Used for stopping rotation of companion flange when removing and tightening self-lock nut.

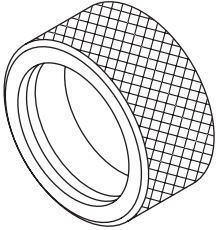
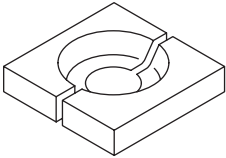
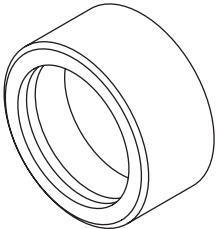
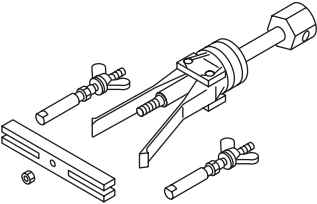
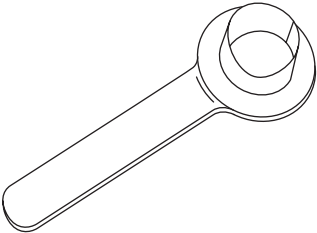
# General Description

## DIFFERENTIALS

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p style="text-align: center;">ST-399780104</p>	399780104	WEIGHT	Used for installing the front bearing cone and the pilot bearing companion flange.
 <p style="text-align: center;">ST-498247001</p>	498247001	MAGNET BASE	<ul style="list-style-type: none"> <li>• Used for measuring backlash between side gear and pinion, and hypoid gear.</li> <li>• Used together with DIAL GAUGE (498247100).</li> </ul>
 <p style="text-align: center;">ST-498247100</p>	498247100	DIAL GAUGE	<ul style="list-style-type: none"> <li>• Used for measuring backlash between side gear and pinion, and hypoid gear.</li> <li>• Used together with MAGNET BASE (498247001).</li> </ul>
 <p style="text-align: center;">ST-398177700</p>	398177700	INSTALLER	Used for installing the rear bearing cone.
 <p style="text-align: center;">ST-398477703</p>	398477703	DRIFT 2	Used for press-fitting bearing race (rear) of differential carrier.

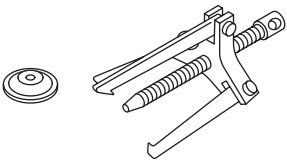
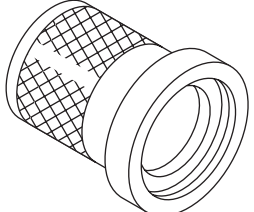
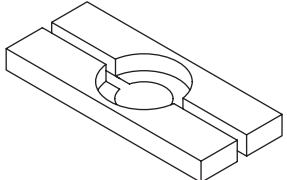
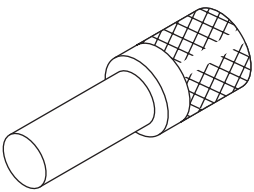
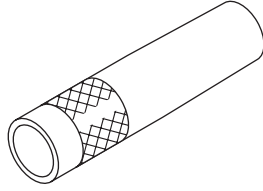
# General Description

DIFFERENTIALS

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p style="text-align: center;">ST-398437700</p>	398437700	DRIFT	Used for installing the side oil seal.
 <p style="text-align: center;">ST-398517700</p>	398517700	REPLACER	Used for removing rear bearing cone.
 <p style="text-align: center;">ST-398487700</p>	398487700	DRIFT	Used for press-fitting side bearing cone.
 <p style="text-align: center;">ST-398527700</p>	398527700	PULLER ASSY	Used for removing front oil seal.
 <p style="text-align: center;">ST28099PA090</p>	28099PA090	OIL SEAL PROTECTOR	<ul style="list-style-type: none"> <li>• Used for installing the rear drive shaft to the rear differential.</li> <li>• For oil seal protection.</li> </ul>

# General Description

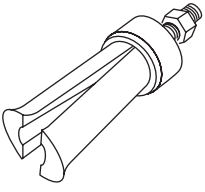
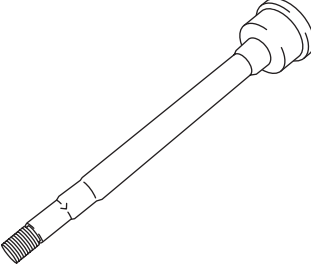
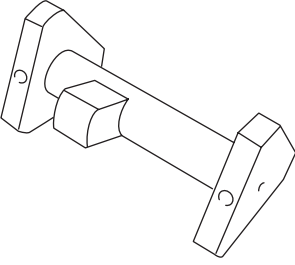
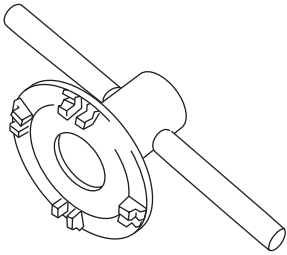
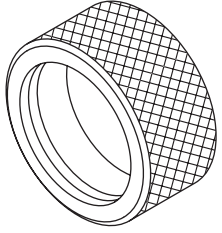
## DIFFERENTIALS

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p style="text-align: center;">ST-399703600</p>	399703600	PULLER ASSY	Used for removing companion flange.
 <p style="text-align: center;">ST-899874100</p>	899874100	INSTALLER	Used for installing the companion flange.
 <p style="text-align: center;">ST-498077000</p>	498077000	REMOVER	Used for removing the differential side bearing cone.
 <p style="text-align: center;">ST-899864100</p>	899864100	REMOVER	Used for removing the differential side bearing.
 <p style="text-align: center;">ST-499277200</p>	499277200	INSTALLER	Used for installing the front bearing cone.



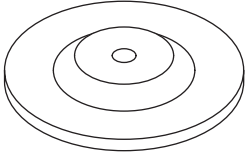
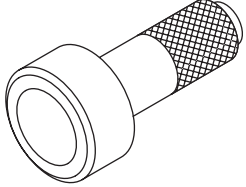
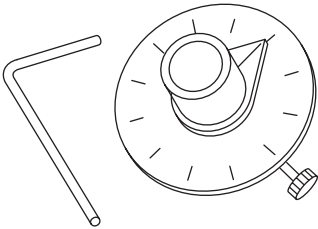
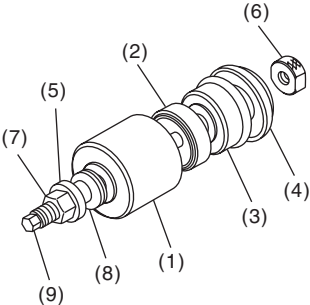
# General Description

DIFFERENTIALS

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p style="text-align: center;">ST18758AA000</p>	18758AA000	PULLER	Used for removing side bearing cup.
 <p style="text-align: center;">ST18678AA000</p>	18678AA000	DUMMY SHAFT	Used for adjusting pinion height and preload.
 <p style="text-align: center;">ST18831AA010</p>	18831AA010	DIFFERENTIAL CARRIER GAUGE	Used for adjusting pinion height.
 <p style="text-align: center;">ST18630AA010</p>	18630AA010	WRENCH COMPL RETAINER	Used for removing and installing the side oil seal holder.
 <p style="text-align: center;">ST-498447100</p>	498447100	INSTALLER	Used for installing the oil seal.

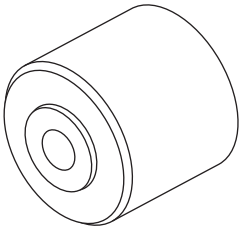
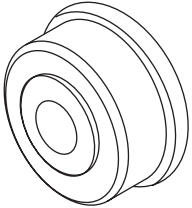
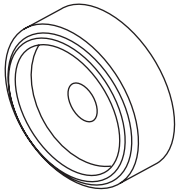
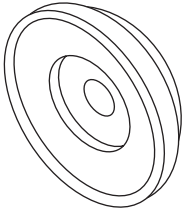
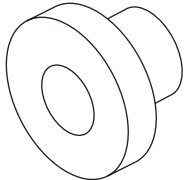
# General Description

## DIFFERENTIALS

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>ST-399520105</p>	399520105	SEAT	Used for removing the side bearing cone.
 <p>ST-398417700</p>	398417700	DRIFT	Used for installing side bearing race.
 <p>ST18854AA000</p>	18854AA000	ANGLE GAUGE	Used for installing the hypoid driven gear.
 <p>ST41399FG000</p>	41399FG000	SPECIAL TOOL ASSY	<ul style="list-style-type: none"> <li>• Used for removing and installing the rear differential mount bushing.</li> <li>• Use (1), (3), (5), (6), (7), (8) and (9) for removal.</li> <li>• Use (2), (4), (5), (6), (7), (8) and (9) for installation.</li> </ul> <p>(1) SPECIAL TOOL A (41399FG010)            (2) SPECIAL TOOL B (41399FG020)            (3) SPECIAL TOOL C (41399FG030)            (4) SPECIAL TOOL D (41399FG040)            (5) SPECIAL TOOL SLEEVE (41399FG050)            (6) SPECIAL TOOL RING (41399FG060)            (7) SPECIAL TOOL NUT (41399FG070)            (8) SPECIAL TOOL BEARING (41399FG080)            (9) SPECIAL TOOL SHAFT (41399FG090)</p>

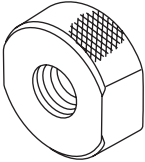
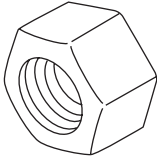
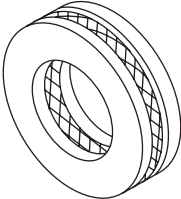
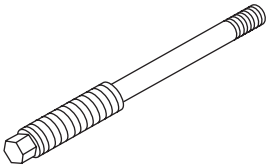
# General Description

DIFFERENTIALS

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p style="text-align: center;">ST41399FG010</p>	41399FG010	SPECIAL TOOL A	<ul style="list-style-type: none"> <li>• Used for removing the rear differential mount bushing.</li> <li>• For combination of tools for removal, refer to "SPECIAL TOOL ASSY (41399FG000)".</li> </ul>
 <p style="text-align: center;">ST41399FG020</p>	41399FG020	SPECIAL TOOL B	<ul style="list-style-type: none"> <li>• Used for installing the rear differential mount bushing.</li> <li>• For combination of tools for installation, refer to "SPECIAL TOOL ASSY (41399FG000)".</li> </ul>
 <p style="text-align: center;">ST41399FG030</p>	41399FG030	SPECIAL TOOL C	<ul style="list-style-type: none"> <li>• Used for removing the rear differential mount bushing.</li> <li>• For combination of tools for removal, refer to "SPECIAL TOOL ASSY (41399FG000)".</li> </ul>
 <p style="text-align: center;">ST41399FG040</p>	41399FG040	SPECIAL TOOL D	<ul style="list-style-type: none"> <li>• Used for installing the rear differential mount bushing.</li> <li>• For combination of tools for installation, refer to "SPECIAL TOOL ASSY (41399FG000)".</li> </ul>
 <p style="text-align: center;">ST41399FG050</p>	41399FG050	SPECIAL TOOL SLEEVE	<ul style="list-style-type: none"> <li>• Used for removing and installing the rear differential mount bushing.</li> <li>• For combination of tools for removal and installation, refer to "SPECIAL TOOL ASSY (41399FG000)".</li> </ul>

# General Description

## DIFFERENTIALS

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST41399FG060	41399FG060	SPECIAL TOOL RING	<ul style="list-style-type: none"> <li>Used for removing and installing the rear differential mount bushing.</li> <li>For combination of tools for removal and installation, refer to "SPECIAL TOOL ASSY (41399FG000)".</li> </ul>
 ST41399FG070	41399FG070	SPECIAL TOOL NUT	<ul style="list-style-type: none"> <li>Used for removing and installing the rear differential mount bushing.</li> <li>For combination of tools for removal and installation, refer to "SPECIAL TOOL ASSY (41399FG000)".</li> </ul>
 ST41399FG080	41399FG080	SPECIAL TOOL BEARING	<ul style="list-style-type: none"> <li>Used for removing and installing the rear differential mount bushing.</li> <li>For combination of tools for removal and installation, refer to "SPECIAL TOOL ASSY (41399FG000)".</li> </ul>
 ST41399FG090	41399FG090	SPECIAL TOOL SHAFT	<ul style="list-style-type: none"> <li>Used for removing and installing the rear differential mount bushing.</li> <li>For combination of tools for removal and installation, refer to "SPECIAL TOOL ASSY (41399FG000)".</li> </ul>

## 2. GENERAL TOOL

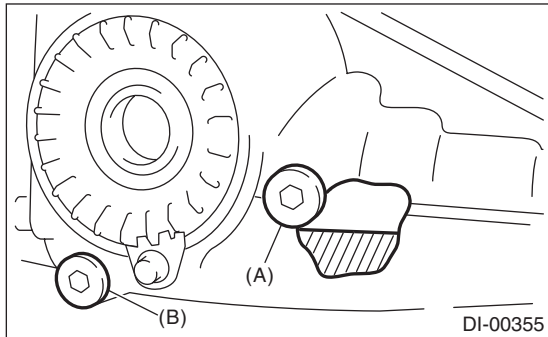
TOOL NAME	REMARKS
Transmission jack	Used for assembly/disassembly of the rear differential.
Puller	Used for removing the side bearing retainer.
Thickness gauge	Used for measuring clearance.
Hexagon wrench	Used for installing and removing the filler and drain plug.
Tire lever	Used for removing the front drive shaft.

## 2. Differential Gear Oil

### A: INSPECTION

1) Remove the filler plug, and check the differential gear oil. Replace the gear oil if it is contaminated or deteriorated. <Ref. to DI-17, REPLACEMENT, Differential Gear Oil.>

2) Check that the gear oil level is within -5 mm (-0.2 in) from the bottom of the filler plug hole. If the level is low, make sure that there is no oil leakage and refill up to the bottom of filler plug hole.



(A) Filler plug  
(B) Oil drain plug

4) Fill the differential carrier with gear oil to the bottom of filler plug.

**NOTE:**

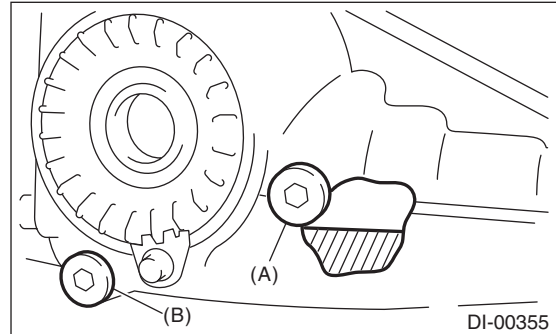
Carefully refill oil while watching the level. Excessive or insufficient oil must be avoided.

**Recommended gear oil:**

<Ref. to DI-2, SPECIFICATION, General Description.>

**Oil capacity:**

**0.8 ℓ (0.8 US qt, 0.7 Imp qt)**



(A) Filler plug  
(B) Oil drain plug

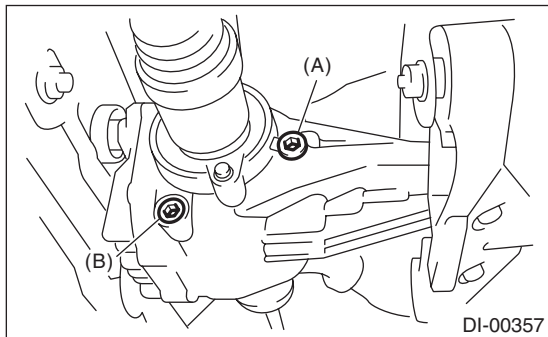
### B: REPLACEMENT

1) Lift up the vehicle.

2) Remove the oil drain plug and filler plug, and drain the gear oil.

**CAUTION:**

**Be careful not to burn your hands, because gear oil becomes extremely hot after running.**



(A) Filler plug  
(B) Oil drain plug

5) Install the filler plug.

**NOTE:**

Use a new gasket.

**Tightening torque:**

**50 N·m (5.1 kgf-m, 36.9 ft-lb)**

3) Tighten the oil drain plug.

**NOTE:**

Use a new gasket.

**Tightening torque:**

**50 N·m (5.1 kgf-m, 36.9 ft-lb)**

## 3. Front Differential Assembly

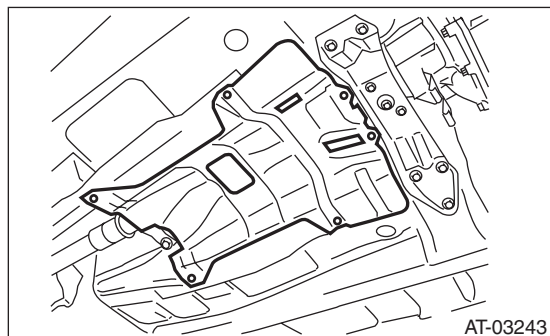
### A: NOTE

Regarding the front differential, refer to the “5AT” section. <Ref. to 5AT-86, Front Differential Assembly.>

## 4. Rear Differential (VA-type)

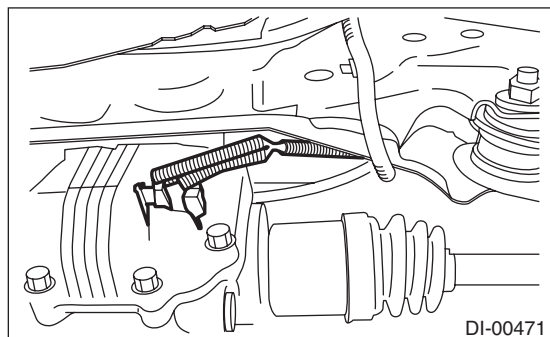
### A: REMOVAL

- 1) Disconnect the ground cable from battery.
- 2) Position the select lever to neutral.
- 3) Release the parking brake.
- 4) Loosen the wheel nuts.
- 5) Lift up the vehicle.
- 6) Remove the wheels.
- 7) Remove the rear exhaust pipe and muffler.  
<Ref. to EX(H6DO)-7, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H6DO)-9, REMOVAL, Muffler.>
- 8) Remove the heat shield cover.

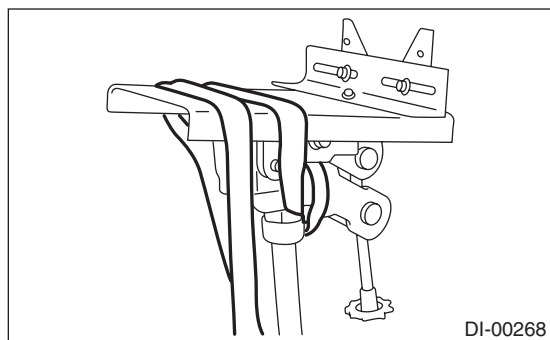


- 9) Remove the propeller shaft. <Ref. to DS-10, REMOVAL, Propeller Shaft.>

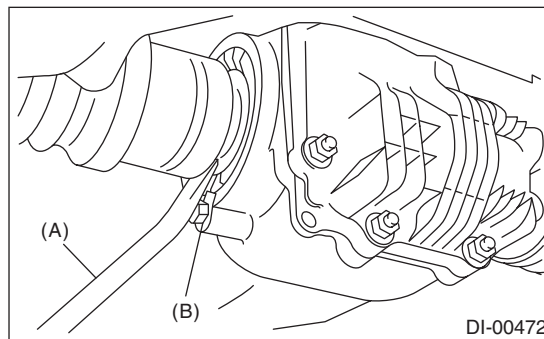
- 10) Remove the connector from the rear differential oil temperature switch.



- 11) Prepare the transmission jack and band.

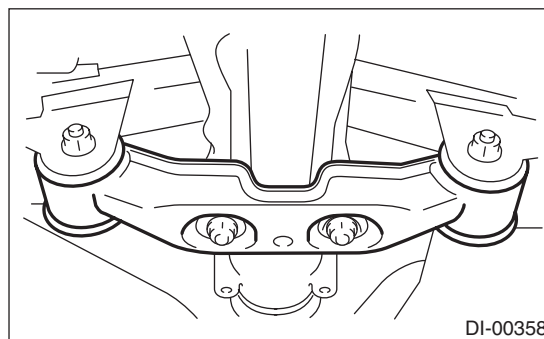


- 12) Remove the DOJ of rear drive shaft from rear differential.

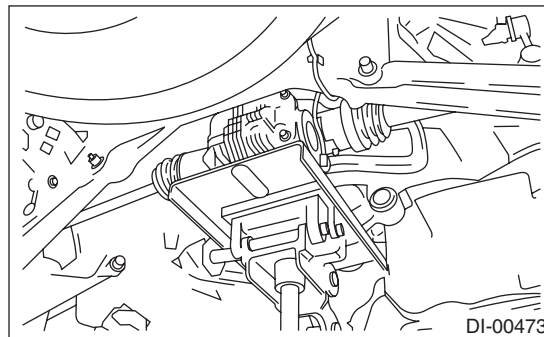


- (A) Tire lever  
(B) Bolt

- 13) Remove the nuts which hold the rear differential front member.



- 14) Support the rear differential with the transmission jack.



- 15) Loosen the self-lock nuts which hold the rear differential to rear crossmember.



- 16) Remove the rear differential front member.
- 17) Secure the rear differential using band.

## Rear Differential (VA-type)

### DIFFERENTIALS

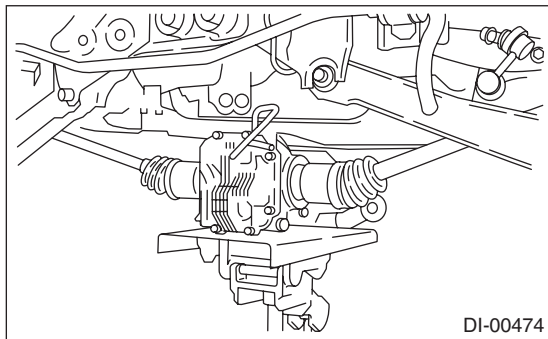
18) Remove the self-lock nuts which hold the rear differential to rear crossmember.

19) Remove the air breather hose from the sub frame.

20) Remove the rear differential stud bolt from rear crossmember bushing.

#### NOTE:

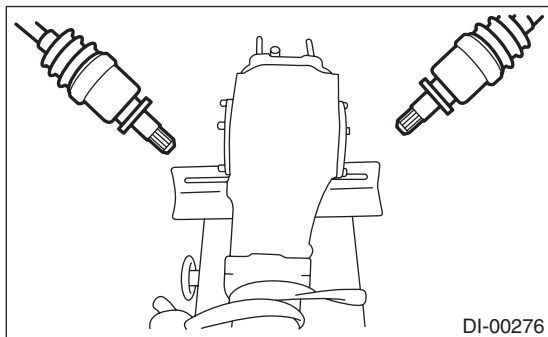
When removing the stud bolt, carefully adjust the angle and location of transmission jack and jack stand, if necessary.



21) Pull out the axle shaft from rear differential.

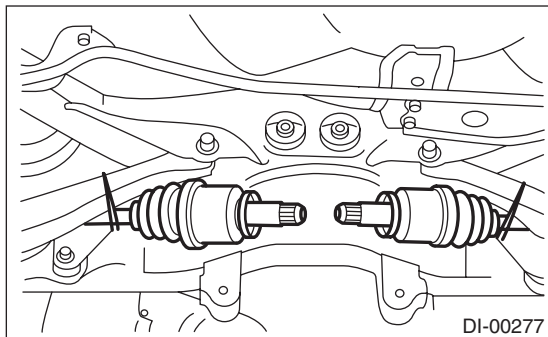
#### NOTE:

If it is difficult to remove the axle shaft from rear differential, remove it using tire lever.

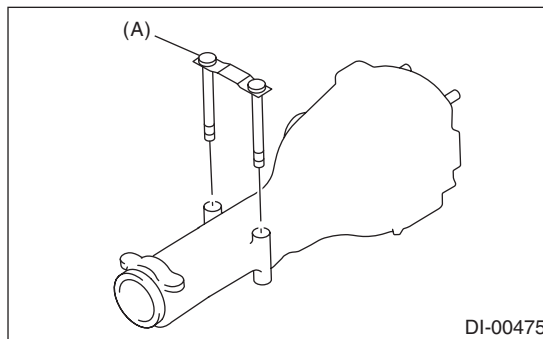


22) Lower the transmission jack.

23) Secure the rear drive shaft to lateral link using wire.



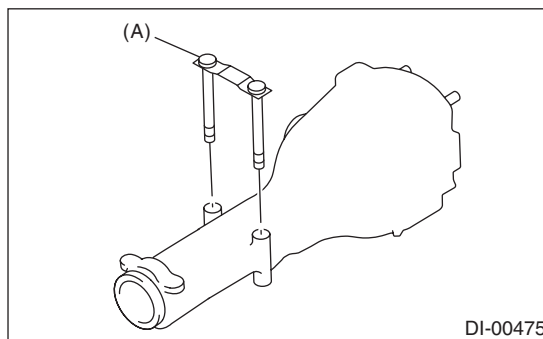
24) Remove the rear differential member plate from rear differential.



(A) Rear differential member plate

### B: INSTALLATION

1) Insert the rear differential member plate into rear differential.



(A) Rear differential member plate

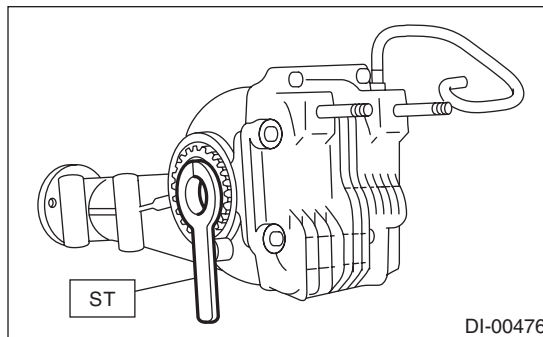
2) Set the rear differential to transmission jack.

#### NOTE:

Secure the rear differential to transmission jack using band.

3) Attach the ST to rear differential.

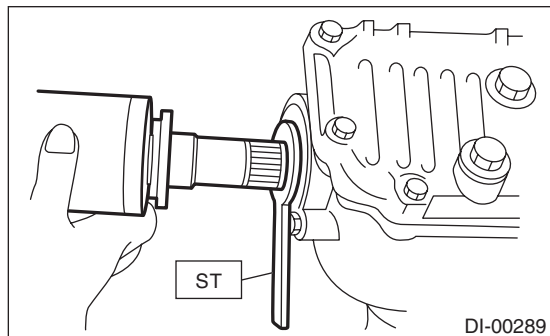
ST 28099PA090 OIL SEAL PROTECTOR





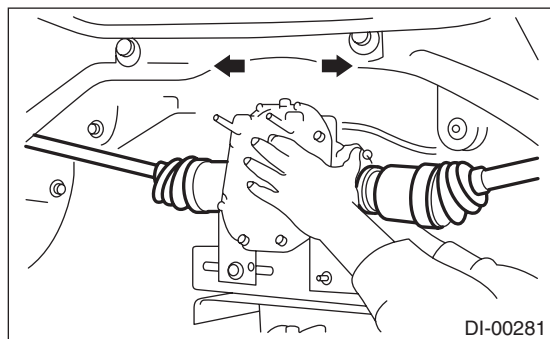
4) Insert the spline shaft until the spline portion comes inside the side oil seal.

ST 28099PA090 OIL SEAL PROTECTOR

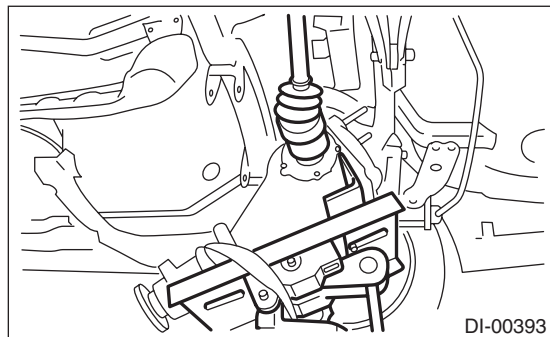


5) Remove ST from rear differential.

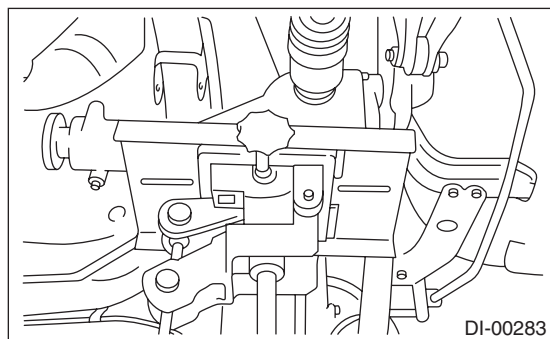
6) Push the rear differential to insert the axle shaft into rear differential.



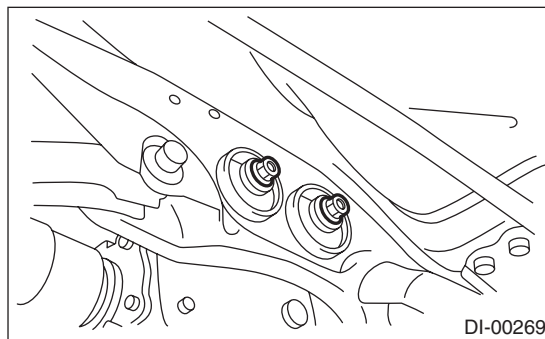
7) Adjust the transmission jack, if necessary, and insert the rear differential stud bolt into rear crossmember bushing properly.



8) After inserting the rear differential stud bolt into the rear crossmember bushing, lift up the transmission jack and align the rear differential to its attachment position.



9) Tighten a new self-locking nut temporarily to rear crossmember.



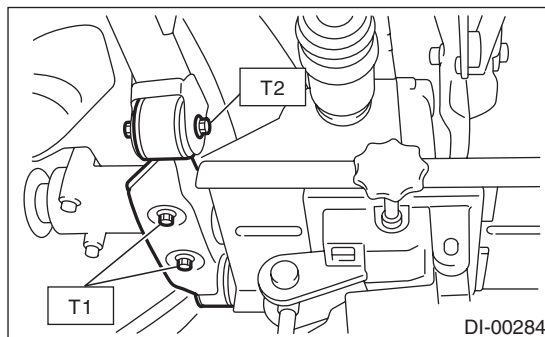
10) Remove the band from rear differential. Lift up the rear differential until the rear differential is separated from the transmission jack.

11) Install the rear differential front member with a new self-locking nut.

**Tightening torque:**

**T1: 50 N·m (5.1 kgf-m, 36.9 ft-lb)**

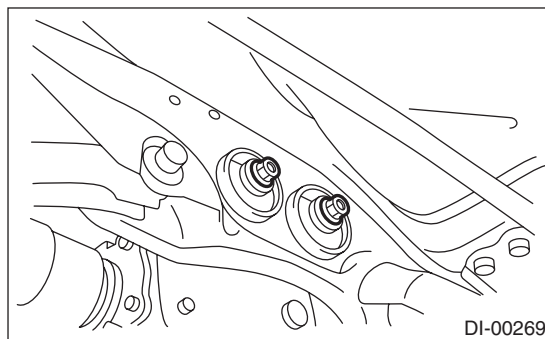
**T2: 110 N·m (11.2 kgf-m, 81.1 ft-lb)**



12) Tighten the self-locking nut.

**Tightening torque:**

**70 N·m (7.1 kgf-m, 51.6 ft-lb)**



13) Lower the transmission jack.

14) Install the air breather hose to the sub frame.

15) Install the propeller shaft. <Ref. to DS-11, INSTALLATION, Propeller Shaft.>

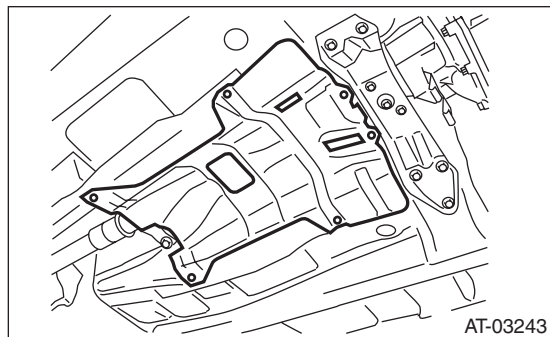
## Rear Differential (VA-type)

### DIFFERENTIALS

16) Install the heat shield cover.

#### **Tightening torque:**

**18 N·m (1.8 kgf-m, 33.3 ft-lb)**



17) Install the rear exhaust pipe and muffler. <Ref. to EX(H6DO)-7, INSTALLATION, Rear Exhaust Pipe.> <Ref. to EX(H6DO)-9, INSTALLATION, Muffler.>

18) Install the wheel. <Ref. to WT-5, INSTALLATION, Tire and Wheel.>

### **C: DISASSEMBLY**

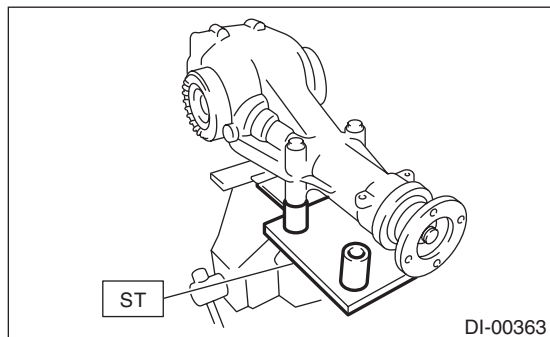
To detect the real cause of trouble, inspect the following items before disassembling.

- Tooth contact and backlash between hypoid driven gear and drive pinion
- Total preload of drive pinion

1) Remove the air breather hose.

2) Set the ST on vise and install the differential assembly to ST.

ST 398217700 ATTACHMENT SET



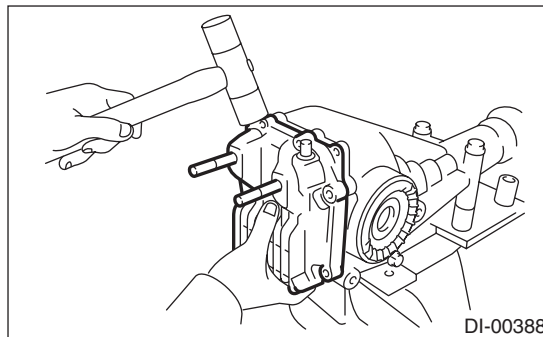
3) Remove the oil drain plug and filler plug.

4) Remove the rear differential oil temperature switch.

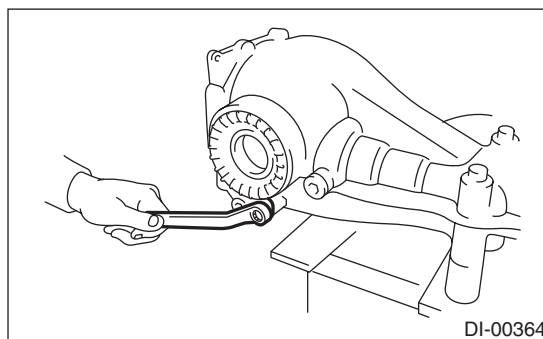
5) Remove the rear cover by removing retaining bolts.

#### **NOTE:**

Remove it by tapping with a plastic hammer.



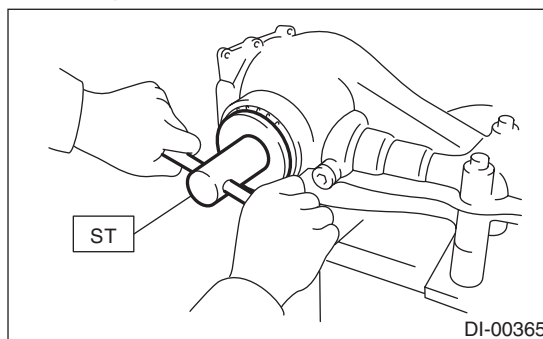
6) Remove the lock plate RH and LH.



7) Remove the side retainer RH and LH with ST. ST 18630AA010 WRENCH COMPL RETAINER

#### **NOTE:**

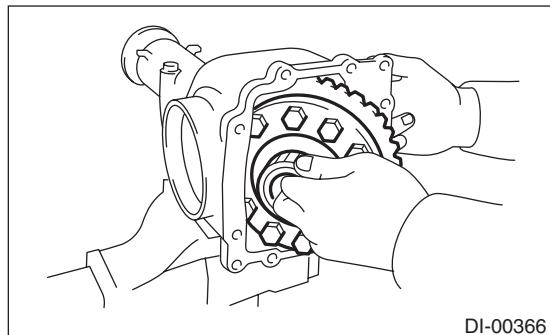
Never mix up the RH and LH retainers.



8) Pull out the differential case assembly from differential carrier.

**NOTE:**

Be careful not to hit the teeth of hypoid driven gear against the differential carrier.

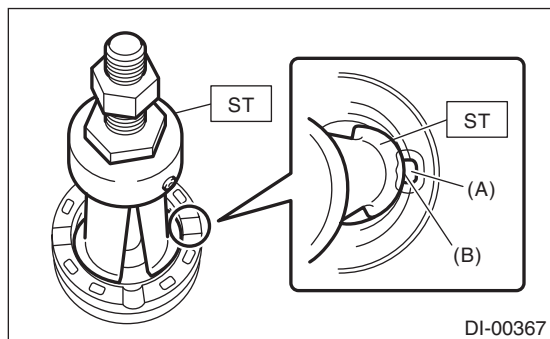


9) Remove the bearing race from the side retainer RH and LH with the ST and a press.

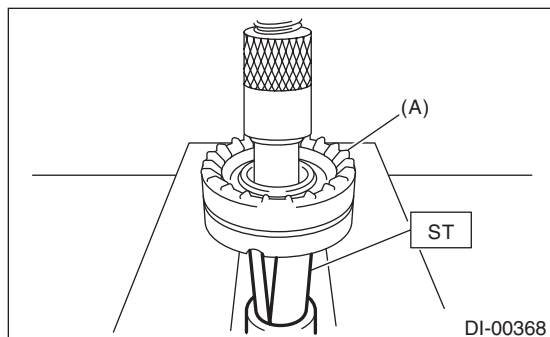
ST 18758AA000 PULLER

**NOTE:**

- Be sure to turn the bolt of puller manually.
- Set the puller so that its claws catch the groove of side retainer.



- (A) Groove
- (B) Claw

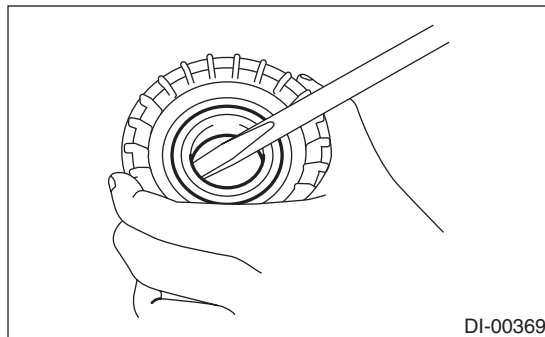


- (A) Side retainer

10) Remove the oil seal from side retainer RH and LH using screwdriver.

**NOTE:**

Perform this operation only when changing oil seal.



11) Extract the bearing cone with ST1, ST2 and ST3.

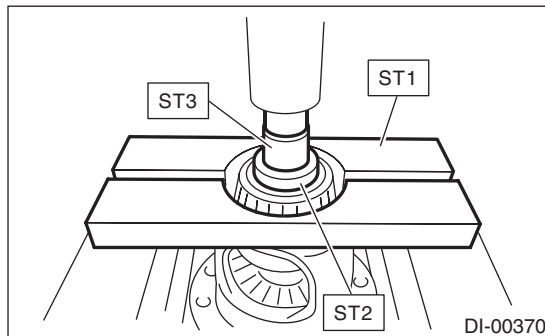
**NOTE:**

- Do not attempt to disassemble the parts unless necessary.
- Never mix up the RH and LH bearing races and cones.

ST1 498077000 REMOVER

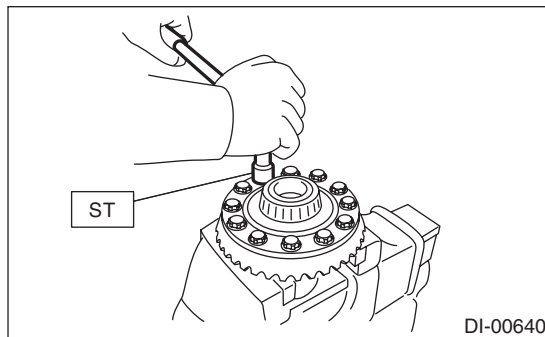
ST2 399520105 SEAT

ST3 899864100 REMOVER



12) Using the ST, loosen the hypoid driven gear bolt and remove the hypoid driven gear.

ST 18270KA020 SOCKET (E20)

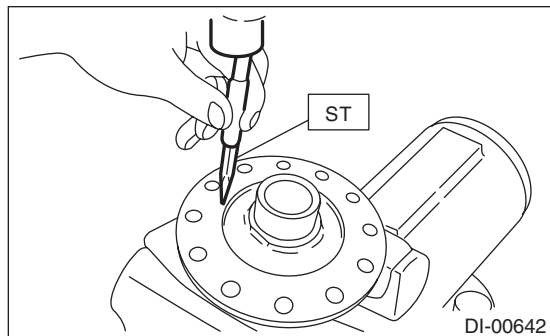


# Rear Differential (VA-type)

## DIFFERENTIALS

13) Remove the spring pin from hypoid driven gear side using ST.

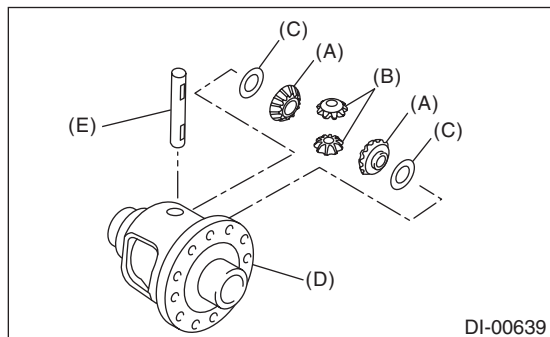
ST 899904100 STRAIGHT PIN REMOVER



14) Draw out the pinion mate shaft and remove pinion mate gears, side gears and thrust washers.

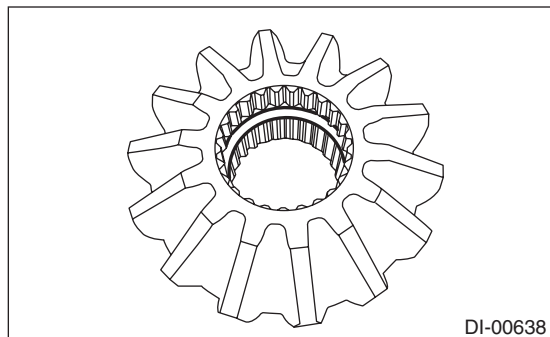
### NOTE:

The gears should be marked or kept separated right and left, and front and rear as well as thrust washers.



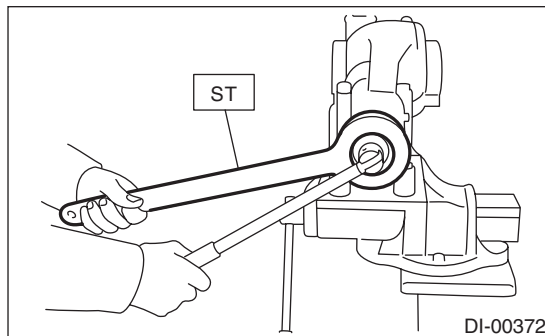
- (A) Side gear
- (B) Pinion mate gear
- (C) Thrust washer
- (D) Differential case
- (E) Pinion mate shaft

15) Remove the circlip from the side gear.



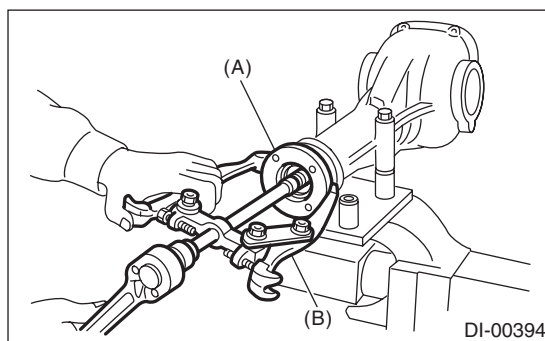
16) Remove the self-locking nut while holding the companion flange with ST.

ST 498427200 FLANGE WRENCH



17) Extract the companion flange with a puller.

ST 399703600 PULLER ASSY



- (A) Companion flange
- (B) Puller

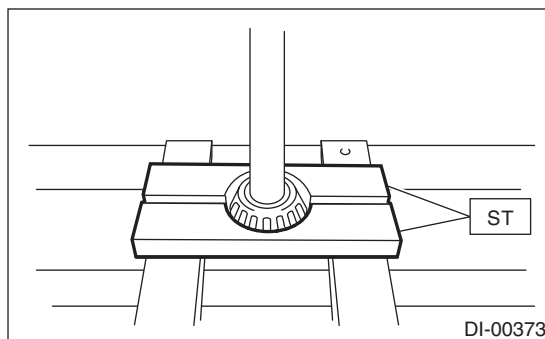
18) Removes the drive pinion shaft.

19) Remove the rear bearing cone from drive pinion by supporting the cone with ST.

### NOTE:

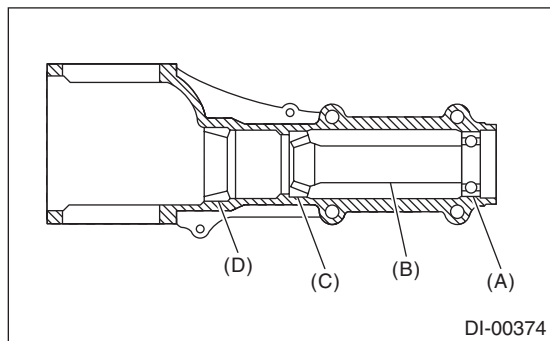
Place the replacer so that its center-recessed side faces the pinion gear.

ST 398517700 REPLACER



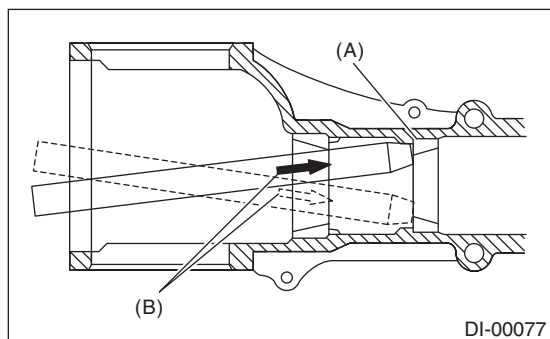
20) Remove the front oil seal from differential carrier using screwdriver.

21) Remove the pilot bearing, front bearing cone and spacer.



- (A) Pilot bearing
- (B) Spacer
- (C) Front bearing
- (D) Rear bearing cup

22) When replacing the bearings, use a brass bar to tap out the front bearing cup and rear bearing cup (in this order).

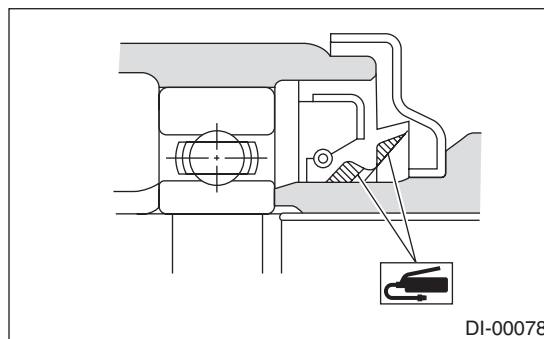


- (A) 2 cutout portions along diagonal lines
- (B) Tap alternately with brass bar.

## D: ASSEMBLY

### NOTE:

- Assemble in the reverse order of disassembly.
- Check and adjust each part during assembly.
- Use new gaskets and O-rings.
- Keep the shims and washers in order, so that they are not improperly installed.
- 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 RH and LH bearing races.
- Replace the oil seal and O-ring with a new part at every disassembly.
- Apply differential gear oil to the lips when installing the oil seal.
- Be careful not to mix up the differential oil seal RH and LH.



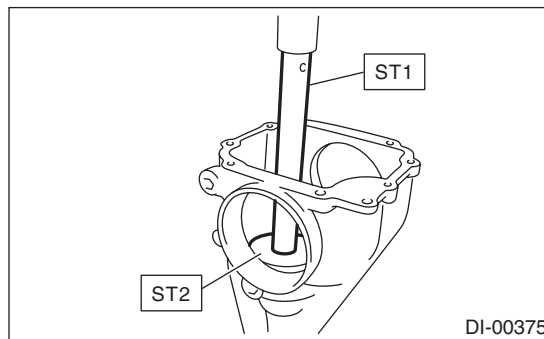
1) Adjusting preload for front and rear bearings.

### NOTE:

Adjust the bearing preload between front and rear bearings with spacer and washer. Pinion height adjusting washer is not affected by this adjustment. The adjustment must not be carried out with oil seal inserted.

(1) Install the rear bearing race into the differential carrier using ST1 and ST2.

- ST1 398477701 HANDLE
- ST2 398477703 DRIFT 2

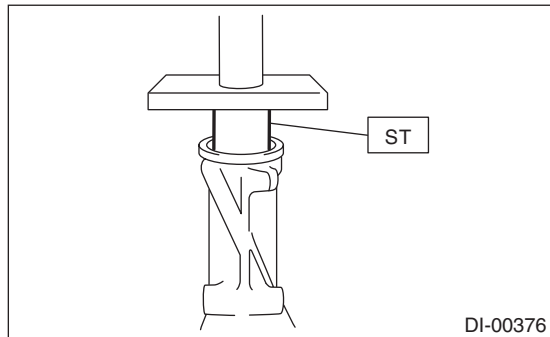


## Rear Differential (VA-type)

### DIFFERENTIALS

(2) Using the ST, install the front bearing race to the differential carrier.

ST 499277200 INSTALLER



(3) Insert the front bearing cone.

#### NOTE:

Use new front bearing cone.

(4) Measure and record the thickness of pinion adjust washer.

#### NOTE:

If tooth contact (drive pinion, hypoid driven gear) is normal in the inspection before disassembling, verify that the washer is not deformed, and then re-use the used washer.

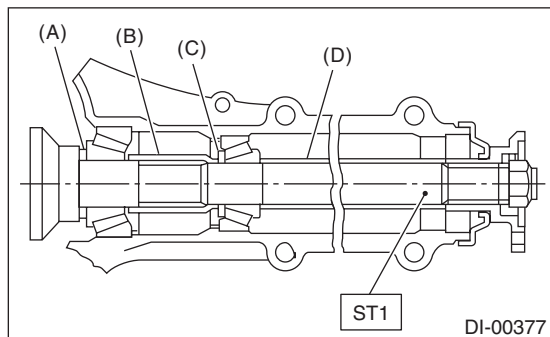
(5) Insert the ST1 into carrier with the pinion height adjusting washer and rear bearing cone fitted onto it.

#### NOTE:

Use new rear bearing cone.

(6) Install the preload adjusting spacer & washer, front bearing cone, spacer, companion flange, and washer & self-locking nut.

ST1 18678AA000 DUMMY SHAFT



- (A) Pinion height adjusting washer
- (B) Preload adjusting spacer
- (C) Preload adjusting washer
- (D) Spacer

(7) Turn the ST1 by hand to smooth the bearing, and tighten the self-locking nut while measuring the initial load or initial torque with a spring scale or torque wrench. Select the preload adjusting washer and spacer so that the specified preload is obtained when nut is tightened to the specified torque.

#### NOTE:

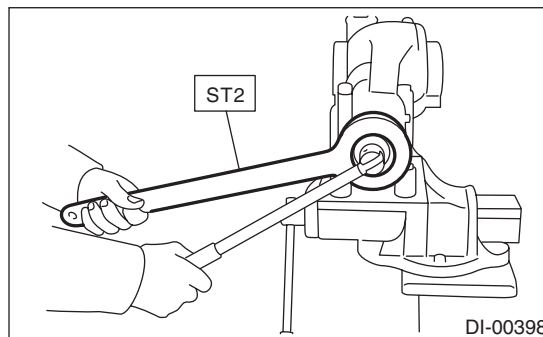
- Use a new self-locking nut.
- Be careful not to give excessive preload.
- When tightening the self-locking nut, lock companion flange with ST2 as shown in the figure.
- Measure the preload in direction of tangent to the flange.

ST1 18678AA000 DUMMY SHAFT

ST2 498427200 FLANGE WRENCH

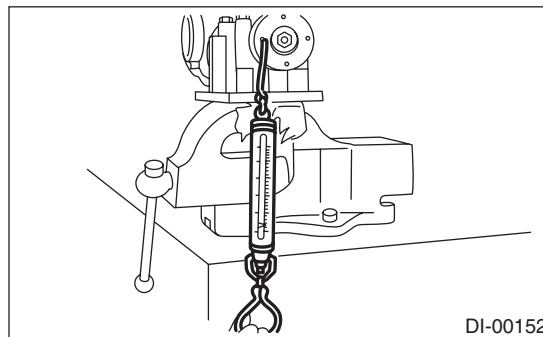
#### Tightening torque:

**191 N·m (19.5 kgf·m, 140.9 ft·lb)**



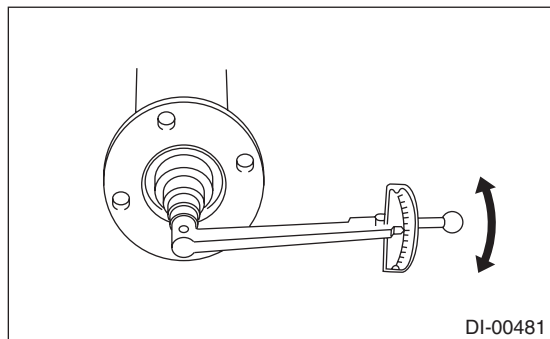
#### Initial load:

**12.7 — 32.2 N (1.3 — 3.3 kgf, 2.9 — 7.2 lb)**



**Initial torque:**

**0.48 — 1.22 N·m (0.05 — 0.12 kgf·m, 0.35 — 0.90 ft·lb)**



Preload adjusting washer	
Part No.	Thickness mm (in)
38336AA430	1.500 (0.0591)
38336AA440	1.513 (0.0596)
38336AA450	1.525 (0.0600)
38336AA460	1.538 (0.0606)
38336AA470	1.550 (0.0610)
38336AA480	1.563 (0.0615)
38336AA490	1.575 (0.0620)
38336AA500	1.588 (0.0625)
38336AA510	1.600 (0.0630)
38336AA520	1.613 (0.0635)
38336AA530	1.625 (0.0640)
38336AA540	1.638 (0.0645)
38336AA550	1.650 (0.0650)
38336AA560	1.663 (0.0655)
38336AA570	1.675 (0.0659)
38336AA580	1.688 (0.0665)
38336AA590	1.700 (0.0669)
38336AA600	1.713 (0.0674)
38336AA610	1.725 (0.0679)
38336AA620	1.738 (0.0684)
38336AA630	1.750 (0.0689)
38336AA640	1.763 (0.0694)
38336AA650	1.775 (0.0699)

Preload adjusting spacer	
Part No.	Length mm (in)
31454AA250	51.05 (2.010)
31454AA260	51.25 (2.018)
31454AA270	51.35 (2.022)
31454AA280	51.45 (2.026)
31454AA290	51.55 (2.030)
31454AA300	51.65 (2.033)
31454AA310	51.75 (2.037)
31454AA320	51.85 (2.041)
31454AA330	52.05 (2.049)

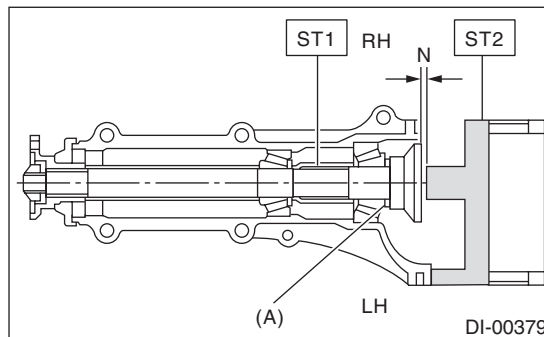
**2) Adjusting drive pinion height:**

Adjust the drive pinion height with washer installed between the rear bearing cone and the back of pinion gear.

(1) Attach the ST2.

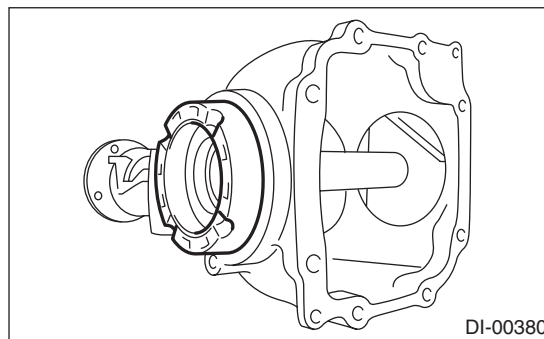
ST1 18678AA000 DUMMY SHAFT

ST2 18831AA010 DIFFERENTIAL CARRIER GAUGE



(A) Pinion height adjusting washer

(2) Install the side retainer LH to the left side of the differential carrier in reverse direction.



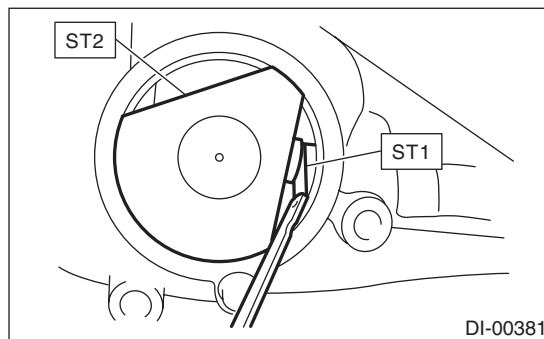
(3) Measure the clearance "N" between the end of ST2 and the end surface of ST1 by using a thickness gauge.

**NOTE:**

Make sure there is no clearance between the case and ST2.

ST1 18678AA000 DUMMY SHAFT

ST2 18831AA010 DIFFERENTIAL CARRIER GAUGE



## Rear Differential (VA-type)

### DIFFERENTIALS

(4) Obtain the thickness of pinion height adjusting washer to be inserted from the following formula, and replace the temporarily installed washer with this one.

#### NOTE:

Adjust it using the 0 — 3 washers.

$$T = T_o + N - 0.05 \text{ mm (0.0020 in)}$$

T	Thickness of pinion height adjusting washer mm (in)	
T <sub>o</sub>	Thickness of washer temporarily inserted mm (in)	
N	Clearance of thickness gauge mm (in)	
Memo:		

(Example of calculation)

$$T_o = 0.15 \text{ mm (0.0059 in)}$$

$$N = 0.1 \text{ mm (0.0039 in)}$$

$$T = 0.15 \text{ mm (0.0059 in)} + 0.1 \text{ mm (0.0039 in)} - 0.05 \text{ mm (0.0020 in)} = 0.2 \text{ mm (0.0079 in)}$$

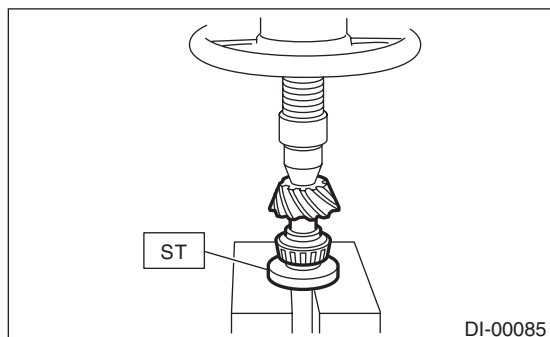
Result: Thickness = 0.2 mm (0.0079 in)

Therefore use part number 32295AA370.

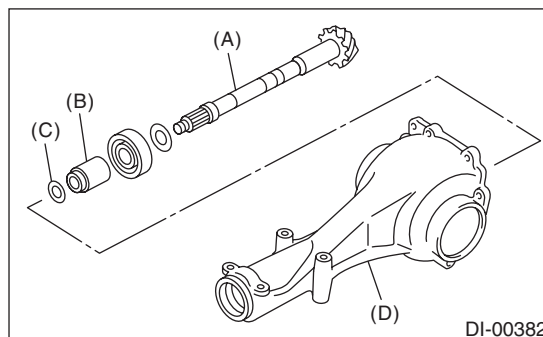
Pinion height adjusting washer	
Part No.	Thickness mm (in)
32295AA350	0.150 (0.0059)
32295AA360	0.175 (0.0069)
32295AA370	0.200 (0.0079)
32295AA380	0.225 (0.0089)
32295AA390	0.250 (0.0098)
32295AA400	0.275 (0.0108)

3) Install the selected pinion height adjusting washer on drive pinion, and press the rear bearing cone into position with ST.

ST 398177700 INSTALLER



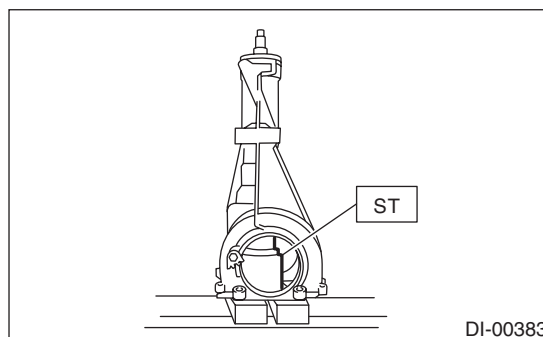
4) Insert the drive pinion into the differential carrier, and install the preselected bearing preload adjusting spacer and washer.



- (A) Drive pinion
- (B) Bearing preload adjusting spacer
- (C) Bearing preload adjusting washer
- (D) Differential carrier

5) Set ST and differential carrier to the press and install the front bearing cone.

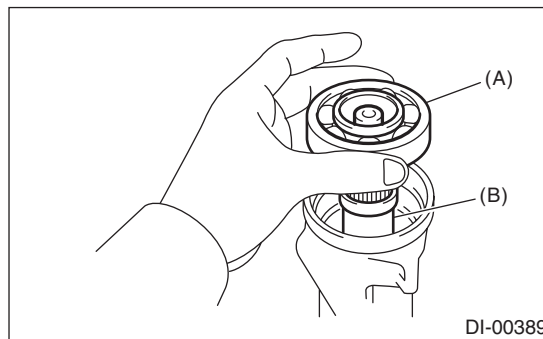
ST 399780104 WEIGHT



#### NOTE:

Set the carrier to the press until the companion flange is installed.

6) Insert the spacer, then install the pilot bearing.



- (A) Pilot bearing
- (B) Spacer

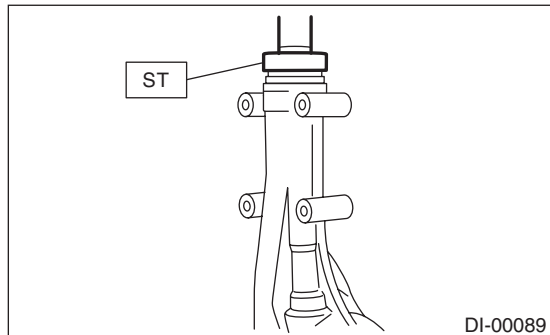


7) Fit a new oil seal with ST.

NOTE:

- Press-fit until the oil seal end comes 1 mm (0.04 in) inward from end of carrier.
- Apply differential gear oil to the oil seal lips.

ST 499277200 INSTALLER

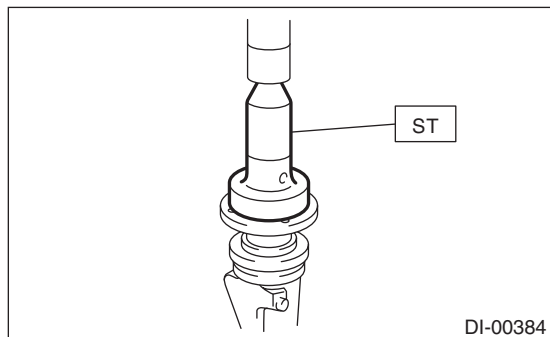


8) Press-fit the companion flange with ST.

NOTE:

Be careful not to damage the bearing.

ST 899874100 INSTALLER



9) Apply seal material to the drive pinion shaft screw threads and on the new self-locking nut seat.

**Seal material:**

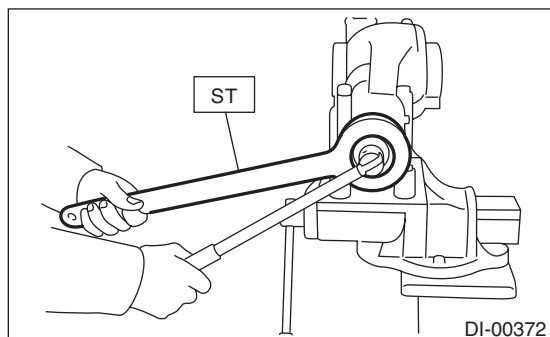
**THREE BOND 1324 (Part No. 004403042) or equivalent**

10) Attach the nut and use the ST to fix the companion flange in place, then tighten.

ST 498427200 FLANGE WRENCH

**Tightening torque:**

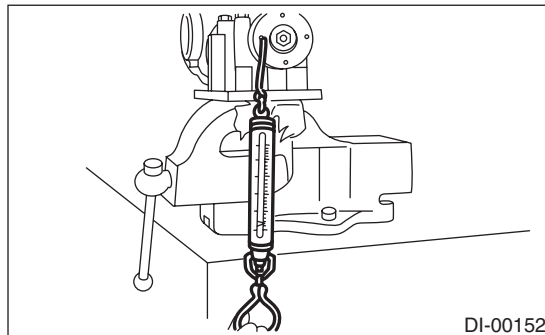
**191 N·m (19.5 kgf·m, 140.9 ft·lb)**



11) Measure the initial torque and initial load.

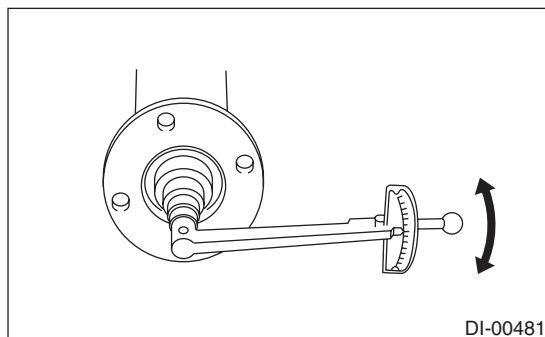
**Initial load:**

**12.7 — 32.2 N (1.3 — 3.3 kgf, 2.9 — 7.2 lb)**



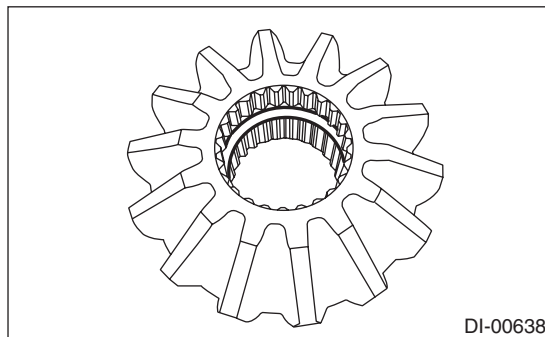
**Initial torque:**

**0.48 — 1.22 N·m (0.05 — 0.12 kgf·m, 0.35 — 0.90 ft·lb)**



12) Assembling differential case

(1) Attach the circlip to the side gear.



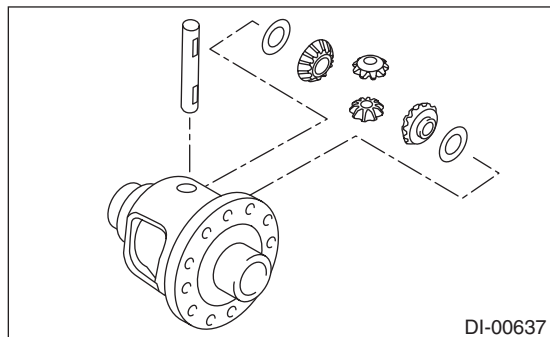
## Rear Differential (VA-type)

### DIFFERENTIALS

(2) Install the side gears and pinion mate gears, with their thrust washers and pinion mate shaft, into the differential case.

#### NOTE:

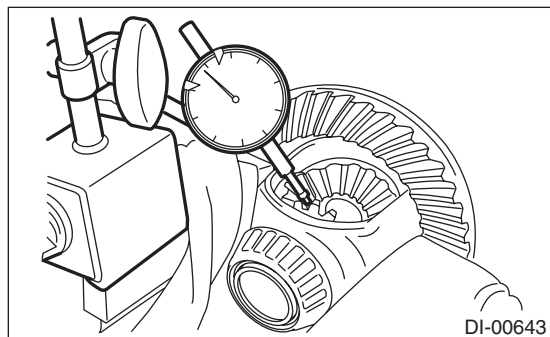
- Apply gear oil on both sides of the washer and on the side gear shaft before installing.
- Install the pinion mate shaft to the differential case by aligning the spring pin holes.



(3) Measure the side gear backlash.

#### Side gear backlash:

**0.13 — 0.18 mm (0.005 — 0.007 in)**



(4) Adjust the side gear backlash by selecting side gear thrust washer.

Side gear thrust washer	
Part No.	Thickness mm (in)
803138021	0.950 (0.0374)
803138022	1.000 (0.0394)
803135023	1.050 (0.0413)

(5) Check the condition of rotation after applying oil to the gear tooth surfaces and thrust washer surfaces.

(6) Attach the spring pin to the differential case.

#### NOTE:

Use new spring pin.

13) Install the hypoid driven gear to differential case.

#### NOTE:

- Set a cushioning such as wooden block, aluminum plate or shop cloth between vise and differential case if the side gear comes into contact with vise.
- Before installing bolts, apply seal material to bolt threads.

#### Seal material:

**THREE BOND 1324 (Part No. 004403042) or equivalent**

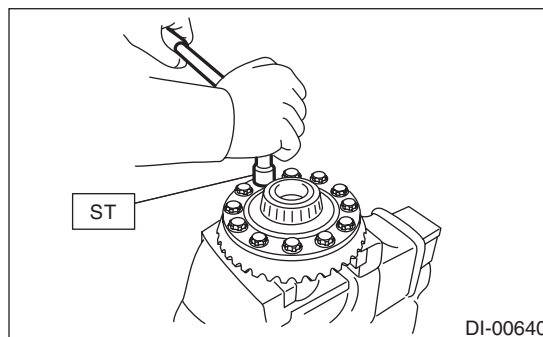
- Tighten opposing bolts in order.

(1) Tighten the hypoid driven gear mounting bolts to the specified torque using the ST.

ST 18270KA020 SOCKET (E20)

#### Tightening torque:

**20 N·m (2.0 kgf·m, 14.8 ft·lb)**

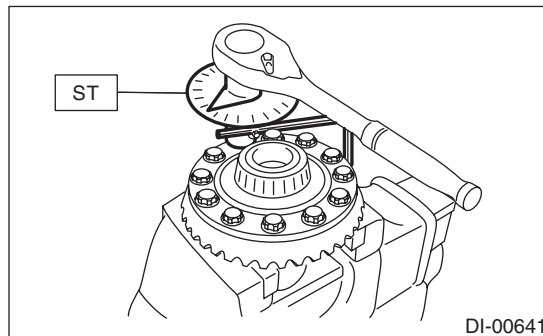


(2) While checking the tightening angle with the ST, further tighten the hypoid driven gear mounting bolts.

#### Tightening angle:

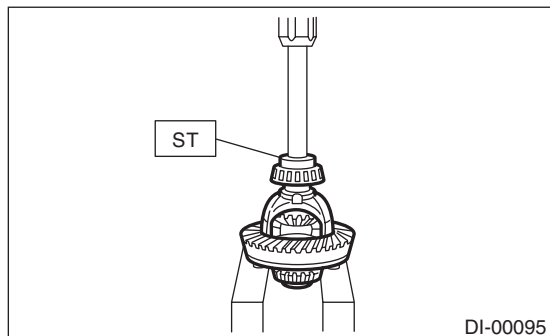
**33° ± 2°**

ST 18554AA000 ANGLE GAUGE



14) Press the side bearing into differential case using ST.

ST 398487700 DRIFT



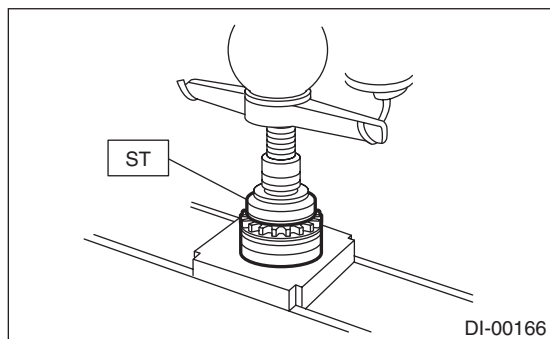
15) Assemble the side retainer.

(1) Install the new oil seal into side retainer RH and LH.

**CAUTION:**

**Make sure that the oil seals and side retainers are properly assembled.**

ST 498447100 INSTALLER

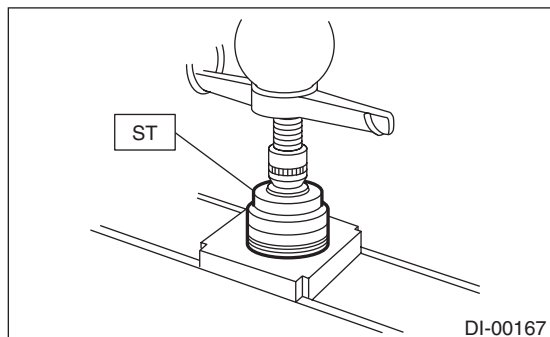


(2) Install the bearing race into side retainer RH and LH.

ST 398417700 DRIFT

**CAUTION:**

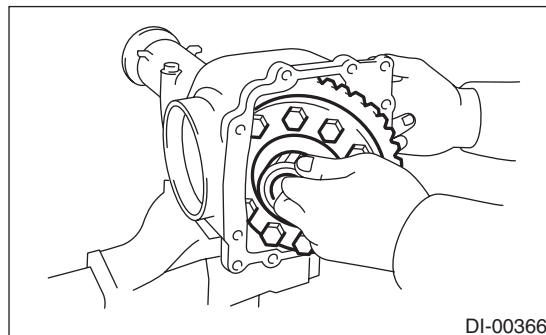
**Make sure that the bearing outer races and cones are properly assembled.**



(3) Install the differential assembly into differential carrier in the reverse order of disassembly.

**NOTE:**

Be careful not to hit the teeth of hypoid driven gear against the case.

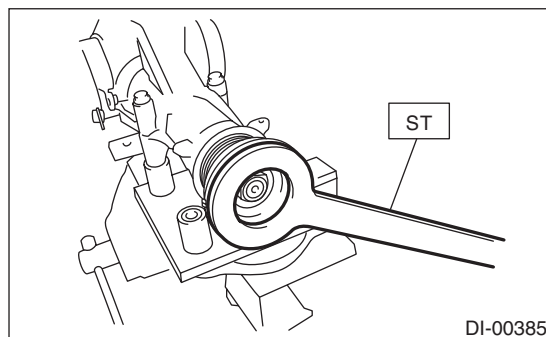


(4) Temporarily tighten the side retainers RH and LH in differential carrier to install.

16) Perform the backlash adjustment between the hypoid driven gear and drive pinion, and preload adjustment of differential side bearing.

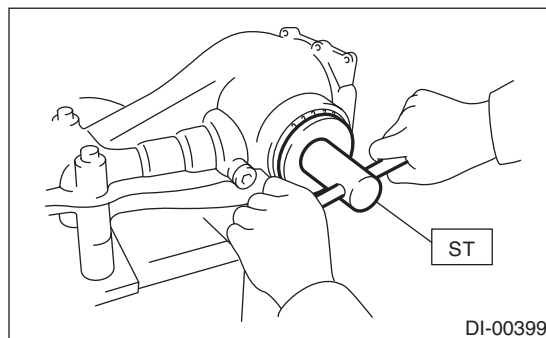
(1) Turn the drive pinion with ST for better fitting of differential side bearing.

ST 498427200 FLANGE WRENCH



(2) Using the ST, tighten the side retainer RH, and then tighten the side retainer LH until there is no backlash.

ST 18630AA010 WRENCH COMPL RETAINER



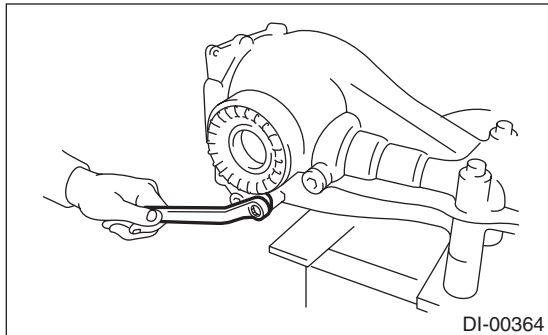
## Rear Differential (VA-type)

### DIFFERENTIALS

- (3) Loosen the side retainer LH by approx. 1 and 1/2 teeth, and tighten the side retainer RH by approx. 2 teeth [amount that the side retainer LH is turned back (1 and 1/2) + approx. 0.5 teeth]. Difference between [amount that the side retainer LH is turned back (approx. 1 and 1/2 teeth)] and [amount that the side retainer RH is tightened (approx. 2 teeth)] gives preload.
- (4) Temporarily tighten the lock plate.

#### NOTE:

Turn over the lock plate to shift the holder by 1/2 tooth.



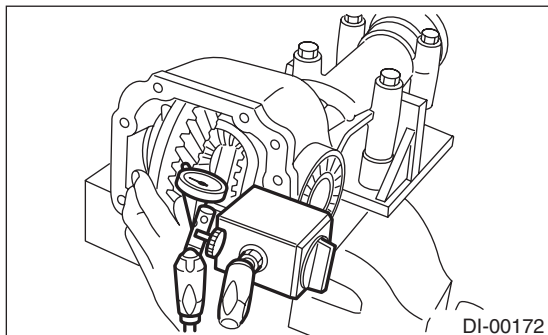
- (5) Measure the hypoid driven gear-to-drive pinion backlash. Set the magnet base on differential carrier. Align the contact point of dial gauge with tooth face of hypoid driven gear, and move hypoid driven gear while holding drive pinion still. Read the value indicated on dial gauge.

#### NOTE:

If measured value of backlash is not within the specified range, repeat the procedures for pinion driven gear set backlash adjustment and the differential side bearing preload adjustment.

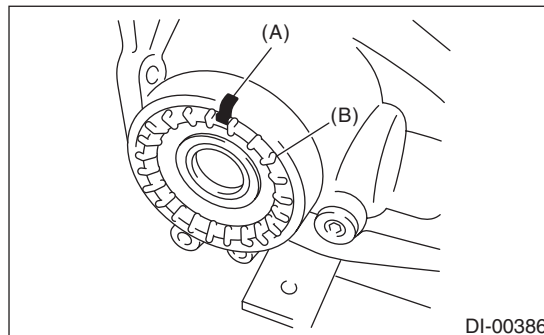
#### **Backlash:**

**0.10 — 0.15 mm (0.004 — 0.006 in)**



- 17) Put alignment marks on both the differential carrier and side retainer. Remove the side retainer side at a time.

Replace them in the original position after inserting an O-ring and applying differential gear oil to the threaded portion.



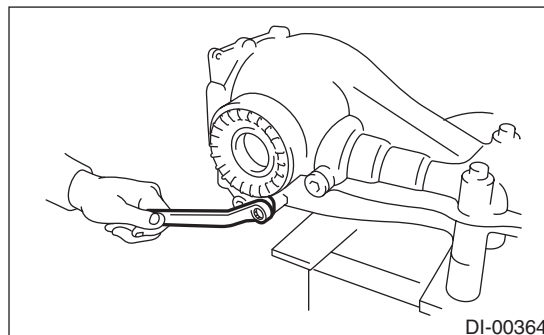
(A) Alignment mark

(B) Side retainer

- 18) Tighten the bolt of lock plate to specified torque.

#### **Tightening torque:**

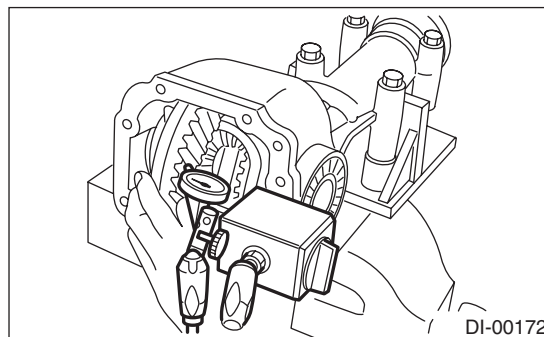
**25 N·m (2.5 kgf·m, 18.4 ft·lb)**



- 19) Recheck the hypoid driven gear to pinion backlash.

#### **Backlash:**

**0.10 — 0.15 mm (0.004 — 0.006 in)**



- 20) Checking and adjusting the tooth contact of hypoid driven gear

(1) Apply lead-free red dye evenly on the both sides of three to four teeth of the hypoid driven gear. Check the contact pattern after rotating the hypoid driven gear several revolutions back and forth until a definite contact pattern appears on the hypoid driven gear.

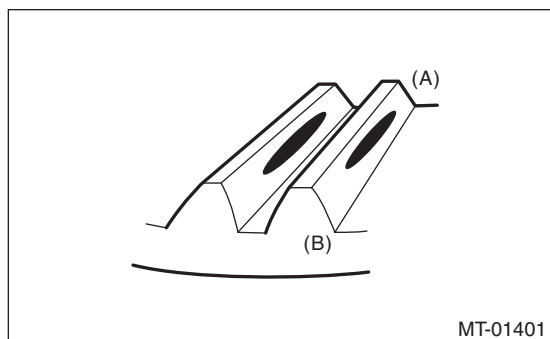
(2) When the contact pattern is not correct, re-adjust.

**NOTE:**

Be sure to wipe off the lead-free red dye completely after the adjustment is completed.

- Correct tooth contact

**Check item: Tooth contact pattern is slightly shifted toward toe side under no-load rotation. (When driving, it moves towards the heel side.)**

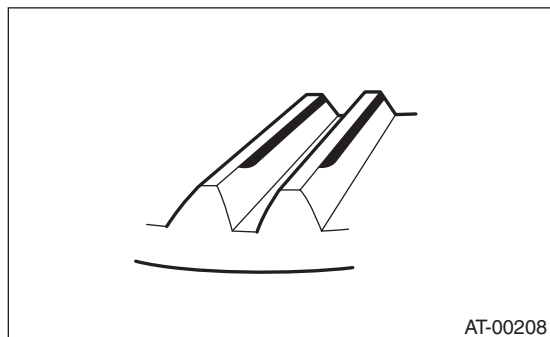


- (A) Toe side
- (B) Heel side

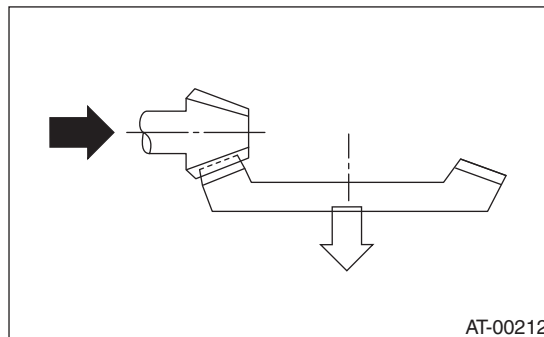
- Face contact

**Check item: Backlash is too large.**

Contact pattern



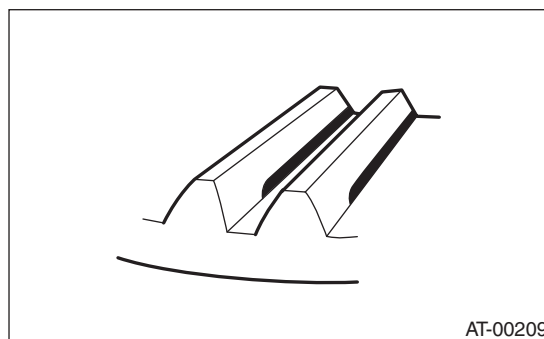
Corrective action: Increase thickness of pinion height adjusting washer according to the procedure for bringing drive pinion close to hypoid driven gear side.



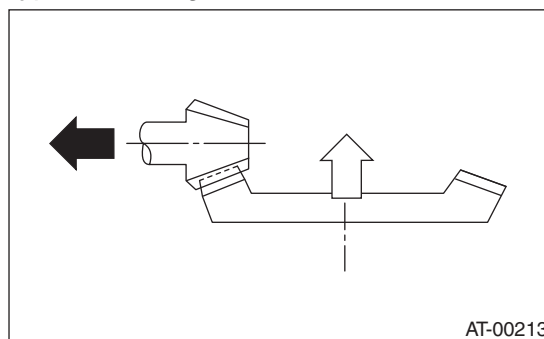
- Flank contact

**Check item: Backlash is too small.**

Contact pattern



Corrective action: Reduce the thickness of pinion height adjusting washer according to the procedure for bringing drive pinion away from hypoid driven gear.



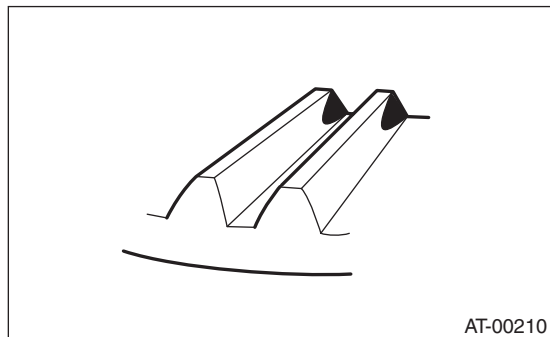
# Rear Differential (VA-type)

## DIFFERENTIALS

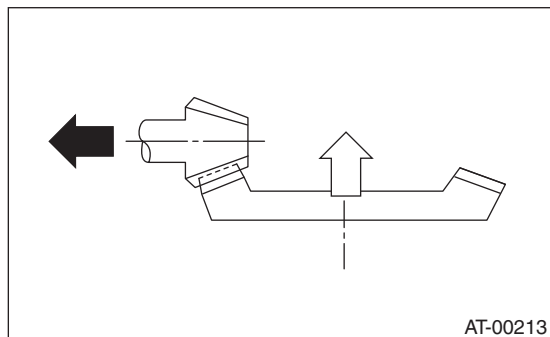
- Toe contact (inside contact)

**Check item: Teeth contact area is too small.**

Contact pattern



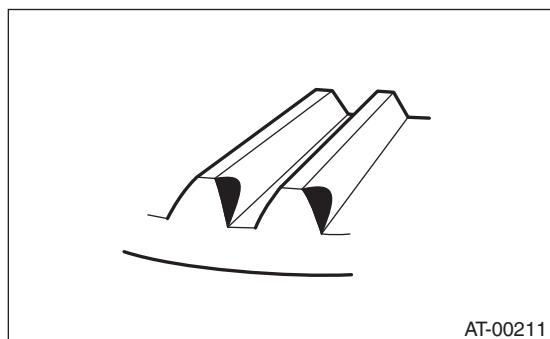
Corrective action: Reduce the thickness of pinion height adjusting washer according to the procedure for bringing drive pinion away from hypoid driven gear.



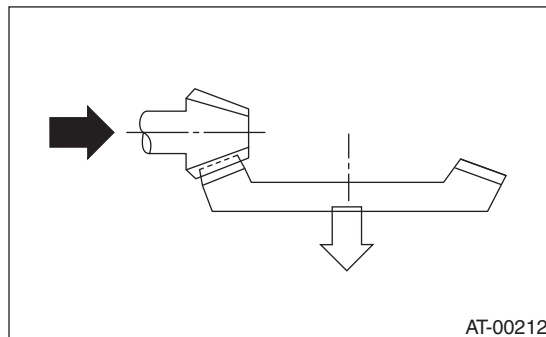
- Heel contact (outside end contact)

**Check item: Teeth contact area is too small.**

Contact pattern



Corrective action: Increase thickness of pinion height adjusting washer according to the procedure for bringing drive pinion close to hypoid driven gear side.

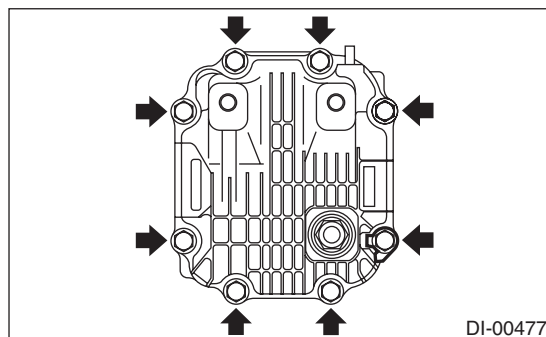


21) If correct tooth contact is not obtained, readjust the drive pinion height and the differential side bearing preload (already mentioned) and the hypoid gear backlash.

22) Install the new gasket, rear cover and ground stay to the differential carrier, and tighten the bolts to the specified torque.

**Tightening torque:**

**34 N·m (3.5 kgf-m, 25.1 ft-lb)**

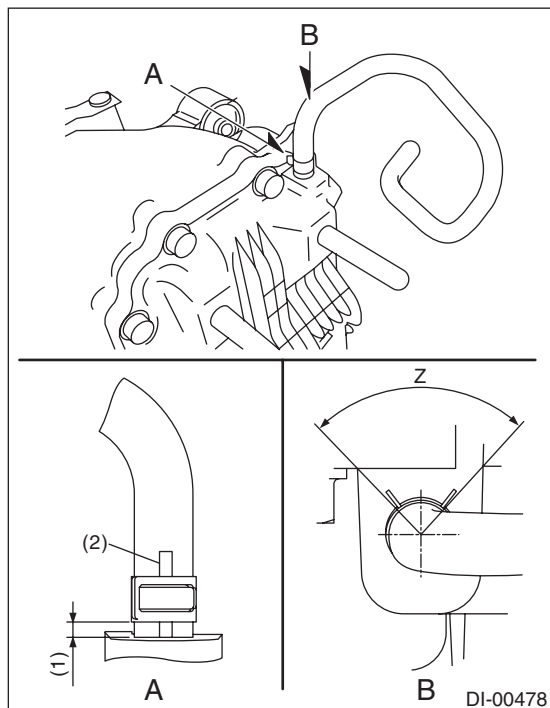


23) Using new gaskets, install the rear differential oil temperature switch.

**Tightening torque:**

**60 N·m (6.1 kgf-m, 44.3 ft-lb)**

24) Affix with the attachment clip so that the white marking of the hose is within the range of Z (87°).



- (1) 0 — 1 mm (0 — 0.04 in)
- (2) Marking

25) Install a new gasket and a new oil drain plug.

**Tightening torque:**

**50 N·m (5.1 kgf·m, 36.9 ft·lb)**

26) Install the filler plug.

**E: INSPECTION**

Wash all the disassembled parts clean, and examine them for wear, damage or other defects. Repair or replace the defective parts as necessary.

- 1) Hypoid driven gear and drive pinion
  - If there is evidently an abnormal tooth contact, find out the cause and adjust until the teeth contact correctly. Replace the gear if there is an excessive worn or an incapable adjustment.
  - If crack, cutout or seizure is found, replace the parts as a set. Slight damage of some teeth can be corrected by oil stone or the like.
- 2) Side gear and pinion mate gear
  - Replace if cracks, scoring or other defects are evident on the tooth surface.
  - Replace if thrust washer contact surface is worn or seized. Slight damages of the surface can be corrected by oil stones or equivalent.
- 3) Thrust washer of side gear and pinion mate gear
 

Replace if seizure, cracking, abnormal wear or other defect is evident.

- 4) Bearing
 

Replace if seizure, peeling, wear, rust, dragging during rotation, noise 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 sliding surfaces are abnormally worn, seized or cracked.
- 8) Companion flange
 

Replace if the oil seal lip contact surface shows cracking.

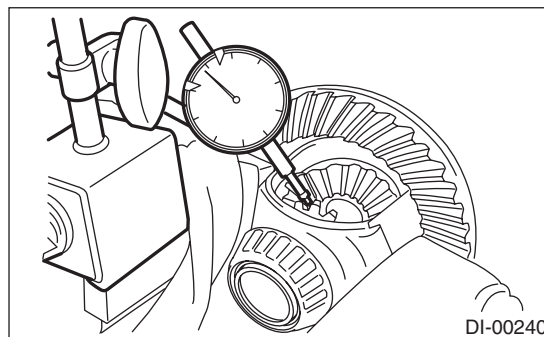
**1. SIDE GEAR BACKLASH**

Using a dial gauge, check the backlash of side gear.

**Side gear backlash:**

**0.13 — 0.18 mm (0.005 — 0.007 in)**

If the side gear backlash is not within the specification, select the side gear thrust washer and adjust the side gear backlash as specified.



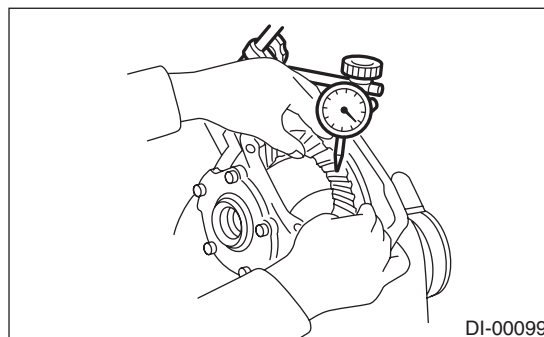
**2. HYPOID DRIVEN GEAR BACKLASH**

Using a dial gauge, check the backlash of hypoid driven gear.

**Hypoid driven gear backlash:**

**0.10 — 0.15 mm (0.004 — 0.006 in)**

If the hypoid driven gear backlash is not within the specification, adjust the side bearing preload or repair if necessary.



# Rear Differential (VA-type)

## DIFFERENTIALS

### 3. TOOTH CONTACT BETWEEN HYPOID DRIVEN GEAR AND DRIVE PINION

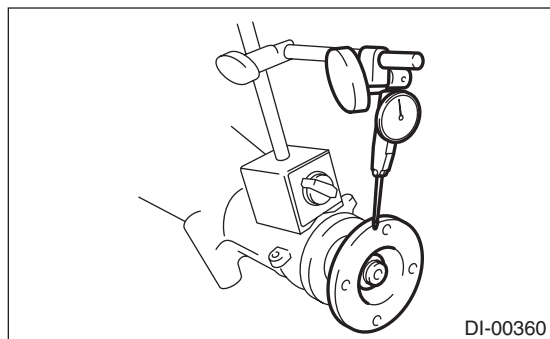
Inspect the tooth contact between the hypoid driven gear and the drive pinion. <Ref. to DI-25, ASSEMBLY, Rear Differential (VA-type).>

### 4. COMPANION FLANGE

- 1) If rust or dirt is attached to the companion flange, remove them.
- 2) Set a dial gauge at a companion flange surface (mating surface of propeller shaft and companion flange), and then measure the companion flange runout.

**Limit of runout:**

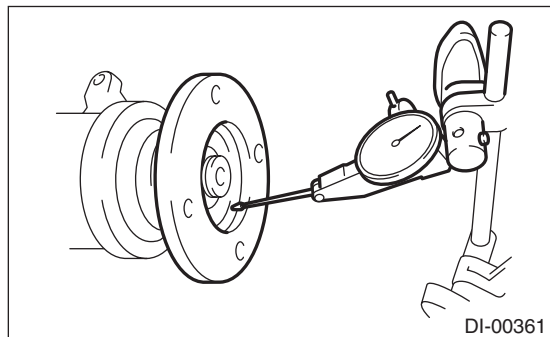
**0.08 mm (0.003 in)**



- 3) Set the gauge inside of the companion flange, and measure the runout.

**Limit of runout:**

**0.08 mm (0.003 in)**

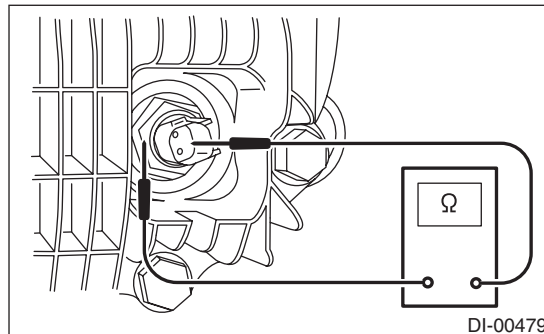


- 4) If either runout exceeds the limit, move the phase of companion flange and drive pinion 90° each, and find the point where the runout will be within the limit.
- 5) If the runout exceeds the limit when changing the phase, replace the companion flange and recheck the runout.
- 6) If the runout exceeds the limit after replacing the companion flange, the drive pinion may be assembled incorrectly or bearing is faulty.

### 5. REAR DIFFERENTIAL OIL TEMPERATURE SWITCH

Inspect the continuity of the rear differential oil temperature switch.

Specified resistance	Criteria
Less than 1 $\Omega$	Normal
1 M $\Omega$ or more	Replacement



### F: ADJUSTMENT

#### 1. SIDE GEAR BACKLASH

Adjust the side gear backlash. <Ref. to DI-25, ASSEMBLY, Rear Differential (VA-type).>

#### 2. HYPOID DRIVEN GEAR BACKLASH

Adjust hypoid driven gear backlash. <Ref. to DI-25, ASSEMBLY, Rear Differential (VA-type).>

#### 3. TOOTH CONTACT BETWEEN HYPOID DRIVEN GEAR AND DRIVE PINION

Adjust the tooth contact between hypoid driven gear and drive pinion gear. <Ref. to DI-25, ASSEMBLY, Rear Differential (VA-type).>



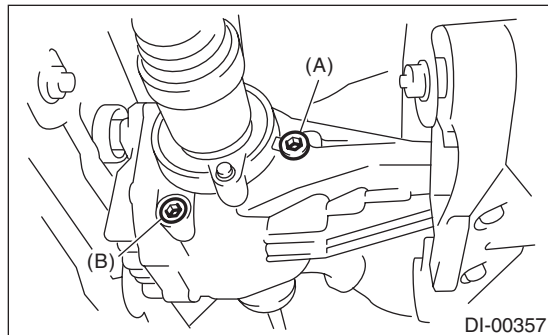
## 5. Rear Differential Front Oil Seal

### A: INSPECTION

Make sure that there is no leakage from front oil seal portion. If there is any leakage replace the oil seal and inspect the propeller shaft.

### B: REPLACEMENT

- 1) Position the select lever to neutral.
- 2) Release the parking brake.
- 3) Lift up the vehicle.
- 4) Remove the oil drain plug, and drain gear oil.



- (A) Filler plug  
(B) Oil drain plug

- 5) Install the oil drain plug.

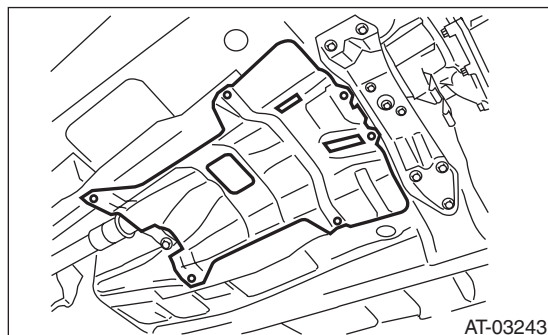
#### NOTE:

Use a new gasket.

#### Tightening torque:

**50 N·m (5.1 kgf-m, 36.9 ft-lb)**

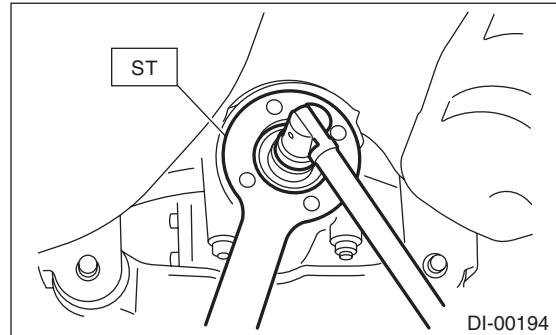
- 6) Remove the rear exhaust pipe and muffler. <Ref. to EX(H6DO)-7, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H6DO)-9, REMOVAL, Muffler.>
- 7) Remove the heat shield cover.



- 8) Remove the propeller shaft. <Ref. to DS-10, REMOVAL, Propeller Shaft.>

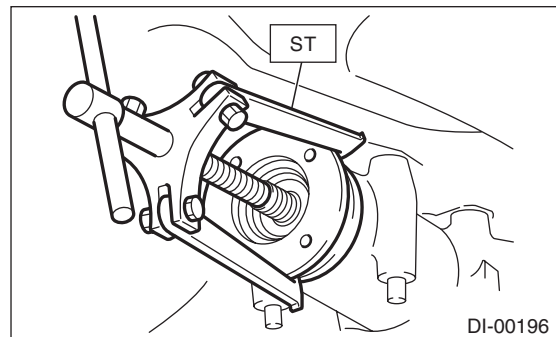
- 9) Remove the self-locking nut while holding the companion flange with ST.

ST 498427200 FLANGE WRENCH



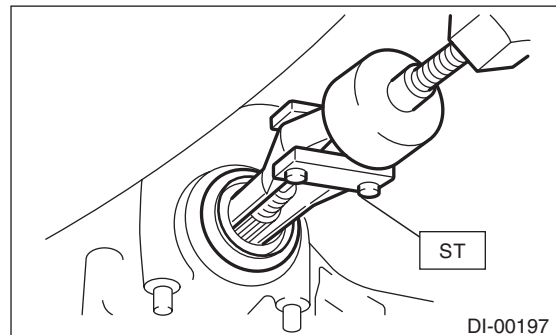
- 10) Extract the companion flange using ST.

ST 399703600 PULLER ASSY



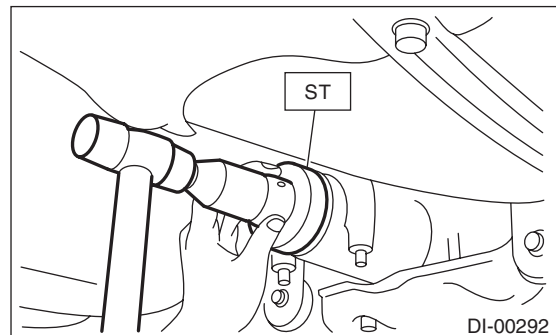
- 11) Remove the oil seal using ST or screwdriver.

ST 398527700 PULLER ASSY



- 12) Install a new oil seal with ST.

ST 498447120 INSTALLER



- 13) Install the companion flange.

#### NOTE:

Use a plastic hammer to install companion flange.

## Rear Differential Front Oil Seal

### DIFFERENTIALS

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14) Apply seal material to the drive pinion shaft screw threads and the self-locking nut seat surface.

**Seal material:**

**THREE BOND 1324 (Part No. 004403042) or equivalent**

15) Tighten the self-locking nut within the specified torque range so that the rotating resistance of companion flange becomes the same as that of before oil seal replacement.

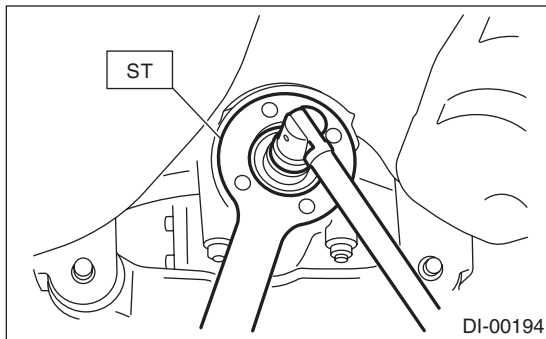
ST 498427200 FLANGE WRENCH

**NOTE:**

Use a new self-locking nut.

**Tightening torque:**

**191 N·m (19.5 kgf·m, 140.9 ft·lb)**



16) Hereafter, reassemble in the reverse order of disassembly.

17) After installing, fill the differential gear oil up to the bottom of the filler plug hole. <Ref. to DI-17, Differential Gear Oil.>

## 6. Rear Differential Side Oil Seal

### A: INSPECTION

Make sure that there is no leakage from side oil seal. If there is any leakage, replace the oil seal.

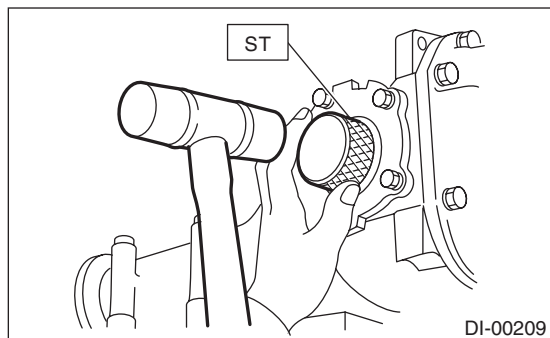
### B: REPLACEMENT

1) Remove the rear differential. <Ref. to DI-19, REMOVAL, Rear Differential (VA-type).>

2) Remove the rear differential side oil seal using a screwdriver wrapped with vinyl tape to prevent the side retainer from scratches.

3) Using the ST, install the oil seal to the side retainer.

ST 398437700 DRIFT

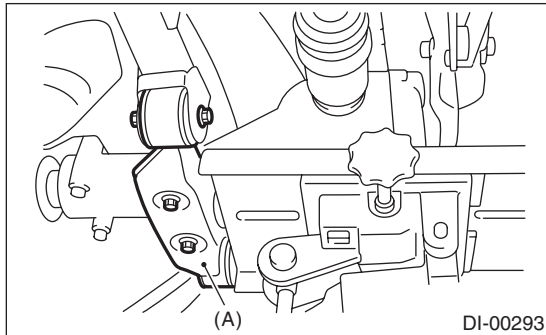


4) Install the rear differential. <Ref. to DI-20, INSTALLATION, Rear Differential (VA-type).>

### 7. Rear Differential Front Member

#### A: REMOVAL

- 1) Disconnect the ground cable from the battery.
- 2) Lift up the vehicle.
- 3) Support the rear differential using transmission jack, and then remove the rear differential front member.



(A) Rear differential front member

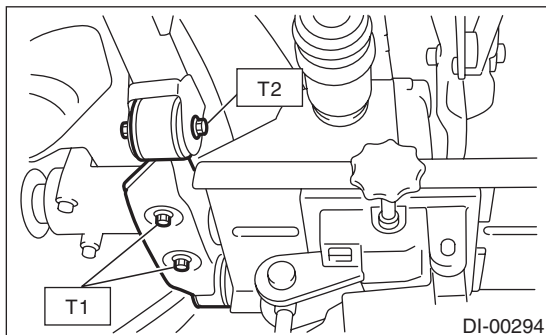
#### B: INSTALLATION

Using new self-locking nuts, install the rear differential front member.

##### *Tightening torque:*

**T1: 50 N·m (5.1 kgf-m, 36.9 ft-lb)**

**T2: 110 N·m (11.2 kgf-m, 81.1 ft-lb)**



#### C: INSPECTION

- 1) Check the rear differential front member for damage, bend and corrosion.  
If damage, bend or corrosion is excessive, replace the rear differential front member.
- 2) Check the bushings of rear differential member for cracking, hardening and damage.  
If cracking, hardening or damage is excessive, replace rear differential front member.

## 8. Rear Differential Mount Bushing

### A: INSPECTION

Check the rear differential mount bushing for cracks, hardening or damage. If cracking, hardening or damage is excessive, replace rear differential mount bushing.

### B: REPLACEMENT

1) Remove the rear differential. <Ref. to DI-19, REMOVAL, Rear Differential (VA-type).>

2) Remove the rear differential mount bushing using ST1 — 7.

(1) From the SPECIAL TOOL ASSY (41399FG000), select the tool to be used for removal.

(2) Apply grease to the threaded portion on the shaft of ST1 and the bearing of ST4.

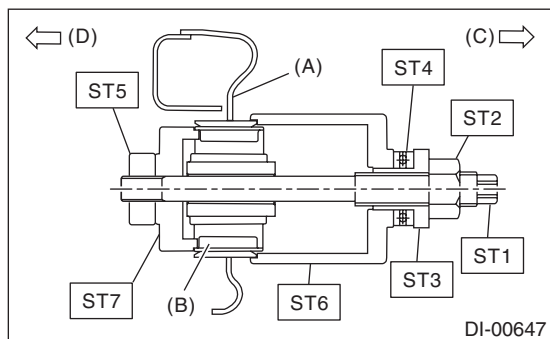
(3) Set the STs as shown in the illustration and tighten the ring of ST5 by hand until it stops.

(4) Secure the edge of the shaft of ST1 with a spanner, and tighten the nut of ST2 until the rear differential mount bushing comes out of the sub frame.

#### CAUTION:

**Turning the shaft of ST1 may loosen the ST5 and damage a ST. Be sure to secure the ST1.**

- ST1 41399FG090 SPECIAL TOOL SHAFT
- ST2 41399FG070 SPECIAL TOOL NUT
- ST3 41399FG050 SPECIAL TOOL SLEEVE
- ST4 41399FG080 SPECIAL TOOL BEARING
- ST5 41399FG060 SPECIAL TOOL RING
- ST6 41399FG010 SPECIAL TOOL A
- ST7 41399FG030 SPECIAL TOOL C



- (A) Sub frame
- (B) Rear differential mount bushing
- (C) Front
- (D) Rear

3) Install the rear differential mount bushing using ST1 — 7.

(1) From the SPECIAL TOOL ASSY (41399FG000), select the tool to be used for installation.

(2) Set the STs as shown in the illustration and tighten the ring of ST5 by hand until it stops.

#### CAUTION:

**Be careful not to install the ST7 in a wrong direction.**

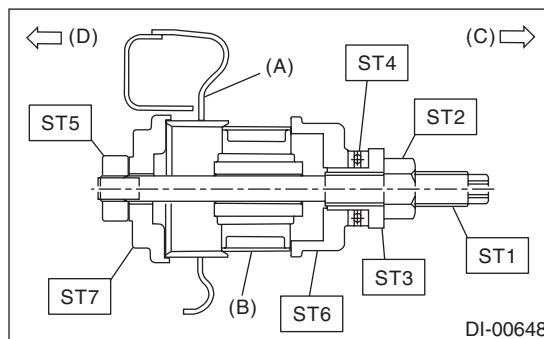
(3) Secure the edge of the shaft of ST1 with a spanner, tighten the nut of ST2, and press-fit the ST6 until it contacts the end face of sub frame.

#### CAUTION:

**Turning the shaft of ST1 may loosen the ST5 and damage a ST. Be sure to secure the ST1.**

**Be careful not to damage a ST by tightening the nut of ST2 further after the ST6 contacts the end surface of sub frame.**

- ST1 41399FG090 SPECIAL TOOL SHAFT
- ST2 41399FG070 SPECIAL TOOL NUT
- ST3 41399FG050 SPECIAL TOOL SLEEVE
- ST4 41399FG080 SPECIAL TOOL BEARING
- ST5 41399FG060 SPECIAL TOOL RING
- ST6 41399FG020 SPECIAL TOOL B
- ST7 41399FG040 SPECIAL TOOL D



- (A) Sub frame
- (B) Rear differential mount bushing
- (C) Front
- (D) Rear

4) Install the rear differential. <Ref. to DI-20, INSTALLATION, Rear Differential (VA-type).>

# General Diagnostic Table

DIFFERENTIALS

## 9. General Diagnostic Table

### A: INSPECTION

Symptom or trouble	Possible cause	Remedy
<b>1. Oil leakage</b>	(1) Worn, scratched, or incorrectly seated front or side oil seal. Scored, battered or excessively worn sliding surface of companion flange.	Repair or replace.
	(2) Clogged or damaged air breather.	Clean, repair or replace.
	(3) Loose bolts on differential spindle or side retainer, or incorrectly fitted O-ring.	Tighten the bolts to specified torque. Replace the O-ring.
	(4) Loose rear cover attaching bolts or damaged gasket.	Tighten the bolts to specified torque. Replace gasket and apply liquid gasket.
	(5) Loose oil filler or oil drain plug.	Retighten and apply liquid gasket.
	(6) Wear, damage or incorrect fitting of spindle, side retainer or oil seal.	Repair or replace.
<b>2. Seizure</b> NOTE: Seized or damaged parts should be replaced, and also other parts should be thoroughly checked for any defect and should be repaired or replaced as required.	(1) Insufficient backlash for hypoid gear.	Readjust or replace.
	(2) Excessive preload for side, rear or front bearing.	Readjust or replace.
	(3) Insufficient or improper oil used.	Add the recommended oil to the specified level.
<b>3. Damage</b> NOTE: Damaged parts should be replaced, and also other parts should be thoroughly checked for any defect and should be repaired or replaced as required.	(1) Improper backlash for hypoid gear.	Replace.
	(2) Insufficient or excessive preload for side, rear or front bearing.	Readjust or replace.
	(3) Excessive backlash for differential gear.	Replace gear or thrust washer.
	(4) Loose bolts and nuts such as hypoid driven gear bolt	Retighten.
	(5) Damage due to overloading.	Replace.
<b>4. Noises when starting or shifting gears</b> NOTE: Noises may be caused by differential assembly, universal joint, wheel bearing, etc. Find out what is actually making noise before disassembling.	(1) Excessive backlash for hypoid gear.	Readjust.
	(2) Excessive backlash for differential gear.	Replace the differential case assembly.
	(3) Insufficient preload for front or rear bearing.	Readjust.
	(4) Loose drive pinion nut.	Tighten to the specified torque.
	(5) Loose bolts and nuts such as the side retainer attaching bolt.	Tighten to the specified torque.
<b>5. Noises when cornering</b>	(1) Damaged differential gear.	Replace the differential case assembly.
	(2) Excessive wear or damage of thrust washer.	Replace the differential case assembly.
	(3) Broken pinion mate shaft.	Replace the differential case assembly.
	(4) Seized or damaged side bearing.	Replace.

# General Diagnostic Table

DIFFERENTIALS

Symptom or trouble	Possible cause	Remedy
<b>6. Gear Noise</b> 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 the condition of trouble. When listening to noises, shift gears into four wheel drive and fourth speed position, trying to pick up only differential noise.	(1) Improper tooth contact of hypoid gear.	Readjust or replace hypoid gear set.
	(2) Improper backlash of the hypoid gear.	Readjust.
	(3) Scored or chipped teeth of hypoid gear.	Replace hypoid gear set.
	(4) Seized hypoid gear.	Replace hypoid gear set.
	(5) Improper preload for front or rear bearings.	Readjust.
	(6) Seized, cut-away or chipped front or rear bearing.	Replace.
	(7) Seized, cut-away or chipped side bearing.	Replace.
	(8) Differential carrier is vibrating.	Replace the differential case assembly.

# General Diagnostic Table

DIFFERENTIALS

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# TRANSFER CASE

# TC

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3. Extension Case .....	4
4. Oil Seal .....	5
5. Center Differential Carrier .....	6
6. Reduction Driven Gear .....	7
7. Transfer Clutch Pressure Test .....	8

# General Description

TRANSFER CASE

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## 1. General Description

### A: NOTE

For general description, refer to the "5AT" section.  
<Ref. to 5AT-2, General Description.>

## 2. Transfer Clutch

### A: NOTE

For removal, installation and inspection, refer to "5AT" section. <Ref. to 5AT-64, Transfer Clutch.>

### **3. Extension Case**

#### **A: NOTE**

For removal, installation and inspection, refer to "5AT" section. <Ref. to 5AT-62, Extension Case.>

## 4. Oil Seal

### A: NOTE

For replacement and inspection, refer to the "5AT" section. <Ref. to 5AT-45, Extension Case Oil Seal.> <Ref. to 5AT-46, Differential Side Retainer Oil Seal.>

## Center Differential Carrier

TRANSFER CASE

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### 5. Center Differential Carrier

#### A: NOTE

For removal, installation and inspection, refer to "5AT" section. <Ref. to 5AT-71, Center Differential Carrier.>

## 6. Reduction Driven Gear

### A: NOTE

For removal, installation and inspection, refer to "5AT" section. <Ref. to 5AT-68, Reduction Driven Gear.>

# Transfer Clutch Pressure Test

TRANSFER CASE

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## 7. Transfer Clutch Pressure Test

### A: NOTE

For inspection, refer to the "5AT" section.  
<Ref. to 5AT-35, Transfer Clutch Pressure Test.>



# DRIVE SHAFT SYSTEM

# *DS*

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	<b>Page</b>
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3. Front Axle .....	13
4. Rear Axle .....	17
5. Front Hub Unit Bearing .....	20
6. Rear Hub Unit Bearing .....	22
7. Front Drive Shaft .....	25
8. Rear Drive Shaft .....	29
9. General Diagnostic Table .....	33

# General Description

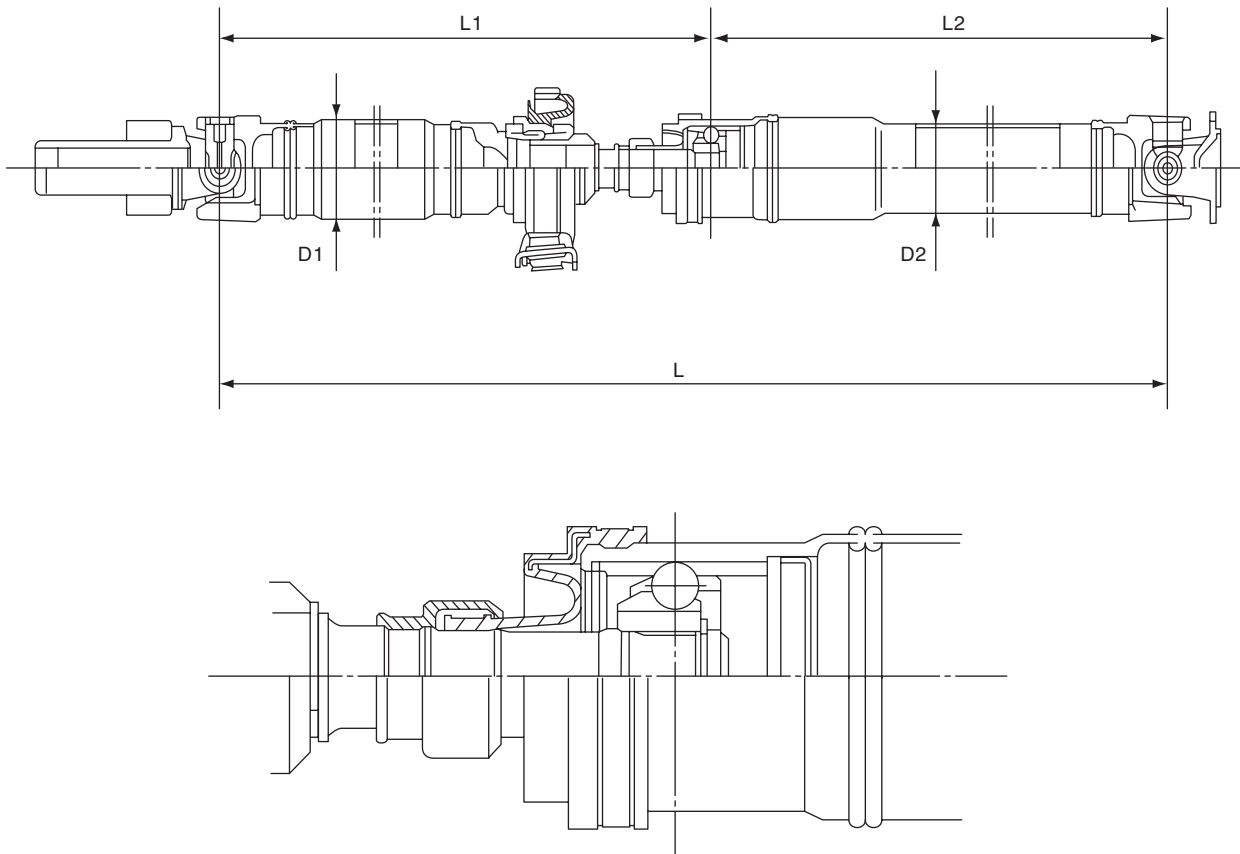
## DRIVE SHAFT SYSTEM

### 1. General Description

#### A: SPECIFICATION

##### 1. PROPELLER SHAFT

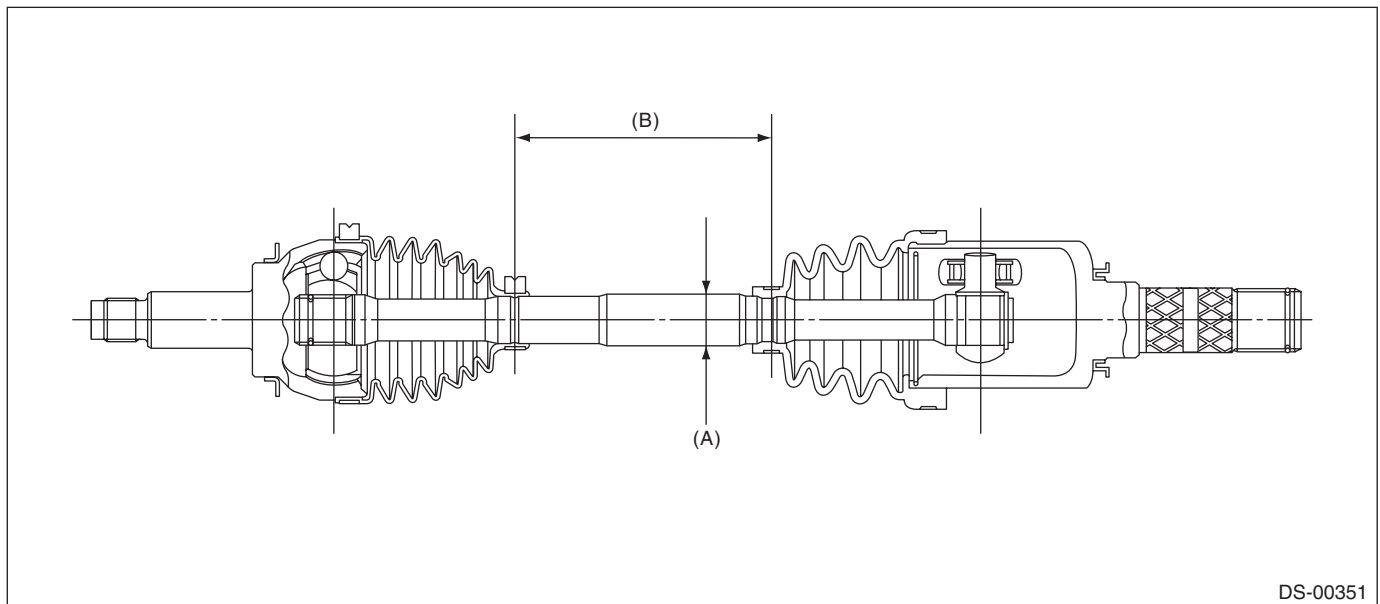
Propeller shaft type		EDJ	
Propeller shaft length: L	mm (in)	1,399 (55.08)	
Front propeller shaft Joint-to-joint length: L <sub>1</sub>	mm (in)	645 (25.39)	
Rear propeller shaft Joint-to-Joint length: L <sub>2</sub>	mm (in)	754 (29.69)	
Outer diameter of tube:	mm (in)	D <sub>1</sub>	63.5 (2.50)
		D <sub>2</sub>	57.5 (2.26)



DS-00350

## 2. FRONT DRIVE SHAFT ASSEMBLY

Type of drive shaft	Axle diameter $\phi$ D mm (in)	Axle length L mm (in)
EBJ + PTJ	26 (1.0)	388.5 (15.30)

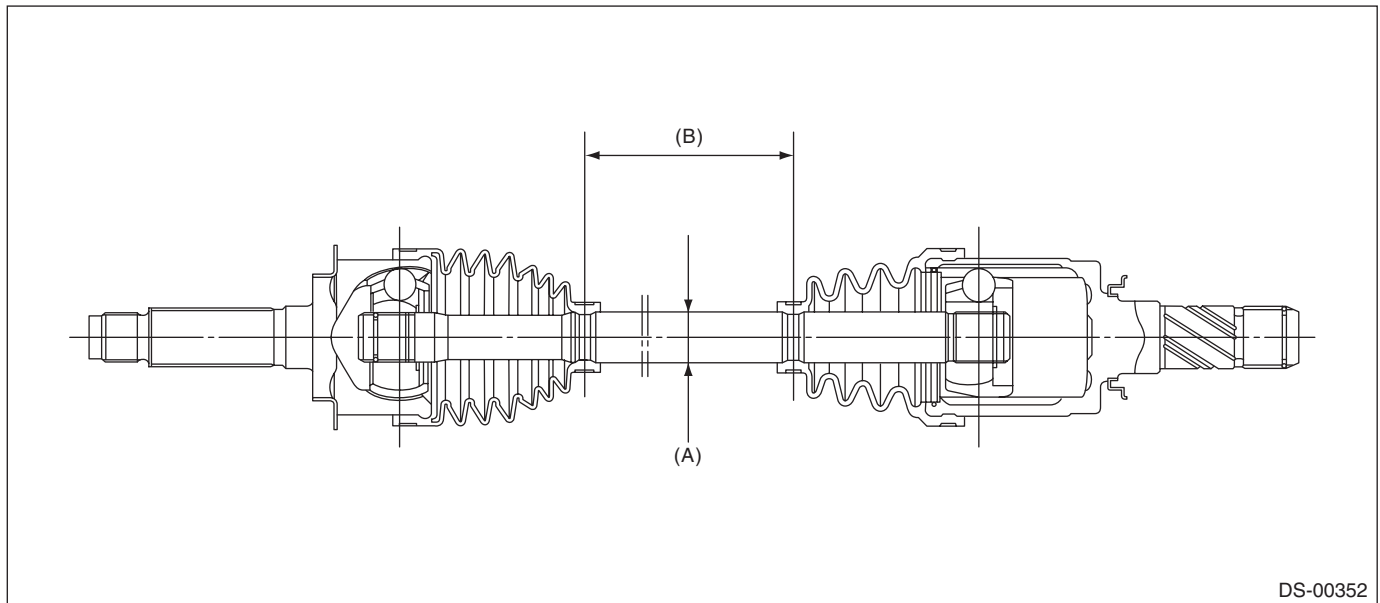


(A) Axle diameter

(B) Axle length

## 3. REAR DRIVE SHAFT ASSEMBLY

Type of drive shaft	Axle diameter $\phi$ D mm (in)	Axle length L mm (in)
EBJ + DOJ	24 (0.94)	386.8 (15.23)



(A) Axle diameter

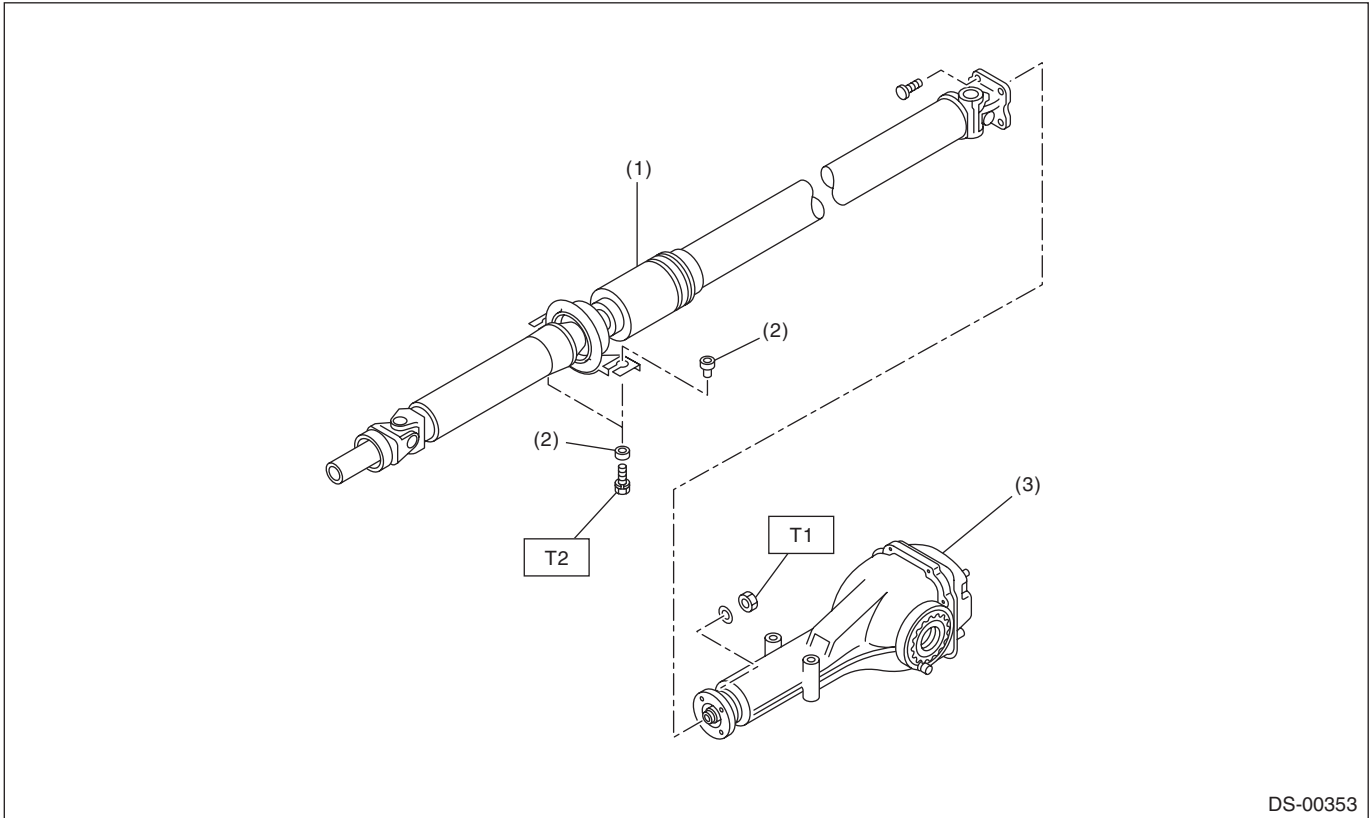
(B) Axle length

# General Description

## DRIVE SHAFT SYSTEM

### B: COMPONENT

#### 1. PROPELLER SHAFT



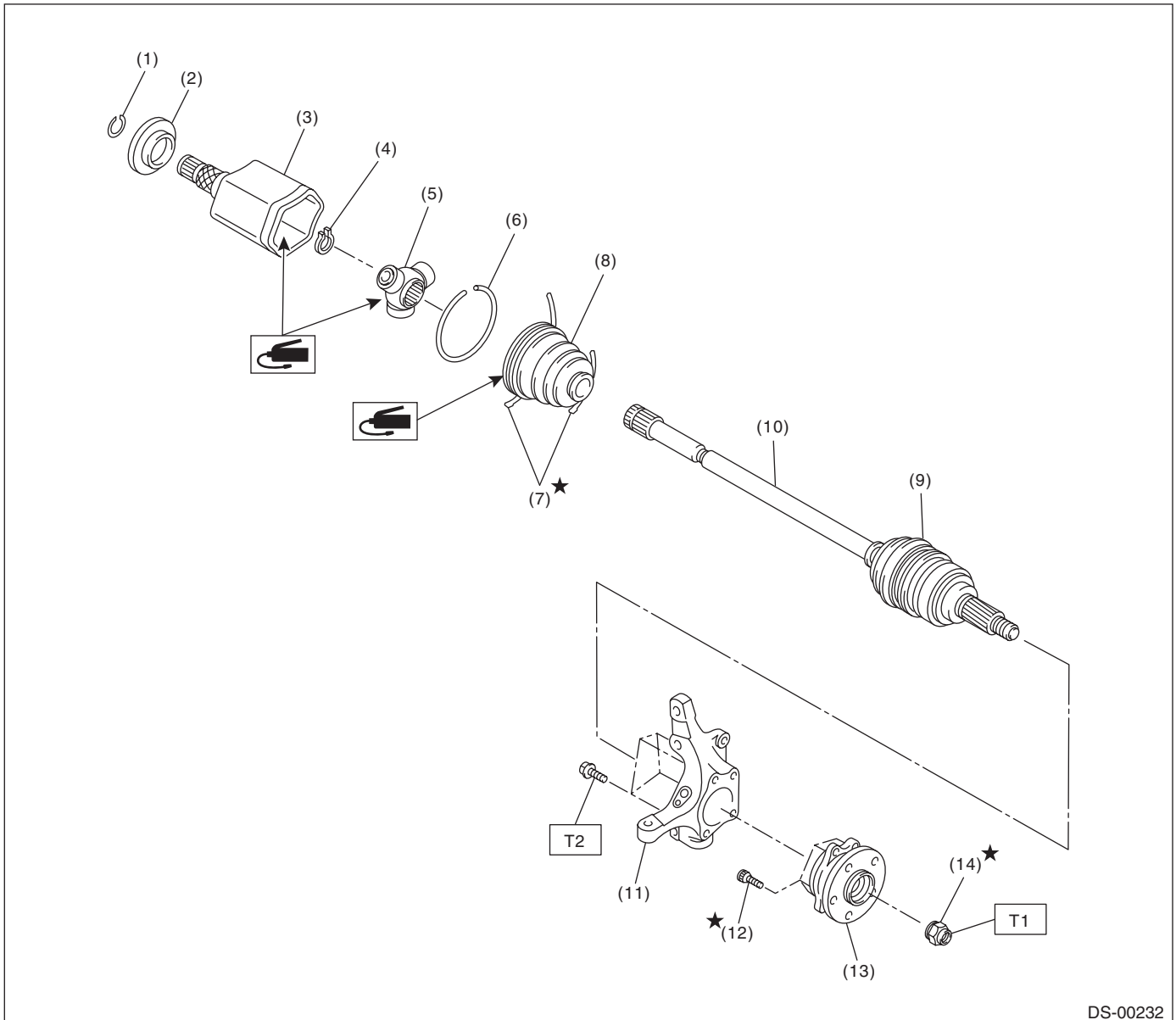
- (1) Propeller shaft
- (2) Bushing
- (3) Rear differential (VA-type)

**Tightening torque: N·m (kgf-m, ft-lb)**

**T1: 31 (3.2, 23.1)**

**T2: 52 (5.3, 38.3)**

## 2. FRONT AXLE



DS-00232

- (1) Circlip
- (2) Baffle plate
- (3) Outer race (PTJ)
- (4) Snap ring
- (5) Trunnion
- (6) Snap ring

- (7) Boot band
- (8) Boot (PTJ)
- (9) Boot (EBJ)
- (10) EBJ shaft ASSY
- (11) Front housing
- (12) Hub bolt

- (13) Front hub unit bearing
- (14) Axle nut

**Tightening torque: N·m (kgf·m, ft·lb)**

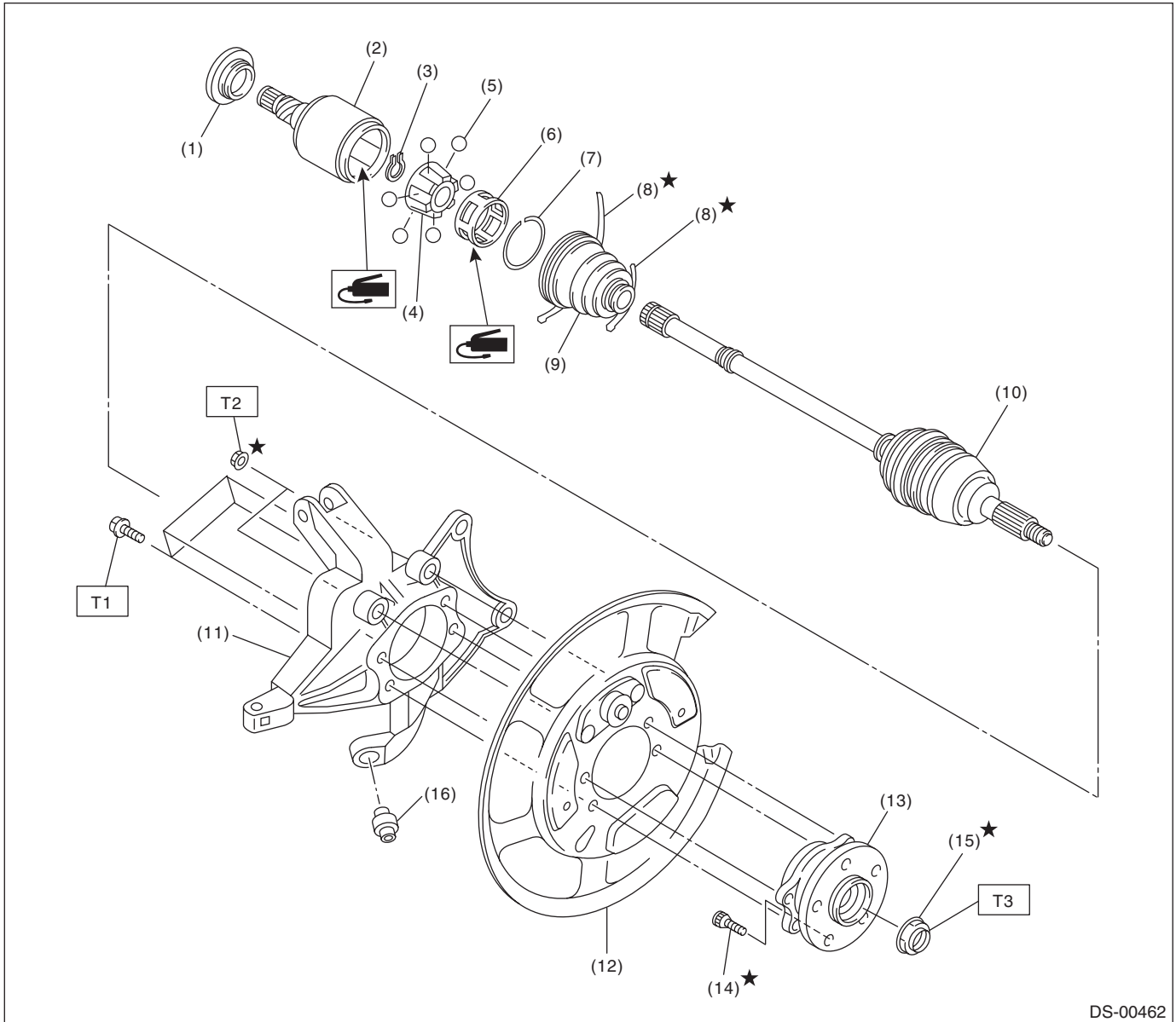
**T1: 240 (24.5, 177)**

**T2: 65 (6.6, 47.9)**

# General Description

## DRIVE SHAFT SYSTEM

### 3. REAR AXLE



DS-00462

- (1) Baffle plate (DOJ)
- (2) Outer race (DOJ)
- (3) Snap ring
- (4) Inner race
- (5) Ball
- (6) Cage
- (7) Snap ring

- (8) Boot band
- (9) Boot (DOJ)
- (10) EBJ shaft ASSY
- (11) Rear housing
- (12) Back plate
- (13) Rear hub unit bearing
- (14) Hub bolt

- (15) Axle nut
- (16) Bushing

**Tightening torque: N·m (kgf·m, ft·lb)**

**T1: 65 (6.6, 47.9)**

**T2: 75 (7.6, 55.3)**

**T3: 240 (24.5, 177)**

## **C: CAUTION**

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

### **1. OPERATION**

- Wear appropriate work clothing, including a cap, protective goggles and protective shoes when performing any work.
- 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.
- Vehicle components are extremely hot after driving. Be wary of receiving burns from heated parts.
- Use SUBARU genuine grease etc. or equivalent. Do not mix grease etc. of different grades or manufacturers.
- Be sure to tighten fasteners including bolts and nuts to the specified torque.
- Place shop jacks or rigid racks at the specified points.
- Apply grease onto sliding or revolving surfaces before installation.
- Before installing 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.

### **2. OIL**

When handling oil, follow the rules below to prevent unexpected accidents.

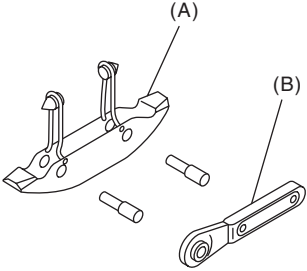
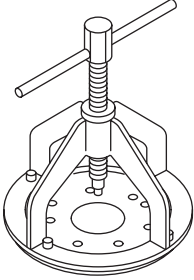
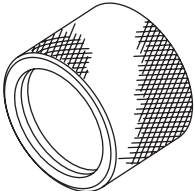
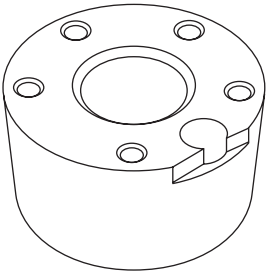
- Prepare container and waste cloths when performing work which oil could possibly spill. If oil spills, wipe it off immediately to prevent from penetrating into floor or flowing outside, for environmental protection.
- Follow all government and local regulations concerning waste disposal.

# General Description

## DRIVE SHAFT SYSTEM

### D: PREPARATION TOOL

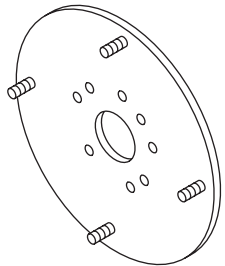
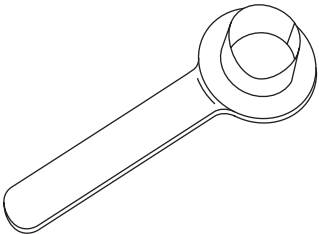
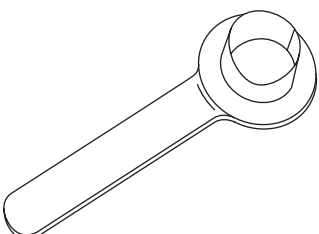
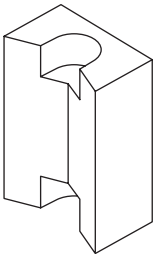
#### 1. SPECIAL TOOL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p style="text-align: center;">ST-925091000</p>	925091000	BAND TIGHTENING TOOL	Used for tightening the boot band. (A) Jig for the band (B) Ratchet wrench
 <p style="text-align: center;">ST-926470000</p>	926470000	AXLE SHAFT PULLER	Used for removing the axle shaft.
 <p style="text-align: center;">ST18675AA000</p>	18675AA000	DIFFERENTIAL SIDE OIL SEAL INSTALLER	Used for installing the differential side retainer oil seal.
 <p style="text-align: center;">ST28099PA080</p>	28099PA080	HUB STAND	Used for assembling hub bolt in hub.



# General Description

DRIVE SHAFT SYSTEM

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p style="text-align: center;">ST28099PA110</p>	28099PA110	AXLE SHAFT PULLER PLATE	Same as plate 2 included in AXLE SHAFT PULLER (926470000).
 <p style="text-align: center;">ST28099PA090</p>	28099PA090	OIL SEAL PROTECTOR	<ul style="list-style-type: none"> <li>• Used for installing the rear drive shaft to the rear differential.</li> <li>• For protecting the oil seal.</li> </ul>
 <p style="text-align: center;">ST28399SA010</p>	28399SA010	OIL SEAL PROTECTOR	<ul style="list-style-type: none"> <li>• Used for installing front drive shaft into front differential.</li> <li>• For protecting the oil seal.</li> </ul>
 <p style="text-align: center;">ST28399AG000</p>	28399AG000	HUB STAND	Used for extracting hub bolt.

## 2. GENERAL TOOL

TOOL NAME	REMARKS
Puller	Used for removing the ball joint from knuckle arm.
Dial gauge	Used for inspecting the propeller shaft run-out.
Extension cap	Used for preventing leakage of gear oil or ATF.
Bar	Used for extracting drive shaft.

# Propeller Shaft

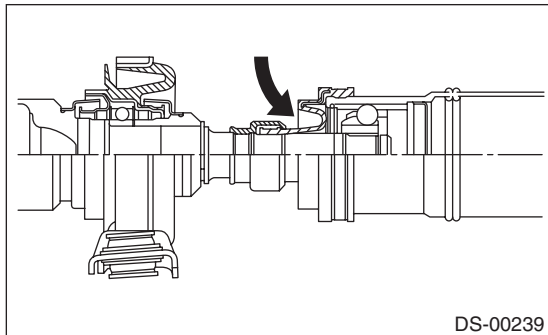
## DRIVE SHAFT SYSTEM

### 2. Propeller Shaft

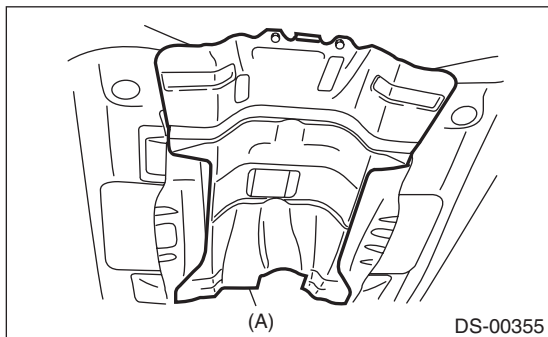
#### A: REMOVAL

##### NOTE:

- Before removing propeller shaft, wrap metal parts with a cloth or rubber material.
- In case of EDJ type, wrap the metal parts at the rubber boot at the center EDJ with a cloth or rubber material before removing propeller shaft, as shown in the figure. The rubber boot may be damaged due to interference with adjacent metal parts while bending the EDJ during removal.

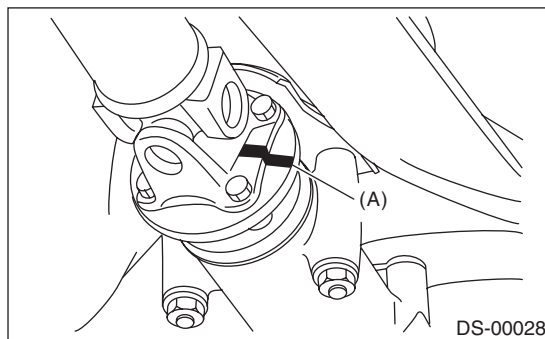


- 1) Disconnect the ground cable from battery.
- 2) Shift the select lever or gear shift lever to neutral.
- 3) Release the parking brake.
- 4) Lift up the vehicle.
- 5) Remove the center exhaust pipe.
- 6) Remove the rear exhaust pipe and muffler.
- 7) Remove the heat shield cover.



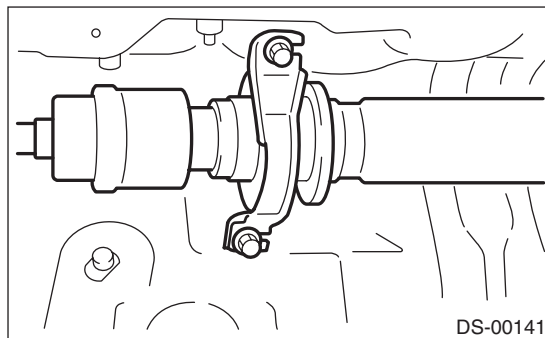
(A) Heat shield cover

- 8) Make alignment marks on the flange yoke and rear differential before removal.



(A) Alignment mark

- 9) Remove the three bolts holding the propeller shaft to the rear differential.
- 10) Remove the remaining bolt.
- 11) Remove the two bolts which hold center bearing to vehicle body.



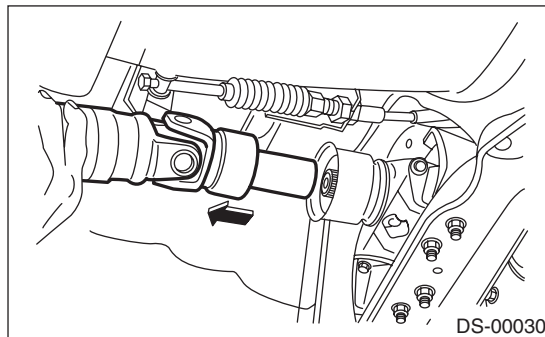
- 12) Remove the propeller shaft from transmission.

##### CAUTION:

- Be careful not to damage oil seals and frictional surface of the 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:

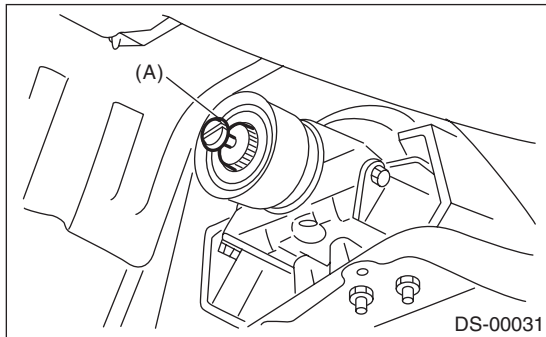
Use a container to catch ATF or oil flowing from propeller shaft.



13) Install an extension cap to the 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.



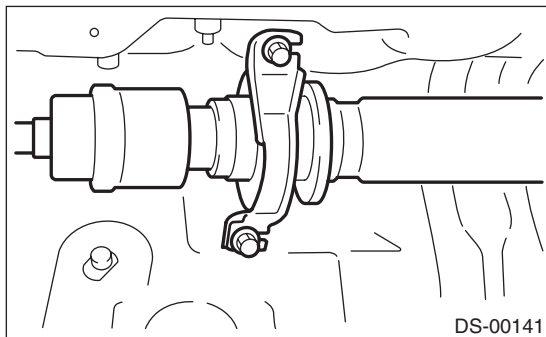
(A) Extension cap

**B: INSTALLATION**

1) Insert the sleeve yoke into the transmission and attach center bearing to body.

**Tightening torque:**

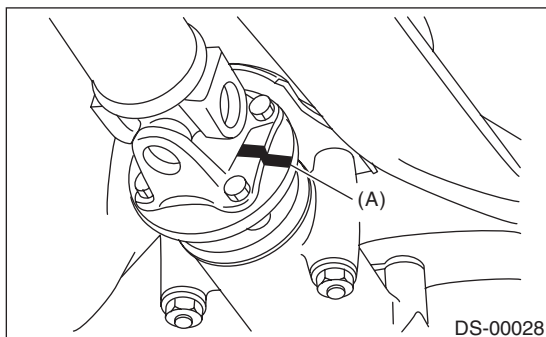
**52 N·m (5.3 kgf·m, 38.3 ft·lb)**



2) Align the alignment marks and connect the flange yoke and rear differential.

**Tightening torque:**

**31 N·m (3.2 kgf·m, 23.1 ft·lb)**



(A) Alignment mark

- 3) Install the heat shield cover.
- 4) Install the center exhaust pipe.
- 5) Install the rear exhaust pipe and muffler.

6) Lower the vehicle.

7) Connect the ground cable to battery.

**C: INSPECTION**

**NOTE:**

Do not disassemble propeller shaft. Check the following and replace if necessary.

- Tube surface for dents or cracks
- Splines for deformation or abnormal wear
- Unsmooth joint operation or abnormal noise
- Center bearing for free play, noise or non-smooth operation.
- Oil seals for abnormal wear or damage
- Damaged center bearing

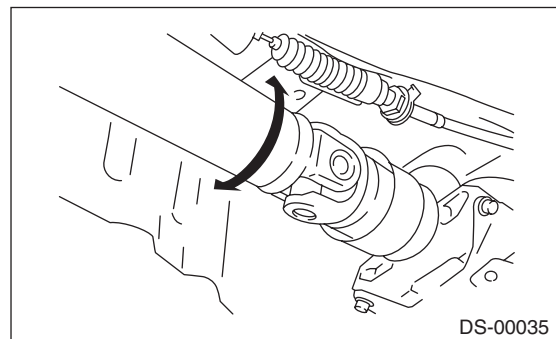
Check the following points with propeller shaft installed in vehicle.

**1. JOINTS AND CONNECTIONS**

- 1) Remove the center exhaust pipe.
- 2) Remove the heat shield cover.
- 3) Check for any looseness of the yoke flange mounting bolts which connect to the rear differential and center bearing bracket mounting bolts.

**2. SPLINES AND BEARING**

- 1) Remove the center exhaust pipe.
- 2) Remove the rear exhaust pipe and muffler.
- 3) Remove the heat shield cover.
- 4) Turn the 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.



# Propeller Shaft

## DRIVE SHAFT SYSTEM

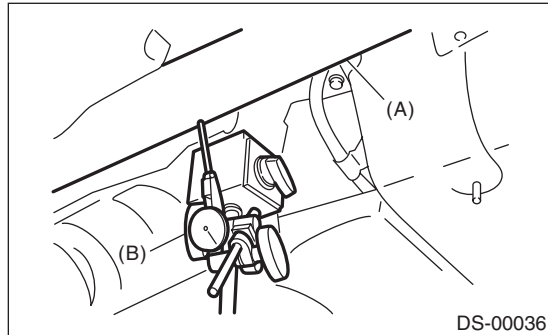
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### 3. RUNOUT OF PROPELLER SHAFT

- 1) Remove the center exhaust pipe.
- 2) Remove the rear exhaust pipe and muffler.
- 3) Remove the heat shield cover.
- 4) Set the dial gauge with its indicator stem at the center of the propeller shaft tube.
- 5) Turn the propeller shaft slowly by hands to check for runout of the propeller shaft.

#### **Runout:**

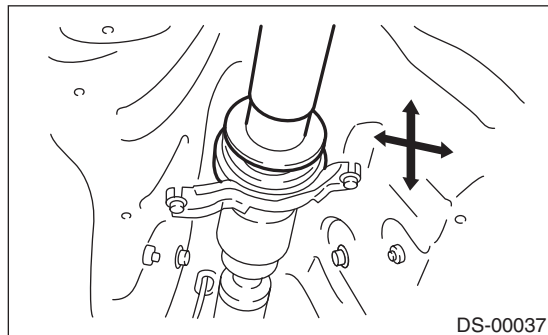
**Service limit 0.6 mm (0.024 in)**



- (A) Propeller shaft  
(B) Dial gauge

### 4. CENTER BEARING FREE PLAY

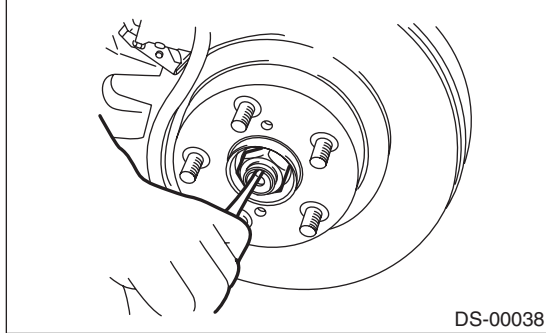
- 1) Remove the front and center exhaust pipes.
- 2) Remove the rear exhaust pipe and muffler.
- 3) Remove the heat shield cover.
- 4) Move the propeller shaft near the center bearing up, down, left, right by hand, to check for any abnormal free play of the bearings.



## 3. Front Axle

### A: REMOVAL

- 1) Disconnect the ground cable from battery.
- 2) Lift up the vehicle, and remove the front wheels.
- 3) Lift the crimped section of axle nut.

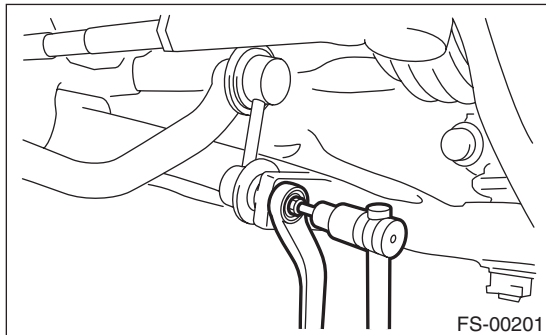


- 4) Remove the axle nut using a socket wrench while depressing the brake pedal.

**CAUTION:**

**Remove the wheel before loosening the axle nut. Failure to follow this rule may damage the wheel bearings.**

- 5) Remove the stabilizer link.

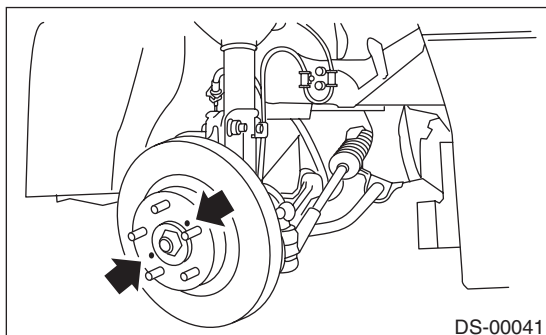


- 6) Remove the disc brake caliper from the front housing, and suspend it from strut using a piece of wire.

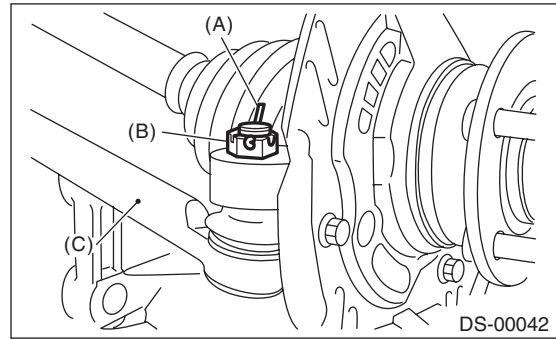
- 7) Remove the disc rotor from the hub.

**NOTE:**

If it is difficult to remove the disc rotor from the hub, drive an 8 mm bolt into the threaded end of rotor, and then remove the rotor.

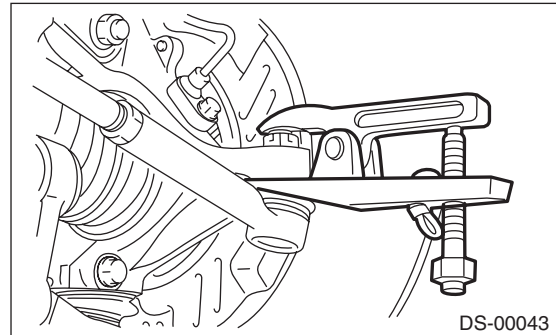


- 8) Remove the cotter pin and castle nut securing the tie-rod end to the front housing knuckle arm.



- (A) Cotter pin
- (B) Castle nut
- (C) Tie-rod

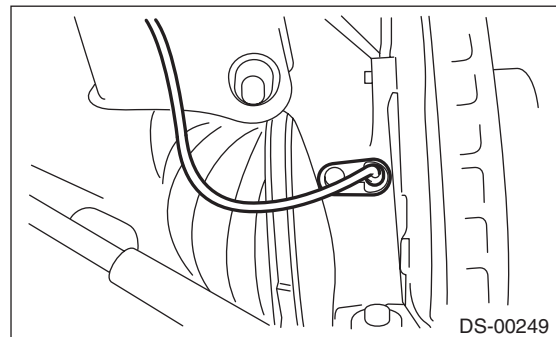
- 9) Using a puller, remove the tie-rod ball joint from knuckle arm.



**CAUTION:**

**When removing tie-rod, do not hit the tie-rod end with hammer.**

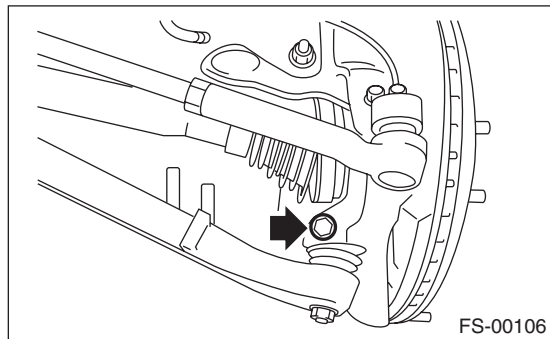
- 10) Remove the ABS wheel speed sensor assembly and harness.



# Front Axle

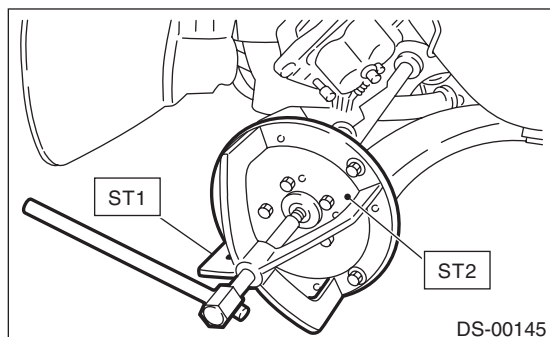
## DRIVE SHAFT SYSTEM

11) Remove the front arm ball joint from the front housing.

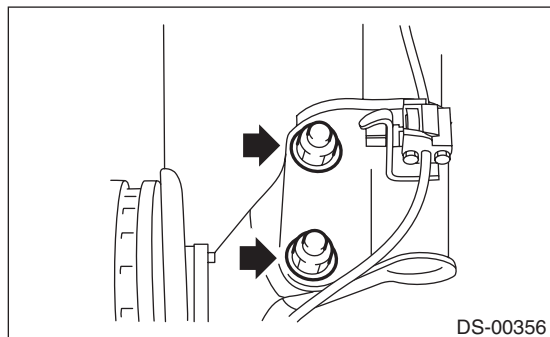


12) Remove the PTJ from transmission.  
13) Remove the front drive shaft assembly from the hub. If it is hard to remove, use the ST.

ST1 926470000 AXLE SHAFT PULLER  
ST2 28099PA110 AXLE SHAFT PULLER PLATE



14) After scribing an alignment mark on the camber adjusting bolt head, remove the bolts which connect the front housing and strut, and disconnect the front housing from the strut.



15) Remove the front axle.

## B: INSTALLATION

1) Align the alignment mark on the camber adjusting bolt head, and affix the front housing and strut together using a new self-locking nut.

**Tightening torque:**

**155 N·m (15.8 kgf-m, 114.3 ft-lb)**

2) Install the front drive shaft. <Ref. to DS-25, INSTALLATION, Front Drive Shaft.>

3) Install the front arm ball joint to the front housing.

**Tightening torque:**

**50 N·m (5.1 kgf-m, 36.9 ft-lb)**

4) Install the ABS wheel speed sensor on the front housing.

**Tightening torque:**

**7.5 N·m (0.8 kgf-m, 5.5 ft-lb)**

5) Install the disc rotor to hub.

6) Install the disc brake caliper to the front housing.

**Tightening torque:**

**120 N·m (12.2 kgf-m, 88.5 ft-lb)**

7) Install the stabilizer link.

8) Connect the tie-rod end ball joint to the knuckle arm with a castle nut.

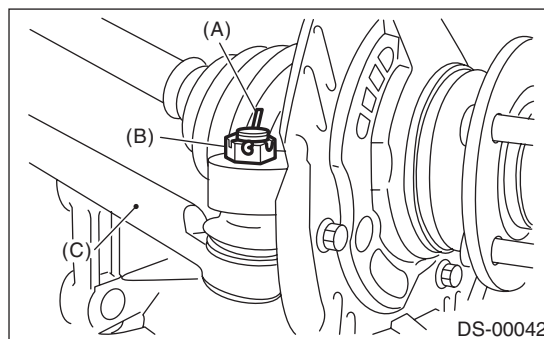
**Tightening torque:**

**27.0 N·m (2.75 kgf-m, 19.9 ft-lb)**

### CAUTION:

**When connecting the tie-rod, do not hit the cap at bottom of tie-rod end with a hammer.**

9) Tighten the castle nut to specified torque and tighten further within 60° until the pin hole is aligned with the slot in nut. Bend the cotter pin to lock.



- (A) Cotter pin
- (B) Castle nut
- (C) Tie-rod

10) While depressing the brake pedal, tighten a new axle nut to the specified torque and lock it securely.

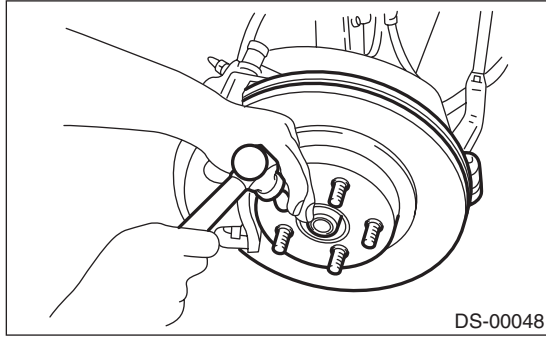
**Tightening torque:**

**240 N·m (24.5 kgf-m, 177 ft-lb)**

### CAUTION:

- Install the wheel after installation of axle nut. Failure to follow this rule may damage the wheel bearing.
- Be sure to tighten the axle nut to specified torque. Do not overtighten it as this may damage the wheel bearing.

11) After tightening the axle nut, lock it securely.



12) Install the front wheel and tighten the wheel nuts to specified torque.

**Tightening torque:**

**Chromed wheel**

**150 N·m (15.3 kgf·m, 110.6 ft·lb)**

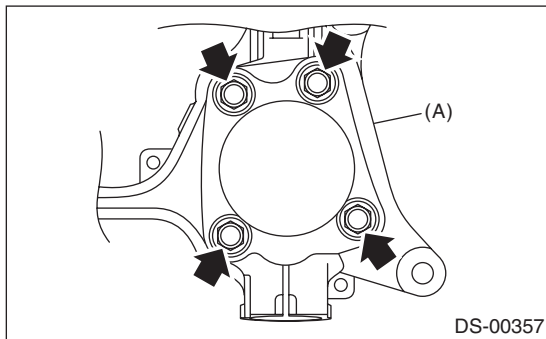
**Other than above**

**120 N·m (12.2 kgf·m, 88.5 ft·lb)**

13) Inspect the wheel alignment and adjust if necessary.

## C: DISASSEMBLY

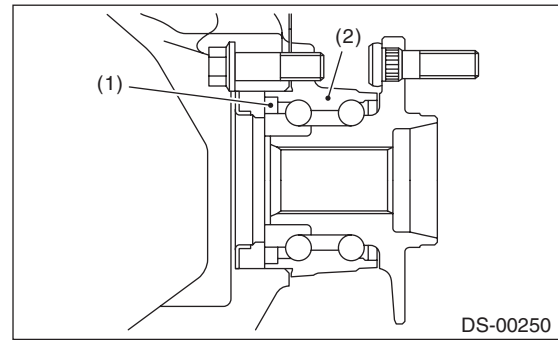
1) Remove the four bolts from the front housing, and remove the front hub unit bearing and disc cover.



(A) Front housing

**CAUTION:**

- Do not get closer the tool which charged magnetism to magnetic encoder.
- Be careful not to damage the magnetic encoder.



(1) Magnetic encoder  
(2) Front hub unit bearing

2) Disassemble the front hub unit bearing. <Ref. to DS-21, DISASSEMBLY, Front Hub Unit Bearing.>

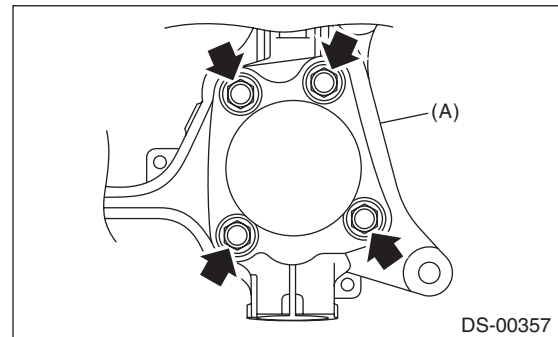
## D: ASSEMBLY

1) Assemble the front hub unit bearing. <Ref. to DS-21, ASSEMBLY, Front Hub Unit Bearing.>

2) Place the disc cover between front housing and front hub unit, and tighten the four bolts.

**Tightening torque:**

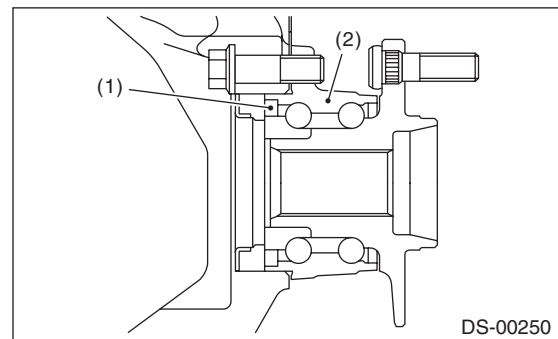
**65 N·m (6.6 kgf·m, 47.9 ft·lb)**



(A) Front housing

**CAUTION:**

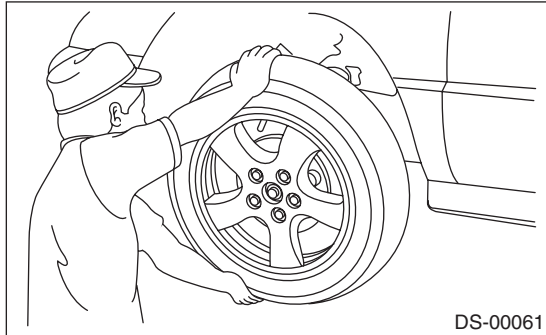
- Do not get closer the tool which charged magnetism to magnetic encoder.
- Be careful not to damage the magnetic encoder.



(1) Magnetic encoder  
(2) Front hub unit bearing

### E: INSPECTION

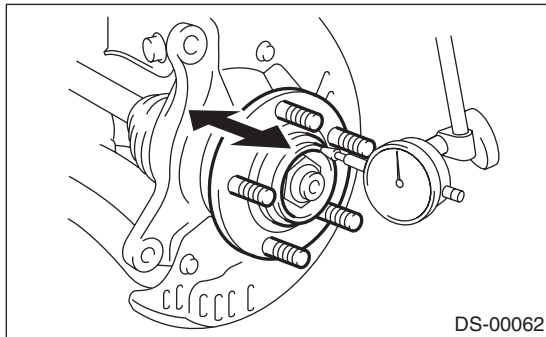
1) Moving the front tire up and down by hand, check there is no backlash in bearing, and check the wheel rotates smoothly.



2) Inspect the lean of axis direction using a dial gauge. Replace the bearing if the load range exceeds the limitation.

**Service limit:**

**Maximum: 0.05 mm (0.0020 in)**

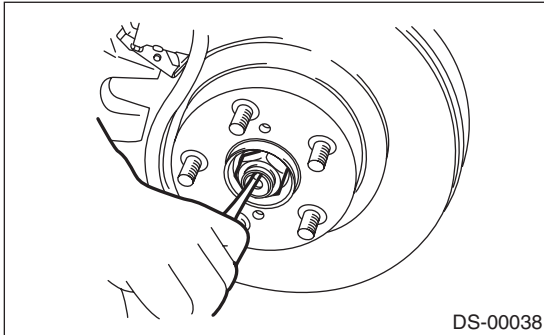




## 4. Rear Axle

### A: REMOVAL

- 1) Disconnect the ground cable from battery.
- 2) Lift up the vehicle, and then remove the rear wheels.
- 3) Lift the crimped section of axle nut.

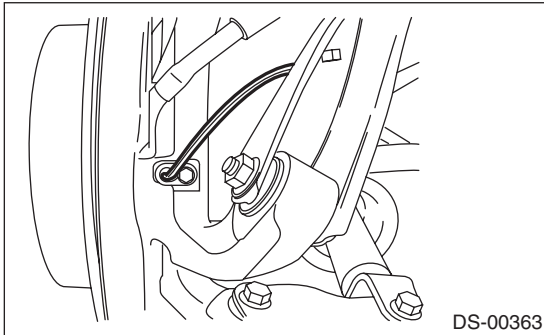


- 4) Remove the axle nut using a socket wrench while depressing the brake pedal.

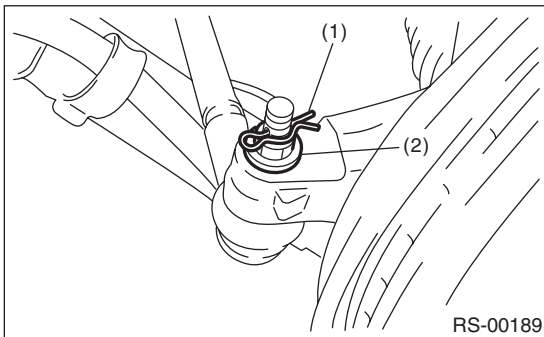
**CAUTION:**

**Remove the wheel before loosening the axle nut. Failure to follow this rule may damage the wheel bearings.**

- 5) Remove the parking brake cable from parking brake assembly. <Ref. to PB-7, REMOVAL, Parking Brake Assembly (Rear Disc Brake).>
- 6) Remove the rear ABS wheel speed sensor.

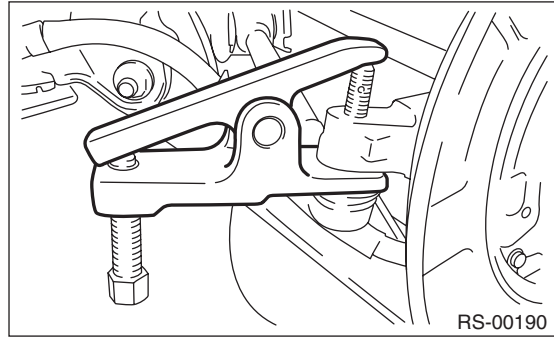


- 7) Remove the snap pin and nut from the front lateral link.

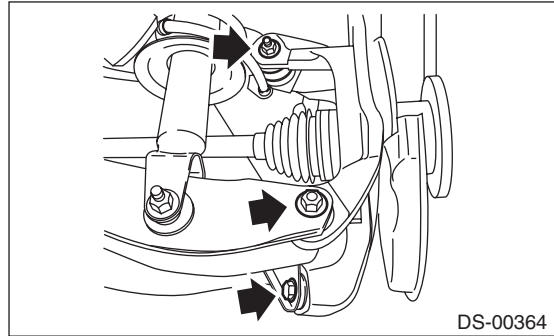


- (1) Snap pin
- (2) Nut

- 8) Using a puller, separate the rear housing and ball joint.



- 9) Detach the upper arm, trailing link, and rear lateral link from the rear housing.

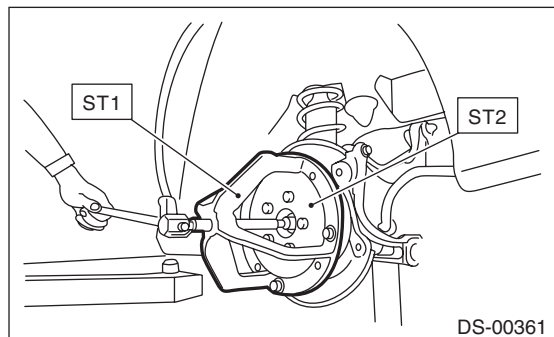


- 10) Remove the rear axle.

**NOTE:**

If it is hard to remove, use the ST.

- ST1 926470000 AXLE SHAFT PULLER
- ST2 28099PA110 AXLE SHAFT PULLER PLATE



### B: INSTALLATION

#### NOTE:

- Be sure to use a new self-locking nut.
  - Always tighten bushings with wheels in full contact with the ground and the vehicle at curb weight.
- 1) Install in the reverse order of removal.

#### Tightening torque:

Refer to “COMPONENT” of “General Description” for the tightening torque.

<Ref. to DS-4, COMPONENT, General Description.>

<Ref. to BR-4, COMPONENT, General Description.>

<Ref. to PB-2, COMPONENT, General Description.>

<Ref. to RS-3, COMPONENT, General Description.>

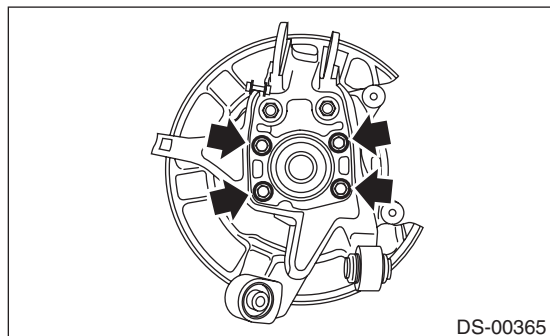
<Ref. to VDC-3, COMPONENT, General Description.>

- 2) Inspect the wheel alignment and adjust if necessary.

### C: DISASSEMBLY

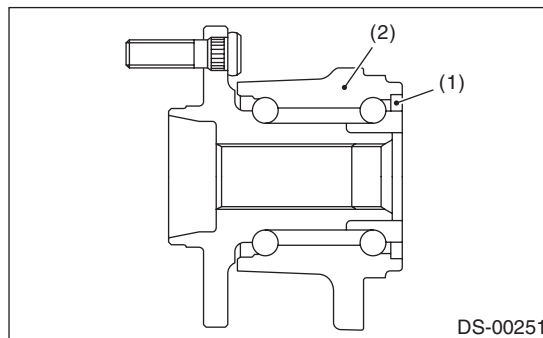
#### 1. REAR HUB UNIT BEARING

- 1) Remove the four bolts from the rear housing, and remove the rear hub unit bearing.



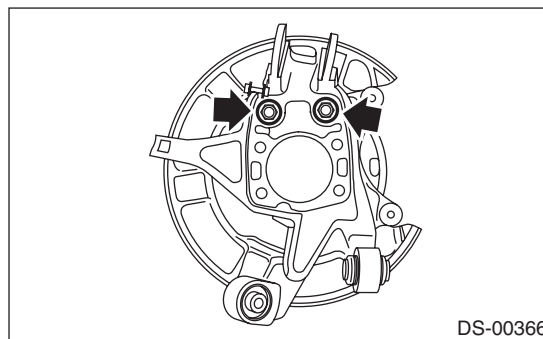
#### CAUTION:

- Be careful not to damage the magnetic encoder.
- Do not get closer the tool which charged magnetism to magnetic encoder.



- (1) Magnetic encoder  
(2) Rear hub unit bearing

- 2) Remove the two bolts from the rear housing, and remove the back plate.



#### 2. BUSHING

Refer to “Rear Trailing Link” of “REAR SUSPENSION” for removal procedure.

<Ref. to RS-10, REAR HOUSING BUSHING, DISASSEMBLY, Rear Trailing Link.>

### D: ASSEMBLY

#### 1. REAR HUB UNIT BEARING

Assemble in the reverse order of disassembly.

#### Tightening torque:

**Rear hub unit bearing**

**65 N·m (6.6 kgf-m, 47.9 ft-lb)**

**Back plate**

**75 N·m (7.6 kgf-m, 55.3 ft-lb)**

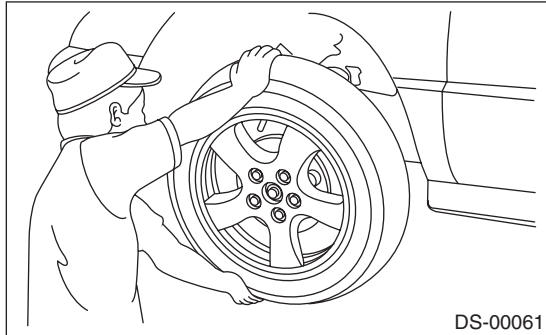
#### 2. BUSHING

Refer to “Rear Trailing Link” of “REAR SUSPENSION” for installation procedure.

<Ref. to RS-11, REAR HOUSING BUSHING, ASSEMBLY, Rear Trailing Link.>

**E: INSPECTION**

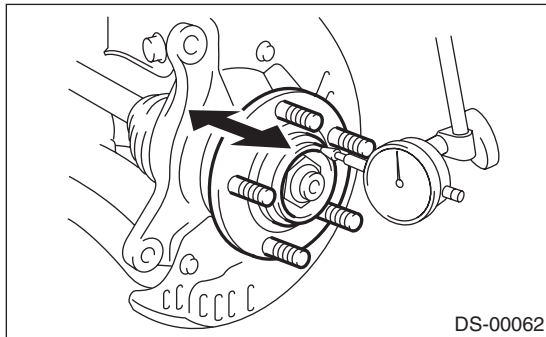
1) Moving the rear tire up and down by hand, check there is no backlash in bearing, and check the wheel rotates smoothly.



2) Inspect the lean of axis direction using a dial gauge. Replace the bearing if the load range exceeds the limitation.

**Service limit:**

**Maximum: 0.05 mm (0.0020 in)**



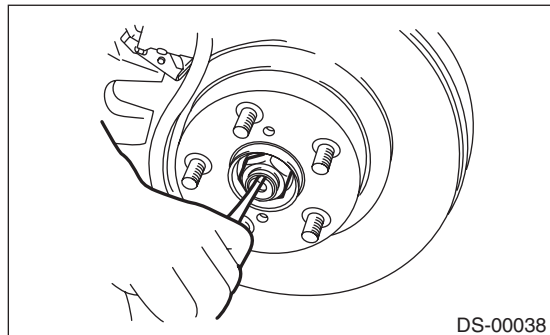
# Front Hub Unit Bearing

## DRIVE SHAFT SYSTEM

### 5. Front Hub Unit Bearing

#### A: REMOVAL

- 1) Disconnect the ground cable from battery.
- 2) Lift up the vehicle, and remove the front wheels.
- 3) Lift the crimped section of axle nut.



- 4) Remove the axle nut using a socket wrench while depressing the brake pedal.

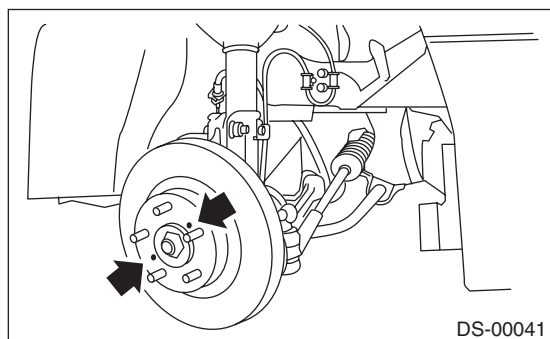
#### CAUTION:

**Remove the wheel before loosening the axle nut. Failure to follow this rule may damage the wheel bearings.**

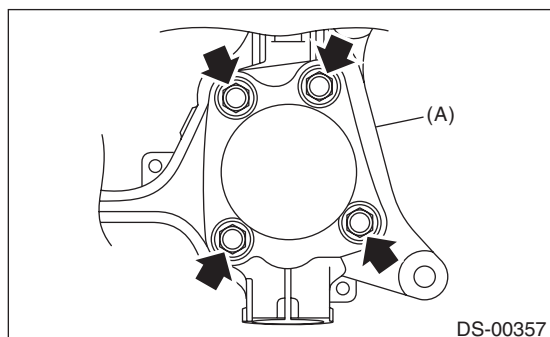
- 5) Remove the disc brake caliper from the front housing, and suspend it from strut using a piece of wire.
- 6) Remove the disc rotor from the hub.

#### NOTE:

If it is difficult to remove the disc rotor from the hub, drive an 8 mm bolt into the threaded end of rotor, and then remove the rotor.



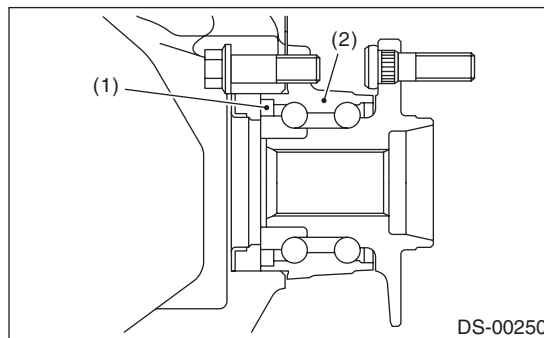
- 7) Remove four bolts from the front housing.



(A) Front housing

#### CAUTION:

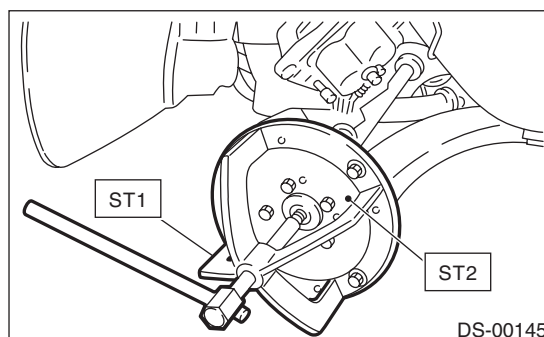
- Do not get closer the tool which charged magnetism to magnetic encoder.
- Be careful not to damage the magnetic encoder.



- (1) Magnetic encoder
- (2) Front hub unit bearing

- 8) Remove the front hub unit bearing. If it is hard to remove, use the ST.

ST1 926470000 AXLE SHAFT PULLER  
ST2 28099PA110 AXLE SHAFT PULLER PLATE

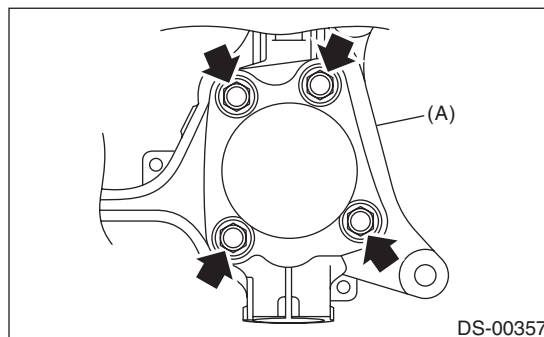


#### B: INSTALLATION

- 1) Place the disc cover between front housing and front hub unit, and tighten the four bolts.

#### Tightening torque:

**65 N·m (6.6 kgf·m, 47.9 ft·lb)**



(A) Front housing

- 2) Install the front drive shaft. <Ref. to DS-25, INSTALLATION, Front Drive Shaft.>

- 3) Tighten the axle nut temporarily.
- 4) Install the disc rotor to hub.
- 5) Install the disc brake caliper to the front housing.

**Tightening torque:**

**120 N·m (12.2 kgf·m, 88.5 ft·lb)**

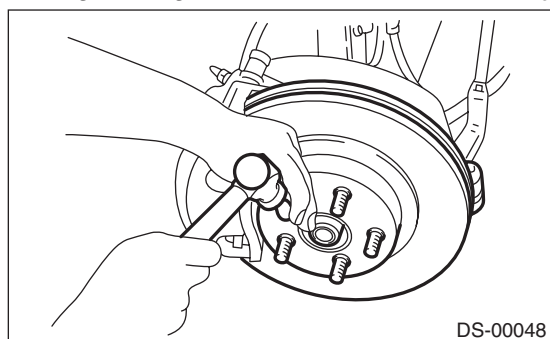
- 6) While depressing the brake pedal, tighten a new axle nut to the specified torque and lock it securely.

**Tightening torque:**

**240 N·m (24.5 kgf·m, 177 ft·lb)**

**CAUTION:**

- Install the wheel after installation of axle nut. Failure to follow this rule may damage the wheel bearing.
  - Be sure to tighten the axle nut to specified torque. Do not overtighten it as this may damage the wheel bearing.
- 7) After tightening the axle nut, lock it securely.



- 8) Install the front wheel and tighten the wheel nuts to specified torque.

**Tightening torque:**

**Chromed wheel**

**150 N·m (15.3 kgf·m, 110.6 ft·lb)**

**Other than above**

**120 N·m (12.2 kgf·m, 88.5 ft·lb)**

## C: DISASSEMBLY

Using the ST and a hydraulic press, push out the hub bolts.

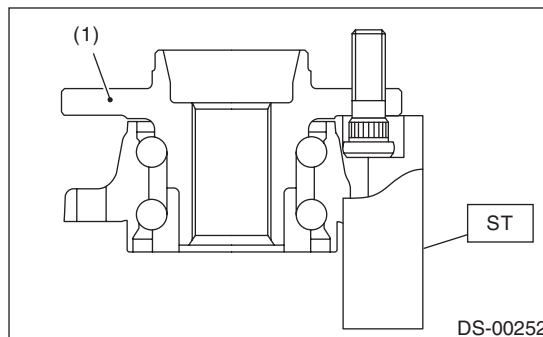
ST 28399AG000 HUB STAND

**CAUTION:**

- Be careful not to hammer the hub bolts. This may deform the hub.
- Do not reuse the hub bolt.

**NOTE:**

Since the hub unit bearing can not be disassembled, only hub bolts can be removed.

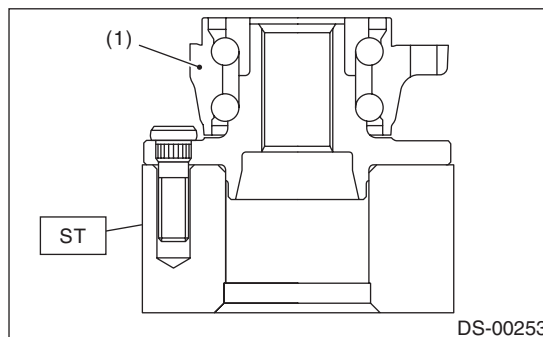


(1) Front hub unit bearing

## D: ASSEMBLY

- 1) Attach the hub to the ST securely.

ST 28099PA080 HUB STAND



(1) Front hub unit bearing

- 2) Using a press, press the new hub bolts until their seating surfaces contact the hub.

**NOTE:**

Use the 12 mm (0.47 in) dia. holes in the HUB STAND to prevent bolts from tilting.

## E: INSPECTION

Refer to "Front Axle" for inspection procedures. <Ref. to DS-16, INSPECTION, Front Axle.>

**CAUTION:**

If there is any fault in the bearing, replace hub unit bearing.

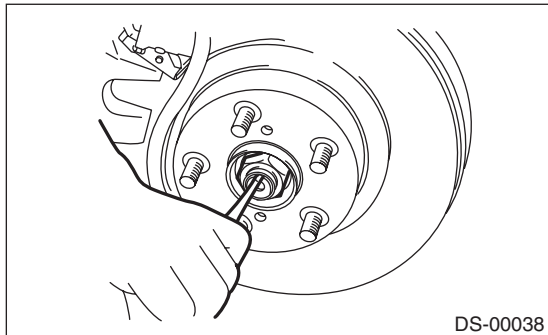
# Rear Hub Unit Bearing

## DRIVE SHAFT SYSTEM

### 6. Rear Hub Unit Bearing

#### A: REMOVAL

- 1) Disconnect the ground cable from battery.
- 2) Lift up the vehicle, and then remove the rear wheels.
- 3) Lift the crimped section of axle nut.

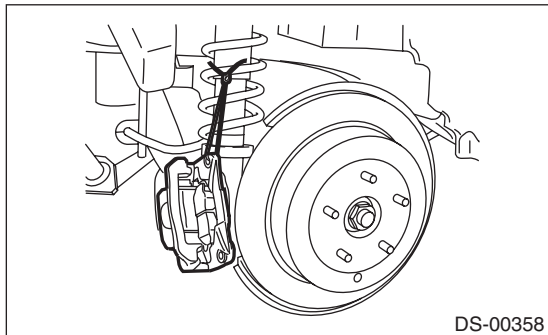


- 4) Remove the axle nut using a socket wrench while depressing the brake pedal.

#### CAUTION:

**Remove the wheel before loosening the axle nut. Failure to follow this rule may damage the wheel bearings.**

- 5) Release the parking brake.
- 6) Remove the disc brake caliper from the rear housing, and suspend it from the vehicle using a piece of rope.

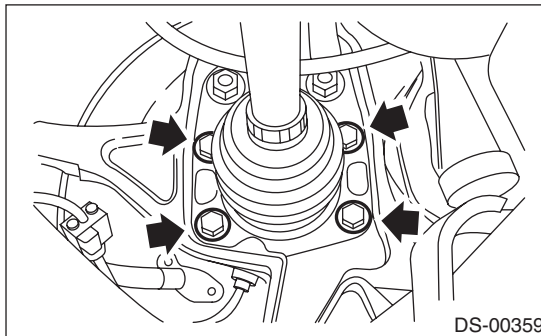


- 7) Remove the disc rotor from the hub.

#### NOTE:

- Mark the mating surface of hub and disc rotor before removing the disc rotor to avoid confusing when installing.
- If it is difficult to remove the disc rotor from the hub, drive an 8 mm bolt into the threaded end of rotor, and then remove the rotor.

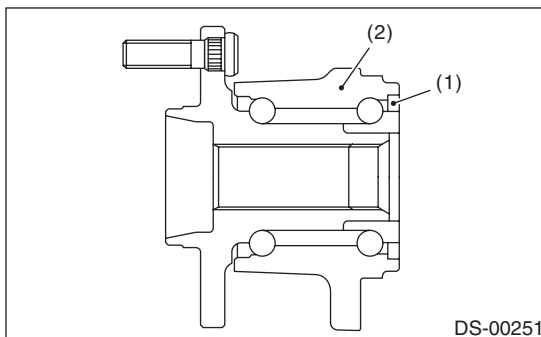
- 8) Remove the four bolts from rear arm.



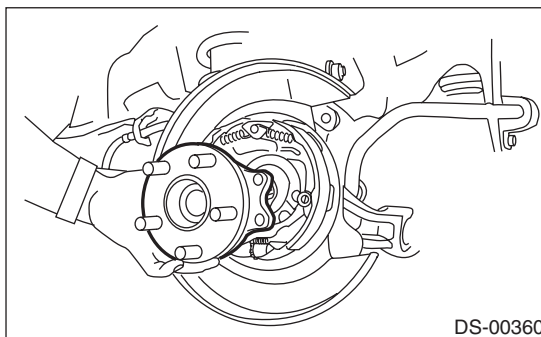
- 9) Remove the hub unit bearing.

#### CAUTION:

- Be careful not to damage the magnetic encoder.
- Do not get closer the tool which charged magnetism to magnetic encoder.



- (1) Magnetic encoder
- (2) Rear hub unit bearing

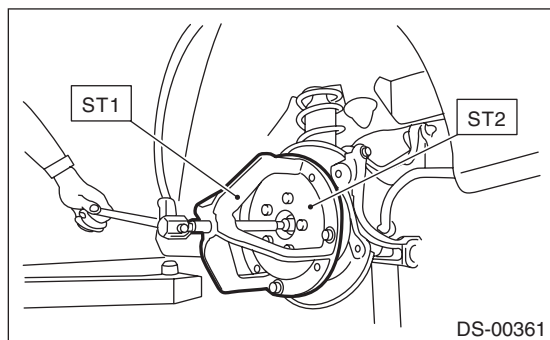


**NOTE:**

If it is hard to remove, use the ST.

ST1 926470000 AXLE SHAFT PULLER

ST2 28099PA110 AXLE SHAFT PULLER  
PLATE

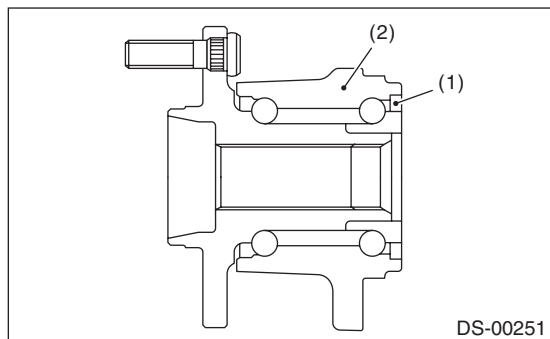


## B: INSTALLATION

1) Aligning the hub unit bearing to the mounting hole of the back plate, install the hub unit assembly and back plate. Tighten the axle nut temporarily.

**CAUTION:**

- Be careful not to damage the magnetic encoder.
- Do not get closer the tool which charged magnetism to magnetic encoder.

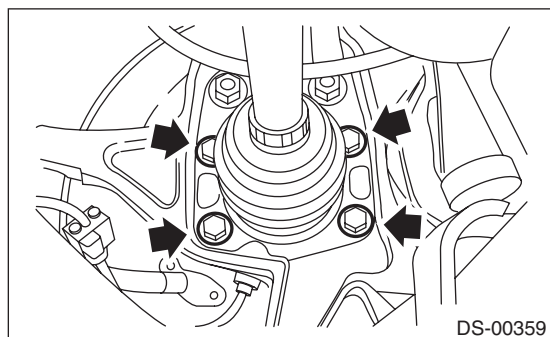


- (1) Magnetic encoder
- (2) Rear hub unit bearing

2) Tighten the four bolts to the rear housing.

**Tightening torque:**

**65 N·m (6.6 kgf-m, 47.9 ft-lb)**



3) Remove the axle nut.

4) Draw the rear drive shaft into specified position.

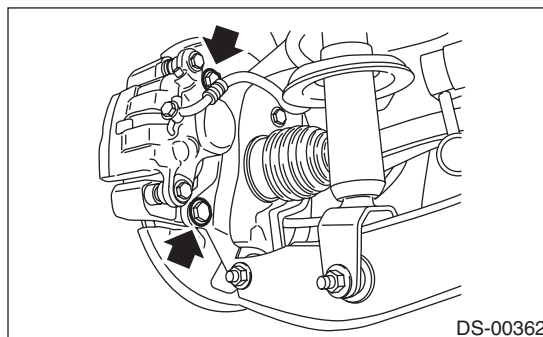
5) Tighten the new axle nut temporarily.

6) Install the disc rotor to hub.

7) Install the disc brake caliper on the rear housing.

**Tightening torque:**

**66 N·m (6.7 kgf-m, 48.7 ft-lb)**



8) Adjust the parking brake pedal stroke by turning the adjuster. <Ref. to PB-4, ADJUSTMENT, Parking Brake Pedal.>

9) While applying the parking brake and depressing the brake pedal, tighten a new axle nut to the specified torque and lock it securely.

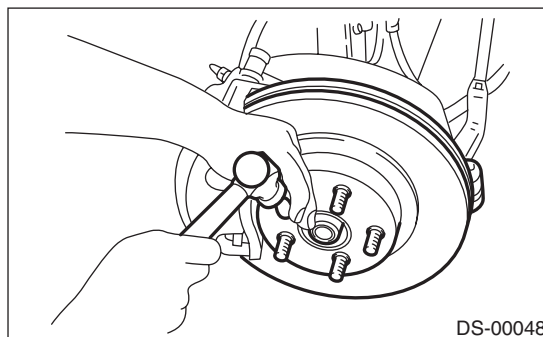
**Tightening torque:**

**240 N·m (24.5 kgf-m, 177 ft-lb)**

**CAUTION:**

- Install the wheel after installation of axle nut. Failure to follow this rule may damage the wheel bearing.
- Be sure to tighten the axle nut to specified torque. Do not overtighten it as this may damage the wheel bearing.

10) After tightening the axle nut, lock it securely.



11) Install the rear wheel and tighten the wheel nuts to specified torque.

**Tightening torque:**

**Chromed wheel**

**150 N·m (15.3 kgf-m, 110.6 ft-lb)**

**Other than above**

**120 N·m (12.2 kgf-m, 88.5 ft-lb)**

# Rear Hub Unit Bearing

## DRIVE SHAFT SYSTEM

### C: DISASSEMBLY

Using the ST and a hydraulic press, push out the hub bolts.

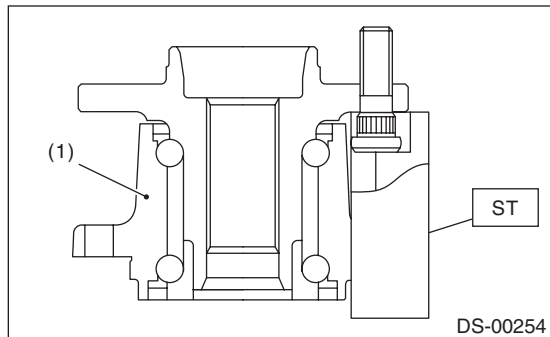
ST 28399AG000 HUB STAND

#### CAUTION:

- Be careful not to hammer the hub bolts. This may deform the hub.
- Do not reuse the hub bolt.

#### NOTE:

Since the hub unit bearing can not be disassembled, only hub bolts can be removed.

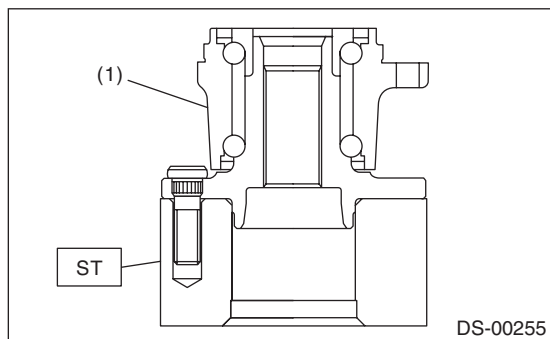


(1) Rear hub unit bearing

### D: ASSEMBLY

1) Attach the hub to the ST securely.

ST 28099PA080 HUB STAND



(1) Rear hub unit bearing

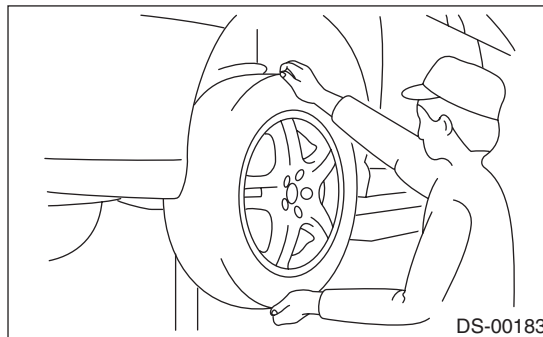
2) Using a press, press the new hub bolts until their seating surfaces contact the hub.

#### NOTE:

Use the 12 mm (0.47 in) dia. holes in the HUB STAND to prevent bolts from tilting.

### E: INSPECTION

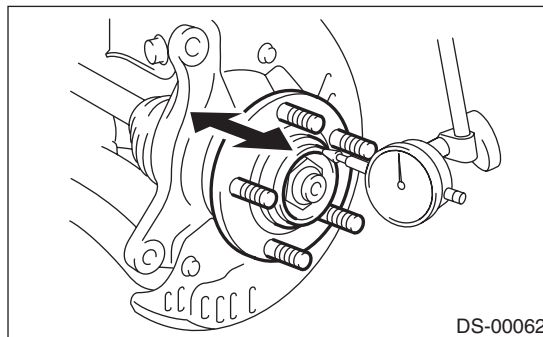
1) Moving the rear tire up and down by hand, check there is no backlash in bearing, and check the wheel rotates smoothly.



2) Inspect the lean of axis direction using a dial gauge. Replace the hub bearing if the play exceeds the limit value.

#### Service limit:

**Maximum: 0.05 mm (0.0020 in)**

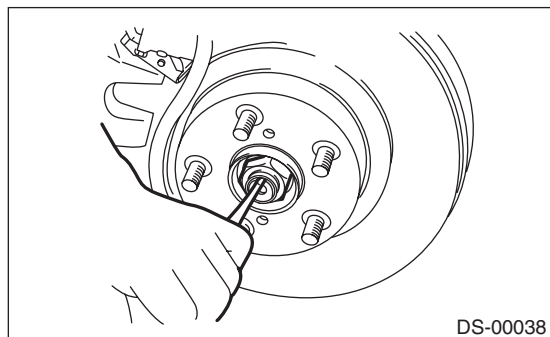




## 7. Front Drive Shaft

### A: REMOVAL

- 1) Disconnect the ground cable from the battery.
- 2) Lift up the vehicle, and remove the front wheels.
- 3) Drain the differential gear oil.
- 4) Lift the crimped section of axle nut.

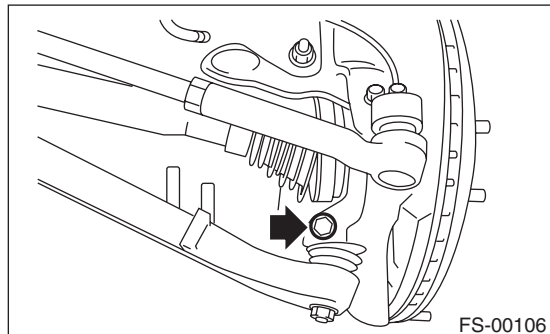


- 5) Remove the axle nut using a socket wrench while depressing the brake pedal.

#### CAUTION:

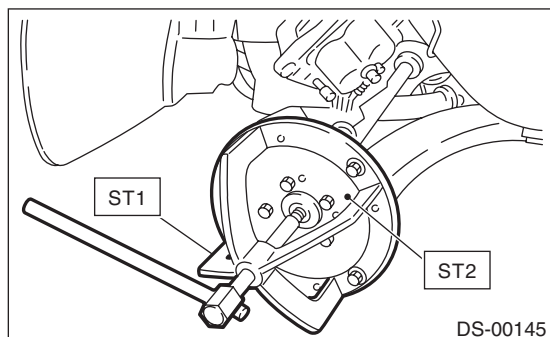
**Remove the wheel before loosening the axle nut. Failure to follow this rule may damage the wheel bearings.**

- 6) Remove the stabilizer link from front arm.
- 7) Disconnect the front arm ball joint from the front housing.



- 8) Remove the front drive shaft assembly. If it is hard to remove, use ST1 and ST2.

ST1 926470000 AXLE SHAFT PULLER  
ST2 28099PA110 AXLE SHAFT PULLER PLATE



- 9) Using a bar, remove the front drive shaft from transmission.

#### CAUTION:

**Be careful not to allow the bar to damage holder area.**

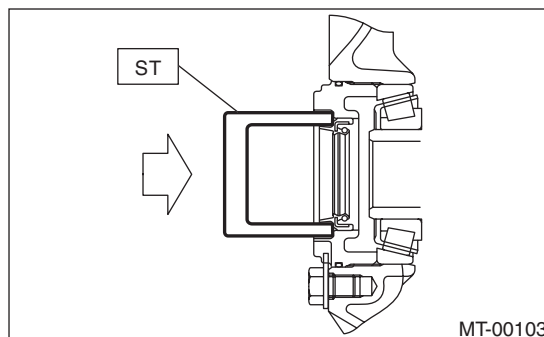
### B: INSTALLATION

- 1) Using the ST, replace the differential side retainer oil seal with a new seal.

ST 18675AA000 DIFFERENTIAL SIDE OIL SEAL INSTALLER

#### NOTE:

After pulling out the drive shaft, be sure to replace with a new oil seal.



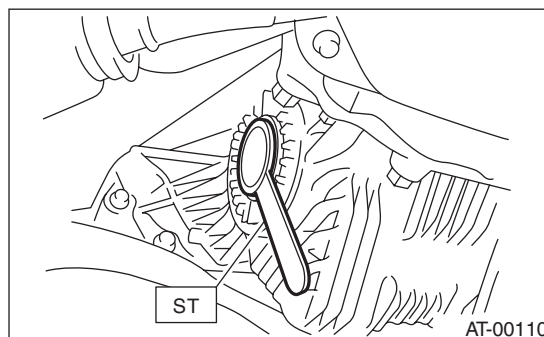
- 2) Insert the EBJ into hub splines.
- 3) Draw the drive shaft into specified position.

#### CAUTION:

**Do not hammer drive shaft when installing it.**

- 4) Tighten the axle nut temporarily.
- 5) Using the ST, install the front drive shaft to transmission.

ST 28399SA010 OIL SEAL PROTECTOR



- 6) Connect the front arm ball joint to the front housing.

#### Tightening torque:

**50 N·m (5.1 kgf-m, 36.9 ft-lb)**

- 7) Install the stabilizer link.

#### Tightening torque:

**60 N·m (6.1 kgf-m, 44.3 ft-lb)**

#### CAUTION:

**Be sure to use a new self-locking nut.**

# Front Drive Shaft

## DRIVE SHAFT SYSTEM

8) While depressing the brake pedal, tighten a new axle nut to the specified torque and lock it securely.

### **Tightening torque:**

**240 N·m (24.5 kgf·m, 177 ft·lb)**

### **CAUTION:**

- Install the wheel after installation of axle nut. Failure to follow this rule may damage the wheel bearing.
- Be sure to tighten axle nut to specified torque. Do not overtighten it as this may damage the wheel bearing.

9) After tightening axle nut, lock it securely.

10) Fill the differential gear oil.

11) Install the front wheel and tighten the wheel nuts to specified torque.

### **Tightening torque:**

#### **Chromed wheel**

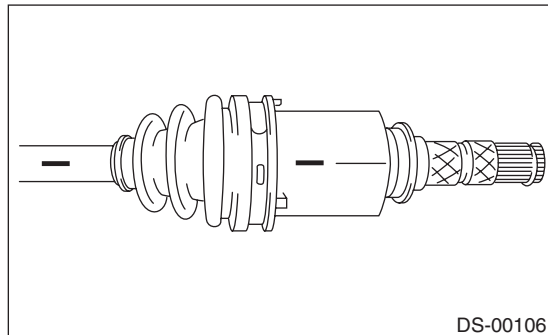
**150 N·m (15.3 kgf·m, 110.6 ft·lb)**

#### **Other than above**

**120 N·m (12.2 kgf·m, 88.5 ft·lb)**

## C: DISASSEMBLY

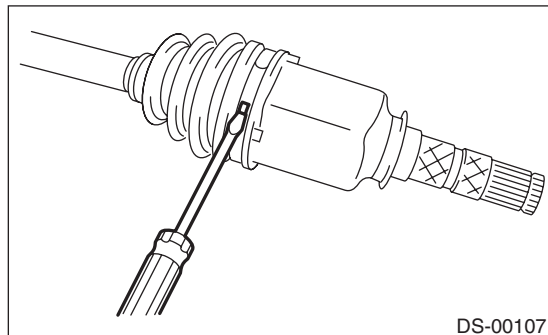
1) Place alignment marks on the shaft and outer race.



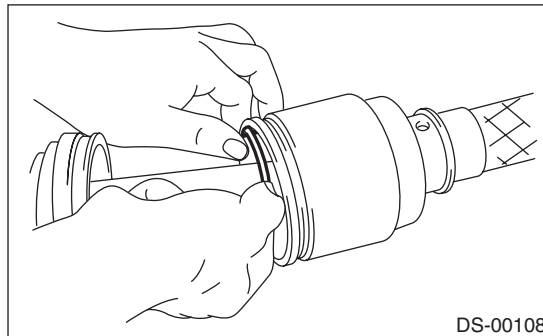
2) Remove the PTJ boot band and boot.

### **CAUTION:**

**Be careful not to damage the boot.**



3) Remove the snap ring from PTJ outer race.



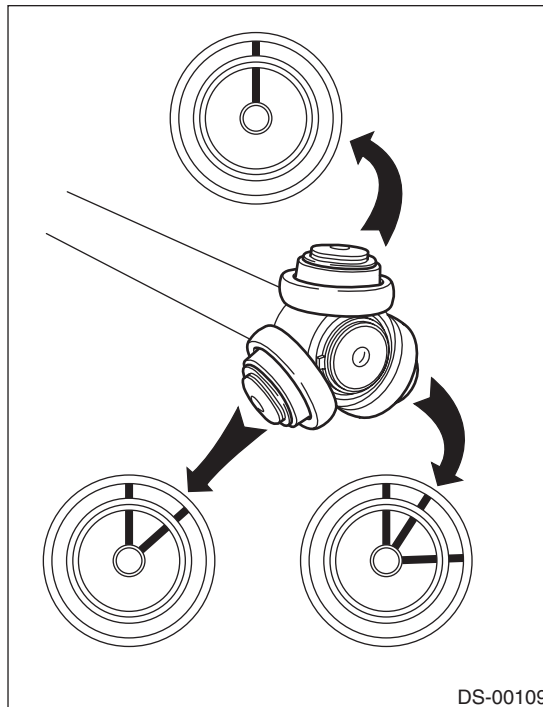
4) Remove the PTJ outer race from shaft assembly.

5) Wipe off grease.

### **CAUTION:**

**The grease is a special type of grease. Do not mix with other grease.**

6) Place alignment marks on the roller kit and trunnion.

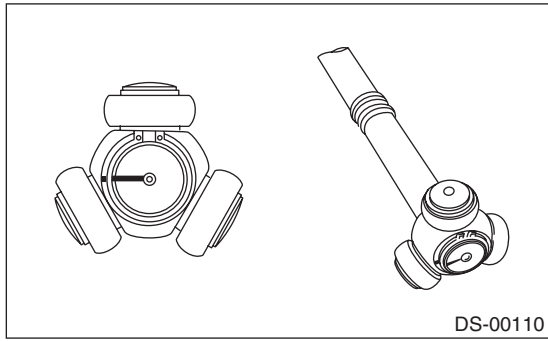


7) Remove the roller kit from trunnion.

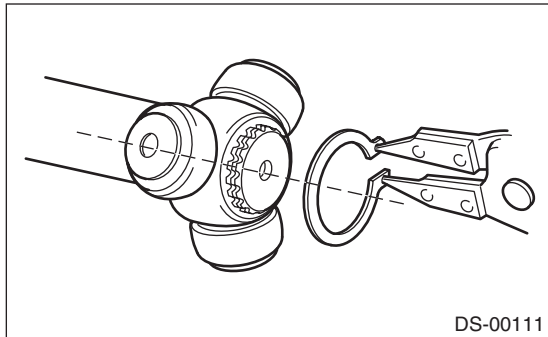
### **CAUTION:**

**Be careful with the roller kit position.**

8) Place alignment marks on the trunnion and shaft.



9) Remove the snap ring and trunnion.



**CAUTION:**  
Be sure to wrap shaft splines with vinyl tape to protect the boot from scratches.

10) Remove the PTJ boot.

NOTE:

The EBJ is a non-disassembly part, so the drive shaft disassembly stops here.

## D: ASSEMBLY

NOTE:

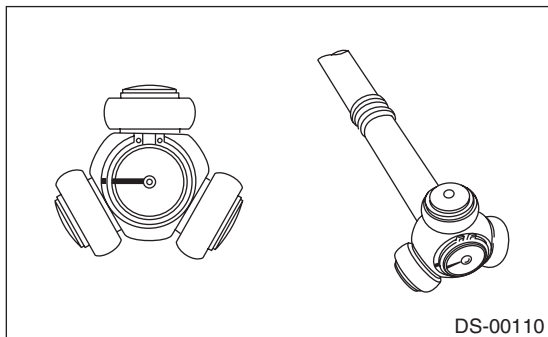
Use specified grease.

**PTJ side:**

**NKG302**

1) Place the PTJ boot at the center of shaft.

2) Align alignment marks and install the trunnion on the shaft.



3) Install the snap ring to shaft.

**CAUTION:**

Confirm that the snap ring is completely fitted in shaft groove.

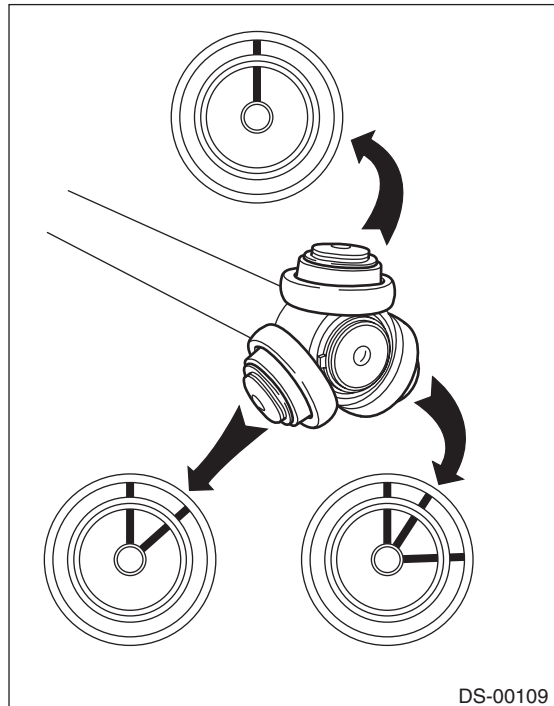
4) Fill 100 to 110 g (3.53 to 3.88 oz) of specified grease into the interior of PTJ outer race.

5) Apply a thin coat of specified grease to the roller kit and trunnion.

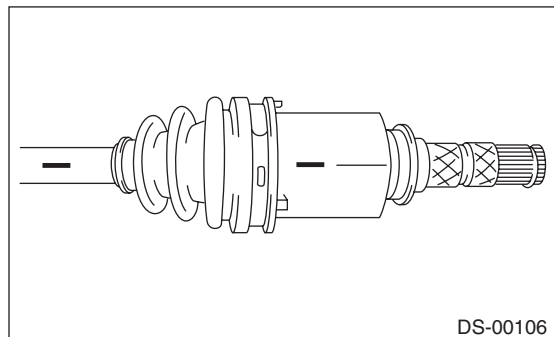
6) Align alignment marks on roller kit and trunnion and install the roller kit.

**CAUTION:**

Be careful with the roller kit position.



7) Align the alignment marks of the shaft and outer race, and install the outer race.



8) Install the snap ring in the groove on PTJ outer race.

**CAUTION:**

Pull the shaft lightly and assure that the snap ring is completely fitted in the groove.

9) 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.

# Front Drive Shaft

## DRIVE SHAFT SYSTEM

10) Install the PTJ boot taking care not to twist it.

### CAUTION:

- The large end of PTJ boot and the boot groove shall be cleaned completely so as to be free from grease and other substances.
- When installing PTJ boot, position outer race of PTJ at center of its travel.

11) Put a new band through the clip and wind twice in the band groove of the boot.

12) Pinch the end of band with pliers. Hold the clip and tighten securely.

### NOTE:

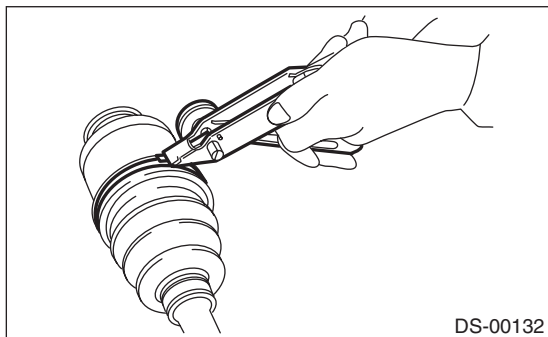
When tightening boot, use care so that the air within the boot is appropriate.

13) Tighten the band using the ST.

ST 925091000 BAND TIGHTENING TOOL

### NOTE:

Tighten the band until it cannot be moved by hand.

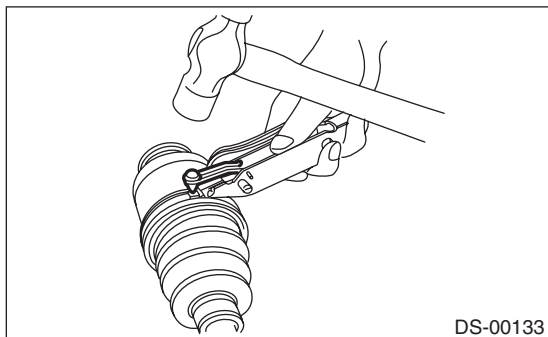


14) Tap the clip with the punch provided at the end of the ST.

ST 925091000 BAND TIGHTENING TOOL

### CAUTION:

Tap to an extent that the boot underneath is not damaged.



15) Cut off the band with an allowance of about 10 mm (0.39 in) left from the clip and bend this allowance over the clip.

### CAUTION:

Make sure that the end of the band is in close contact with clip.

16) Extend and retract the PTJ to provide equal grease coating.

## E: INSPECTION

Check the removed parts for damage, wear, corrosion etc. If faulty, repair or replace.

- PTJ (pillow tripod joint)

Check for seizure, corrosion, damage, wear and excessive play.

- EBJ (high-efficiency compact ball fixed joint)

Check for seizure, corrosion, damage and excessive play.

- Shaft

Check for excessive bending, twisting, damage and wear.

- Boot

Check for wear, warping, breakage and scratches.

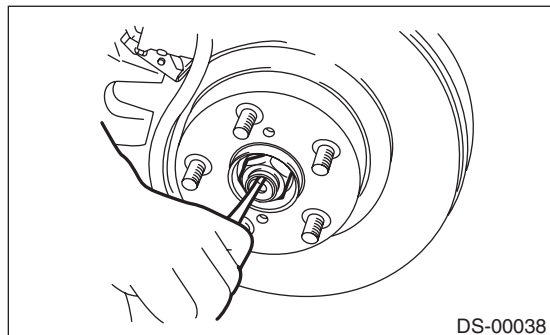
- Grease

Check for discoloration and fluidity.

## 8. Rear Drive Shaft

### A: REMOVAL

- 1) Disconnect the ground cable from battery.
- 2) Lift up the vehicle, and then remove the rear wheels.
- 3) Lift the crimped section of axle nut.



- 4) While applying the parking brake, remove the axle nut using a socket wrench.

#### CAUTION:

**Remove the wheel before loosening the axle nut. Failure to follow this rule may damage the wheel bearings.**

- 5) Remove the rear differential assembly.

VA-type

<Ref. to DI-19, REMOVAL, Rear Differential (VA-type).>

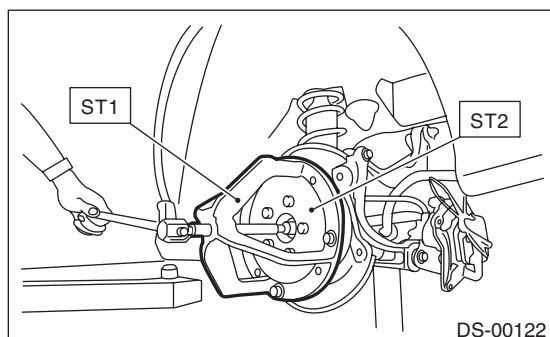
- 6) Remove the axle nut and rear drive shaft. If it is hard to remove, use ST1 and ST2.

ST1 926470000 AXLE SHAFT PULLER

ST2 28099PA110 AXLE SHAFT PULLER  
PLATE

#### CAUTION:

- Do not hammer drive shaft when removing it.
- Do not damage the oil seal and magnetic encoder.

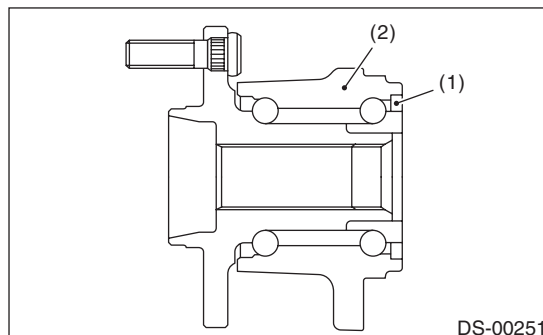


### B: INSTALLATION

- 1) Insert the EBJ into rear hub splines.

#### CAUTION:

- Be careful not to damage the magnetic encoder.
- Do not get closer the tool which charged magnetism to magnetic encoder.



(1) Magnetic encoder

(2) Rear hub unit bearing

- 2) Draw the rear drive shaft into specified position.

#### CAUTION:

**Do not hammer drive shaft when installing it.**

- 3) Tighten the axle nut temporarily.

- 4) Install the rear differential assembly.

VA-type

<Ref. to DI-20, INSTALLATION, Rear Differential (VA-type).>

- 5) While applying the parking brake and depressing the brake pedal, tighten a new axle nut to the specified torque and lock it securely.

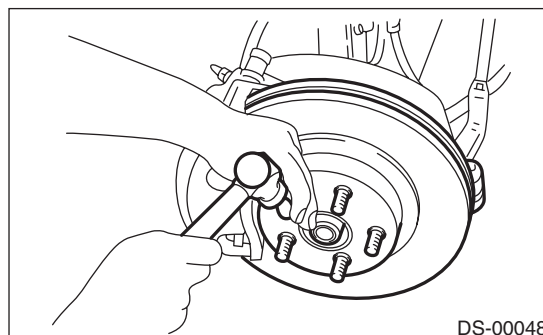
#### Tightening torque:

**240 N·m (24.5 kgf-m, 177 ft-lb)**

#### CAUTION:

- Install the wheel after installation of axle nut. Failure to follow this rule may damage the wheel bearing.
- Be sure to tighten the axle nut to specified torque. Do not overtighten it as this may damage the wheel bearing.

- 6) Lock the axle nut securely.



# Rear Drive Shaft

## DRIVE SHAFT SYSTEM

7) Install the rear wheel and tighten to specified torque.

### Tightening torque:

#### Chromed wheel

150 N·m (15.3 kgf·m, 110.6 ft·lb)

#### Other than above

120 N·m (12.2 kgf·m, 88.5 ft·lb)

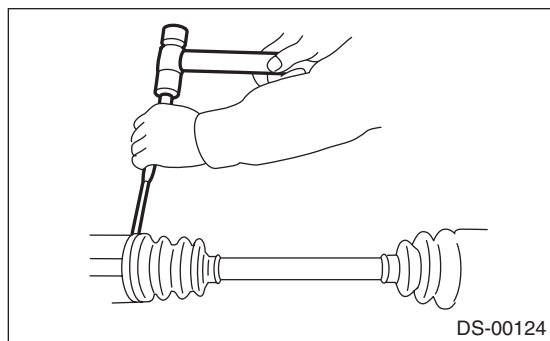
## C: DISASSEMBLY

1) Straighten the bent claw at the larger end of the DOJ boot.

2) Loosen the band by means of screwdriver or pliers.

### CAUTION:

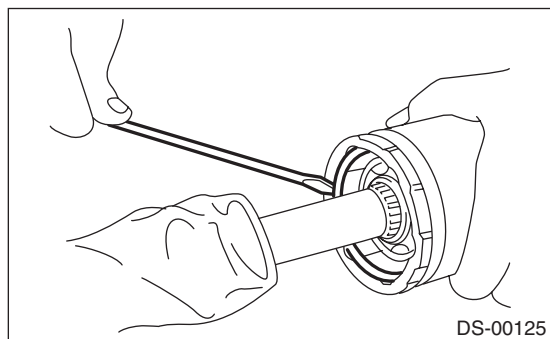
Be careful not to damage the boot.



3) Remove the 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 the circlip at the neck of DOJ outer race with a screwdriver.



6) Take out the DOJ outer race from the shaft assembly.

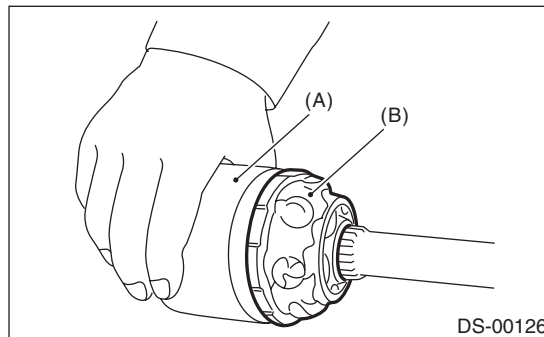
7) Wipe off the grease and take out the ball bearings.

### CAUTION:

The grease is a special grease (grease for constant velocity joints). Do not mix with other greases.

### NOTE:

Disassemble exercising care not to lose balls (6 pcs).



(A) Outer race

(B) Grease

8) To remove the cage from inner race, turn the cage by a half pitch to the track groove of inner race and shift the cage.

9) Using pliers, remove the snap ring fixing the inner race to the shaft.

10) Take out the DOJ inner race.

11) Take off the DOJ cage from shaft and remove the DOJ boot.

### CAUTION:

Be sure to wrap shaft splines with vinyl tape to prevent boot from scratches.

### NOTE:

The EBJ is a non-disassembly part, so the drive shaft disassembly stops here.

## D: ASSEMBLY

### NOTE:

Use specified grease.

### DOJ side:

#### NKG205

1) Place the DOJ boot at the center of shaft.

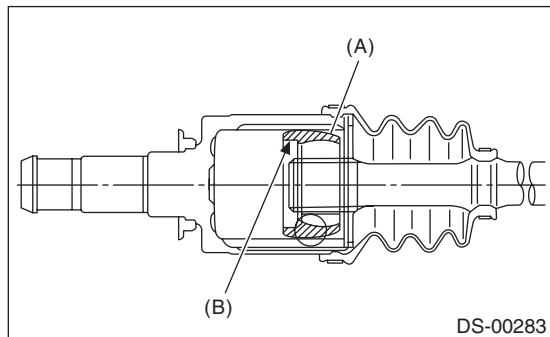
### CAUTION:

Be sure to wrap shaft splines with vinyl tape to prevent boot from scratches.

2) Insert the DOJ cage onto shaft.

**NOTE:**

Insert the cage with the cutout portion facing the shaft end, since the cage has an orientation.

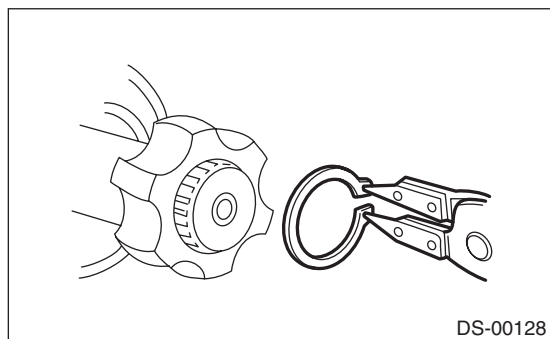


(A) Cage  
(B) Cutout portion

3) Install the DOJ inner race on shaft and fix the snap ring in place with pliers.

**NOTE:**

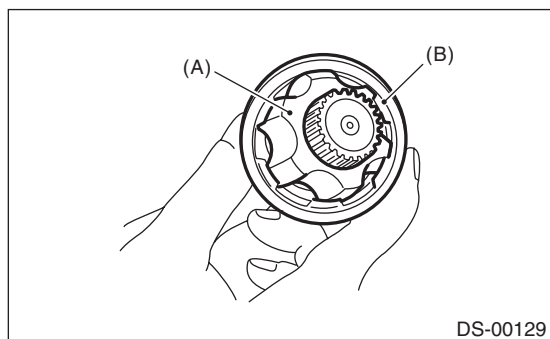
Confirm that the snap ring is completely fitted in the shaft groove.



4) Install the cage to inner race fixed upon shaft.

**NOTE:**

Fit the cage with the protruding section aligned with the track on the inner race, and turn by a half pitch.



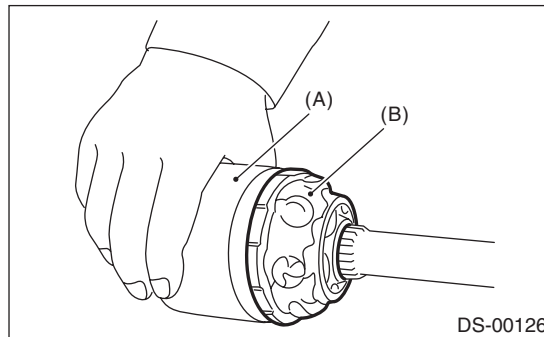
(A) Inner race  
(B) Cage

5) Fill 80 to 90 g (2.82 to 3.17 oz) of specified grease into the inner side of the DOJ outer race.

6) Apply a thin coat of specified grease to the cage pocket and six ball bearings.

7) Insert the six ball bearings into the cage pocket.

8) Align the outer race track and ball positions, and place the shaft, inner race, cage and ball bearings in the original positions, and then fix outer race in place.

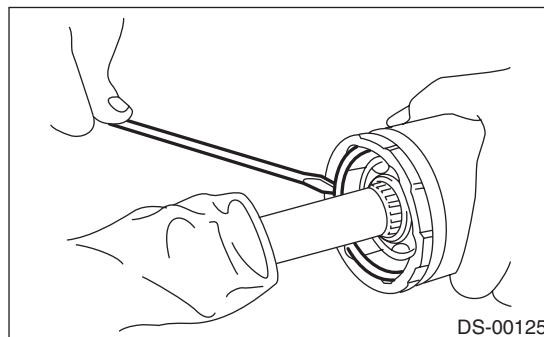


(A) Outer race  
(B) Grease

9) Install the snap ring in the groove on the DOJ outer race.

**NOTE:**

- Assure that the balls, cage and inner race are completely fitted in the outer race of DOJ.
- Use care not to place the matched position of snap ring in the ball groove of outer race.
- Pull the shaft lightly and assure that the circlip is completely fitted in the groove.



10) 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 the shaft.

11) Install the DOJ boot taking care not to twist it.

**NOTE:**

- The inside of the large end of DOJ boot and the boot groove shall be cleaned so as to be free from grease and other substances.
- When installing the DOJ boot, position the outer race of DOJ at center of the stroke.

12) Put a new band through the clip and wind twice in the band groove of the boot.

## Rear Drive Shaft

### DRIVE SHAFT SYSTEM

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13) Pinch the end of band with pliers. Hold the clip and tighten securely.

**NOTE:**

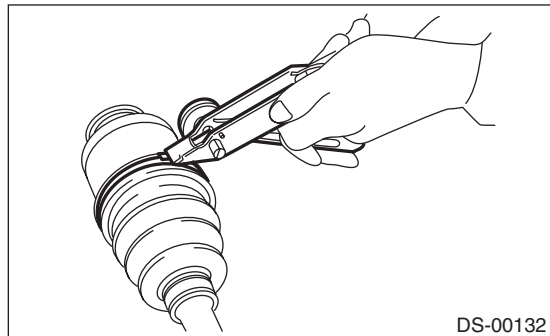
When tightening boot, use care so that the air within the boot is appropriate.

14) Tighten the band using the ST.

ST 925091000 BAND TIGHTENING TOOL

**NOTE:**

Tighten the band until it cannot be moved by hand.

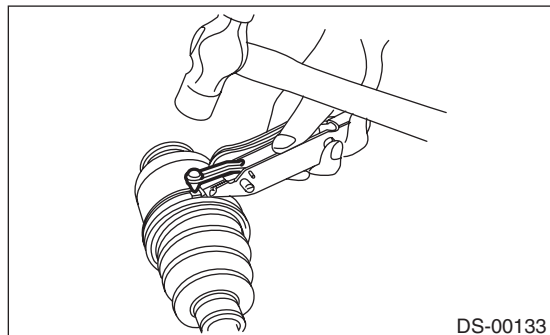


15) Tap the clip with the punch provided at the end of the ST.

ST 925091000 BAND TIGHTENING TOOL

**NOTE:**

Tap to an extent that the boot underneath is not damaged.



16) Cut off the band with an allowance of about 10 mm (0.39 in) left from the clip and bend this allowance over the clip.

**NOTE:**

Be careful so that the end of the band is in close contact with clip.

17) Install the EBJ boot using the same procedures as for the DOJ boot.

18) Extend and retract the DOJ repeatedly to provide an equal coating of grease.

## E: INSPECTION

Check the removed parts for damage, wear, corrosion etc. Repair or replace if defective.

- DOJ (Double Offset Joint)

Check for seizure, corrosion, damage, wear and excessive play.

- EBJ (high-efficiency compact ball fixed joint)

Check for seizure, corrosion, damage, wear and excessive play.

- Shaft

Check for excessive bending, twisting, damage and wear.

- Boot

Check for wear, warping, breakage and scratches.

- Grease

Check for discoloration and fluidity.



## 9. General Diagnostic Table

### A: INSPECTION

**NOTE:**

Vibration while cruising may be caused by an unbalanced tire, improper tire inflation pressure, improper wheel alignment, etc.

Symptoms	Possible cause	Corrective action
<b>Noise or vibration from propeller shaft</b>	Center bearing	Check the center bearing. <Ref. to DS-12, CENTER BEARING FREE PLAY, INSPECTION, Propeller Shaft.>
	Runout of propeller shaft	Check for deflection of the propeller shaft. <Ref. to DS-12, RUNOUT OF PROPELLER SHAFT, INSPECTION, Propeller Shaft.>
	Loose or gap at connections	Check the joints and connectors. <Ref. to DS-11, JOINTS AND CONNECTIONS, INSPECTION, Propeller Shaft.> Check the spline and bearing. <Ref. to DS-11, SPLINES AND BEARING, INSPECTION, Propeller Shaft.>
<b>Abnormal wheel vibration</b>	Wheel is out of balance.	Check the wheel balance. <Ref. to WT-6, WHEEL BALANCING, INSPECTION, Tire and Wheel.>
	Front wheel alignment	Check the front wheel alignment. <Ref. to FS-6, INSPECTION, Wheel Alignment.>
	Rear wheel alignment	Check the rear wheel alignment. <Ref. to RS-7, INSPECTION, Wheel Alignment.>
	Front strut	Check the front strut. <Ref. to FS-22, INSPECTION, Front Strut.>
	Rear shock absorber	Check the rear shock absorber. <Ref. to RS-13, INSPECTION, Rear Shock Absorber.>
	Front drive shaft	Check the front drive shaft. <Ref. to DS-28, INSPECTION, Front Drive Shaft.>
	Rear drive shaft	Check the rear drive shaft. <Ref. to DS-32, INSPECTION, Rear Drive Shaft.>
	Front hub unit bearing	Check the front hub unit bearing. <Ref. to DS-21, INSPECTION, Front Hub Unit Bearing.>
	Rear hub unit bearing	Check the rear hub unit bearing. <Ref. to DS-24, INSPECTION, Rear Hub Unit Bearing.>
<b>Noise from the underbody</b>	Wheel is out of balance.	Check the wheel balance. <Ref. to WT-6, WHEEL BALANCING, INSPECTION, Tire and Wheel.>
	Front wheel alignment	Check the front wheel alignment. <Ref. to FS-6, INSPECTION, Wheel Alignment.>
	Rear wheel alignment	Check the rear wheel alignment. <Ref. to RS-7, INSPECTION, Wheel Alignment.>
	Front strut	Check the front strut. <Ref. to FS-22, INSPECTION, Front Strut.>
	Rear shock absorber	Check the rear shock absorber. <Ref. to RS-13, INSPECTION, Rear Shock Absorber.>

# General Diagnostic Table

DRIVE SHAFT SYSTEM

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# VEHICLE DYNAMICS CONTROL (VDC)

# VDC

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2. VDC Control Module and Hydraulic Control Unit (VDCCM&H/U) .....	7
3. ABS Sequence Control .....	12
4. VDC Sequence Control .....	15
5. Yaw Rate and G Sensor .....	18
6. Steering Angle Sensor .....	19
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9. Front Magnetic Encoder .....	24
10. Rear Magnetic Encoder .....	25
11. TCS OFF Switch .....	26

# General Description

VEHICLE DYNAMICS CONTROL (VDC)

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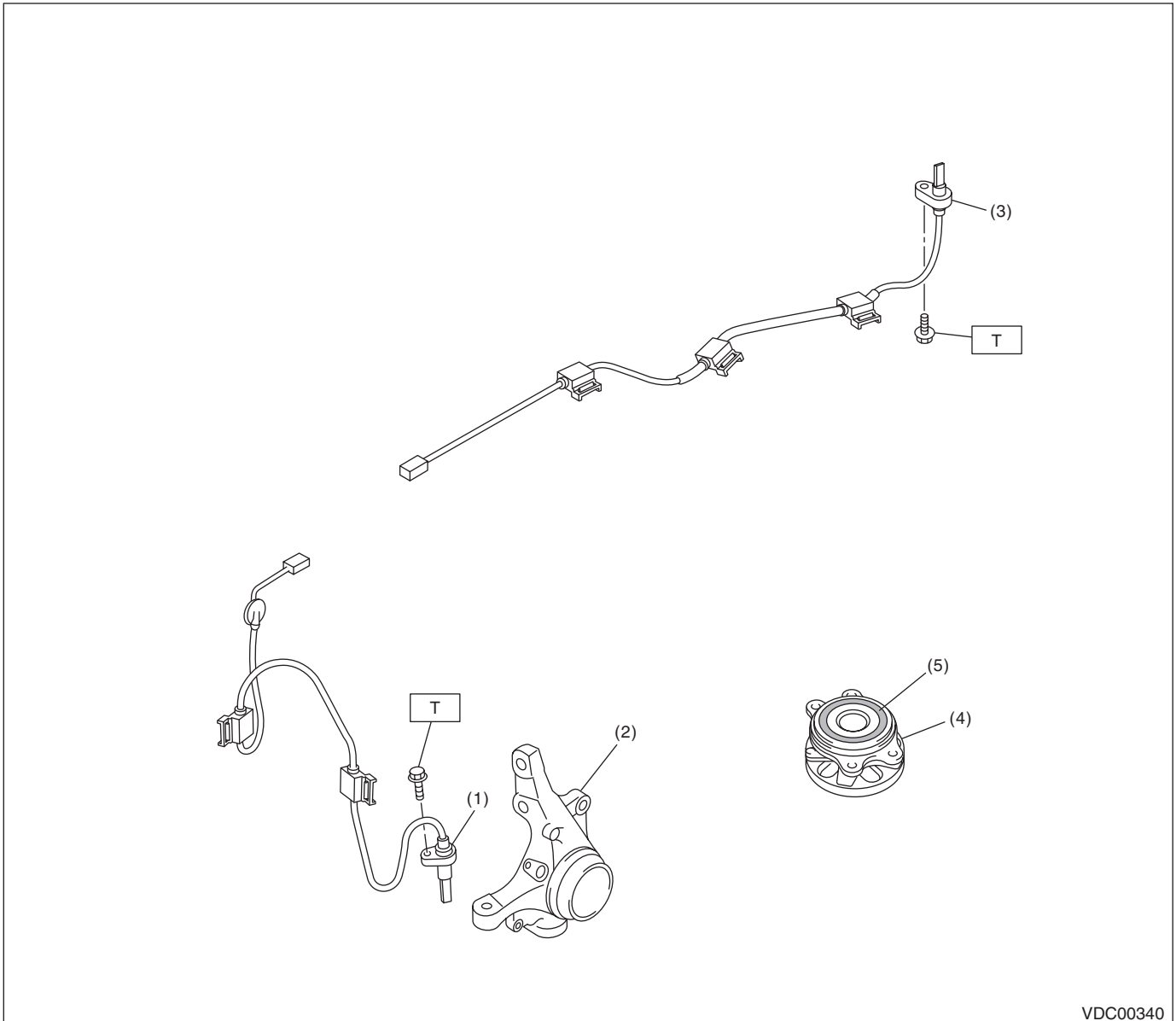
## 1. General Description

### A: SPECIFICATION

Item			Specification or identification
ABS wheel speed sensor	ABS wheel speed sensor gap (for reference)	Front	0.55 — 1.45 mm (0.022 — 0.057 in)
		Rear	0.50 — 1.50 mm (0.020 — 0.059 in)
	Identifications of harness (marks, color)	Front	W1 (White)
		Rear	W3 (White)
VDCCM&H/U Identification			W3

## B: COMPONENT

### 1. ABS WHEEL SPEED SENSOR



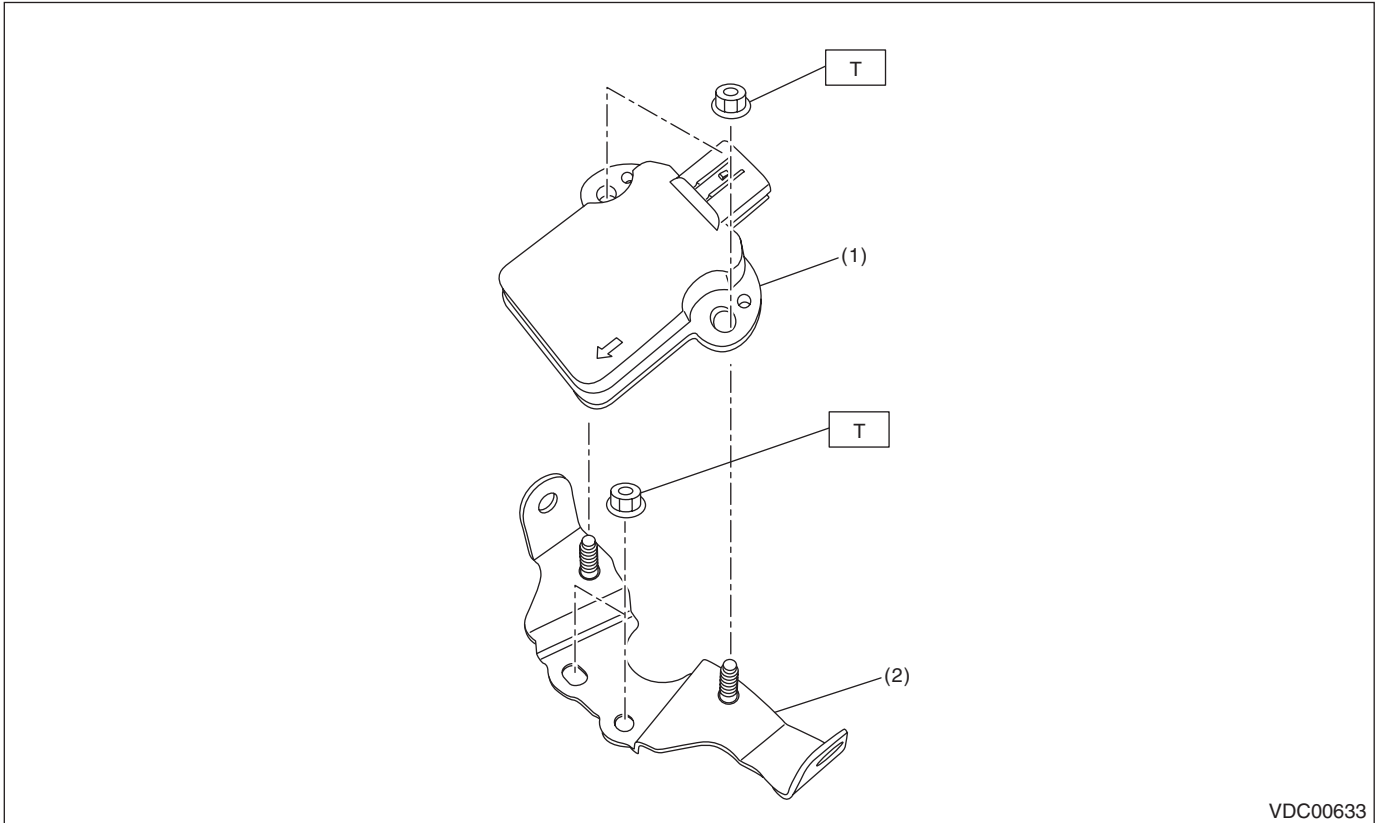
- |                                  |                      |
|----------------------------------|----------------------|
| (1) Front ABS wheel speed sensor | (4) Hub unit bearing |
| (2) Front housing                | (5) Magnetic encoder |
| (3) Rear ABS wheel speed sensor  |                      |

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

# General Description

VEHICLE DYNAMICS CONTROL (VDC)

## 2. YAW RATE & LATERAL G SENSOR



VDC00633

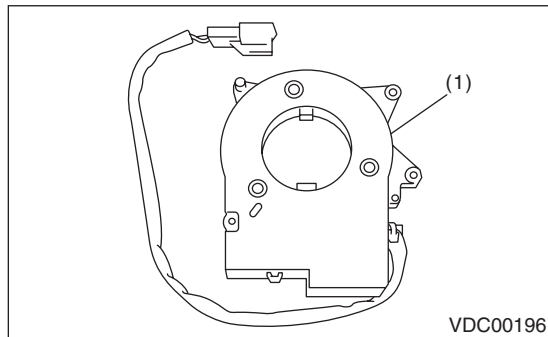
- (1) Yaw rate & lateral G sensor
- (2) Bracket

---

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

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## 3. STEERING ANGLE SENSOR

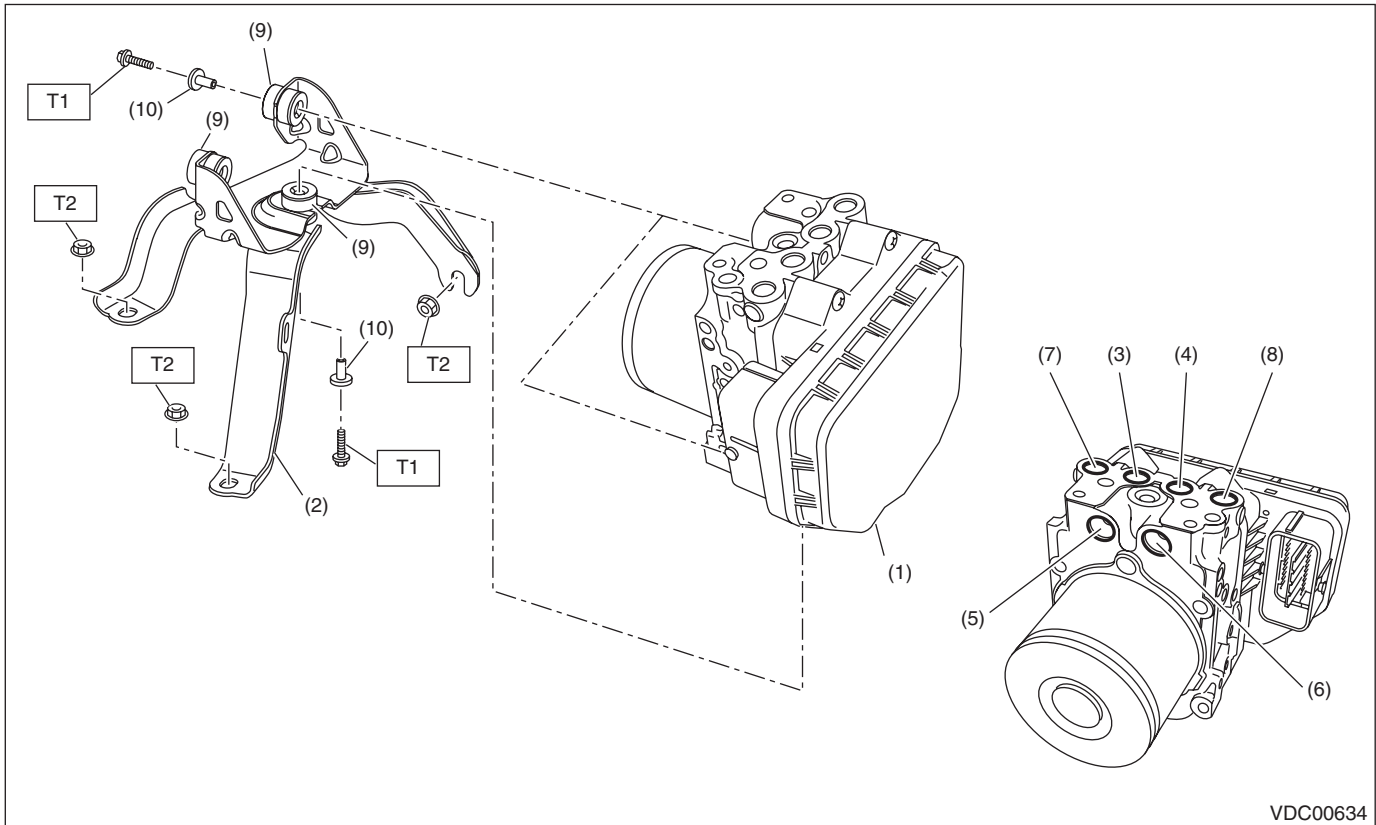


- (1) Steering angle sensor

# General Description

VEHICLE DYNAMICS CONTROL (VDC)

## 4. VDC CONTROL MODULE AND HYDRAULIC CONTROL UNIT (VDCCM&H/U)



- |   |                     |
|---|---------------------|
| (1) VDC control module & hydraulic control unit (VDCCM&H/U) | (6) Primary inlet   |
| (2) Bracket   | (7) Front LH outlet |
| (3) Rear RH outlet  | (8) Front RH outlet |
| (4) Rear LH outlet  | (9) Damper          |
| (5) Secondary inlet   | (10) Spacer         |

**Tightening torque: N·m (kgf·m, ft·lb)**

**T1: 7.5 (0.76, 5.53)**

**T2: 33 (3.4, 24.3)**

# General Description

## VEHICLE DYNAMICS CONTROL (VDC)

### C: CAUTION

Please understand and adhere to the following general precautions. They must be strictly followed to avoid any injury to the person performing the work or persons in the area.

#### 1. OPERATION

- Wear appropriate work clothing, including a cap, protective goggles and protective shoes when performing any work.
- 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 disconnecting connectors of sensors or units, be sure to disconnect the ground cable from the battery.
- Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
- Vehicle components are extremely hot after driving. Be wary of receiving burns from heated parts.
- Be sure to tighten fasteners including bolts and nuts to the specified torque.
- Place shop jacks or rigid racks at the specified points.

#### 2. OIL

When handling oil, follow the rules below to prevent unexpected accidents.

- Prepare container and waste cloths when performing work which oil could possibly spill. If oil spills, wipe it off immediately to prevent from penetrating into floor or flowing outside, for environmental protection.
- Follow all government and local regulations concerning waste disposal.

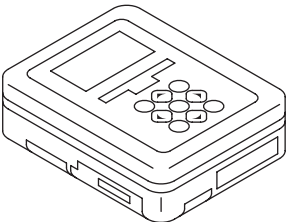
#### 3. BRAKE FLUID

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.
- Follow all government and local regulations concerning waste disposal.

### D: PREPARATION TOOL

#### 1. SPECIAL TOOL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST1B022XU0	1B022XU0	SUBARU SELECT MONITOR III KIT	Used for troubleshooting the electrical system.

#### 2. GENERAL TOOL

TOOL NAME	REMARKS
Circuit tester	Used for measuring resistance, voltage and current.
Pressure gauge	Used for measuring oil pressure.
Oscilloscope	Used for measuring the sensor.



## 2. VDC Control Module and Hydraulic Control Unit (VDCCM&H/U)

### A: REMOVAL

- 1) Disconnect the ground cable from battery.
- 2) Remove the air intake duct and air cleaner case.
- 3) Use compressed air to remove moisture and dust around the VDCCM&H/U.

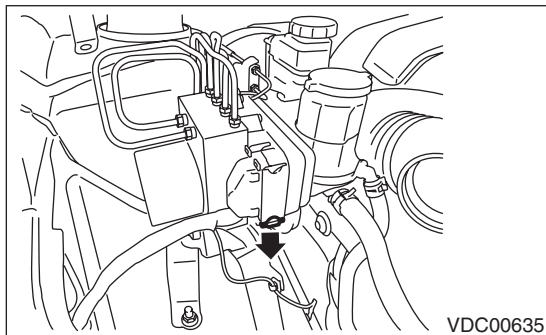
#### NOTE:

If the terminals become dirty, it may cause improper contact.

- 4) Pull down the lock lever and disconnect the VDCCM&H/U connector.

#### CAUTION:

Do not pull on the harness when disconnecting the connector.

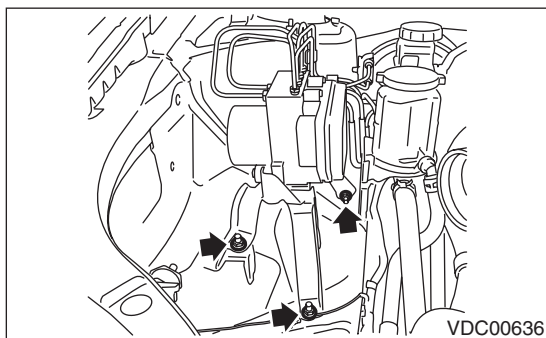


- 5) Disconnect the brake pipes from the VDCCM&H/U.
- 6) Wrap the brake pipe with a vinyl bag so as not to spill the brake fluid on the vehicle body.

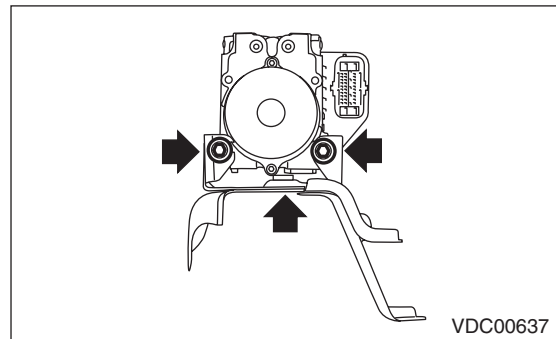
#### CAUTION:

If brake fluid is spilled on the vehicle body, wash it off immediately with water and wipe clean.

- 7) Remove the nuts and remove the VDCCM&H/U with the bracket as a unit.



- 8) Remove the bolts and remove the VDCCM&H/U.



#### CAUTION:

- The VDCCM&H/U cannot be disassembled. Do not attempt to loosen the bolts and nuts.
- Do not drop or bump the VDCCM&H/U.
- Do not turn the VDCCM&H/U upside down or place it sideways for storage.
- Be careful not to let foreign matter enter the VDCCM&H/U.
- Be careful that no water enters the connectors.

### B: INSTALLATION

- 1) Install the VDCCM&H/U to the bracket.

#### Tightening torque:

**7.5 N·m (0.76 kgf-m, 5.53 ft-lb)**

- 2) Install the VDCCM&H/U bracket.

#### Tightening torque:

**33 N·m (3.3 kgf-m, 24.3 ft-lb)**

- 3) Connect the brake pipes to their correct VDCCM&H/U positions.

#### Tightening torque:

**<Ref. to BR-7, FRONT BRAKE PIPES AND HOSES, COMPONENT, General Description.>**

- 4) Connect the VDCCM&H/U connector.

#### NOTE:

- Be sure to remove all foreign matter from inside the connector before connecting.
- Make sure the VDCCM&H/U connector is securely locked.
- 5) Bleed air from the brake system.

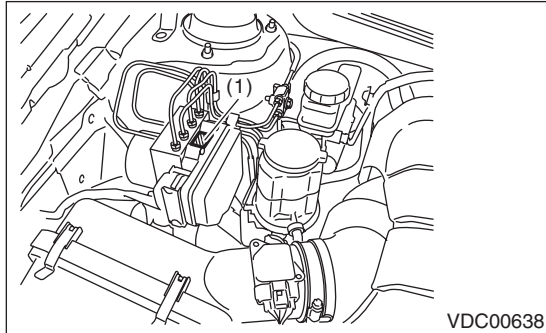
# VDC Control Module and Hydraulic Control Unit (VDCCM&H/U)

## VEHICLE DYNAMICS CONTROL (VDC)

### C: INSPECTION

- 1) Check the condition of connection and settlement of connector.
- 2) Check the mark used for VDCCM&H/U identification.

Refer to "SPECIFICATION" for the identification mark. <Ref. to VDC-2, SPECIFICATION, General Description.>



(1) Identification mark

### 1. CHECKING THE HYDRAULIC UNIT ABS OPERATION BY PRESSURE GAUGE

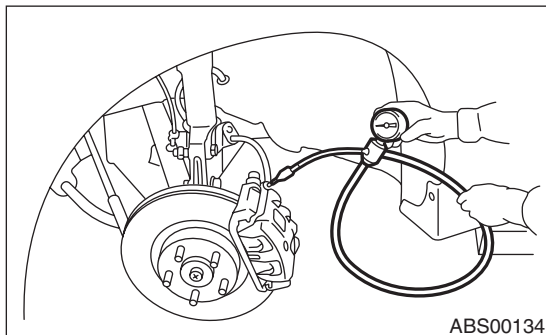
- 1) Lift up the vehicle and remove the wheel.
- 2) Remove the air bleeder screws from FL and FR caliper bodies.
- 3) Connect two pressure gauges to FL and FR caliper bodies.

#### CAUTION:

- Use a pressure gauge used exclusively for brake fluid measurement.
- Do not use the pressure gauge used for the measurement of transmission oil. Doing so will cause the piston seal to expand and deform.

#### NOTE:

Wrap sealing tape around the pressure gauge.



- 4) Bleed air from the pressure gauges and the FL and FR caliper bodies.
- 5) Perform ABS sequence control. <Ref. to VDC-12, ABS Sequence Control.>
- 6) When the hydraulic unit begins to work, first the FL side performs decompression, hold and compression, and then the FR side performs decompression, hold 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. Depress the brake pedal and check that the kick-back is normal, and tightness is normal.

	Front wheel	Rear wheel
Initial value	3,500 kPa (36 kgf/cm <sup>2</sup> , 511 psi)	3,500 kPa (36 kgf/cm <sup>2</sup> , 511 psi)
When depressurized	500 kPa (5 kgf/cm <sup>2</sup> , 73 psi) or less	500 kPa (5 kgf/cm <sup>2</sup> , 73 psi) or less
When pressurized	3,500 kPa (36 kgf/cm <sup>2</sup> , 511 psi) or more	3,500 kPa (36 kgf/cm <sup>2</sup> , 511 psi) or more

8) Disconnect the pressure gauges from FL and FR caliper bodies.

9) Install the air bleeder screws of FL and FR caliper bodies.

10) Remove the air bleeder screws from RL and RR caliper bodies.

11) Connect two pressure gauges to RL and RR caliper bodies.

12) Bleed air from the brake system.

13) Bleed air from RL and RR caliper bodies, and pressure gauge.

14) Perform ABS sequence control.

<Ref. to VDC-12, ABS Sequence Control.>

15) When the hydraulic unit begins to work, first the RR side performs decompression, hold and compression, and then the RL side performs decompression, hold and compression.

16) Read values indicated on the pressure gauge and check if the fluctuation of the values between decompression and compression meets specification. Depress the brake pedal and check that the kick-back is normal, and tightness is normal.

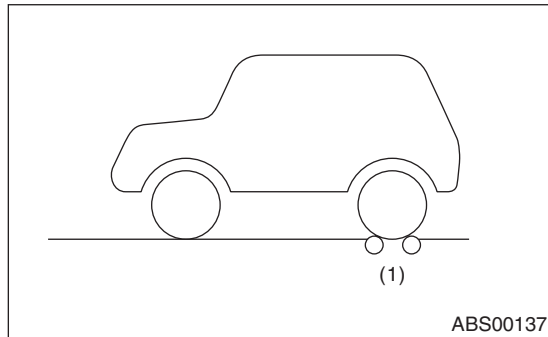
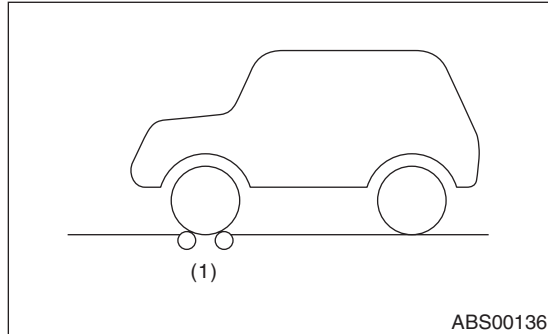
17) Disconnect the pressure gauge from the RL and RR caliper bodies.

18) Install the air bleeder screws of RL and RR caliper bodies.

19) Bleed air from the brake system.

### 2. CHECKING THE HYDRAULIC UNIT ABS OPERATION WITH THE BRAKE TESTER

- 1) Set wheels other than the one to measure on free rollers.
- 2) Prepare for the ABS sequence control operation.  
<Ref. to VDC-12, ABS Sequence Control.>
- 3) Set the front wheels or rear wheels on the brake tester and set the select lever position to the "N" range.



(1) Brake tester

- 4) Operate the brake tester.
- 5) Perform ABS sequence control.  
<Ref. to VDC-12, ABS Sequence Control.>
- 6) When the hydraulic unit begins to work, check the following work sequence.
  - (1) The FL wheel performs decompression, hold and compression in sequence, and subsequently the FR wheel repeats the cycle.
  - (2) The RR wheel performs decompression, hold 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 the values between decompression and compression meets specification.

	Front wheel	Rear wheel
Initial value	2,000 N (204 kgf, 450 lb)	2,000 N (204 kgf, 450 lb)
When depressurized	500 N (51 kgf, 112 lb) or less	500 N (51 kgf, 112 lb) or less
When pressurized	2,000 N (204 kgf, 450 lb) or more	2,000 N (204 kgf, 450 lb) or more

- 8) After the inspection, depress the brake pedal and check that it is not abnormally hard, and tightness is normal.

### 3. CHECKING THE HYDRAULIC UNIT VDC OPERATION USING A PRESSURE GAUGE

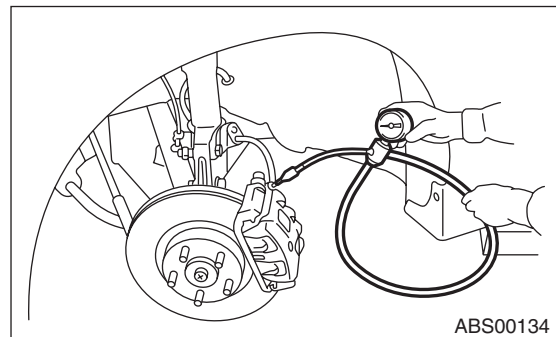
- 1) Lift up the vehicle and remove the wheel.
- 2) Remove the air bleeder screws from FL and FR caliper bodies.
- 3) Connect two pressure gauges to FL and FR caliper bodies.

#### CAUTION:

- Use a pressure gauge used exclusively for brake fluid measurement.
- Do not use a pressure gauge used for the measuring transmission oil pressure, as the piston seal may expand and deform.

#### NOTE:

Wrap sealing tape around the pressure gauge.



- 4) Bleed air from the pressure gauge.
- 5) Perform VDC sequence control.  
<Ref. to VDC-15, VDC Sequence Control.>
- 6) When the hydraulic unit begins to work, first the FL side performs compression, hold, and decompression, and then the FR side performs compression, hold, and decompression.

# VDC Control Module and Hydraulic Control Unit (VDCCM&H/U)

## VEHICLE DYNAMICS CONTROL (VDC)

7) Read values indicated on the pressure gauge and check if the fluctuation of the values between decompression and compression meets specification. Depress the brake pedal and check that it is not abnormally hard, and tightness is normal.

	Front wheel	Rear wheel
When pressurized	3,000 kPa (31 kgf/cm <sup>2</sup> , 441 psi) or more	3,000 kPa (31 kgf/cm <sup>2</sup> , 441 psi) or more
When depressurized	500 kPa (5 kgf/cm <sup>2</sup> , 73 psi) or less	500 kPa (5 kgf/cm <sup>2</sup> , 73 psi) or less

8) Disconnect the pressure gauges from FL and FR caliper bodies.

9) Install the air bleeder screws of FL and FR caliper bodies.

10) Remove the air bleeder screws from RL and RR caliper bodies.

11) Connect two pressure gauges to RL and RR caliper bodies.

12) Bleed air from RL and RR caliper bodies, and pressure gauge.

13) Perform VDC sequence control.

<Ref. to VDC-15, VDC Sequence Control.>

14) When the hydraulic unit begins to work, first the RR side performs compression, hold, and decompression, and then the RL side performs compression, hold, and decompression.

15) Read the values indicated on the pressure gauges and check if it is within specification. Depress the brake pedal and check that it is not abnormally hard, and tightness is normal.

16) Disconnect the pressure gauge from the RL and RR caliper bodies.

17) Install the air bleeder screws of RL and RR caliper bodies.

18) Bleed air from the brake line.

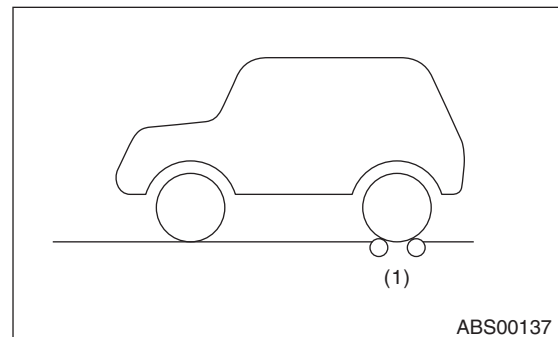
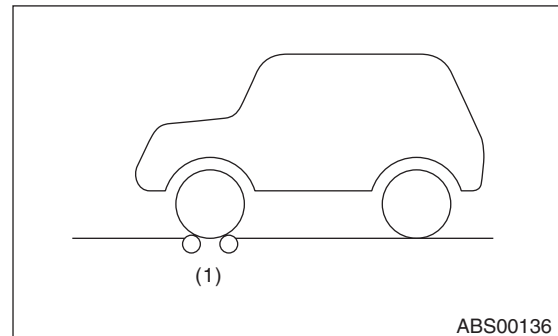
### 4. CHECKING THE HYDRAULIC UNIT VDC OPERATION WITH BRAKE TESTER

1) Set wheels other than the one to measure on free rollers.

2) Prepare to operate the VDC sequence control.

<Ref. to VDC-15, VDC Sequence Control.>

3) Set the front wheels or rear wheels on the brake tester and set the select lever position to the "N" range.



(1) Brake tester

4) Operate the brake tester.

5) Perform VDC sequence control.

<Ref. to VDC-15, VDC Sequence Control.>

6) When the hydraulic unit begins to work, check the following work sequence.

(1) The FL wheel performs compression, hold and decompression in sequence, and subsequently the FR wheel repeats the cycle.

(2) The RR wheel performs compression, hold and decompression in sequence, and subsequently the RL wheel repeats the cycle.

7) Read values indicated on the brake tester and check if the fluctuation of the values between decompression and compression meets specification.

	Front wheel	Rear wheel
When pressurized	2,000 N (204 kgf, 450 lb) or more	2,000 N (204 kgf, 450 lb) or more
When depressurized	500 N (51 kgf, 112 lb) or less	500 N (51 kgf, 112 lb) or less

8) After the inspection, depress the brake pedal and check that it is not abnormally hard, and tightness is normal.

## D: ADJUSTMENT

When the following replacement, removal and installation are performed, be sure to perform the centering of the steering angle sensor and zero point setting of the yaw rate & lateral G sensor.

- VDCCM&H/U
  - Steering angle sensor
  - Yaw rate & lateral G sensor
  - Steering wheel parts (Including airbag)
  - Suspension parts
  - Wheel alignment adjustment
- 1) Park the vehicle straight on a level surface. (Engine operation in the “P” or “N” range)
  - 2) Check that steering wheel is positioned at the center. (When the center position is not correct, adjust the wheel alignment.)
  - 3) Set the Subaru Select Monitor III to the vehicle, and select {Set up mode for Neutral of Steering Angle Sensor & Lateral G Sensor 0 point} in the “Function check sequence” screen. (Follow the steps on the display.)
  - 4) On the “Brake Control System” display screen, select {Current Data Display & Save}, and check that the steering angle sensor shows “0 deg”.
  - 5) When the “0 deg” is not displayed, repeat the above steps and check that the “0 deg” is displayed.
  - 6) Drive the vehicle for 10 minutes, and check that the ABS and VDC warning light is not illuminated.
  - 7) Check that there is no unnecessary VDC operation or steering control loss. If there is a problem, repeat the steps above.

## 3. ABS Sequence Control

### A: OPERATION

- 1) While the ABS sequence control is being performed, the operation of the hydraulic unit can be checked using the brake tester or pressure gauge after the hydraulic unit solenoid valve operation.
- 2) ABS sequence control can be started by the Subaru Select Monitor.

#### 1. ABS SEQUENCE CONTROL WITH SUBARU SELECT MONITOR

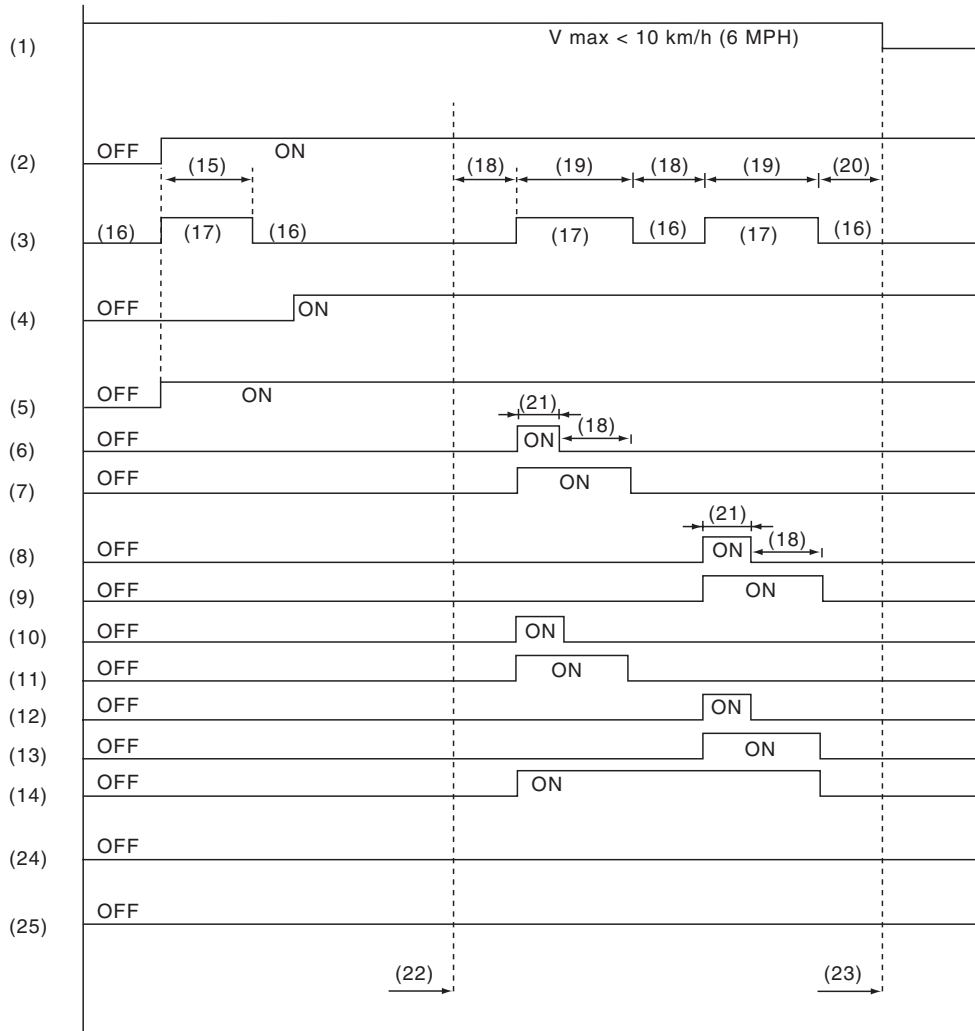
**NOTE:**

In the event of any trouble, the ABS sequence control will not operate.

- 1) Connect the Subaru Select Monitor to data link connector under the driver's side instrument panel lower cover.
- 2) Turn the ignition switch to ON.
- 3) Run the "PC application for Subaru Select Monitor".
- 4) Set the Subaru Select Monitor to "Brake Control System" mode.
- 5) When the "Function Check Sequence" is selected, the "ABS Sequence Control" will start.
- 6) Execute the following operations when the message "Press Brake Pedal Firmly" is displayed.
  - (1) When the brake tester is used, press brake pedal pad with a force of 1,000 N (102 kgf, 225 lb).
  - (2) When using a pressure gauge, press the brake pedal so that the pressure gauge indicates 3,500 kPa (36 kg/cm<sup>2</sup>, 511 psi).
- 7) "Press "OK"" will be displayed. Press the [OK] key.
- 8) The brake system being operated is displayed on the Subaru Select Monitor.

# ABS Sequence Control

## 2. CONDITIONS FOR ABS SEQUENCE CONTROL



VDC00357

# ABS Sequence Control

## VEHICLE DYNAMICS CONTROL (VDC)

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(1) All wheel speed	(10) RR decompression valve	(18) 1.0 second
(2) Ignition key	(11) RR hold valve	(19) 1.4 seconds
(3) ABS warning light	(12) RL decompression valve	(20) 0.6 seconds
(4) Stop light switch	(13) RL hold valve	(21) 0.4 seconds
(5) Valve relay	(14) Pump motor	(22) Point A
(6) FL decompression valve	(15) 1.5 seconds	(23) Reset
(7) FL hold valve	(16) Light OFF	(24) Linear valve 1
(8) FR decompression valve	(17) Light ON	(25) Linear valve 2
(9) FR hold valve		

### NOTE:

The control operation starts from point A.

## **B: SPECIFICATION**

### **1. ABS SEQUENCE CONTROL COMPLETE CONDITION**

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 the brake pedal is released during ABS sequence control and the stop light switch is becomes OFF.
- 3) After completion of ABS sequence control.
- 4) When a malfunction is detected.



## 4. VDC Sequence Control

### A: OPERATION

- 1) While the VDC sequence control is performed, the operation of the hydraulic unit can be checked using the brake tester or pressure gauge after the hydraulic unit solenoid valve is operated.
- 2) VDC sequence control can be started by Subaru Select Monitor.

### 1. VDC SEQUENCE CONTROL WITH SUBARU SELECT MONITOR

#### NOTE:

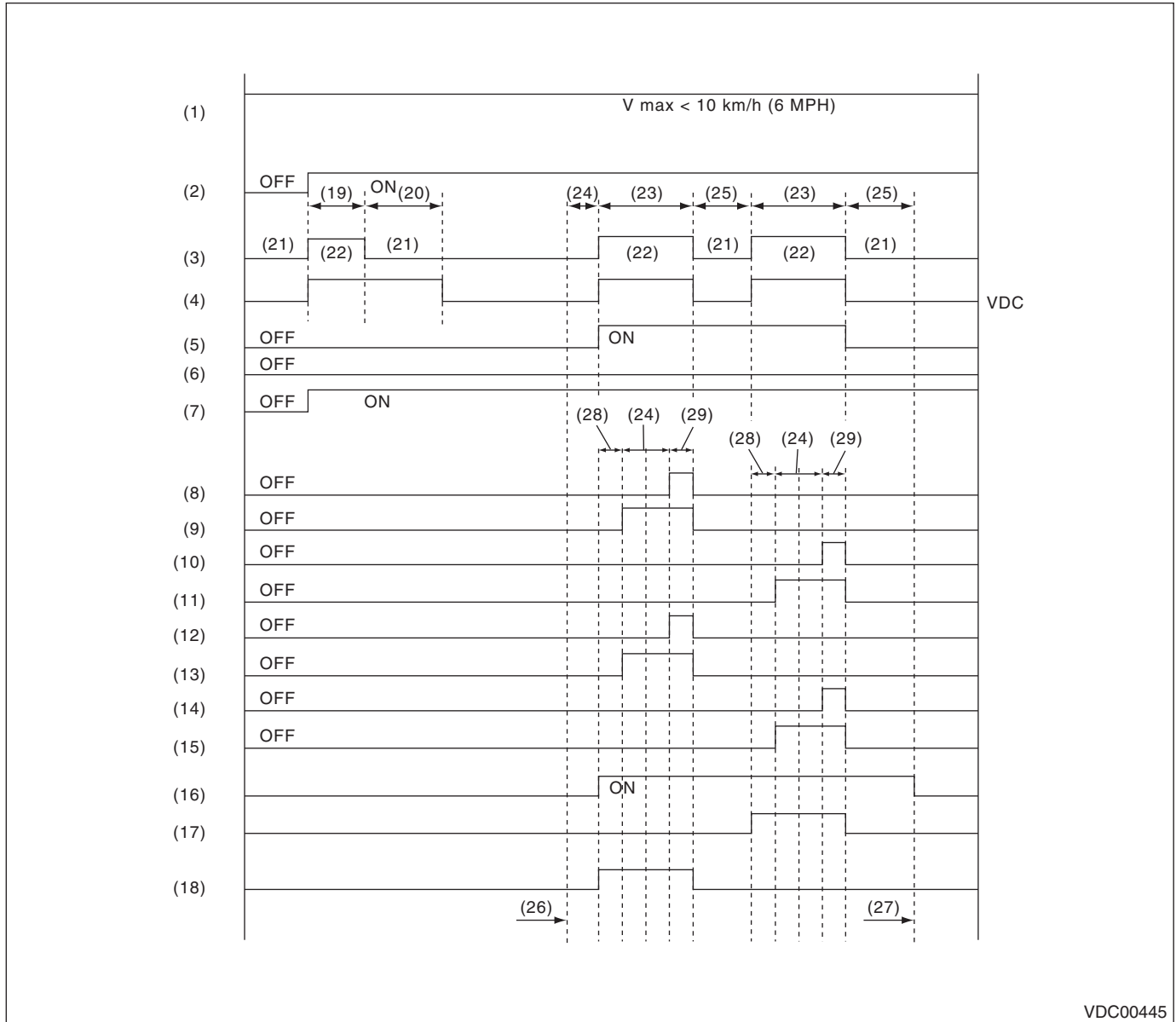
In the event of any trouble, sequence control will not operate.

- 1) Connect the Subaru Select Monitor to data link connector under the driver's side instrument panel lower cover.
- 2) Turn the ignition switch to ON.
- 3) Run the "PC application for Subaru Select Monitor".
- 4) Set the Subaru Select Monitor to "Brake Control System" mode.
- 5) When the "VDC Inspection Mode" is selected from the "Function check sequence" menu, the "VDC sequence control" will start.
- 6) "Press "OK"" will be displayed. Press the [OK] key.
- 7) Operation points will be displayed on Subaru Select Monitor.

# VDC Sequence Control

VEHICLE DYNAMICS CONTROL (VDC)

## 2. CONDITIONS FOR VDC SEQUENCE CONTROL



VDC00445

- |                                      |                             |                  |
|--------------------------------------|-----------------------------|------------------|
| (1) All wheel speed                  | (11) FR compression valve   | (21) Light OFF   |
| (2) Ignition key                     | (12) RR decompression valve | (22) Light ON    |
| (3) ABS warning light                | (13) RR compression valve   | (23) 3.4 seconds |
| (4) VDC warning light                | (14) RL decompression valve | (24) 2.2 seconds |
| (5) VDC operation light (CAN output) | (15) RL compression valve   | (25) 1.6 seconds |
| (6) Stop light switch                | (16) Pump motor             | (26) Point A     |
| (7) Valve relay                      | (17) Linear valve 1         | (27) Reset       |
| (8) FL decompression valve           | (18) Linear valve 2         | (28) 0.8 seconds |
| (9) FL compression valve             | (19) 1.5 seconds            | (29) 0.4 seconds |
| (10) FR decompression valve          | (20) Approx. 3 seconds      |                  |

**NOTE:**

The control operation starts from point A.

## **B: SPECIFICATION**

### **1. CONDITIONS FOR COMPLETION OF VDC SEQUENCE CONTROL**

When the following conditions develop, the VDC sequence control stops and VDC 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 the brake pedal is pressed during sequence control and the stop light switch is set to ON.
- 3) After completion of VDC sequence control.
- 4) When a malfunction is detected.

# Yaw Rate and G Sensor

VEHICLE DYNAMICS CONTROL (VDC)

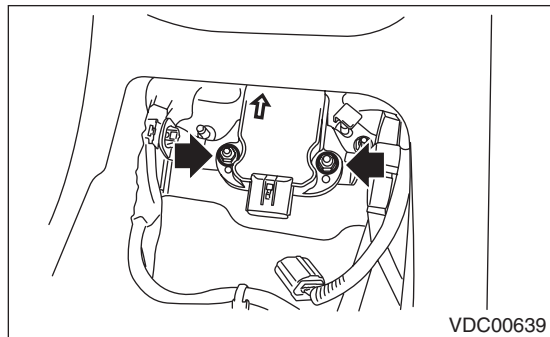
## 5. Yaw Rate and G Sensor

### A: REMOVAL

- 1) Disconnect the ground cable from battery.
- 2) Remove the console box.  
<Ref. to EI-39, Console Box.>
- 3) Disconnect the connector from the yaw rate & lateral G sensor.
- 4) Remove the yaw rate & lateral G sensor.

### CAUTION:

**Do not drop or bump the yaw rate & lateral G sensor.**

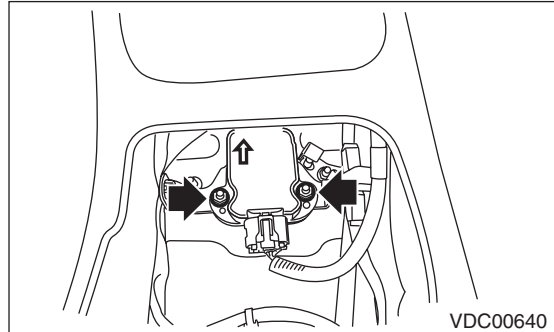


### B: INSTALLATION

Install in the reverse order of removal.

### NOTE:

Install the yaw rate & lateral G sensor to the body while pointing the arrow mark on the sensor to the front of the vehicle.



### Tightening torque:

**7.5 N·m (0.76 kgf-m, 5.53 ft-lb)**

### CAUTION:

After completion of installation, set the following two positions.

- Positioning to the center of steering angle sensor
- Positioning of the yaw rate & lateral G sensors to zero

The above procedure is required VDCCM&H/U to identify the vehicle position afterward. For the setting procedures of the 2 steps above, refer to "VDC Control Module and Hydraulic Control Unit (VDCCM&H/U)". <Ref. to VDC-11, ADJUSTMENT, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>

## 6. Steering Angle Sensor

### A: REPLACEMENT

**CAUTION:**

- Do not perform the removal except when the replacement.
- When replacing three times or more, replace the combination switch as assembly to protect the threads.

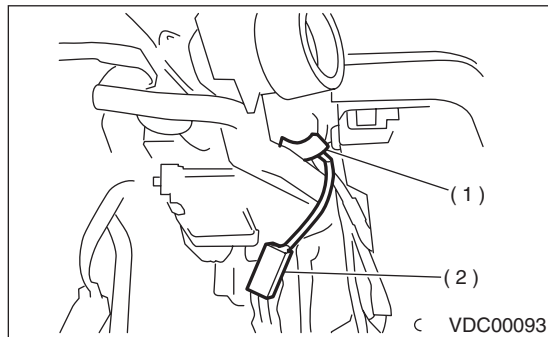
- 1) Set the steering wheel in a straight-ahead position.
- 2) Disconnect the ground cable from the battery.
- 3) Remove the airbag module.  
<Ref. to AB-14, REMOVAL, Driver's Airbag Module.>

**WARNING:**

Always refer to "Airbag System" when performing the airbag module repair service.

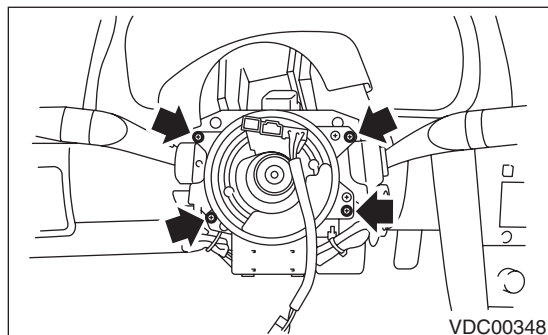
<Ref. to AB-4, CAUTION, General Description.>

- 4) Remove the steering wheel.  
<Ref. to PS-12, REMOVAL, Steering Wheel.>
- 5) Remove the screws and remove the steering column lower cover.
- 6) Remove the two screws securing the steering column upper cover.
- 7) Unlock the harness band and disconnect the connector of the steering angle sensor.

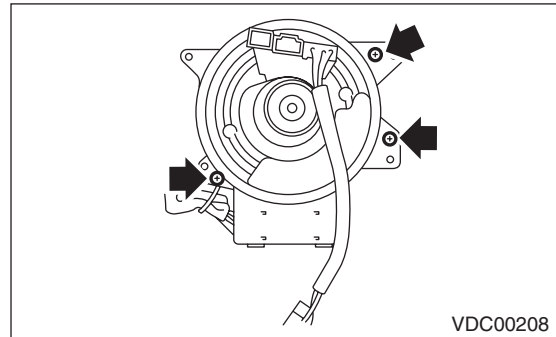


- (1) Harness band
- (2) Connector

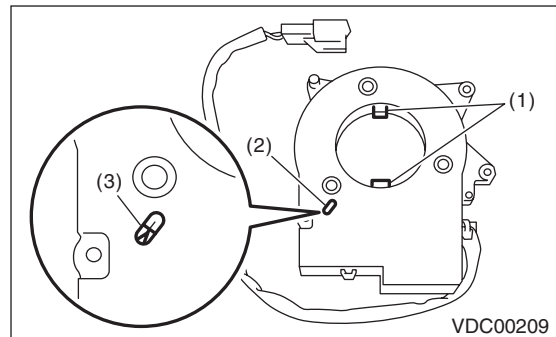
- 8) Remove the screws which secure the roll connector to steering column.



- 9) Remove the steering angle sensor from roll connector.



- 10) Turn the protrusion portion of new steering angle sensor to match the alignment mark of inspection hole.

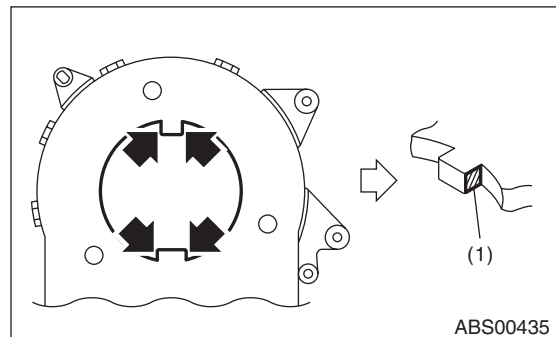


- (1) Protrusion portion
- (2) Inspection hole
- (3) Alignment mark

**CAUTION:**

Be careful not to allow foreign matter to enter into inspection hole.

- 11) Align the center of roll connector.  
<Ref. to AB-24, ADJUSTMENT, Roll Connector.>
- 12) Apply a thin coat of grease that is supplied with the new part, to the 4 protruding sections of the steering angle sensor.



- (1) Apply grease.

# Steering Angle Sensor

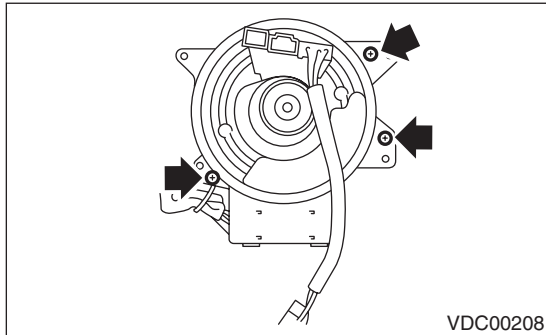
## VEHICLE DYNAMICS CONTROL (VDC)

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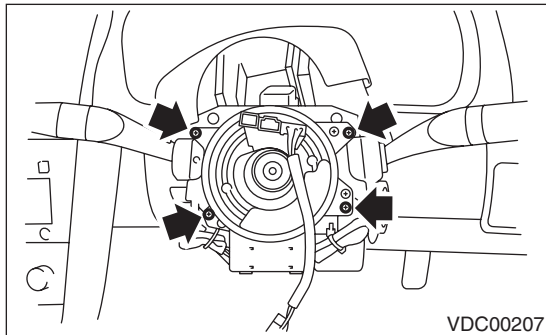
13) Align the position of the protrusion and install roll connector to steering angle sensor.

**Tightening torque:**

**0.5 N·m (0.05 kgf·m, 0.36 ft·lb)**



14) Install the roll connector to combination switch.



15) Install the steering wheel.  
<Ref. to PS-12, INSTALLATION, Steering Wheel.>

**Tightening torque:**

**45 N·m (4.6 kgf·m, 33.2 ft·lb)**

16) Install the airbag module to the steering wheel.  
<Ref. to AB-14, INSTALLATION, Driver's Airbag Module.>

**WARNING:**

**Always refer to "Airbag System" before performing the service operation.**

<Ref. to AB-4, CAUTION, General Description.>

17) Connect the ground cable to battery.

**CAUTION:**

**After completion of installation, adjust the following two positions.**

- Positioning to the center of steering angle sensor

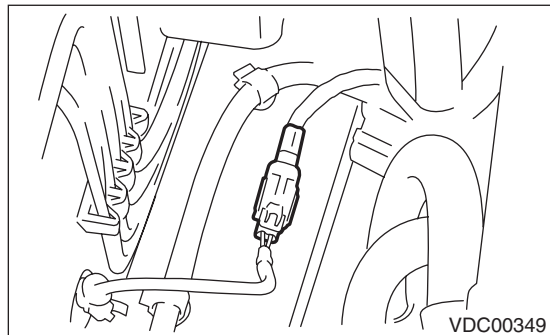
- Positioning the yaw rate & G sensors to zero

The above procedure is required for the VDC-CM to identify vehicle position afterward. For the setting procedures of the 2 steps above, refer to "VDC Control Module and Hydraulic Control Unit (VDCCM&H/U)". <Ref. to VDC-11, ADJUSTMENT, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>

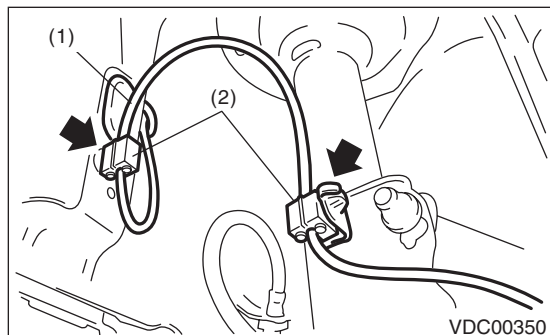
## 7. Front ABS Wheel Speed Sensor

### A: REMOVAL

- 1) Disconnect the ground cable from the battery.
- 2) Disconnect the ABS wheel speed sensor connector in the engine compartment.



- 3) Remove the sensor harness from the clip.

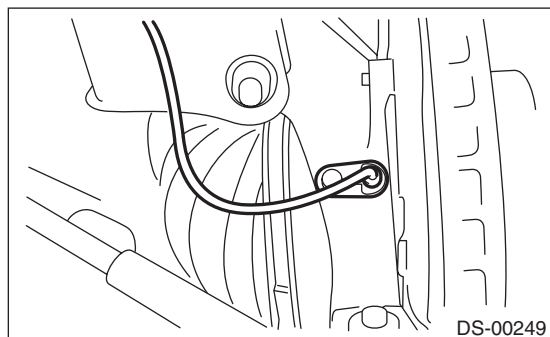


- (1) To the front ABS wheel speed sensor connector
- (2) Clip

- 4) Remove the clip which secures the sensor harness to the front strut.
- 5) Remove the front ABS wheel speed sensor from housing.

### CAUTION:

- Be careful not to damage the sensor.
- Do not apply excessive force to the sensor harness.



### B: INSTALLATION

Install in the reverse order of removal.

#### Tightening torque:

**7.5 N·m (0.76 kgf-m, 5.53 ft-lb)**

### CAUTION:

**Be careful not to damage the sensor.**

### NOTE:

- Check the identification (mark) on the harness to make sure there is no warpage. (W1 (White))
- Check if the harness is not pulled and does not come in contact with the suspension or body during steering wheel effort.

### C: INSPECTION

#### 1. CHECK WITH SUBARU SELECT MONITOR

- 1) Connect the Subaru Select Monitor to the data link connector.
- 2) Select {Current Data Display & Save}. Check if the speed indicated on the display changes in the same manner as the speedometer reading during acceleration/deceleration when the steering wheel is in the straight-ahead position.
- 3) If the speed indicated on the display does not change, check the ABS wheel speed sensor. <Ref. to VDC-22, ABS WHEEL SPEED SENSOR, INSPECTION, Front ABS Wheel Speed Sensor.>

# Front ABS Wheel Speed Sensor

VEHICLE DYNAMICS CONTROL (VDC)

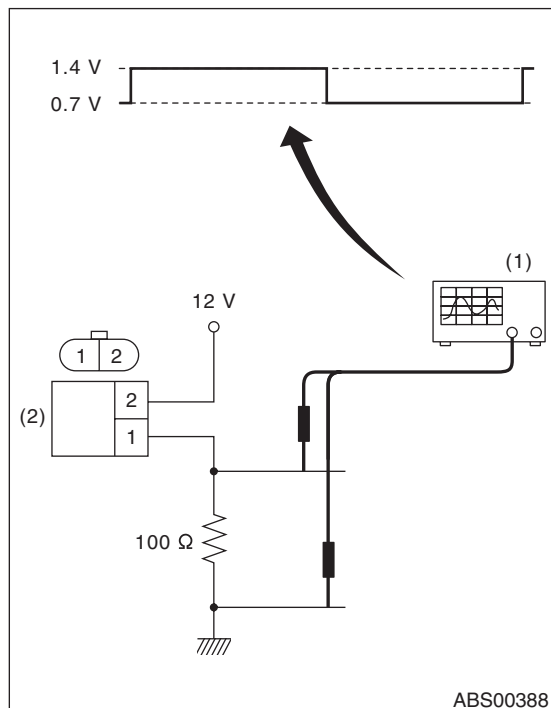
## 2. ABS WHEEL SPEED SENSOR

1) Check the tip of the ABS wheel speed sensor for foreign particles or damage. If necessary, clean the tip or replace the ABS wheel speed sensor.

2) Connect a 12 V power supply to No. 2 terminal of sensor connector as shown in the figure, then attach resistance to the No. 1 terminal. Rotate the wheel at about 2.75 km/h (2 MPH), and measure the voltage using an oscilloscope.

**Standard value of output voltage:**

**0.7 — 1.4 V**



(1) Oscilloscope

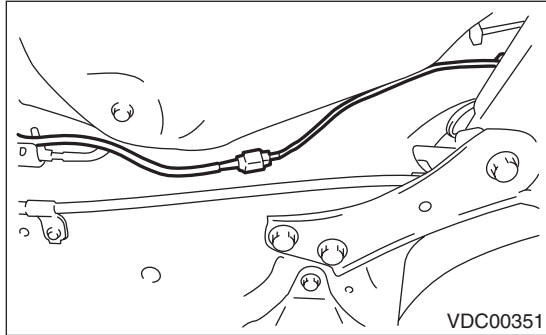
(2) ABS wheel speed sensor



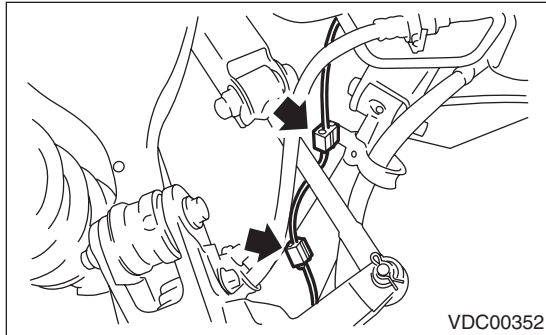
## 8. Rear ABS Wheel Speed Sensor

### A: REMOVAL

- 1) Disconnect the ground cable from the battery.
- 2) Disconnect the connector from the rear ABS wheel speed sensor.



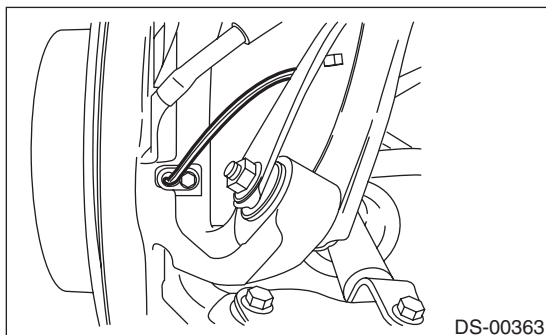
- 3) Remove the sensor harness from the rear arm clip.



- 4) Remove the rear ABS wheel speed sensor from the rear housing.

### CAUTION:

- Be careful not to damage the sensor.
- Do not apply excessive force to the sensor harness.



### B: INSTALLATION

Install in the reverse order of removal.

### CAUTION:

Be careful not to damage the sensor.

### Tightening torque:

*7.5 N·m (0.76 kgf-m, 5.53 ft-lb)*

### NOTE:

Check the identification (mark) on the harness to make sure there is no warpage. (W3 (White))

### C: INSPECTION

#### 1. ABS WHEEL SPEED SENSOR

<Ref. to VDC-22, ABS WHEEL SPEED SENSOR, INSPECTION, Front ABS Wheel Speed Sensor.>

# Front Magnetic Encoder

VEHICLE DYNAMICS CONTROL (VDC)

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## 9. Front Magnetic Encoder

### A: REMOVAL

Refer to “Front Hub Bearing” for removal, because the front magnetic encoder is integrated with front hub bearing.

<Ref. to DS-20, REMOVAL, Front Hub Unit Bearing.>

### B: INSTALLATION

Refer to “Front Hub Bearing” for installation, because the front magnetic encoder is integrated with front hub bearing.

<Ref. to DS-20, INSTALLATION, Front Hub Unit Bearing.>

### C: INSPECTION

Visually check the magnetic encoder for any damage. If necessary, replace with a new hub unit bearing.

#### NOTE:

Because the magnetic encoder is integrated with hub unit bearing assembly, replace the hub unit bearing with a new part if there is any defect found on the magnetic encoder.

## 10.Rear Magnetic Encoder

### A: REMOVAL

Refer to “Rear Hub Unit Bearing” for removal, because the rear magnetic encoder is integrated with rear hub unit bearing.

<Ref. to DS-22, REMOVAL, Rear Hub Unit Bearing.>

### B: INSTALLATION

Refer to “Rear Hub Unit Bearing” for installation, because the rear magnetic encoder is integrated with rear hub unit bearing.

<Ref. to DS-23, INSTALLATION, Rear Hub Unit Bearing.>

### C: INSPECTION

Visually check the magnetic encoder parts for any damage. If necessary, replace with a new hub unit bearing.

#### NOTE:

Because the magnetic encoder is integrated with hub unit bearing assembly, replace the hub unit bearing with a new part if there is any defect found on the magnetic encoder.

# TCS OFF Switch

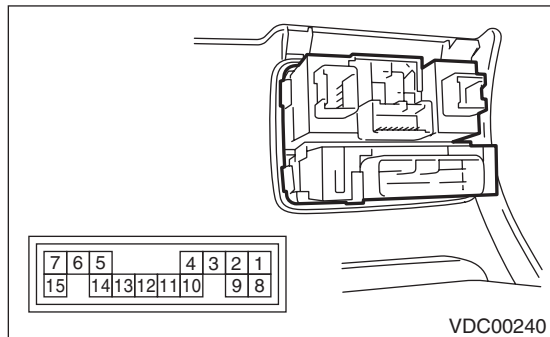
VEHICLE DYNAMICS CONTROL (VDC)

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## 11.TCS OFF Switch

### A: REMOVAL

- 1) Remove the instrument panel lower cover.
- 2) Remove the screws, and then remove the TCS OFF switch.



### B: INSTALLATION

Install in the reverse order of removal.

### C: INSPECTION

Measure the resistance between the TCS OFF switch terminals.

Switch position	Terminal No.	Standard value
ON	5 — 15	Less than 1 $\Omega$
OFF	5 — 15	1 M $\Omega$ or more

If NG, replace the TCS OFF switch.

# VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)

## *VDC(diag)*

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	<b>Page</b>
1. Basic Diagnostic Procedure .....	2
2. Check List for Interview .....	4
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4. Electrical Component Location .....	13
5. Control Module I/O Signal .....	15
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7. Read Diagnostic Trouble Code (DTC) .....	24
8. Inspection Mode .....	25
9. Clear Memory Mode .....	26
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# Basic Diagnostic Procedure

VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)

## 1. Basic Diagnostic Procedure

### A: PROCEDURE

NOTE:

- To check the harness for open or short circuits, shake problem spot or connector.
- Refer to "Check List for Interview". <Ref. to VDC(diag)-4, Check List for Interview.>

Step	Check	Yes	No
<b>1 CHECK PRE-INSPECTION.</b> 1) Ask the customer when and how the trouble occurred using the interview check list. <Ref. to VDC(diag)-4, Check List for Interview.> 2) Before performing diagnostics, check the component which might affect VDC problems. <Ref. to VDC(diag)-11, INSPECTION, General Description.>	Is the component that might influence the VDC problem normal?	Go to step 2.	Repair or replace each component.
<b>2 CHECK INDICATION OF DTC.</b> 1) Turn the ignition switch to OFF. 2) Connect the Subaru Select Monitor to data link connector. 3) Turn the ignition switch to ON and run the Subaru Select Monitor. 4) Read the DTC. <Ref. to VDC(diag)-24, OPERATION, Read Diagnostic Trouble Code (DTC).> NOTE: If the communication function of the Subaru Select Monitor cannot be executed properly, check the communication circuit. <Ref. to VDC(diag)-21, COMMUNICATION FOR INITIALIZING IMPOSSIBLE, INSPECTION, Subaru Select Monitor.>	Is DTC displayed?	Record the DTC. Go to step 4.	Go to step 3.
<b>3 PERFORM GENERAL DIAGNOSTICS.</b> 1) Perform the inspection by referring to "General Diagnostic Table". <Ref. to VDC(diag)-96, INSPECTION, General Diagnostic Table.> 2) Perform the Clear Memory Mode. <Ref. to VDC(diag)-26, OPERATION, Clear Memory Mode.> 3) Perform the Inspection Mode. <Ref. to VDC(diag)-25, PROCEDURE, Inspection Mode.> 4) Read the DTC. <Ref. to VDC(diag)-24, OPERATION, Read Diagnostic Trouble Code (DTC).> 5) Check the DTC is not displayed.	Do the VDC warning light and ABS warning light go off after starting the engine?	Finish the diagnosis.	Check the combination meter circuit. <Ref. to VDC(diag)-33, ABS WARNING LIGHT DOES NOT GO OFF, Warning Light Illumination Pattern.> <Ref. to VDC(diag)-35, VDC WARNING LIGHT AND TCS OFF INDICATOR LIGHT DO NOT GO OFF, Warning Light Illumination Pattern.> <Ref. to VDC(diag)-36, VDC WARNING LIGHT AND VDC INDICATOR LIGHT DO NOT GO OFF, Warning Light Illumination Pattern.>
<b>4 CHECK FREEZE FRAME DATA.</b> Using the Subaru Select Monitor, check the freeze frame data of the VDC control module.	Are freeze frame data recorded?	Record the freeze frame data. Go to step 5.	Go to step 5.

# Basic Diagnostic Procedure

VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)

	Step	Check	Yes	No
5	<b>PERFORM DIAGNOSIS.</b> 1) Refer to "List of Diagnostic Trouble Code (DTC)". NOTE: For the DTC list, refer to "List of Diagnostic Trouble Code (DTC)". <Ref. to VDC(diag)-41, LIST, List of Diagnostic Trouble Code (DTC).> 2) Correct the cause of trouble. 3) Perform the Clear Memory Mode. <Ref. to VDC(diag)-26, OPERATION, Clear Memory Mode.> 4) Perform the Inspection Mode. <Ref. to VDC(diag)-25, PROCEDURE, Inspection Mode.> 5) Read the DTC. <Ref. to VDC(diag)-24, OPERATION, Read Diagnostic Trouble Code (DTC).>	Is DTC displayed?	Repeat step 5 until DTC is not shown.	Finish the diagnosis.

## Check List for Interview

VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)

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### 2. Check List for Interview

#### A: CHECK

Check the following item about the vehicle's state.

#### 1. STATE OF ABS WARNING LIGHT

ABS warning light come on.	<input type="checkbox"/> Always <input type="checkbox"/> Sometimes <input type="checkbox"/> Only once <input type="checkbox"/> Does not illuminate • When/How long does it come on?		
Ignition key position	<input type="checkbox"/> LOCK <input type="checkbox"/> ACC <input type="checkbox"/> ON (before starting engine) <input type="checkbox"/> START <input type="checkbox"/> ON (after starting engine, while engine is running) <input type="checkbox"/> ON (after starting engine, engine is stopped)		
Timing	<input type="checkbox"/> Immediately after turning the ignition switch to ON <input type="checkbox"/> Immediately after turning the ignition switch to START		
	<input type="checkbox"/> Accelerating	—	km/h
		—	MPH
	<input type="checkbox"/> While traveling at a constant speed	km/h	MPH
	<input type="checkbox"/> Decelerating	—	km/h
		—	MPH
	<input type="checkbox"/> When turning to the right	Steering angle:	deg
		Steering time:	Sec.
	<input type="checkbox"/> When turning to the left	Steering angle:	deg
		Steering time:	Sec.
	<input type="checkbox"/> When operating other electrical parts		
	• Part name:		
	• Operating condition:		



## Check List for Interview

VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)

### 2. STATE OF VDC WARNING LIGHT AND TCS OFF INDICATOR LIGHT

NOTE:

This Check List for Interview is applied to C4 model.

VDC warning light & TCS OFF indicator light come on.	<input type="checkbox"/> Always <input type="checkbox"/> Sometimes <input type="checkbox"/> Only once <input type="checkbox"/> Does not illuminate • When/How long does it illuminate?		
Ignition key position	<input type="checkbox"/> LOCK <input type="checkbox"/> ACC <input type="checkbox"/> ON (before starting engine) <input type="checkbox"/> START <input type="checkbox"/> ON (after starting engine, engine is running) <input type="checkbox"/> ON (after starting engine, engine is at a standstill)		
Timing	<input type="checkbox"/> Immediately after turning the ignition switch to ON <input type="checkbox"/> Immediately after turning the ignition switch to START		
	<input type="checkbox"/> While accelerating	—	km/h
		—	MPH
	<input type="checkbox"/> While driving at a constant speed	km/h	MPH
	<input type="checkbox"/> While decelerating	—	km/h
		—	MPH
	<input type="checkbox"/> When turning to the right	Steering angle:	deg
		Steering time:	Sec.
	<input type="checkbox"/> When turning to the left	Steering angle:	deg
		Steering time:	Sec.
	<input type="checkbox"/> When other electrical parts are operating • Part name: • Operating condition:		

## Check List for Interview

VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)

### 3. STATE OF VDC WARNING LIGHT & VDC INDICATOR LIGHT

NOTE:

This Check List for Interview is applied to other models than C4 model.

VDC warning light & VDC indicator light illuminates.	<input type="checkbox"/> Always <input type="checkbox"/> Sometimes <input type="checkbox"/> Only once <input type="checkbox"/> Does not illuminate • When/How long does it illuminate?		
Ignition key position	<input type="checkbox"/> LOCK <input type="checkbox"/> ACC <input type="checkbox"/> ON (before starting engine) <input type="checkbox"/> START <input type="checkbox"/> ON (after starting engine, engine is running) <input type="checkbox"/> ON (after starting engine, engine is at a standstill)		
Timing	<input type="checkbox"/> Immediately after turning the ignition switch to ON <input type="checkbox"/> Immediately after turning the ignition switch to START		
	<input type="checkbox"/> While accelerating	—	km/h
		—	MPH
	<input type="checkbox"/> While driving at a constant speed	km/h	MPH
	<input type="checkbox"/> While decelerating	—	km/h
		—	MPH
	<input type="checkbox"/> When turning to the right	Steering angle:	deg
		Steering time:	Sec.
	<input type="checkbox"/> When turning to the left	Steering angle:	deg
		Steering time:	Sec.
	<input type="checkbox"/> When other electrical parts are operating		
	• Part name: • Operating condition:		

# Check List for Interview

VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)

## 4. STATE OF VDC INDICATOR LIGHT

NOTE:

This Check List for Interview is applied to C4 model.

VDC operation indicator light illuminate.	<input type="checkbox"/> Always <input type="checkbox"/> Sometimes <input type="checkbox"/> Only once <input type="checkbox"/> Does not illuminate • When/How long does it illuminate?		
Ignition key position	<input type="checkbox"/> LOCK <input type="checkbox"/> ACC <input type="checkbox"/> ON (before starting engine) <input type="checkbox"/> START <input type="checkbox"/> ON (after starting engine, engine is running) <input type="checkbox"/> ON (after starting engine, engine is at a standstill)		
Timing	<input type="checkbox"/> Immediately after turning the ignition switch to ON <input type="checkbox"/> Immediately after turning the ignition switch to START		
	<input type="checkbox"/> While accelerating	—	km/h
		—	MPH
	<input type="checkbox"/> While driving at a constant speed	km/h	MPH
	<input type="checkbox"/> While decelerating	—	km/h
		—	MPH
	<input type="checkbox"/> When turning to the right	Steering angle:	deg
		Steering time:	Sec.
	<input type="checkbox"/> When turning to the left	Steering angle:	deg
		Steering time:	Sec.
	<input type="checkbox"/> When other electrical parts are operating		
	• Part name: • Operating condition:		

## Check List for Interview

VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)

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### 5. STATE OF TCS OFF INDICATOR LIGHT

NOTE:

This Check List for Interview is applied to other models than C4 model.

TCS OFF indicator light comes on.	<input type="checkbox"/> Always <input type="checkbox"/> Sometimes <input type="checkbox"/> Only once <input type="checkbox"/> Does not illuminate • When/How long does it illuminate?																																																				
Ignition key position	<input type="checkbox"/> LOCK <input type="checkbox"/> ACC <input type="checkbox"/> ON (before starting engine) <input type="checkbox"/> START <input type="checkbox"/> ON (after starting engine, engine is running) <input type="checkbox"/> ON (after starting engine, engine is at a standstill)																																																				
Timing	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="padding: 2px;"><input type="checkbox"/> Immediately after turning the ignition switch to ON</td> <td style="width: 20%;"></td> <td style="width: 20%;"></td> <td style="width: 20%;"></td> </tr> <tr> <td style="padding: 2px;"><input type="checkbox"/> Immediately after turning the ignition switch to START</td> <td></td> <td></td> <td></td> </tr> <tr> <td style="padding: 2px;"><input type="checkbox"/> While accelerating</td> <td style="text-align: center;">—</td> <td></td> <td style="text-align: right;">km/h</td> </tr> <tr> <td style="padding: 2px;"><input type="checkbox"/> While driving at a constant speed</td> <td style="text-align: center;">—</td> <td></td> <td style="text-align: right;">MPH</td> </tr> <tr> <td style="padding: 2px;"><input type="checkbox"/> While decelerating</td> <td style="text-align: center;">—</td> <td></td> <td style="text-align: right;">km/h</td> </tr> <tr> <td style="padding: 2px;"><input type="checkbox"/> While decelerating</td> <td style="text-align: center;">—</td> <td></td> <td style="text-align: right;">MPH</td> </tr> <tr> <td style="padding: 2px;"><input type="checkbox"/> When turning to the right</td> <td style="padding: 2px;">Steering angle:</td> <td></td> <td style="text-align: right;">deg</td> </tr> <tr> <td style="padding: 2px;"><input type="checkbox"/> When turning to the right</td> <td style="padding: 2px;">Steering time:</td> <td></td> <td style="text-align: right;">Sec.</td> </tr> <tr> <td style="padding: 2px;"><input type="checkbox"/> When turning to the left</td> <td style="padding: 2px;">Steering angle:</td> <td></td> <td style="text-align: right;">deg</td> </tr> <tr> <td style="padding: 2px;"><input type="checkbox"/> When turning to the left</td> <td style="padding: 2px;">Steering time:</td> <td></td> <td style="text-align: right;">Sec.</td> </tr> <tr> <td style="padding: 2px;"><input type="checkbox"/> When other electrical parts are operating</td> <td></td> <td></td> <td></td> </tr> <tr> <td style="padding: 2px;">• Part name:</td> <td colspan="3"></td> </tr> <tr> <td style="padding: 2px;">• Operating condition:</td> <td colspan="3"></td> </tr> </table>	<input type="checkbox"/> Immediately after turning the ignition switch to ON				<input type="checkbox"/> Immediately after turning the ignition switch to START				<input type="checkbox"/> While accelerating	—		km/h	<input type="checkbox"/> While driving at a constant speed	—		MPH	<input type="checkbox"/> While decelerating	—		km/h	<input type="checkbox"/> While decelerating	—		MPH	<input type="checkbox"/> When turning to the right	Steering angle:		deg	<input type="checkbox"/> When turning to the right	Steering time:		Sec.	<input type="checkbox"/> When turning to the left	Steering angle:		deg	<input type="checkbox"/> When turning to the left	Steering time:		Sec.	<input type="checkbox"/> When other electrical parts are operating				• Part name:				• Operating condition:			
<input type="checkbox"/> Immediately after turning the ignition switch to ON																																																					
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<input type="checkbox"/> When other electrical parts are operating																																																					
• Part name:																																																					
• Operating condition:																																																					

# Check List for Interview

VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)

## 6. CONDITIONS UNDER WHICH TROUBLE OCCURS

Environment	a) Weather	<input type="checkbox"/> Fine <input type="checkbox"/> Cloudy <input type="checkbox"/> Rainy <input type="checkbox"/> Snowy <input type="checkbox"/> Others:
	b) Ambient temperature	°C (°F)
	c) Road	<input type="checkbox"/> Inner city <input type="checkbox"/> Suburbs <input type="checkbox"/> Highway <input type="checkbox"/> Local street <input type="checkbox"/> Uphill <input type="checkbox"/> Downhill <input type="checkbox"/> Paved road <input type="checkbox"/> Gravel road <input type="checkbox"/> Muddy road <input type="checkbox"/> Sandy place <input type="checkbox"/> Straight road <input type="checkbox"/> Sharp curve <input type="checkbox"/> Gentle curve <input type="checkbox"/> S-curve <input type="checkbox"/> Road with a slope on both sides <input type="checkbox"/> Others:
	d) Road surface	<input type="checkbox"/> Dry <input type="checkbox"/> Wet <input type="checkbox"/> Covered with fresh snow <input type="checkbox"/> Covered with hardened snow <input type="checkbox"/> Frozen slope <input type="checkbox"/> Others:

## Check List for Interview

### VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)

Condition	a) Brakes	Deceleration: <span style="float: right;">G</span>
		<input type="checkbox"/> continuous / <input type="checkbox"/> intermittent
	b) Accelerator	Acceleration: <span style="float: right;">G</span>
		<input type="checkbox"/> continuous / <input type="checkbox"/> intermittent
	c) Vehicle speed	km/h <span style="margin-left: 100px;">MPH</span>
		<input type="checkbox"/> Advancing <input type="checkbox"/> When accelerating <input type="checkbox"/> While decelerating <input type="checkbox"/> At low speed <input type="checkbox"/> When turning <input type="checkbox"/> Others:
	d) Tire inflation pressure	Front RH tire: <span style="float: right;">kPa</span>
		Front LH tire: <span style="float: right;">kPa</span>
		Rear RH tire: <span style="float: right;">kPa</span>
		Rear LH tire: <span style="float: right;">kPa</span>
	e) Degree of wear	Front RH tire: <span style="float: right;">mm (in)</span>
		Front LH tire: <span style="float: right;">mm (in)</span>
		Rear RH tire: <span style="float: right;">mm (in)</span>
		Rear LH tire: <span style="float: right;">mm (in)</span>
	f) Steering wheel	<input type="checkbox"/> Sharp turning <input type="checkbox"/> Gentle turning <input type="checkbox"/> Straight forward motion <input type="checkbox"/> Gentle return <input type="checkbox"/> Sharp return
	g) Tire/Wheel size	<input type="checkbox"/> Specified size <input type="checkbox"/> Except specification (            )
	h) Tire variation	<input type="checkbox"/> Summer tire <input type="checkbox"/> Studless tire (Brand:            )
	i) Tire chain is attached: <input type="checkbox"/> Yes / <input type="checkbox"/> No	
	j) Using T-type tires: <input type="checkbox"/> Yes / <input type="checkbox"/> No	
	k) Condition of suspension alignment:	
	l) Load condition:	
	m) Repaired parts are used: <input type="checkbox"/> Yes / <input type="checkbox"/> No	
	• Content:	
	n) Others:	

## 3. General Description

### A: CAUTION

#### 1. SRS AIRBAG SYSTEM

Airbag system wiring harness is routed near the ABS wheel speed sensor and VDCCM&H/U.

#### CAUTION:

- Do not use electrical test equipment on wiring harness and connector circuits of the airbag system.
- Be careful not to damage the airbag system wiring harness when servicing the ABS wheel speed sensor and VDCCM&H/U.

### B: INSPECTION

Before performing diagnosis, check the following items which might affect VDC problems.

#### 1. BATTERY

Measure the battery voltage and check electrolyte.

**Standard voltage: 12 V or more**

**Specific gravity: 1.260 or more**

#### 2. GROUND

Check the tightening torque of ground (GB-7) bolt of VDC.

#### Tightening torque:

**13 N·m (1.3 kgf·m, 9.6 ft·lb)**

#### 3. BRAKE FLUID

- 1) Check the brake fluid level.
- 2) Check the brake fluid for leaks.

#### 4. HYDRAULIC UNIT

Check the hydraulic unit.

- With brake tester <Ref. to VDC-10, CHECKING THE HYDRAULIC UNIT VDC OPERATION WITH BRAKE TESTER, INSPECTION, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>
- Without brake tester <Ref. to VDC-9, CHECKING THE HYDRAULIC UNIT VDC OPERATION USING A PRESSURE GAUGE, INSPECTION, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>

#### 5. BRAKE DRAG

Check for brake drag.

#### 6. BRAKE PAD AND ROTOR

Check the brake pad and rotor.

- Front <Ref. to BR-13, INSPECTION, Front Brake Pad.> <Ref. to BR-14, INSPECTION, Front Disc Rotor.>
- Rear <Ref. to BR-20, INSPECTION, Rear Brake Pad.> <Ref. to BR-21, INSPECTION, Rear Disc Rotor.>

#### 7. TIRE

Check the tire specifications, tire wear and air pressure. <Ref. to WT-2, SPECIFICATION, General Description.>

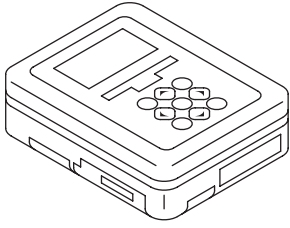
# General Description

VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)

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## C: PREPARATION TOOL

### 1. SPECIAL TOOL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST1B022XU0	1B022XU0	SUBARU SELECT MONITOR III KIT	Used for troubleshooting for the electrical system.

### 2. GENERAL TOOL

TOOL NAME	REMARKS
Circuit tester	Used for measuring resistance, voltage and current.
Oscilloscope	Used for measuring the sensor.

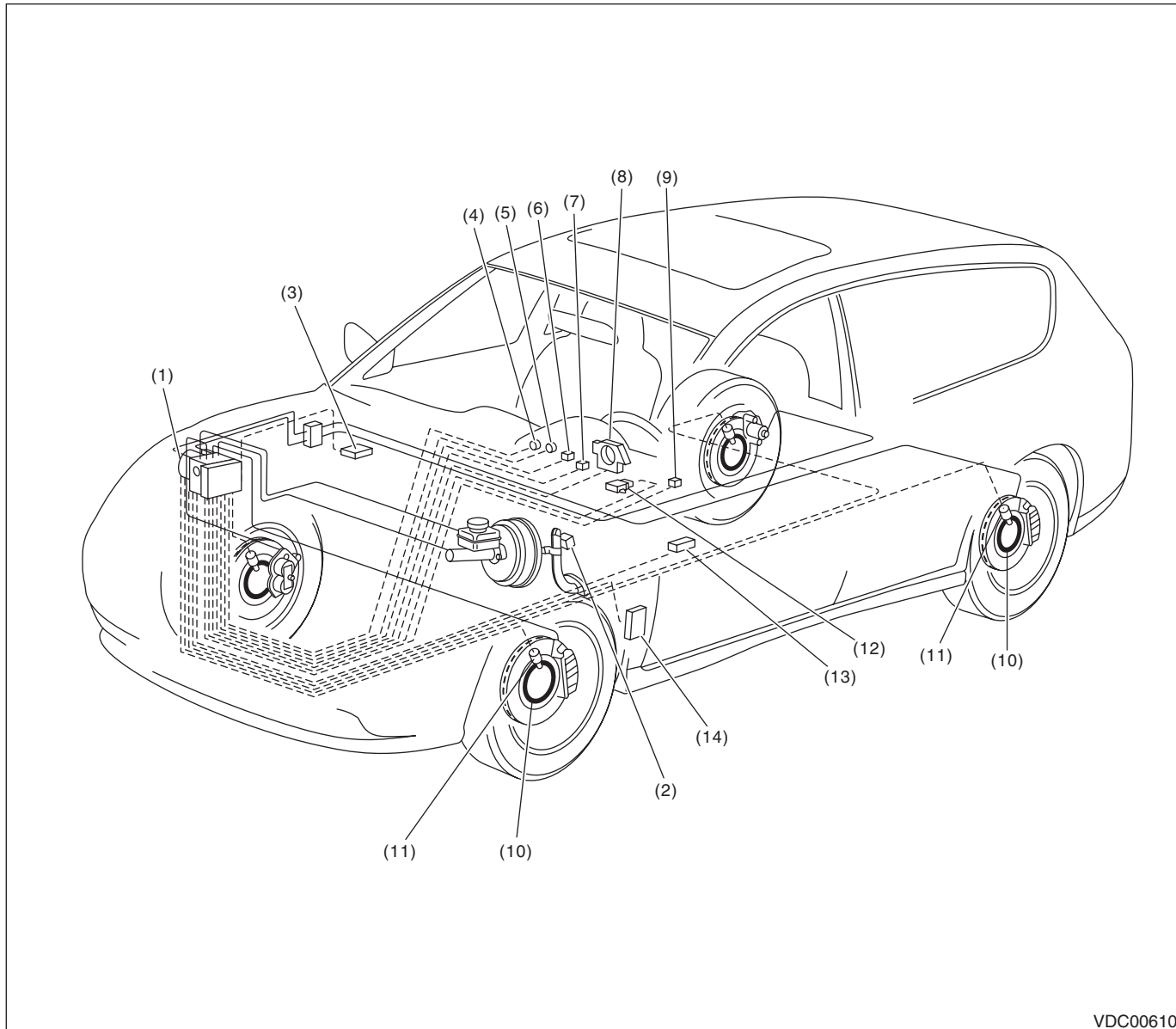


# Electrical Component Location

VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)

## 4. Electrical Component Location

### A: LOCATION

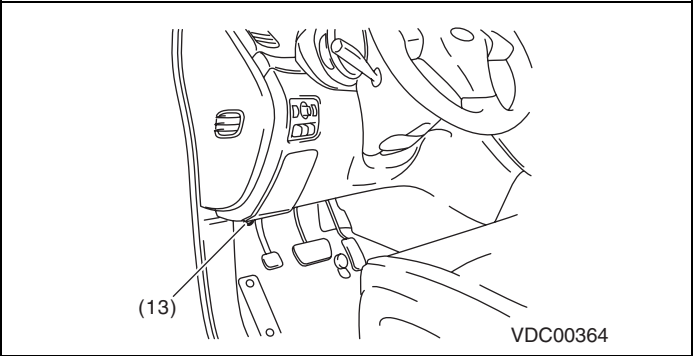
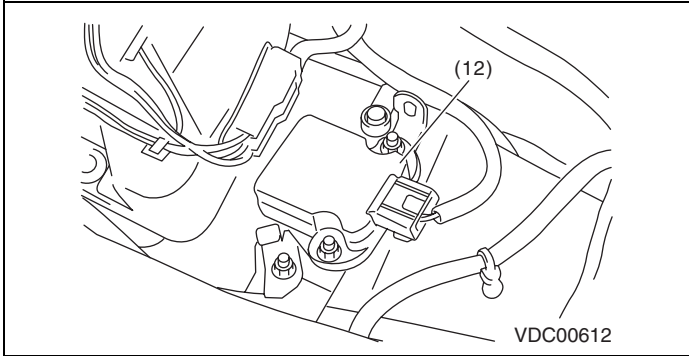
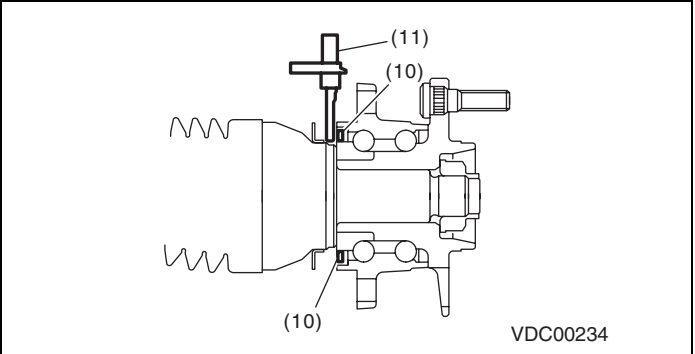
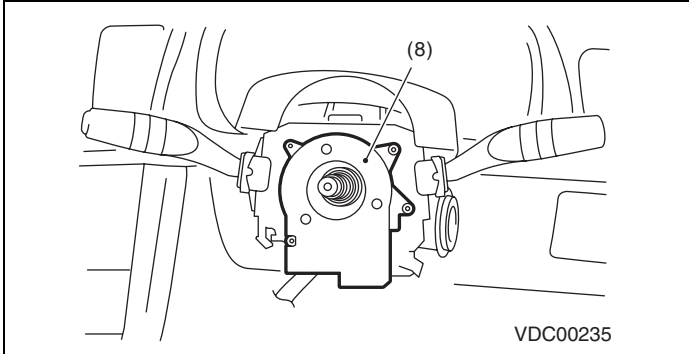
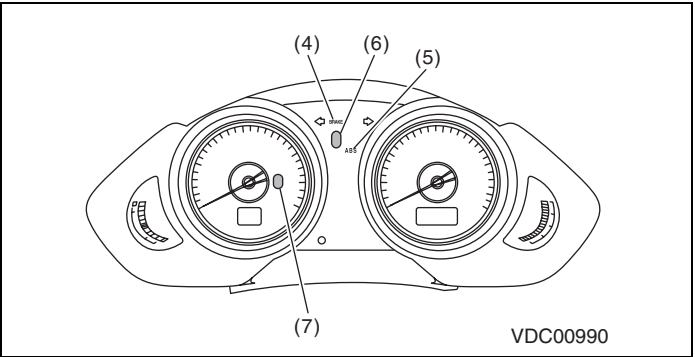
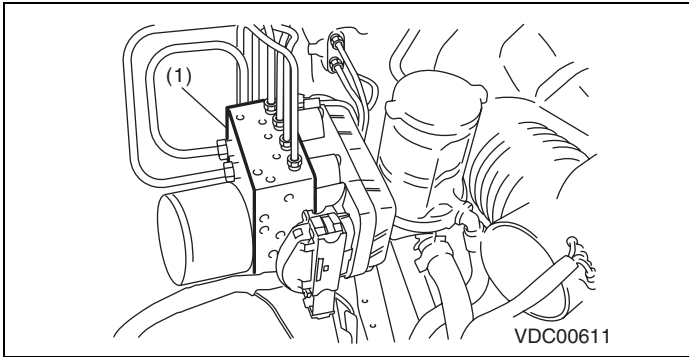


VDC00610

- |   |   |  |
|---|---|--|
| (1) VDC control module and hydraulic control unit (VDCCM&H/U) | (6) VDC indicator light (C4 model)<br>TCS OFF indicator light (except for C4 model)   | (11) ABS wheel speed sensor            |
| (2) Stop light and brake switch                               | (7) VDC warning light & TCS OFF indicator light (C4 model)<br>VDC warning light & VDC indicator light (except for C4 model) | (12) Yaw rate & G sensor               |
| (3) Engine control module (ECM)                               | (8) Steering angle sensor   | (13) Data link connector               |
| (4) Brake warning light (EBD warning light)                   | (9) TCS OFF switch  | (14) Transmission control module (TCM) |
| (5) ABS warning light   | (10) Magnetic encoder   |  |

# Electrical Component Location

## VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)

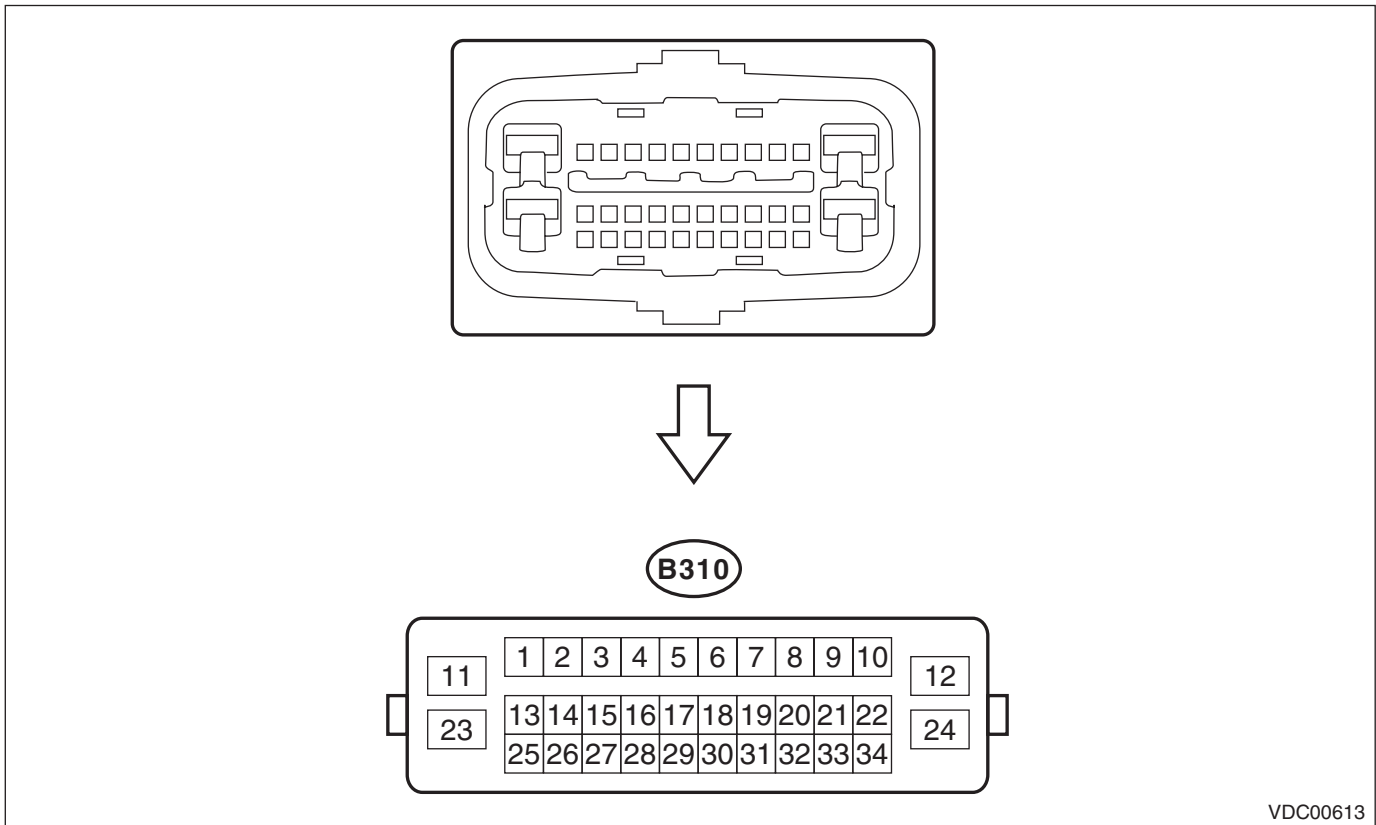


# Control Module I/O Signal

VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)

## 5. Control Module I/O Signal

### A: ELECTRICAL SPECIFICATION



VDC00613

#### NOTE:

- Terminal numbers in VDCCM&H/U connector are shown in the figure.
- When the connector is removed from VDCCM&H/U, the ABS warning light, EBD warning light, VDC warning light & TCS OFF indicator light illuminate.

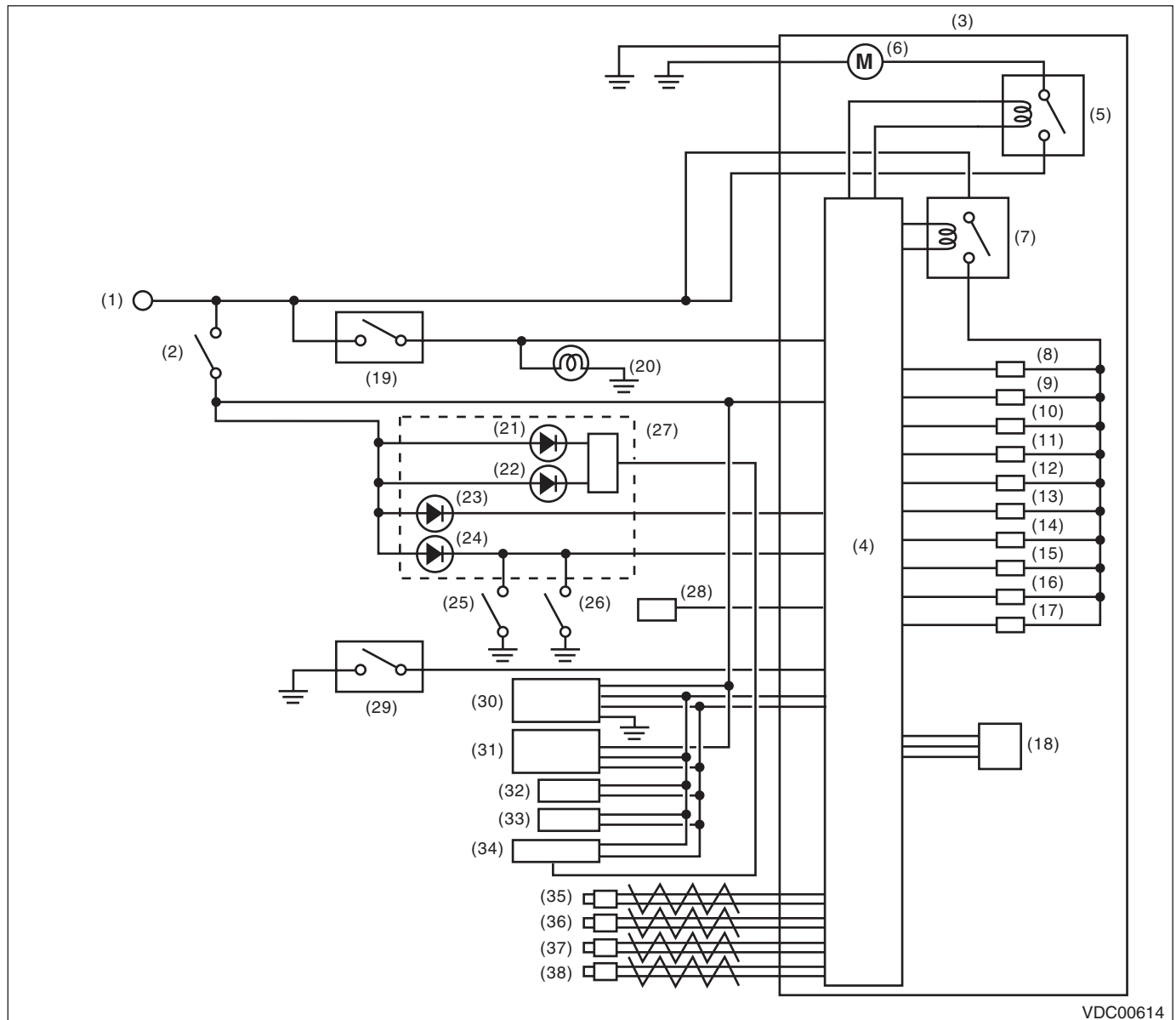
Content		Terminal No. (+) — (-)	Input/Output signal	
			Measured value and measuring conditions	
Power supply		34 — 11	10 — 15 V when the ignition switch is ON.	
ABS wheel speed sensor	Front LH wheel	Power supply	18 — 11	8 — 15 V
		Signal	17	5 — 17 mA: Rectangle waveform
	Front RH wheel	Power supply	6 — 11	8 — 15 V
		Signal	5	5 — 17 mA: Rectangle waveform
	Rear LH wheel	Power supply	4 — 11	8 — 15 V
		Signal	3	5 — 17 mA: Rectangle waveform
	Rear RH wheel	Power supply	16 — 11	8 — 15 V
		Signal	15	5 — 17 mA: Rectangle waveform
Yaw rate & G sensor		25 — 13	Serial communication	
Steering angle sensor			Serial communication	
CAN communication line (+)		25	Serial communication	
CAN communication line (-)		13	Serial communication	
Valve relay power supply		12 — 11	Normally 10 — 15V	
Motor power supply		24 — 23	10 — 15 V when motor is ON	
ABS warning light		8 — 11	After turning the ignition switch to ON, 10 — 15 V during 1.5 seconds, and 1.5 V or less after 1.5 seconds passed	

# Control Module I/O Signal

## VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)

Content	Terminal No. (+) — (-)	Input/Output signal
		Measured value and measuring conditions
Brake warning light (EBD warning light)	7 — 11	After turning the ignition switch to ON, 10 — 15 V during 1.5 seconds, and 1.5 V or less after 1.5 seconds passed
Stop light switch	1 — 11	1.5 V or less when the stop light is OFF; otherwise, 10 — 15 V when the stop light is ON.
Subaru Select Monitor	19 — 11	0 ↔ 12 V pulse (in communication)
Vehicle speed output signal	10	Models without vehicle speed sensitive windshield wipers: 0 ↔ 5 V pulse Models with vehicle speed sensitive windshield wipers: 0 ↔ 12 V pulse
TCS OFF switch	30 — 11	0.5 Ω or less when the OFF switch is ON; 1 MΩ or more when the switch is OFF.
Ground	11	—

### B: WIRING DIAGRAM



# Control Module I/O Signal

## VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)

---

(1) Battery	(14) Rear inlet solenoid valve RH	(27) Combination meter
(2) Ignition switch	(15) Rear outlet solenoid valve RH	(28) Data link connector
(3) VDC control module and hydraulic control unit (VDCCM&H/U)	(16) Linear valve 1	(29) TCS OFF switch
(4) VDC control module	(17) Linear valve 2	(30) Steering angle sensor
(5) Motor relay	(18) Pressure sensor	(31) Yaw rate & G sensor
(6) Motor	(19) Stop light and brake switch	(32) Transmission control module (TCM)
(7) Valve relay	(20) Stop light	(33) Engine control module (ECM)
(8) Front inlet solenoid valve LH	(21) VDC indicator light (C4 model) TCS OFF indicator light (except for C4 model)	(34) Body integrated unit
(9) Front outlet solenoid valve LH	(22) VDC warning light & TCS OFF indicator light (C4 model) VDC warning light & VDC indicator light (except for C4 model)	(35) Front ABS wheel speed sensor LH
(10) Front inlet solenoid valve RH	(23) ABS warning light	(36) Front ABS wheel speed sensor RH
(11) Front outlet solenoid valve RH	(24) Brake warning light	(37) Rear ABS wheel speed sensor LH
(12) Rear inlet solenoid valve LH	(25) Parking brake switch	(38) Rear ABS wheel speed sensor RH
(13) Rear outlet solenoid valve LH	(26) Brake fluid level switch	

# Subaru Select Monitor

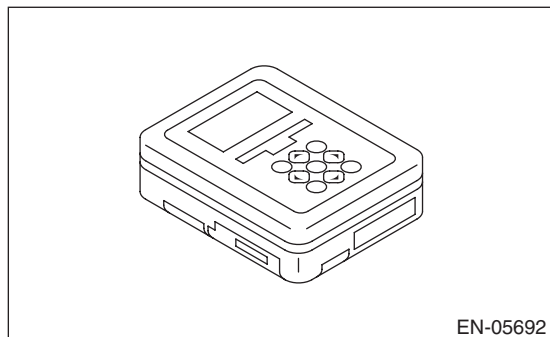
VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)

## 6. Subaru Select Monitor

### A: OPERATION

#### 1. HOW TO USE SUBARU SELECT MONITOR

1) Prepare the Subaru Select Monitor kit. <Ref. to VDC(diag)-12, SPECIAL TOOL, PREPARATION TOOL, General Description.>



2) Prepare PC with Subaru Select Monitor installed.

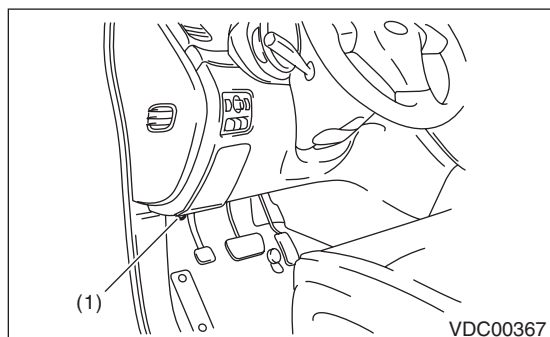
3) Connect the USB cable to SDI (Subaru Diagnosis Interface) and USB port on the personal computer (dedicated port for the Subaru Select Monitor).

#### NOTE:

The dedicated port for the Subaru Select Monitor means the USB port which was used to install the Subaru Select Monitor.

4) Connect the diagnosis cable to SDI.

5) Connect SDI to data link connector located in the lower portion of the instrument panel (on the driver's side).



(1) Data link connector

#### CAUTION:

**Do not connect the scan tools other than the Subaru Select Monitor.**

6) Start the PC.

7) Turn the ignition switch to ON (engine OFF) and run the "PC application for Subaru Select Monitor".

#### NOTE:

For detailed operation procedures, refer to "PC application help for Subaru Select Monitor".

8) If VDC and Subaru Select Monitor cannot communicate, check the communication circuit. <Ref. to VDC(diag)-21, COMMUNICATION FOR INITIALIZING IMPOSSIBLE, INSPECTION, Subaru Select Monitor.>

9) Record the DTC and data.

# Subaru Select Monitor

VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)

## 2. READ CURRENT DATA

- 1) On «Main Menu» display, select {Each System Check}.
  - 2) On «System Selection Menu» display, select {Brake Control System}.
  - 3) Click the [OK] button after {VDC} is displayed.
  - 4) On «Brake Control Diagnosis» display, select {Current Data Display & Save}.
  - 5) On «Data Display Menu» display, select the data display method.
  - 6) Using the scroll key, scroll the display screen up or down until necessary data is shown.
- A list of the support data is shown in the following table.

Display	Contents to be displayed	Unit of measure
FR Wheel Speed	Wheel speed detected by front ABS wheel speed sensor RH is displayed.	km/h or MPH
FL Wheel Speed	Wheel speed detected by front ABS wheel speed sensor LH is displayed.	km/h or MPH
RR Wheel Speed	Wheel speed detected by rear ABS wheel speed sensor RH is displayed.	km/h or MPH
RL Wheel Speed	Wheel speed detected by rear ABS wheel speed sensor LH is displayed.	km/h or MPH
Longitudinal G Sensor	Vehicle longitudinal acceleration detected by G sensor is displayed.	m/s <sup>2</sup>
Lateral G Sensor	Vehicle lateral acceleration detected by G sensor is displayed.	m/s <sup>2</sup>
IG power supply voltage	Voltage supplied to VDCCM&H/U is displayed.	V
Steering Angle Sensor	Steering angle detected by steering angle sensor is displayed.	deg
Yaw Rate Sensor	Vehicle angular speed detected by yaw rate sensor is displayed.	deg/s
Pressure Sensor	Brake fluid pressure detected by pressure sensor is displayed.	bar
ABS Control Flag	ABS control condition is displayed.	ON or OFF
EBD Control Flag	EBD control condition is displayed.	ON or OFF
Brake Switch	Brake ON/OFF is displayed.	ON or OFF
ABS Warning Light	ON operation of the ABS warning light is displayed.	ON or OFF
EBD Warning Light	ON operation of the EBD warning light is displayed.	ON or OFF
Motor Relay Signal	Motor relay operation signal is displayed.	ON or OFF
Motor Relay Monitor	Motor relay monitor signal is displayed.	ON or OFF
TCS Control Flag	TCS control condition is displayed.	ON or OFF
Valve Relay Signal	Valve relay operation signal is displayed.	ON or OFF
VDC Control Flag	VDC control condition is displayed.	ON or OFF
VDC Warning Light	ON operation of the VDC warning light is displayed.	ON or OFF
OFF Lamp	ON/OFF condition of TCS OFF indicator light is displayed.	ON or OFF
E/G Control Stop Flag	Engine control command signal is displayed.	1 or 0
OFF SW Signal	Operation condition of TCS OFF switch is displayed.	ON or OFF
Fail Safe Relay Signal	Motor fail safe relay operation signal is displayed.	ON or OFF

### NOTE:

For details concerning the operation procedure, refer to “PC application help for Subaru Select Monitor”.

# Subaru Select Monitor

## VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)

### 3. FUNCTION CHECK

Display	Contents to be displayed	Reference
ABS Sequence Control Mode	Operate the valve and pump motor continuously to perform the ABS sequence control.	<Ref. to VDC-12, ABS Sequence Control.>
VDC Check Mode	Operate the valve and pump motor continuously to perform the VDC sequence control.	<Ref. to VDC-15, VDC Sequence Control.>
Set up mode for Neutral of Steering Angle Sensor & Lateral G Sensor 0 point	Set the steering angle sensor neutral position and the yaw rate & G sensor "0" point.	<Ref. to VDC-19, Steering Angle Sensor.>

### 4. FREEZE FRAME DATA

#### NOTE:

- Data stored at the time of trouble occurrence is shown on display.
- Each time a trouble occurs, the latest information is stored in the freeze frame data in memory.

Display	Contents to be displayed
IG counter	Number of ignition switch ON is displayed.
Trouble Code	Recorded trouble code is displayed.
FR Wheel Speed	Wheel speed detected by front ABS wheel speed sensor RH is displayed in km/h or MPH.
FL Wheel Speed	Wheel speed detected by front ABS wheel speed sensor LH is displayed in km/h or MPH.
RR Wheel Speed	Wheel speed detected by rear ABS wheel speed sensor RH is displayed in km/h or MPH.
RL Wheel Speed	Wheel speed detected by rear ABS wheel speed sensor LH is displayed in km/h or MPH.
Vehicle Speed	Vehicle speed calculated by VDC control module is displayed.
G Sensor First Axis(GL1)	The sensor value for a 45° angle crossed 2 axis G sensor is displayed.
G Sensor Sec Axis(GL2)	
Yaw Rate Sensor Output	Vehicle angular speed detected by yaw rate sensor is displayed.
IG power supply voltage	Voltage supplied to VDC control module is displayed.
Steering Angle Sensor Op	Steering angle detected by steering angle sensor is displayed.
Pressure Sensor Output	Brake fluid pressure detected by pressure sensor is displayed.

Display	Contents to be displayed
Engine Speed	Engine speed on malfunction occurrence is displayed.
Accel. Opening Angle	Acceleration opening is displayed.
Gear Position	Gear position on malfunction occurrence is displayed.
Steering Angle Sens Code	Recorded trouble code of steering angle sensor is displayed.
ABS Control Flag	ABS control condition is displayed.
EBD Control Flag	EBD control condition is displayed.
Brake Switch	Brake ON/OFF is displayed.
TCS Control Flag	TCS control condition is displayed.
VDC Control Flag	VDC control condition is displayed.
E/G Control Stop Flag	Engine control command signal is displayed.
Steering angle flag	Whether the absolute angle was determined is displayed.
OFF SW Signal	Operation condition of TCS OFF switch is displayed.



# Subaru Select Monitor

VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)

## B: INSPECTION

### 1. COMMUNICATION FOR INITIALIZING IMPOSSIBLE

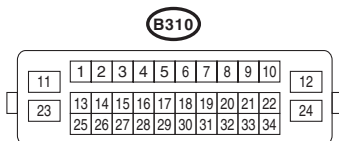
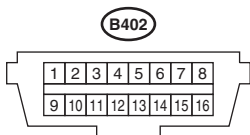
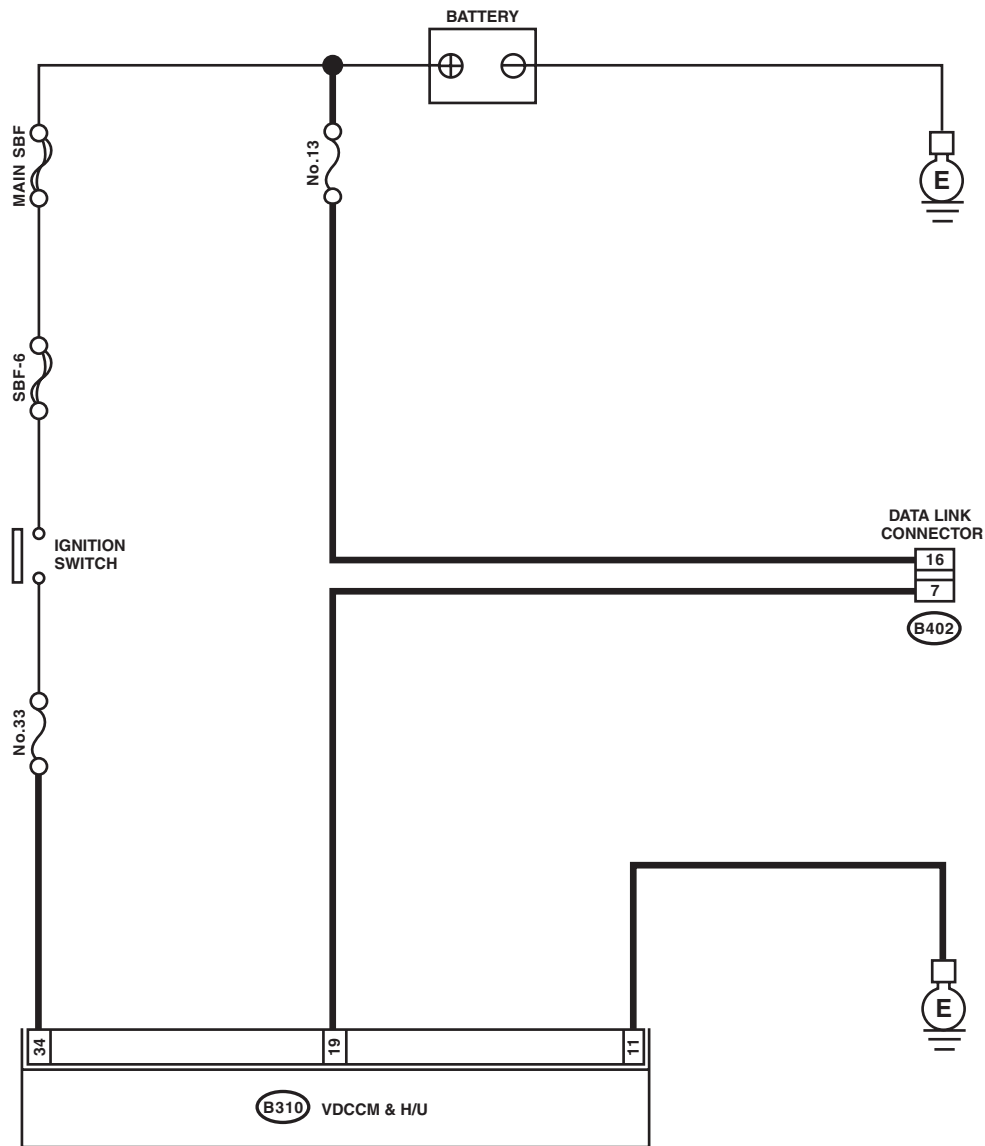
#### DETECTING CONDITION:

Defective harness connector

#### TROUBLE SYMPTOM:

Communication is impossible between VDC and Subaru Select Monitor.

#### WIRING DIAGRAM:



VDC00660

# Subaru Select Monitor

## VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)

Step	Check	Yes	No
<b>1</b> <b>CHECK IGNITION SWITCH.</b>	Is the ignition switch ON?	Go to step 2.	Turn the ignition switch to ON, and select VDC mode using Subaru Select Monitor.
<b>2</b> <b>CHECK BATTERY.</b> 1) Turn the ignition switch to OFF. 2) Measure the battery voltage.	Is the voltage 11 V or more?	Go to step 3.	Charge or replace the battery.
<b>3</b> <b>CHECK BATTERY TERMINAL.</b>	Is there poor contact at battery terminal?	Repair or tighten the battery terminal.	Go to step 4.
<b>4</b> <b>CHECK SUBARU SELECT MONITOR COMMUNICATION.</b> 1) Turn the ignition switch to ON. 2) Using the Subaru Select Monitor, check whether communication to other systems can be executed normally.	Is the system name displayed on Subaru Select Monitor?	Go to step 8.	Go to step 5.
<b>5</b> <b>CHECK SUBARU SELECT MONITOR COMMUNICATION.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the VDCCM&H/U connector. 3) Turn the ignition switch to ON. 4) Check whether communication to other systems can be executed normally.	Is the system name displayed on Subaru Select Monitor?	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>	Go to step 6.
<b>6</b> <b>CHECK HARNESS CONNECTOR BETWEEN EACH CONTROL MODULE AND DATA LINK CONNECTOR.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from the VDCCM&H/U, ECM and TCM. 3) Measure the resistance between data link connector and chassis ground. <b>Connector &amp; terminal</b> <b>(B402) No. 7 — Chassis ground:</b>	Is the resistance 1 M $\Omega$ or more?	Go to step 7.	Repair the harness and connector between each control module and data link connector.
<b>7</b> <b>CHECK HARNESS CONNECTOR BETWEEN VDCCM&amp;H/U AND DATA LINK CONNECTOR.</b> 1) Turn the ignition switch to ON. 2) Measure the voltage between data link connector and chassis ground. <b>Connector &amp; terminal</b> <b>(B402) No. 7 (+) — Chassis ground (-):</b>	Is the voltage less than 1 V?	Go to step 8.	Repair the harness and connector between each control module and data link connector.
<b>8</b> <b>CHECK HARNESS CONNECTOR BETWEEN VDCCM&amp;H/U AND DATA LINK CONNECTOR.</b> Measure the resistance between VDCCM&H/U connector and data link connector. <b>Connector &amp; terminal</b> <b>(B310) No. 19 — (B402) No. 7:</b>	Is the resistance less than 1 $\Omega$ ?	Go to step 9.	Repair harness and connector between VDCCM&H/U and data link connector.
<b>9</b> <b>CHECK INSTALLATION OF VDCCM&amp;H/U CONNECTOR.</b> Turn the ignition switch to OFF.	Is the VDCCM&H/U connector inserted into VDCCM&H/U until the clamp locks onto it?	Go to step 10.	Insert VDCCM&H/U connector into VDCCM&H/U.
<b>10</b> <b>CHECK POWER SUPPLY CIRCUIT.</b> 1) Turn the ignition switch to ON. (engine OFF) 2) Measure the ignition power supply voltage between VDCCM&H/U connector and chassis ground. <b>Connector &amp; terminal</b> <b>(B310) No. 34 (+) — Chassis ground (-):</b>	Is the voltage 10 — 15 V?	Go to step 11.	Repair open circuit in harness between VDCCM&H/U and battery.

# Subaru Select Monitor

## VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)

Step	Check	Yes	No
<b>11 CHECK HARNESS CONNECTOR BETWEEN VDCCM&amp;H/U AND CHASSIS GROUND.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connector from the VDCCM&H/U. 3) Measure the resistance of harness between VDCCM&H/U connector and chassis ground. <b>Connector &amp; terminal</b> <b>(B310) No. 11 — Chassis ground:</b>	Is the resistance less than 10 $\Omega$ ?	Go to step 12.	Repair the open circuit of VDCCM&H/U ground harness and poor contact of connector.
<b>12 CHECK POOR CONTACT OF CONNECTOR.</b>	Is there poor contact of control module power supply, ground circuit and data link connector?	Repair the connector.	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>

# Read Diagnostic Trouble Code (DTC)

VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)

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## 7. Read Diagnostic Trouble Code (DTC)

### A: OPERATION

- 1) On «Main Menu» display, select {Each System Check}.
- 2) On «System Selection Menu» display, select {Brake Control System}.
- 3) Click the [OK] button after {VDC} is displayed.
- 4) On «Brake Control Diagnosis» display, select {Diagnostic Code(s) Display}.
- 5) Record the DTC and data.

#### NOTE:

- For detailed operation procedures, refer to “PC application help for Subaru Select Monitor”.
- For details concerning DTCs, refer to “List of Diagnostic Trouble Code (DTC)”. <Ref. to VDC(diag)-41, List of Diagnostic Trouble Code (DTC).>
- Up to 3 DTCs are displayed in the order of detection.

Display	Contents to be displayed
Latest	The latest DTC is displayed on Subaru Select Monitor display screen.
(Old)	The latest DTC from the history of previous problems is displayed on Subaru Select Monitor display screen.
(Older)	The second latest DTC from the history of previous problems is displayed on the Subaru Select Monitor display screen.

## 8. Inspection Mode

### A: PROCEDURE

Reproduce the malfunction occurrence condition as much as possible.

Drive the vehicle at least ten minutes.

#### NOTE:

Make sure the vehicle is not dragged to one side under usual driving condition.

## Clear Memory Mode

VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)

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### 9. Clear Memory Mode

#### A: OPERATION

- 1) On the «Main Menu» display screen, select the {Each System Check}.
- 2) On the «System Selection Menu», select the {Brake Control System}.
- 3) Click the [OK] button after the {VDC} is displayed.
- 4) On the «Brake Control Diagnosis» display screen, select the {Clear Memory}.
- 5) When the “Clear Memory?” is shown on the screen, click the “YES” button.
- 6) When “Done” and “Turn off the ignition switch” is shown on the display screen, turn the ignition switch to OFF.

#### NOTE:

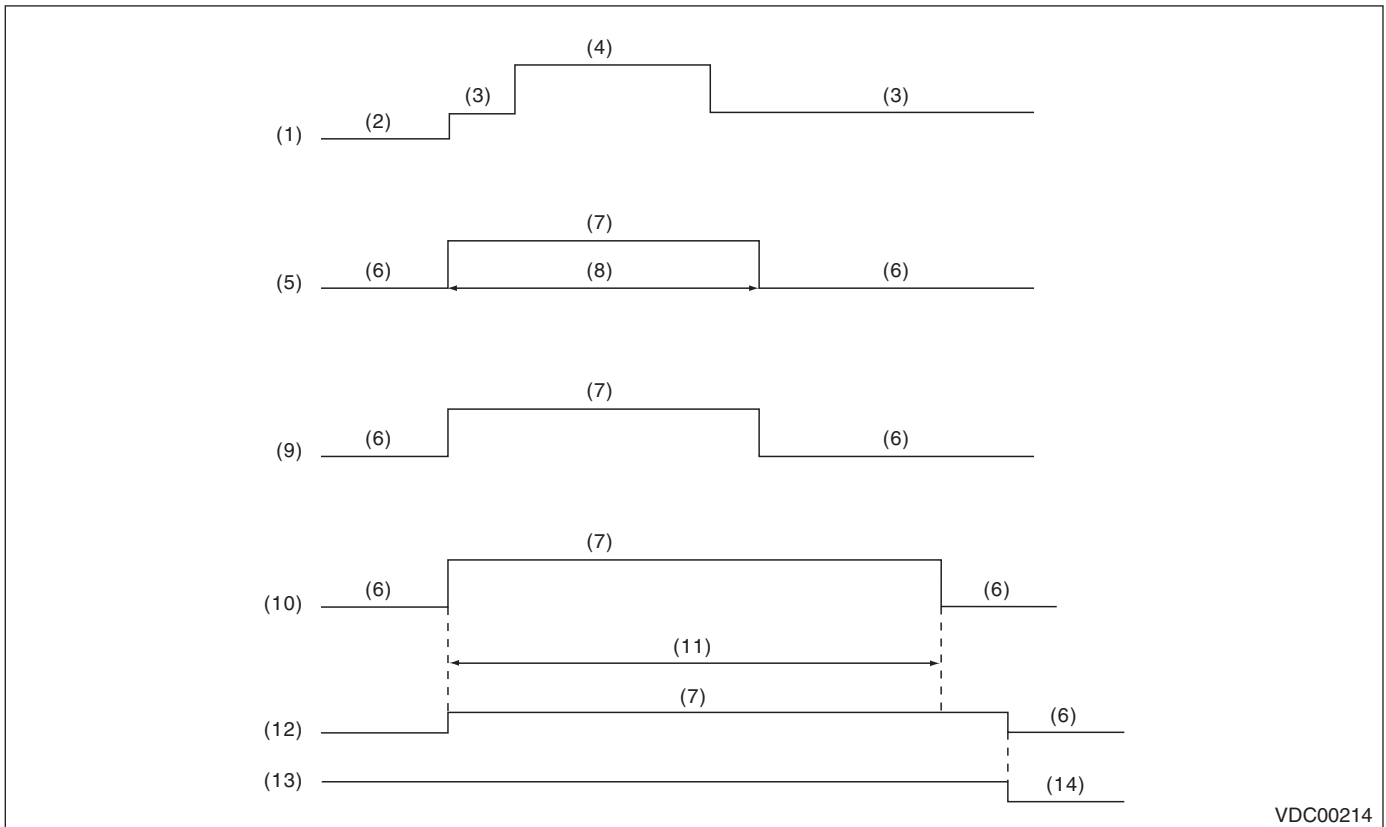
For details concerning the operation procedure, refer to the “PC application help for Subaru Select Monitor”.

# Warning Light Illumination Pattern

VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)

## 10.Warning Light Illumination Pattern

### A: INSPECTION



VDC00214

- |                       |  |  |
|-----------------------|--|--|
| (1) Ignition switch   | (6) Light OFF  | (11) Several seconds (depending on engine coolant temperature) |
| (2) OFF               | (7) Light ON   | (12) Brake warning light (EBD warning light)                   |
| (3) ON                | (8) 1.5 seconds  | (13) Parking brake   |
| (4) Engine start      | (9) VDC indicator light (C4 model)<br>TCS OFF indicator light (except for C4 model)  | (14) Released  |
| (5) ABS warning light | (10) VDC warning light & TCS OFF indicator light (C4 model)<br>VDC warning light & VDC indicator light (except for C4 model) |  |

## Warning Light Illumination Pattern

### VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)

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1) When warning lights or indicator lights do not illuminate in accordance with this illumination pattern, there must be an electrical malfunction.

2) When warning lights or indicator lights remain constantly OFF, check the combination meter circuit or CAN communication circuit. <Ref. to VDC(diag)-29, VDC WARNING LIGHT, TCS OFF INDICATOR LIGHT AND VDC INDICATOR LIGHT DO NOT COME ON, Warning Light Illumination Pattern.> <Ref. to VDC(diag)-30, VDC WARNING LIGHT AND VDC INDICATOR LIGHT, TCS OFF INDICATOR LIGHT DO NOT COME ON, Warning Light Illumination Pattern.>

3) When ABS warning light does not go off, check the combination meter circuit. <Ref. to VDC(diag)-33, ABS WARNING LIGHT DOES NOT GO OFF, Warning Light Illumination Pattern.>

4) When the VDC warning light & TCS OFF indicator light (C4 model), VDC warning light & VDC indicator light (except for C4 model), VDC indicator light (C4 model) or TCS OFF indicator light (except for C4 model) does not go off, check the combination meter circuit or CAN communication circuit. <Ref. to VDC(diag)-35, VDC WARNING LIGHT AND TCS OFF INDICATOR LIGHT DO NOT GO OFF, Warning Light Illumination Pattern.> <Ref. to VDC(diag)-36, VDC WARNING LIGHT AND VDC INDICATOR LIGHT DO NOT GO OFF, Warning Light Illumination Pattern.> <Ref. to VDC(diag)-37, VDC INDICATOR LIGHT DOES NOT GO OFF, Warning Light Illumination Pattern.> <Ref. to VDC(diag)-38, TCS OFF INDICATOR LIGHT DO NOT GO OFF, Warning Light Illumination Pattern.>

#### NOTE:

- Even though the ABS warning light does not go off after 1.5 seconds from ABS warning light illumination, the ABS system operates normally when the warning light goes off while driving at approximately 12 km/h (7 MPH). However, the ABS system does not work while the ABS warning light is illuminated.
- If the vehicle is parked under a low temperature for a specified time, it may take several minutes before VDC warning light & TCS OFF indicator light (C4 model) or VDC warning light & VDC indicator light (except for C4 model) goes off. This is not defective because it is resulted from low engine coolant temperature.
- With the vehicle jacked-up/lifted-up or set on free rollers, when the wheels lock or spin after starting the engine, the ABS warning light, VDC warning light & TCS OFF indicator light (C4 model) or VDC warning light & VDC indicator light (except for C4 model) may illuminate because the VDCCM&H/U detects the abnormal condition from the ABS wheel speed sensors. In this case, this is not a malfunction. Perform the Clear Memory Mode.



## Warning Light Illumination Pattern

VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)

### B: VDC WARNING LIGHT, TCS OFF INDICATOR LIGHT AND VDC INDICATOR LIGHT DO NOT COME ON

**NOTE:**

This diagnosis is applied to C4 model.

**DETECTING CONDITION:**

- Defective combination meter
- Defective CAN communication

**TROUBLE SYMPTOM:**

When the ignition switch is turned to ON (engine OFF), the VDC indicator light, VDC warning light & TCS OFF indicator light do not become lit.

**NOTE:**

When the TCS OFF switch is pressed for 10 seconds or more, the TCS OFF indicator light turns off and switch operations thereafter will not be accepted. When turning the ignition switch from OFF to ON, the OFF operation enabled status is restored.

Step	Check	Yes	No
<b>1</b> <b>CHECK OTHER INDICATOR LIGHT.</b> Turn the ignition switch to ON.	Does other indicator light illuminate soon after "ON"?	Go to step 2.	Perform the self-diagnosis of combination meter. <Ref. to IDI-4, SELF-DIAGNOSIS, INSPECTION, Combination Meter System.>
<b>2</b> <b>CHECK VDCCM.</b> Connect the Subaru Select Monitor, and display the current data of VDCCM without starting the engine. <Ref. to VDC(diag)-19, READ CURRENT DATA, OPERATION, Subaru Select Monitor.>	Is "VDC Warning Light" output set to ON?	Go to step 3.	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>
<b>3</b> <b>CHECK LAN SYSTEM.</b> Perform the diagnosis for LAN system. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>	Is there any fault in LAN system?	Perform the diagnosis according to DTC for LAN system. <Ref. to LAN(diag)-31, List of Diagnostic Trouble Code (DTC).>	Go to step 4.
<b>4</b> <b>CHECK COMBINATION METER.</b> Perform the self-diagnosis of combination meter. <Ref. to IDI-4, SELF-DIAGNOSIS, INSPECTION, Combination Meter System.>	Is combination meter OK?	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>	Replace the combination meter. <Ref. to IDI-11, Combination Meter.>

## Warning Light Illumination Pattern

VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)

### C: VDC WARNING LIGHT AND VDC INDICATOR LIGHT, TCS OFF INDICATOR LIGHT DO NOT COME ON

NOTE:

This diagnosis is applied to models other than C4 model.

**DETECTING CONDITION:**

- Defective combination meter
- Defective CAN communication

**TROUBLE SYMPTOM:**

When the ignition switch is turned to ON (engine OFF), VDC warning light & VDC indicator light and TCS OFF indicator light do not illuminate.

NOTE:

When the TCS OFF switch is pressed for 10 seconds or more, the TCS OFF indicator light turns off and switch operations thereafter will not be accepted. When turning the ignition switch from OFF to ON, the OFF operation enabled status is restored.

Step	Check	Yes	No
<b>1</b> <b>CHECK OTHER INDICATOR LIGHT.</b> Turn the ignition switch to ON.	Does other indicator light illuminate soon after "ON"?	Go to step 2.	Perform the self-diagnosis of combination meter. <Ref. to IDI-4, SELF-DIAGNOSIS, INSPECTION, Combination Meter System.>
<b>2</b> <b>CHECK VDCCM.</b> Connect the Subaru Select Monitor, and display the current data of VDCCM without starting the engine. <Ref. to VDC(diag)-19, READ CURRENT DATA, OPERATION, Subaru Select Monitor.>	Is "VDC Warning Light" output set to ON?	Go to step 3.	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>
<b>3</b> <b>CHECK LAN SYSTEM.</b> Perform the diagnosis for LAN system. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>	Is there any fault in LAN system?	Perform the diagnosis according to DTC for LAN system. <Ref. to LAN(diag)-31, List of Diagnostic Trouble Code (DTC).>	Go to step 4.
<b>4</b> <b>CHECK COMBINATION METER.</b> Perform the self-diagnosis of combination meter. <Ref. to IDI-4, SELF-DIAGNOSIS, INSPECTION, Combination Meter System.>	Is combination meter OK?	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>	Replace the combination meter. <Ref. to IDI-11, Combination Meter.>

# Warning Light Illumination Pattern

VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)

## D: ABS WARNING LIGHT DOES NOT COME ON

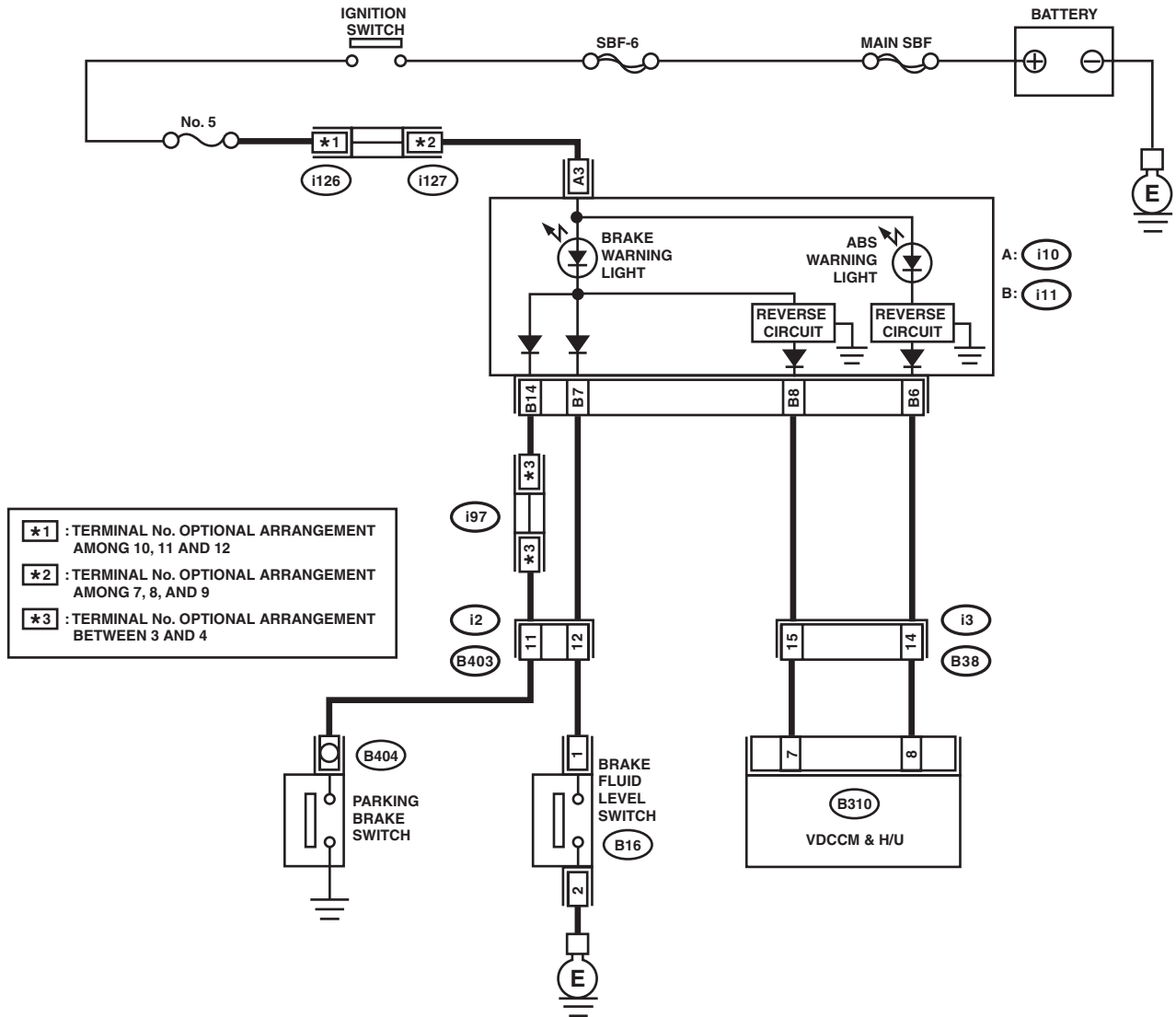
### DETECTING CONDITION:

- Defective combination meter
- Defective harness

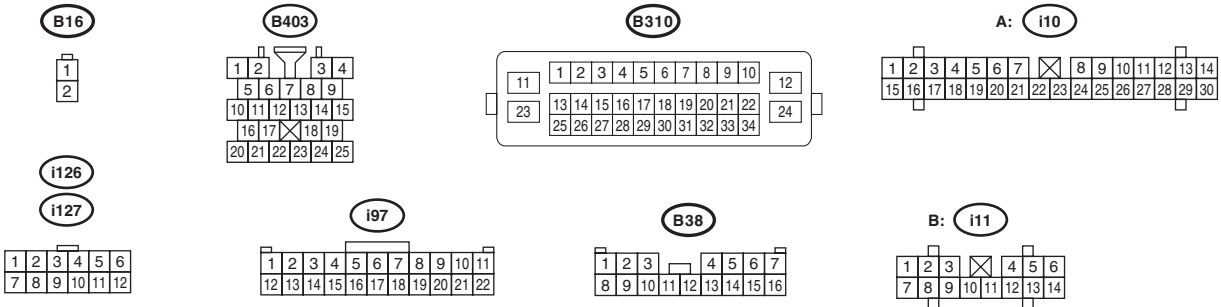
### TROUBLE SYMPTOM:

When the ignition switch is turned to ON (engine OFF), ABS warning light does not illuminate.

### WIRING DIAGRAM:



\*1 : TERMINAL No. OPTIONAL ARRANGEMENT AMONG 10, 11 AND 12  
 \*2 : TERMINAL No. OPTIONAL ARRANGEMENT AMONG 7, 8, AND 9  
 \*3 : TERMINAL No. OPTIONAL ARRANGEMENT BETWEEN 3 AND 4



VDC00825

## Warning Light Illumination Pattern

### VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)

Step	Check	Yes	No
<b>1</b> <b>CHECK OTHER LIGHTS TURN ON.</b> Turn the ignition switch to ON. (engine OFF)	Do other warning lights illuminate?	Go to step 2.	Perform the self-diagnosis of combination meter. <Ref. to IDI-4, SELF-DIAGNOSIS, INSPECTION, Combination Meter System.>
<b>2</b> <b>READ DTC.</b> Read the DTC. <Ref. to VDC(diag)-24, Read Diagnostic Trouble Code (DTC).>	Is DTC displayed?	Perform the diagnosis according to DTC. <Ref. to VDC(diag)-41, List of Diagnostic Trouble Code (DTC).>	Go to step 3.
<b>3</b> <b>CHECK GROUND SHORT CIRCUIT OF HARNESS.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connector (B310) from the VDCCM&H/U. 3) Disconnect the connector (i11) from combination meter. 4) Measure the resistance between VDCCM&H/U connector and chassis ground. <b>Connector &amp; terminal</b> <b>(B310) No. 8 — Chassis ground:</b>	Is the resistance 1 MΩ or more?	Go to step 4.	Repair the harness connector between VDCCM&H/U and combination meter.
<b>4</b> <b>CHECK VDCCM.</b> 1) Connect the connector (B310) to VDCCM&H/U. 2) Turn the ignition switch to ON. 3) Measure the resistance between the combination meter connector and chassis ground soon after the ignition switch is turned to ON (within 1.5 seconds). <b>Connector &amp; terminal</b> <b>(i11) No. 6 — Chassis ground:</b>	Is the resistance 1 MΩ or more?	Perform the self-diagnosis of combination meter. <Ref. to IDI-4, SELF-DIAGNOSIS, INSPECTION, Combination Meter System.>	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>

# Warning Light Illumination Pattern

VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)

## E: ABS WARNING LIGHT DOES NOT GO OFF

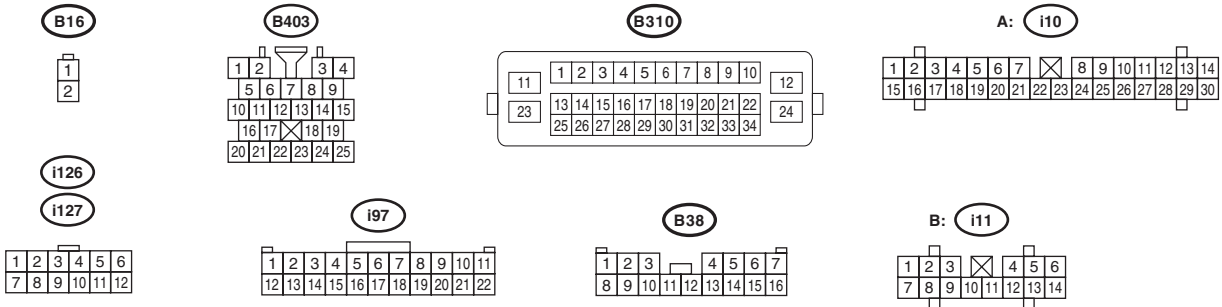
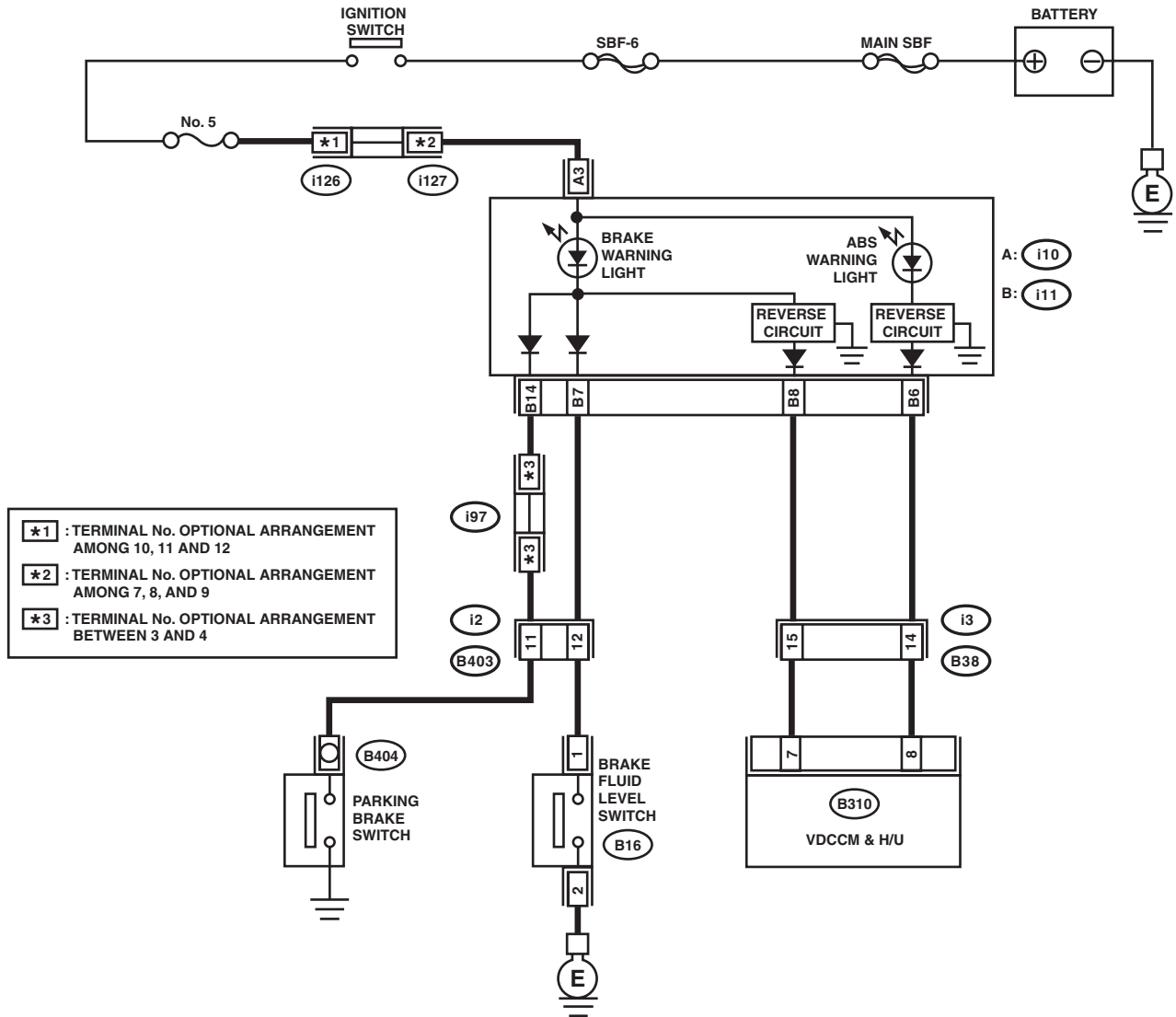
### DETECTING CONDITION:

- Defective combination meter
- Open circuit of harness

### TROUBLE SYMPTOM:

When starting the engine, the ABS warning light is kept ON.

### WIRING DIAGRAM:



VDC00825

## Warning Light Illumination Pattern

### VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)

Step	Check	Yes	No
<b>1 CHECK INSTALLATION OF VDCCM&amp;H/U CONNECTOR.</b> 1) Turn the ignition switch to OFF. 2) Check that the VDCCM&H/U connector is inserted until it is locked by clamp.	Is the connector firmly inserted?	Go to step 2.	Insert the VDCCM&H/U connector until it is locked by clamp.
<b>2 READ DTC.</b> Read the DTC. <Ref. to VDC(diag)-24, Read Diagnostic Trouble Code (DTC).>	Is DTC displayed?	Perform the diagnosis according to DTC. <Ref. to VDC(diag)-41, List of Diagnostic Trouble Code (DTC).>	Go to step 3.
<b>3 CHECK WIRING HARNESS.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connector (B310) from the VDCCM&H/U. 3) Disconnect the connector (i11) from combination meter. 4) Measure the resistance between VDCCM&H/U connector and combination meter connector. <b>Connector &amp; terminal</b> <b>(B310) No. 8 — (i11) No. 6:</b>	Is the resistance less than 1 $\Omega$ ?	Go to step 4.	Repair the harness connector between VDCCM&H/U and combination meter.
<b>4 CHECK POOR CONTACT OF CONNECTOR.</b> Check for poor contact of all connectors.	Is there poor contact?	Repair the poor contact of connector.	Go to step 5.
<b>5 CHECK VDCCM.</b> 1) Connect the connector (B310) to VDCCM&H/U. 2) Turn the ignition switch to ON. 3) After turning the ignition switch to ON, wait 1.5 seconds or more, then measure the resistance between the combination meter connector and chassis ground. <b>Connector &amp; terminal</b> <b>(i11) No. 6 (+) — Chassis ground (-):</b>	Is the voltage less than 1 V?	Perform the self-diagnosis of combination meter. <Ref. to IDI-4, SELF-DIAGNOSIS, INSPECTION, Combination Meter System.>	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>

# Warning Light Illumination Pattern

VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)

## F: VDC WARNING LIGHT AND TCS OFF INDICATOR LIGHT DO NOT GO OFF

NOTE:

This diagnosis is applied to C4 model.

### DETECTING CONDITION:

- Defective combination meter
- Defective CAN communication
- Defective engine
- TCS OFF switch is shorted.

### TROUBLE SYMPTOM:

When starting the engine, TCS OFF indicator light is kept ON.

NOTE:

When the TCS OFF switch is pressed for 10 seconds or more, the TCS OFF indicator light turns off and switch operations thereafter will not be accepted. When turning the ignition switch from OFF to ON, the OFF operation enabled status is restored.

Step	Check	Yes	No
<b>1 READ DTC.</b> Read the DTC. <Ref. to VDC(diag)-24, Read Diagnostic Trouble Code (DTC).>	Is DTC displayed?	Perform the diagnosis according to DTC. <Ref. to VDC(diag)-41, List of Diagnostic Trouble Code (DTC).>	Go to step 2.
<b>2 CHECK ENGINE.</b>	Does the malfunction indicator light illuminate?	Repair the engine. <Ref. to EN(H6DO)(diag)-2, Basic Diagnostic Procedure.>	Go to step 3.
<b>3 CHECK ENGINE COOLANT TEMPERATURE.</b> Warm up the engine and check for whether the VDC warning light & TCS OFF indicator light illumination condition changes.	When the engine coolant temperature is too low, the VDC warning light & TCS OFF indicator light illuminates. Do the lights go off when the engine is warmed up?	Normal	Go to step 4.
<b>4 CHECK TCS OFF SWITCH.</b> Remove and check TCS OFF switch. <Ref. to VDC-26, TCS OFF Switch.>	Is the TCS OFF switch operating normally?	Go to step 5.	Replace the TCS OFF switch. <Ref. to VDC-26, TCS OFF Switch.>
<b>5 CHECK VDCCM&amp;H/U.</b> 1) Connect the Subaru Select Monitor to the vehicle. 2) Start the engine, and select "Current Data Display & Save" in the Subaru Select Monitor. <Ref. to VDC(diag)-19, READ CURRENT DATA, OPERATION, Subaru Select Monitor.>	Is the VDC warning light and TCS OFF light output displayed as being OFF?	Go to step 6.	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>
<b>6 CHECK LAN SYSTEM.</b> Perform the diagnosis for LAN system. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>	Is there any fault in LAN system?	Perform the diagnosis according to DTC for LAN system. <Ref. to LAN(diag)-31, List of Diagnostic Trouble Code (DTC).>	Go to step 7.
<b>7 CHECK COMBINATION METER.</b> Perform the self-diagnosis of combination meter. <Ref. to IDI-4, SELF-DIAGNOSIS, INSPECTION, Combination Meter System.>	Is combination meter OK?	Temporary poor contact occurs.	Replace the combination meter. <Ref. to IDI-11, Combination Meter.>

## Warning Light Illumination Pattern

VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)

### G: VDC WARNING LIGHT AND VDC INDICATOR LIGHT DO NOT GO OFF

NOTE:

This diagnosis is applied to models other than C4 model.

**DETECTING CONDITION:**

- Defective combination meter
- Defective CAN communication

**TROUBLE SYMPTOM:**

When starting the engine, the VDC warning light & VDC indicator light remains lit.

Step	Check	Yes	No
<b>1 READ DTC.</b> Read the DTC. <Ref. to VDC(diag)-24, Read Diagnostic Trouble Code (DTC).>	Is DTC displayed?	Perform the diagnosis according to DTC. <Ref. to VDC(diag)-41, List of Diagnostic Trouble Code (DTC).>	Go to step 2.
<b>2 CHECK ENGINE.</b>	Does the malfunction indicator light illuminate?	Repair the engine. <Ref. to EN(H6DO)(diag)-2, Basic Diagnostic Procedure.>	Go to step 3.
<b>3 CHECK ENGINE COOLANT TEMPERATURE.</b> Warm up the engine, and check if the VDC warning light & VDC indicator light illumination condition changes.	When the engine coolant temperature is too low, the VDC warning light & VDC indicator light illuminates. Do the lights go off when the engine is warmed up?	Normal	Go to step 4.
<b>4 CHECK LAN SYSTEM.</b> Perform the diagnosis for LAN system. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>	Is there any fault in LAN system?	Perform the diagnosis according to DTC for LAN system. <Ref. to LAN(diag)-31, List of Diagnostic Trouble Code (DTC).>	Go to step 5.
<b>5 CHECK COMBINATION METER.</b> Perform the self-diagnosis of combination meter. <Ref. to IDI-4, SELF-DIAGNOSIS, INSPECTION, Combination Meter System.>	Is combination meter OK?	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>	Replace the combination meter. <Ref. to IDI-11, Combination Meter.>



# Warning Light Illumination Pattern

VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)

## H: VDC INDICATOR LIGHT DOES NOT GO OFF

NOTE:

This diagnosis is applied to C4 model.

### DETECTING CONDITION:

- Defective combination meter
- Defective CAN communication

### TROUBLE SYMPTOM:

When starting the engine, VDC indicator light is kept ON.

Step	Check	Yes	No
<b>1 READ DTC.</b> Read the DTC. <Ref. to VDC(diag)-24, Read Diagnostic Trouble Code (DTC).>	Is DTC displayed?	Perform the diagnosis according to DTC. <Ref. to VDC(diag)-41, List of Diagnostic Trouble Code (DTC).>	Go to step 2.
<b>2 CHECK VDCCM&amp;H/U.</b> 1) Connect the Subaru Select Monitor to the vehicle. 2) Start the engine, and select "Current Data Display & Save" in the Subaru Select Monitor. <Ref. to VDC(diag)-19, READ CURRENT DATA, OPERATION, Subaru Select Monitor.>	Is the ABS warning light output displayed as being OFF?	Go to step 3.	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>
<b>3 CHECK LAN SYSTEM.</b> Perform the diagnosis for LAN system. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>	Is there any fault in LAN system?	Perform the diagnosis according to DTC for LAN system. <Ref. to LAN(diag)-31, List of Diagnostic Trouble Code (DTC).>	Go to step 4.
<b>4 CHECK COMBINATION METER.</b> Perform the self-diagnosis of combination meter. <Ref. to IDI-4, SELF-DIAGNOSIS, INSPECTION, Combination Meter System.>	Is combination meter OK?	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>	Replace the combination meter. <Ref. to IDI-11, Combination Meter.>

## Warning Light Illumination Pattern

VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)

### I: TCS OFF INDICATOR LIGHT DO NOT GO OFF

NOTE:

This diagnosis is applied to models other than C4 model.

#### DETECTING CONDITION:

- Defective combination meter
- Defective CAN communication
- Defective engine
- TCS OFF switch is shorted.

#### TROUBLE SYMPTOM:

When starting the engine, TCS OFF indicator light is kept ON.

NOTE:

When the TCS OFF switch is pressed for 10 seconds or more, the TCS OFF indicator light turns off and switch operations thereafter will not be accepted. When turning the ignition switch from OFF to ON, the OFF operation enabled status is restored.

Step	Check	Yes	No
<b>1 READ DTC.</b> Read the DTC. <Ref. to VDC(diag)-24, Read Diagnostic Trouble Code (DTC).>	Is DTC displayed?	Perform the diagnosis according to DTC. <Ref. to VDC(diag)-41, List of Diagnostic Trouble Code (DTC).>	Go to step 2.
<b>2 CHECK TCS OFF SWITCH.</b> Remove and check TCS OFF switch. <Ref. to VDC-26, TCS OFF Switch.>	Is the TCS OFF switch operating normally?	Go to step 3.	Replace the TCS OFF switch. <Ref. to VDC-26, TCS OFF Switch.>
<b>3 CHECK LAN SYSTEM.</b> Perform the diagnosis for LAN system. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>	Is there any fault in LAN system?	Perform the diagnosis according to DTC for LAN system. <Ref. to LAN(diag)-31, List of Diagnostic Trouble Code (DTC).>	Go to step 4.
<b>4 CHECK COMBINATION METER.</b> Perform the self-diagnosis of combination meter. <Ref. to IDI-4, SELF-DIAGNOSIS, INSPECTION, Combination Meter System.>	Is combination meter OK?	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>	Replace the combination meter. <Ref. to IDI-11, Combination Meter.>

# Warning Light Illumination Pattern

VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)

## J: BRAKE WARNING LIGHT DOES NOT GO OFF

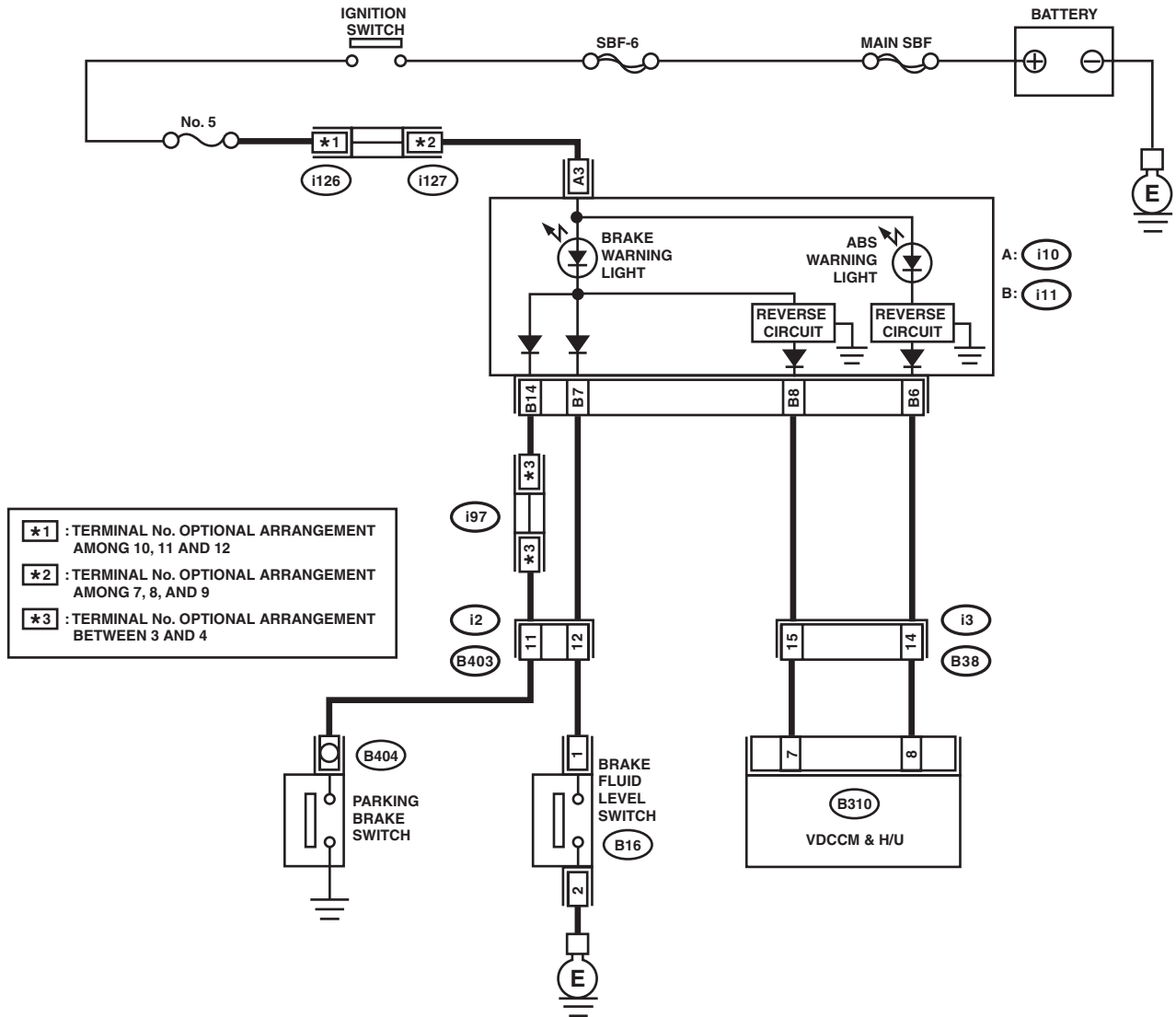
### DETECTING CONDITION:

- Brake warning light circuit is shorted.
- Defective sensor/connector

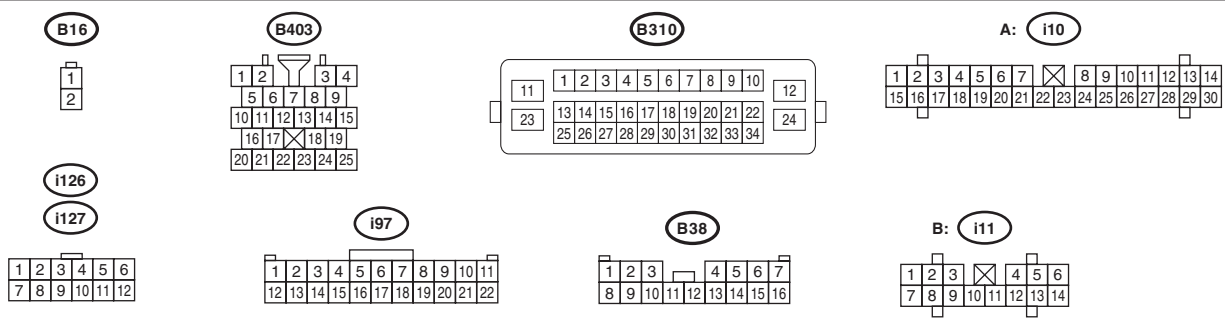
### TROUBLE SYMPTOM:

After starting the engine, the brake warning light remains lit though the parking lever is released.

### WIRING DIAGRAM:



\*1 : TERMINAL No. OPTIONAL ARRANGEMENT AMONG 10, 11 AND 12  
 \*2 : TERMINAL No. OPTIONAL ARRANGEMENT AMONG 7, 8, AND 9  
 \*3 : TERMINAL No. OPTIONAL ARRANGEMENT BETWEEN 3 AND 4



VDC00825

## Warning Light Illumination Pattern

### VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)

Step	Check	Yes	No
<b>1 CHECK INSTALLATION OF VDCCM&amp;H/U CONNECTOR.</b> 1) Turn the ignition switch to OFF. 2) Check that the VDCCM&H/U connector is inserted until it is locked by clamp.	Is the connector firmly inserted?	Go to step 2.	Insert the VDCCM&H/U connector until it is locked by clamp.
<b>2 READ DTC.</b> Read the DTC. <Ref. to VDC(diag)-24, Read Diagnostic Trouble Code (DTC).>	Is DTC displayed?	Perform the diagnosis according to DTC. <Ref. to VDC(diag)-41, List of Diagnostic Trouble Code (DTC).>	Go to step 3.
<b>3 CHECK BRAKE FLUID AMOUNT.</b> Check the amount of brake fluid in the reservoir tank of master cylinder.	Is the amount of brake fluid between the lines of "MAX" and "MIN"?	Go to step 4.	Replenish brake fluid to the specified value.
<b>4 CHECK BRAKE FLUID LEVEL SWITCH.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the level switch connector (B16) from master cylinder. 3) Measure the resistance between the brake fluid level switch terminals.  <i>Terminals</i> <i>No. 1 — No. 2:</i>	Is the resistance 1 MΩ or more?	Go to step 5.	Replace the master cylinder. <Ref. to BR-25, Master Cylinder.>
<b>5 CHECK PARKING BRAKE SWITCH.</b> 1) Disconnect the connector (B404) from parking brake switch. 2) Release the parking brake. 3) Measure the resistance between parking brake switch terminal and chassis ground.	Is the resistance 1 MΩ or more?	Go to step 6.	Replace the parking brake switch.
<b>6 CHECK GROUND SHORT OF HARNESS.</b> 1) Disconnect the connector (i11) from combination meter. 2) Measure the resistance between combination meter connector and chassis ground.  <i>Connector &amp; terminal</i> <i>(i11) No. 7 — Chassis ground:</i> <i>(i11) No. 14 — Chassis ground:</i>	Is the resistance 1 MΩ or more?	Go to step 7.	Repair the harness connector between combination meter and brake fluid level switch or parking brake switch.
<b>7 CHECK HARNESS CONNECTOR.</b> 1) Disconnect the connector (B310) from the VDCCM&H/U. 2) Disconnect the connector (i11) from combination meter. 3) Measure the resistance between VDCCM&H/U connector and combination meter connector.  <i>Connector &amp; terminal</i> <i>(B310) No. 7 — (i11) No. 8:</i>	Is the resistance less than 1 Ω?	Go to step 8.	Repair the harness connector between VDCCM&H/U and combination meter.
<b>8 CHECK POOR CONTACT OF CONNECTOR.</b> Check for poor contact of all connectors.	Is there poor contact?	Repair the connector.	Go to step 9.
<b>9 CHECK VDCCM.</b> 1) Connect the connector (B310) to VDCCM&H/U. 2) Turn the ignition to ON. 3) After turning the ignition switch to ON, wait 1.5 seconds or more, then measure the resistance between the combination meter connector and chassis ground.  <i>Connector &amp; terminal</i> <i>(i11) No. 8 (+) — Chassis ground (-):</i>	Is the voltage less than 1 V?	Perform the self-diagnosis of combination meter. <Ref. to IDI-4, SELF-DIAGNOSIS, INSPECTION, Combination Meter System.>	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>

# List of Diagnostic Trouble Code (DTC)

VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)

## 11.List of Diagnostic Trouble Code (DTC)

### A: LIST

DTC	Detailed code	Item	Content of diagnosis	Reference
C0021	4211	Front Right ABS Sensor Circuit Open	Front ABS wheel speed sensor RH is open	<Ref. to VDC(diag)-45, DTC C0021 FRONT RIGHT ABS SENSOR OPEN CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C0022	4221	Front Right ABS Sensor Signal	Front ABS wheel speed sensor RH signal malfunction	<Ref. to VDC(diag)-49, DTC C0022 FRONT ABS WHEEL SPEED SENSOR RH SIGNAL MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
	4222	FR Wheel Speed Sensor Noise	Front ABS wheel speed sensor RH signal noise	<Ref. to VDC(diag)-48, DTC C0022 FRONT RIGHT ABS SENSOR NOISE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C0023	4231	Front Left ABS Sensor Circuit Open	Front ABS wheel speed sensor LH is open	<Ref. to VDC(diag)-45, DTC C0023 FRONT LEFT ABS SENSOR OPEN CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C0024	4241	Front Left ABS Sensor Signal	Front ABS wheel speed sensor LH signal malfunction	<Ref. to VDC(diag)-49, DTC C0024 FRONT ABS WHEEL SPEED SENSOR LH SIGNAL MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
	4242	FL Wheel Speed Sensor Noise	Front ABS wheel speed sensor LH signal noise	<Ref. to VDC(diag)-48, DTC C0024 FRONT LEFT ABS SENSOR NOISE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C0025	4251	Rear Right ABS Sensor Circuit Open	Rear ABS wheel speed sensor RH is open	<Ref. to VDC(diag)-45, DTC C0025 REAR RIGHT ABS SENSOR OPEN CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C0026	4261	Rear Right ABS Sensor Signal	Rear ABS wheel speed sensor RH signal malfunction	<Ref. to VDC(diag)-49, DTC C0026 REAR ABS WHEEL SPEED SENSOR RH SIGNAL MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
	4262	RR Wheel Speed Sensor Noise	Rear ABS wheel speed sensor RH signal noise	<Ref. to VDC(diag)-48, DTC C0026 REAR RIGHT ABS SENSOR NOISE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C0027	4271	Rear Left ABS Sensor Circuit Open	Rear ABS wheel speed sensor LH is open	<Ref. to VDC(diag)-46, DTC C0027 REAR LEFT ABS SENSOR OPEN CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C0028	4281	Rear Left ABS Sensor Signal	Rear ABS wheel speed sensor LH signal malfunction	<Ref. to VDC(diag)-50, DTC C0028 REAR ABS WHEEL SPEED SENSOR LH SIGNAL MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
	4282	RL Wheel Speed Sensor Noise	Rear ABS wheel speed sensor LH signal noise	<Ref. to VDC(diag)-48, DTC C0028 REAR LEFT ABS SENSOR NOISE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C0031	4311	FR Hold Valve Malfunction	Front inlet solenoid valve RH malfunction in VDCCM&H/U	<Ref. to VDC(diag)-52, DTC C0031 FRONT INLET SOLENOID VALVE RH MALFUNCTION IN VDCCM&H/U, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C0032	4321	FR Pressure Reducing Valve Malfunction	Front outlet solenoid valve RH malfunction in VDCCM&H/U	<Ref. to VDC(diag)-52, DTC C0032 FRONT OUTLET SOLENOID VALVE RH MALFUNCTION IN VDCCM&H/U, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C0033	4331	FL Hold Valve Malfunction	Front inlet solenoid valve LH malfunction in VDCCM&H/U	<Ref. to VDC(diag)-53, DTC C0033 FRONT INLET SOLENOID VALVE LH MALFUNCTION IN VDCCM&H/U, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

## List of Diagnostic Trouble Code (DTC)

### VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)

DTC	Detailed code	Item	Content of diagnosis	Reference
C0034	4341	FL Pressure Reducing Valve Malfunction	Front outlet solenoid valve LH malfunction in VDCCM&H/U	<Ref. to VDC(diag)-53, DTC C0034 FRONT OUTLET SOLENOID VALVE LH MALFUNCTION IN VDCCM&H/U, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C0035	4351	RR Hold Valve Malfunction	Rear inlet solenoid valve RH malfunction in VDCCM&H/U	<Ref. to VDC(diag)-53, DTC C0035 REAR INLET SOLENOID VALVE RH MALFUNCTION IN VDCCM&H/U, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C0036	4361	RR Pressure Reducing Valve Malfunction	Rear outlet solenoid valve RH malfunction in VDCCM&H/U	<Ref. to VDC(diag)-53, DTC C0036 REAR OUTLET SOLENOID VALVE RH MALFUNCTION IN VDCCM&H/U, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C0037	4371	RL Hold Valve Malfunction	Rear inlet solenoid valve LH malfunction in VDCCM&H/U	<Ref. to VDC(diag)-53, DTC C0037 REAR INLET SOLENOID VALVE LH MALFUNCTION IN VDCCM&H/U, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C0038	4381	RL Pressure Reducing Valve Malfunction	Rear outlet solenoid valve LH malfunction in VDCCM&H/U	<Ref. to VDC(diag)-53, DTC C0038 REAR OUTLET SOLENOID VALVE LH MALFUNCTION IN VDCCM&H/U, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C0061	4611	VDC Switchover Valve (P)	Primary linear valve malfunction in VDCCM&H/U	<Ref. to VDC(diag)-53, DTC C0061 VDC SWITCHOVER VALVE (P), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C0062	4621	VDC Switchover Valve (S)	Secondary linear valve malfunction in VDCCM&H/U	<Ref. to VDC(diag)-53, DTC C0062 VDC SWITCHOVER VALVE (S), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C0063	4631	VDC Switchover Valve	Linear valve malfunction in VDCCM&H/U	<Ref. to VDC(diag)-54, DTC C0063 VDC SWITCHOVER VALVE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C0041	4411	Internal ECM	VDC control module malfunction	<Ref. to VDC(diag)-56, DTC C0041 ECM INTERNAL PROBLEM, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C0042	4421	Power Supply Voltage Low	Power voltage malfunction	<Ref. to VDC(diag)-58, DTC C0042 POWER VOLTAGE MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
	4422	Power Supply Voltage High		
C0047	C471	Improper CAN Communication	Improper CAN communication	<Ref. to VDC(diag)-61, DTC C0047 IMPROPER CAN COMMUNICATION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C0051	4511	Valve Relay Open Circuit	Open valve relay	<Ref. to VDC(diag)-62, DTC C0051 VALVE RELAY OPEN CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
	4512	Valve Relay Short Circuit	Shorted valve relay	<Ref. to VDC(diag)-64, DTC C0051 VALVE RELAY SHORT CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

# List of Diagnostic Trouble Code (DTC)

## VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)

DTC	Detailed code	Item	Content of diagnosis	Reference
C0052	4521	Motor Relay Circuit Open	Open motor/motor relay	<Ref. to VDC(diag)-65, DTC C0052 MOTOR AND MOTOR RELAY OPEN CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
	4522	Motor Relay Short Circuit	Shorted motor/motor relay	<Ref. to VDC(diag)-65, DTC C0052 MOTOR AND MOTOR RELAY SHORT CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
	4523	Motor Do Not Work	Motor does not rotate	<Ref. to VDC(diag)-66, DTC C0052 MOTOR DO NOT WORK, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
	4524	Motor Malfunction	Motor malfunction	<Ref. to VDC(diag)-65, DTC C0052 MOTOR MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
	4525	Motor Fail Safe Relay Short	Shorted motor fail safe relay	<Ref. to VDC(diag)-65, DTC C0052 MOTOR FAIL SAFE RELAY SHORT CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C0054	4541	Brake Lamp SW Open Circuit	Open brake light switch	<Ref. to VDC(diag)-68, DTC C0054 BRAKE LAMP SWITCH OPEN CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C0056	4561	G Sensor Signal Stick	G sensor output is stuck	<Ref. to VDC(diag)-70, DTC C0056 G SENSOR OUTPUT FREEZE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
	4562	G Sensor Signal	Faulty G sensor signal	<Ref. to VDC(diag)-71, DTC C0056 G SENSOR SIGNAL MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
	4563	Yaw Rate G Sensor Power Supply V	Yaw rate & G sensor power supply voltage malfunction	<Ref. to VDC(diag)-72, DTC C0056 YAW RATE G SENSOR POWER SUPPLY VOLTAGE MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
	4564	G Sensor Output	Faulty G sensor output	<Ref. to VDC(diag)-74, DTC C0056 G SENSOR OUTPUT MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
	C565	G Sensor Communication	Faulty G sensor communication	<Ref. to VDC(diag)-88, DTC C0056 G SENSOR COMMUNICATION MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
	4566	G Sensor Internal Problem	Malfunction in G sensor	<Ref. to VDC(diag)-87, DTC C0056 G SENSOR INTERNAL PROBLEM MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C0057	C571	ECM Communication Circuit	EGI communication	<Ref. to VDC(diag)-75, DTC C0057 ECM COMMUNICATION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
	C573	TCM Communication Circuit	AT communication	<Ref. to VDC(diag)-76, DTC C0057 AT COMMUNICATION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
	4574	Transmission System	Transmission system failure	<Ref. to VDC(diag)-77, DTC C0057 TRANSMISSION SYSTEM FAILURE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
	4575	VDC Control Interruption Because of Engine Instructions	Engine system failure	<Ref. to VDC(diag)-78, DTC C0057 ENGINE SYSTEM FAILURE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

## List of Diagnostic Trouble Code (DTC)

### VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)

DTC	Detailed code	Item	Content of diagnosis	Reference
C0071	4711	Steering Angle Sensor Counter	Steering angle sensor internal malfunction	<Ref. to VDC(diag)-79, DTC C0071 STEERING ANGLE SENSOR INTERNAL PROBLEM MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
	C712	No Signal from Steering Angle Sensor	Steering angle sensor communication malfunction	<Ref. to VDC(diag)-81, DTC C0071 STEERING ANGLE SENSOR COMMUNICATION MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
	4715	Steering Angle Sensor at 0 Degree		
	4713	Steering Sensor Signal Freeze	Steering angle sensor signal is stuck	<Ref. to VDC(diag)-84, DTC C0071 STEERING ANGLE SENSOR SIGNAL FREEZE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
	4714	Steering Sensor Not Calibration	Steering angle sensor calibration not completed	<Ref. to VDC(diag)-85, DTC C0071 STEERING ANGLE SENSOR CALIBRATION NON COMPLETION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C0072	4721	Yaw Rate Sensor Signal	Yaw rate sensor signal malfunction	<Ref. to VDC(diag)-86, DTC C0072 YAW RATE SENSOR SIGNAL MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
	4722	Yaw Rate Sensor Internal Problem	Yaw rate sensor internal malfunction	<Ref. to VDC(diag)-88, DTC C0072 YAW RATE SENSOR INTERNAL PROBLEM MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
	C723	Yaw Rate Sensor Communication	Yaw rate sensor communication malfunction	<Ref. to VDC(diag)-89, DTC C0072 YAW RATE SENSOR COMMUNICATION MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
	4724	Yaw Rate Sensor Oscillation	Yaw rate sensor oscillation malfunction	<Ref. to VDC(diag)-85, DTC C0072 YAW RATE SENSOR OSCILLATION MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C0074	4741	Pressure Sensor Open Circuit	Pressure sensor is open	<Ref. to VDC(diag)-91, DTC C0074 PRESSURE SENSOR OPEN CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
	4742	Pressure Sensor Signal Freeze	Pressure sensor signal is stuck	<Ref. to VDC(diag)-90, DTC C0074 PRESSURE SENSOR SIGNAL FREEZE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
	4743	Pressure Sensor 0 Point	Pressure sensor 0 point	<Ref. to VDC(diag)-93, DTC C0074 PRESSURE SENSOR 0 POINT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
	4744	Pressure Sensor Noise	Pressure sensor noise	<Ref. to VDC(diag)-94, DTC C0074 PRESSURE SENSOR NOISE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
	4745	Pressure Sensor Output Rise	Pressure sensor output rise	<Ref. to VDC(diag)-90, DTC C0074 PRESSURE SENSOR OUTPUT RISE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>



## Diagnostic Procedure with Diagnostic Trouble Code (DTC)

VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)

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### 12. Diagnostic Procedure with Diagnostic Trouble Code (DTC)

#### **A: DTC C0021 FRONT RIGHT ABS SENSOR OPEN CIRCUIT**

NOTE:

For the diagnostic procedure, refer to “DTC C0027 REAR LEFT ABS SENSOR OPEN CIRCUIT”. <Ref. to VDC(diag)-46, DTC C0027 REAR LEFT ABS SENSOR OPEN CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

#### **B: DTC C0023 FRONT LEFT ABS SENSOR OPEN CIRCUIT**

NOTE:

For the diagnostic procedure, refer to “DTC C0027 REAR LEFT ABS SENSOR OPEN CIRCUIT”. <Ref. to VDC(diag)-46, DTC C0027 REAR LEFT ABS SENSOR OPEN CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

#### **C: DTC C0025 REAR RIGHT ABS SENSOR OPEN CIRCUIT**

NOTE:

For the diagnostic procedure, refer to “DTC C0027 REAR LEFT ABS SENSOR OPEN CIRCUIT”. <Ref. to VDC(diag)-46, DTC C0027 REAR LEFT ABS SENSOR OPEN CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)

## D: DTC C0027 REAR LEFT ABS SENSOR OPEN CIRCUIT

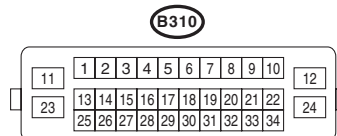
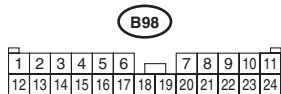
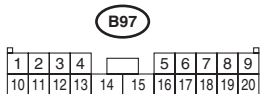
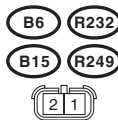
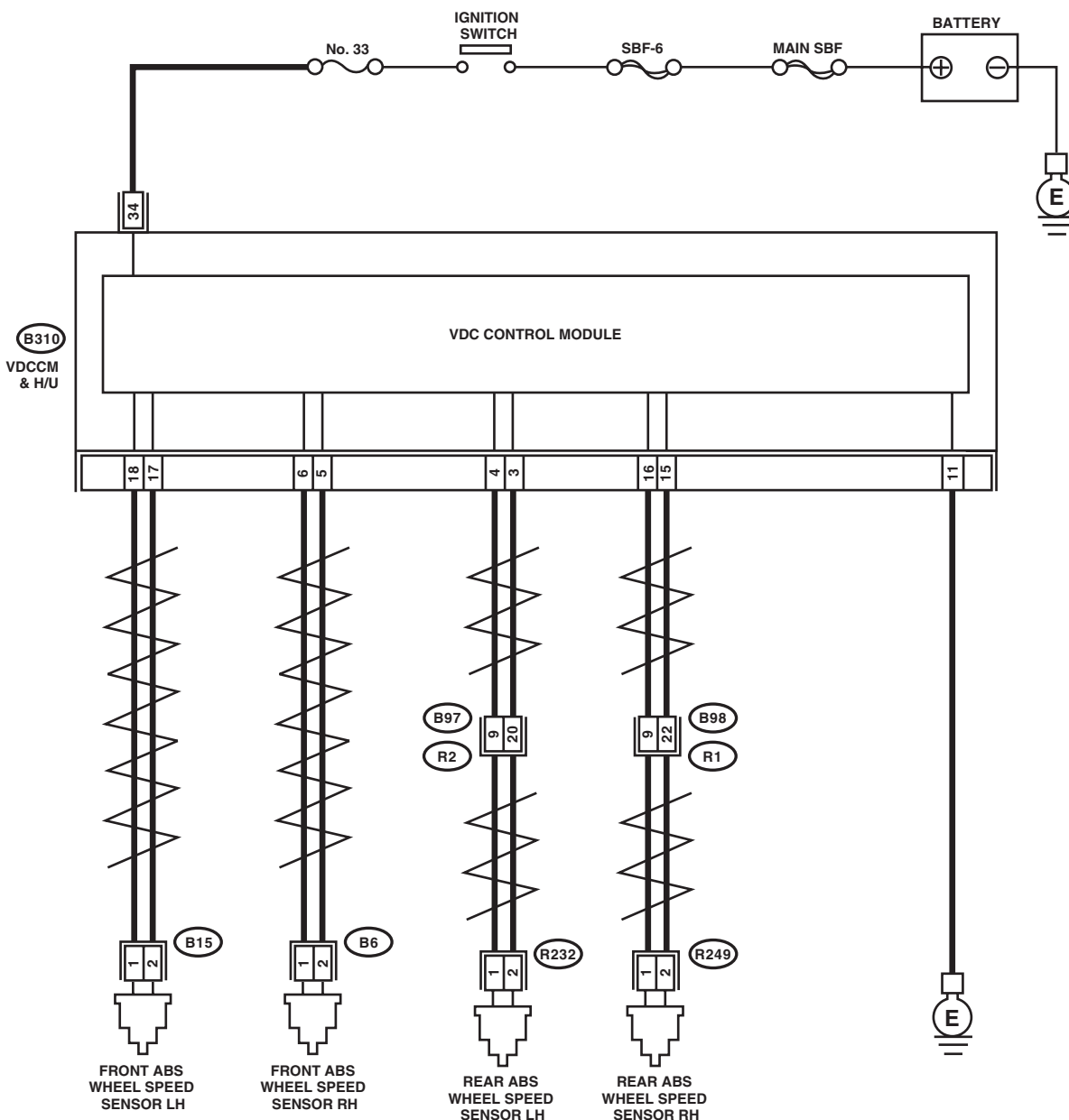
### DTC DETECTING CONDITION:

- Faulty ABS wheel speed sensor (harness open line)
- Defective harness connector

### TROUBLE SYMPTOM:

- ABS does not operate.
- VDC does not operate.

### WIRING DIAGRAM:



VDC00791

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)

Step	Check	Yes	No
<b>1 CHECK POOR CONTACT OF CONNECTOR.</b> Check if there is poor contact between VDCCM&H/U and ABS wheel speed sensor.	Is there poor contact?	Repair the connector.	Go to step 2.
<b>2 CHECK HARNESS CONNECTOR BETWEEN VDCCM&amp;H/U AND ABS WHEEL SPEED SENSOR.</b> 1) Disconnect the connector (B310) from the VDCCM&H/U. 2) Disconnect the connector from ABS wheel speed sensor. 3) Measure the resistance between VDCCM&H/U connector and ABS wheel speed sensor connector. <i><b>Connector &amp; terminal</b></i> <i><b>DTC C0021</b></i> <i>(B310) No. 6 — (B6) No. 1:</i> <i>(B310) No. 5 — (B6) No. 2:</i> <i><b>DTC C0023</b></i> <i>(B310) No. 18 — (B15) No. 1:</i> <i>(B310) No. 17 — (B15) No. 2:</i> <i><b>DTC C0025</b></i> <i>(B310) No. 16 — (R249) No. 1:</i> <i>(B310) No. 15 — (R249) No. 2:</i> <i><b>DTC C0027</b></i> <i>(B310) No. 4 — (R232) No. 1:</i> <i>(B310) No. 3 — (R232) No. 2:</i>	Is the resistance less than 1 Ω?	Go to step 3.	Repair the harness connector between VDCCM&H/U and ABS wheel speed sensor.
<b>3 CHECK GROUND SHORT OF HARNESS.</b> Measure the resistance between VDCCM&H/U connector and chassis ground. <i><b>Connector &amp; terminal</b></i> <i><b>DTC C0021</b></i> <i>(B310) No. 5 — Chassis ground:</i> <i><b>DTC C0023</b></i> <i>(B310) No. 17 — Chassis ground:</i> <i><b>DTC C0025</b></i> <i>(B310) No. 15 — Chassis ground:</i> <i><b>DTC C0027</b></i> <i>(B310) No. 3 — Chassis ground:</i>	Is the resistance 1 MΩ or more?	Go to step 4.	Repair the harness connector between VDCCM&H/U and ABS wheel speed sensor.
<b>4 CHECK ABS WHEEL SPEED SENSOR POWER SUPPLY CIRCUIT.</b> 1) Connect the VDCCM&H/U connector. 2) Turn the ignition switch to ON. 3) Measure the voltage between ABS wheel speed sensor connector and chassis ground. <i><b>Connector &amp; terminal</b></i> <i><b>DTC C0021</b></i> <i>(B6) No. 1 (+) — Chassis ground (-):</i> <i><b>DTC C0023</b></i> <i>(B15) No. 1 (+) — Chassis ground (-):</i> <i><b>DTC C0025</b></i> <i>(R249) No. 1 (+) — Chassis ground (-):</i> <i><b>DTC C0027</b></i> <i>(R232) No. 1 (+) — Chassis ground (-):</i>	Is the voltage 8 — 15 V?	Go to step 6.	Go to step 5.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)

Step	Check	Yes	No
<b>5 CHECK VDCCM&amp;H/U POWER SUPPLY CIRCUIT.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the VDCCM&H/U connector. 3) Turn the ignition switch to ON. 4) Measure the voltage between VDCCM&H/U connector terminals. <b>Connector &amp; terminal</b> <b>(B310) No. 34 (+) — (B310) No. 11 (-):</b>	Is the voltage 10 — 15 V?	Go to step 7.	Check the generator, battery and VDCCM&H/U power supply circuit.
<b>6 CHECK ABS WHEEL SPEED SENSOR SIGNAL.</b> 1) Install the ABS wheel speed sensor. 2) Prepare an oscilloscope. 3) Check the ABS wheel speed sensor. <Ref. to VDC-22, ABS WHEEL SPEED SENSOR, INSPECTION, Front ABS Wheel Speed Sensor.>	Is the pattern the same waveform as shown in the figure?	Go to step 7.	Replace the ABS wheel speed sensor. <Ref. to VDC-21, Front ABS Wheel Speed Sensor.> <Ref. to VDC-23, Rear ABS Wheel Speed Sensor.>
<b>7 CHECK VDCCM&amp;H/U.</b> 1) Connect all connectors. 2) Clear the memory. <Ref. to VDC(diag)-26, OPERATION, Clear Memory Mode.> 3) Perform the Inspection Mode. <Ref. to VDC(diag)-25, PROCEDURE, Inspection Mode.> 4) Read the DTC. <Ref. to VDC(diag)-24, OPERATION, Read Diagnostic Trouble Code (DTC).>	Is the same DTC displayed?	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>	Go to step 8.
<b>8 CHECK OTHER DTC DETECTION.</b>	Is any other DTC displayed?	Perform the diagnosis according to DTC.	It results from a temporary noise interference.

### E: DTC C0022 FRONT RIGHT ABS SENSOR NOISE

**NOTE:**

For the diagnostic procedure, refer to “DTC C0028 REAR ABS WHEEL SPEED SENSOR LH SIGNAL MALFUNCTION”. <Ref. to VDC(diag)-50, DTC C0028 REAR ABS WHEEL SPEED SENSOR LH SIGNAL MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

### F: DTC C0024 FRONT LEFT ABS SENSOR NOISE

**NOTE:**

For the diagnostic procedure, refer to “DTC C0028 REAR ABS WHEEL SPEED SENSOR LH SIGNAL MALFUNCTION”. <Ref. to VDC(diag)-50, DTC C0028 REAR ABS WHEEL SPEED SENSOR LH SIGNAL MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

### G: DTC C0026 REAR RIGHT ABS SENSOR NOISE

**NOTE:**

For the diagnostic procedure, refer to “DTC C0028 REAR ABS WHEEL SPEED SENSOR LH SIGNAL MALFUNCTION”. <Ref. to VDC(diag)-50, DTC C0028 REAR ABS WHEEL SPEED SENSOR LH SIGNAL MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

### H: DTC C0028 REAR LEFT ABS SENSOR NOISE

**NOTE:**

For the diagnostic procedure, refer to “DTC C0028 REAR ABS WHEEL SPEED SENSOR LH SIGNAL MALFUNCTION”. <Ref. to VDC(diag)-50, DTC C0028 REAR ABS WHEEL SPEED SENSOR LH SIGNAL MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

## Diagnostic Procedure with Diagnostic Trouble Code (DTC)

VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)

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### **I: DTC C0022 FRONT ABS WHEEL SPEED SENSOR RH SIGNAL MALFUNCTION**

**NOTE:**

For the diagnostic procedure, refer to “DTC C0028 REAR ABS WHEEL SPEED SENSOR LH SIGNAL MALFUNCTION”. <Ref. to VDC(diag)-50, DTC C0028 REAR ABS WHEEL SPEED SENSOR LH SIGNAL MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

### **J: DTC C0024 FRONT ABS WHEEL SPEED SENSOR LH SIGNAL MALFUNCTION**

**NOTE:**

For the diagnostic procedure, refer to “DTC C0028 REAR ABS WHEEL SPEED SENSOR LH SIGNAL MALFUNCTION”. <Ref. to VDC(diag)-50, DTC C0028 REAR ABS WHEEL SPEED SENSOR LH SIGNAL MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

### **K: DTC C0026 REAR ABS WHEEL SPEED SENSOR RH SIGNAL MALFUNCTION**

**NOTE:**

For the diagnostic procedure, refer to “DTC C0028 REAR ABS WHEEL SPEED SENSOR LH SIGNAL MALFUNCTION”. <Ref. to VDC(diag)-50, DTC C0028 REAR ABS WHEEL SPEED SENSOR LH SIGNAL MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)

## L: DTC C0028 REAR ABS WHEEL SPEED SENSOR LH SIGNAL MALFUNCTION

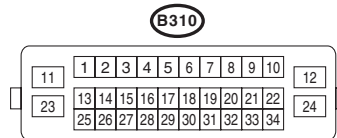
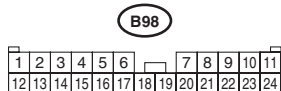
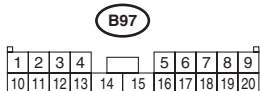
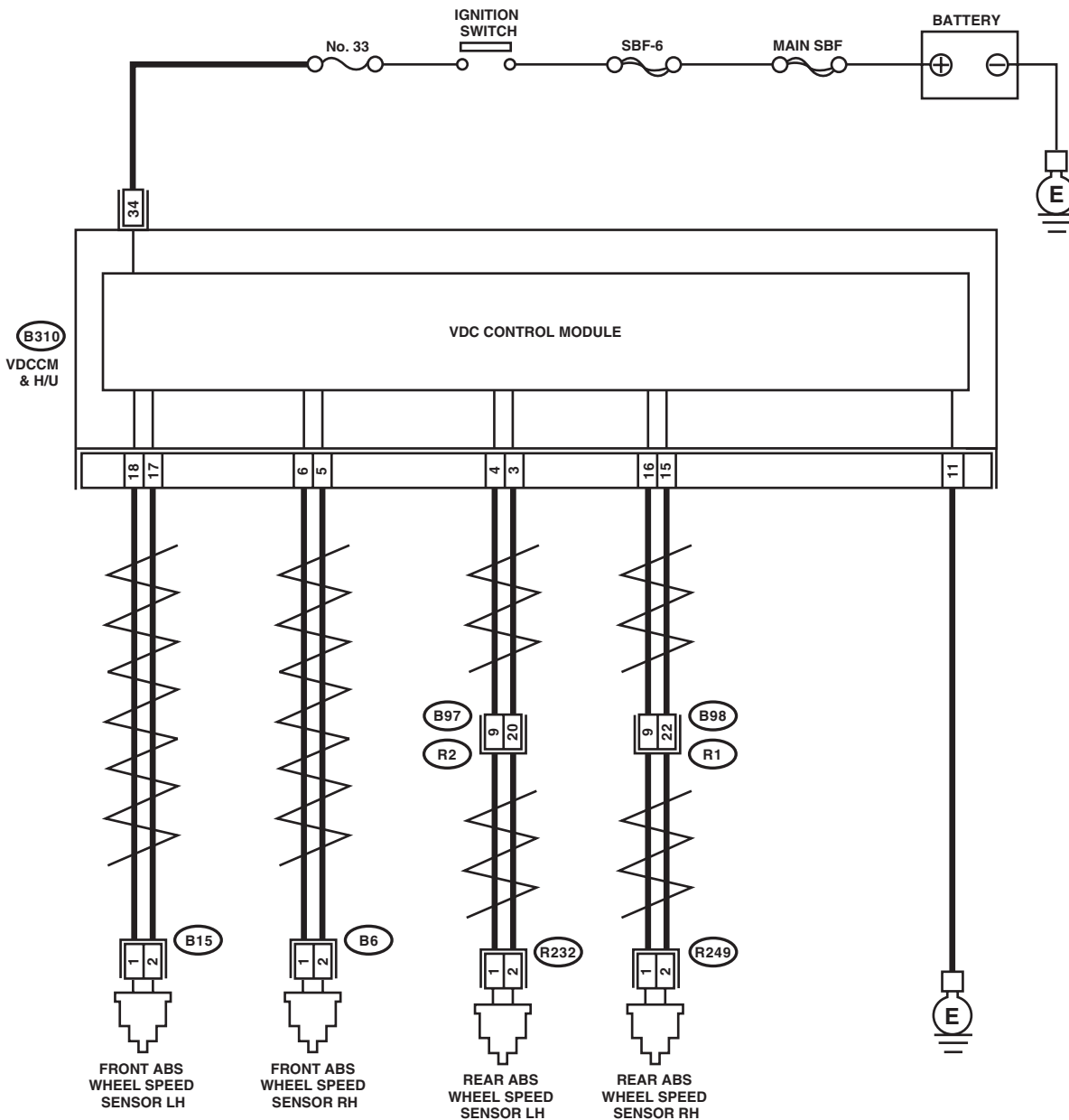
### DTC DETECTING CONDITION:

- Defective ABS wheel speed sensor signal (noise, irregular signal, etc.)
- Defective harness connector

### TROUBLE SYMPTOM:

- ABS does not operate.
- VDC does not operate.

### WIRING DIAGRAM:



VDC00791

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)

Step	Check	Yes	No
<b>1 CHECK VDCCM&amp;H/U POWER SUPPLY CIRCUIT.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the VDCCM&H/U connector. 3) Turn the ignition switch to ON. 4) Measure the voltage between VDCCM&H/U connector terminals. <b>Connector &amp; terminal</b> <b>(B310) No. 34 (+) — (B310) No. 11 (-):</b>	Is the voltage 10 — 15 V?	Go to step 2.	Check the generator, battery and VDCCM&H/U power supply circuit.
<b>2 CHECK OUTPUT OF ABS WHEEL SPEED SENSOR USING SUBARU SELECT MONITOR.</b> 1) Select “Current Data Display & Save” on the Subaru Select Monitor. <Ref. to VDC(diag)-19, READ CURRENT DATA, OPERATION, Subaru Select Monitor.> 2) Read the defective ABS wheel speed sensor output.	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 3.	Go to step 8.
<b>3 CHECK POOR CONTACT OF CONNECTOR.</b> Turn the ignition switch to OFF.	Is there poor contact of connectors between VDCCM&H/U and ABS wheel speed sensor?	Repair the connector.	Go to step 4.
<b>4 CHECK CAUSE OF SIGNAL NOISE.</b> Make sure the radio wave devices and electronic components are installed correctly.	Are the radio wave devices and electronic components installed correctly?	Go to step 5.	Install the radio wave devices and electronic components properly.
<b>5 CHECK CAUSE OF SIGNAL NOISE.</b> Check if the noise sources (such as an antenna) are installed near the sensor harness.	Are noise sources installed?	Install the noise sources apart from sensor harness.	Go to step 6.
<b>6 CHECK VDCCM&amp;H/U.</b> 1) Connect all connectors. 2) Clear the memory. <Ref. to VDC(diag)-26, OPERATION, Clear Memory Mode.> 3) Perform the Inspection Mode. <Ref. to VDC(diag)-25, PROCEDURE, Inspection Mode.> 4) Read the DTC. <Ref. to VDC(diag)-24, OPERATION, Read Diagnostic Trouble Code (DTC).>	Is the same DTC displayed?	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>	Go to step 7.
<b>7 CHECK OTHER DTC DETECTION.</b>	Is any other DTC displayed?	Perform the diagnosis according to DTC. <Ref. to VDC(diag)-41, List of Diagnostic Trouble Code (DTC).>	It results from a temporary noise interference.
<b>8 CHECK INSTALLATION OF ABS WHEEL SPEED SENSOR.</b>	Is the ABS wheel speed sensor installation bolt tightened to 7.5 N·m (0.76 kgf-m, 5.5 ft-lb)?	Go to step 9.	Tighten the ABS wheel speed sensor installation bolts.
<b>9 CHECK ABS WHEEL SPEED SENSOR SIGNAL.</b> 1) Install the ABS wheel speed sensor. 2) Prepare an oscilloscope. 3) Check the ABS wheel speed sensor. <Ref. to VDC-22, ABS WHEEL SPEED SENSOR, INSPECTION, Front ABS Wheel Speed Sensor.>	Does the oscilloscope indicate the waveform pattern like shown in the figure when the tire is slowly turned? Does the oscilloscope indication repeat the waveform pattern like shown in the figure when the tire is slowly turned in equal speed for one rotation or more?	Go to step 11.	Go to step 10.

## Diagnostic Procedure with Diagnostic Trouble Code (DTC)

### VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)

Step	Check	Yes	No
<b>10</b> <b>CHECK ABS WHEEL SPEED SENSOR OR MAGNETIC ENCODER.</b>	Are there foreign matter, breakage or damage at the tip of ABS wheel speed sensor or magnetic encoder?	Remove dirt thoroughly. Also replace the ABS wheel speed sensor or magnetic encoder as a unit with hub unit bearing if it is broken or damaged.	Go to step 11.
<b>11</b> <b>CHECK CAUSE OF SIGNAL NOISE.</b> Make sure the radio wave devices and electronic components are installed correctly.	Are the radio wave devices and electronic components installed correctly?	Go to step 12.	Install the radio wave devices and electronic components properly.
<b>12</b> <b>CHECK CAUSE OF SIGNAL NOISE.</b> Check if the noise sources (such as an antenna) are installed near the sensor harness.	Are noise sources installed?	Install the noise sources apart from sensor harness.	Go to step 13.
<b>13</b> <b>CHECK VDCCM&amp;H/U.</b> 1) Connect all connectors. 2) Clear the memory. <Ref. to VDC(diag)-26, OPERATION, Clear Memory Mode.> 3) Perform the Inspection Mode. <Ref. to VDC(diag)-25, PROCEDURE, Inspection Mode.> 4) Read the DTC. <Ref. to VDC(diag)-24, OPERATION, Read Diagnostic Trouble Code (DTC).>	Is the same DTC displayed?	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>	Go to step 14.
<b>14</b> <b>CHECK OTHER DTC DETECTION.</b>	Is any other DTC displayed?	Perform the diagnosis according to DTC. <Ref. to VDC(diag)-41, List of Diagnostic Trouble Code (DTC).>	It results from a temporary noise interference. <b>NOTE:</b> Though the ABS warning light remains on at this time, this is normal. Drive the vehicle at 12 km/h (7 MPH) or more in order to turn ABS warning light off. Be sure to drive the vehicle and check that the warning light goes off.

### **M: DTC C0031 FRONT INLET SOLENOID VALVE RH MALFUNCTION IN VDC-CM&H/U**

**NOTE:**

For the diagnostic procedure, refer to "DTC C0063 VDC SWITCHOVER VALVE". <Ref. to VDC(diag)-54, DTC C0063 VDC SWITCHOVER VALVE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

### **N: DTC C0032 FRONT OUTLET SOLENOID VALVE RH MALFUNCTION IN VDC-CM&H/U**

**NOTE:**

For the diagnostic procedure, refer to "DTC C0063 VDC SWITCHOVER VALVE". <Ref. to VDC(diag)-54, DTC C0063 VDC SWITCHOVER VALVE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>



## Diagnostic Procedure with Diagnostic Trouble Code (DTC)

VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)

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### **O: DTC C0033 FRONT INLET SOLENOID VALVE LH MALFUNCTION IN VDC-CM&H/U**

**NOTE:**

For the diagnostic procedure, refer to “DTC C0063 VDC SWITCHOVER VALVE”. <Ref. to VDC(diag)-54, DTC C0063 VDC SWITCHOVER VALVE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

### **P: DTC C0034 FRONT OUTLET SOLENOID VALVE LH MALFUNCTION IN VDC-CM&H/U**

**NOTE:**

For the diagnostic procedure, refer to “DTC C0063 VDC SWITCHOVER VALVE”. <Ref. to VDC(diag)-54, DTC C0063 VDC SWITCHOVER VALVE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

### **Q: DTC C0035 REAR INLET SOLENOID VALVE RH MALFUNCTION IN VDC-CM&H/U**

**NOTE:**

For the diagnostic procedure, refer to “DTC C0063 VDC SWITCHOVER VALVE”. <Ref. to VDC(diag)-54, DTC C0063 VDC SWITCHOVER VALVE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

### **R: DTC C0036 REAR OUTLET SOLENOID VALVE RH MALFUNCTION IN VDC-CM&H/U**

**NOTE:**

For the diagnostic procedure, refer to “DTC C0063 VDC SWITCHOVER VALVE”. <Ref. to VDC(diag)-54, DTC C0063 VDC SWITCHOVER VALVE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

### **S: DTC C0037 REAR INLET SOLENOID VALVE LH MALFUNCTION IN VDC-CM&H/U**

**NOTE:**

For the diagnostic procedure, refer to “DTC C0063 VDC SWITCHOVER VALVE”. <Ref. to VDC(diag)-54, DTC C0063 VDC SWITCHOVER VALVE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

### **T: DTC C0038 REAR OUTLET SOLENOID VALVE LH MALFUNCTION IN VDC-CM&H/U**

**NOTE:**

For the diagnostic procedure, refer to “DTC C0063 VDC SWITCHOVER VALVE”. <Ref. to VDC(diag)-54, DTC C0063 VDC SWITCHOVER VALVE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

### **U: DTC C0061 VDC SWITCHOVER VALVE (P)**

**NOTE:**

For the diagnostic procedure, refer to “DTC C0063 VDC SWITCHOVER VALVE”. <Ref. to VDC(diag)-54, DTC C0063 VDC SWITCHOVER VALVE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

### **V: DTC C0062 VDC SWITCHOVER VALVE (S)**

**NOTE:**

For the diagnostic procedure, refer to “DTC C0063 VDC SWITCHOVER VALVE”. <Ref. to VDC(diag)-54, DTC C0063 VDC SWITCHOVER VALVE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)

## W: DTC C0063 VDC SWITCHOVER VALVE

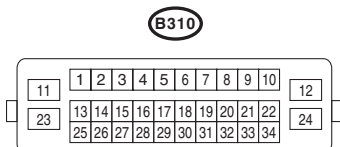
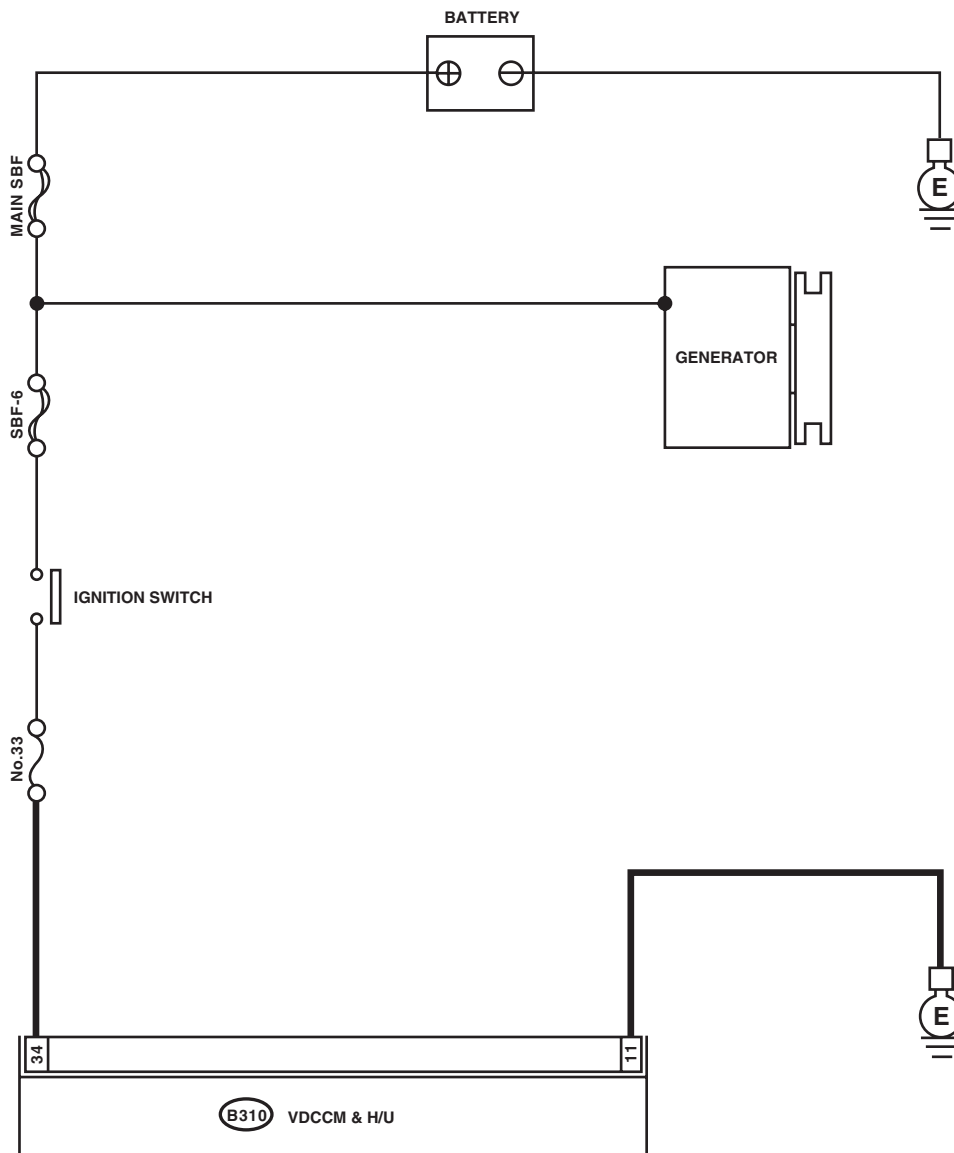
### DTC DETECTING CONDITION:

- Defective harness connector
- Defective VDCH/U solenoid valve

### TROUBLE SYMPTOM:

- ABS does not operate.
- EBD does not operate.
- VDC does not operate.

### WIRING DIAGRAM:



VDC00624

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)

	Step	Check	Yes	No
1	<b>CHECK VDCCM&amp;H/U INPUT VOLTAGE.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connector from the VDCCM&H/U. 3) Run the engine at idle. 4) Measure the voltage between VDCCM&H/U connector and chassis ground. <b>Connector &amp; terminal</b> <b>(B310) No. 34 (+) — Chassis ground (-):</b>	Is the voltage 10 — 15 V?	Go to step 2.	Repair the power supply circuit.
2	<b>CHECK VDCCM&amp;H/U GROUND CIRCUIT.</b> 1) Turn the ignition switch to OFF. 2) Measure the resistance between VDCCM&H/U connector and chassis ground. <b>Connector &amp; terminal</b> <b>(B310) No. 11 — Chassis ground:</b>	Is the resistance less than 10 $\Omega$ ?	Go to step 3.	Repair the VDCCM&H/U ground harness.
3	<b>CHECK POOR CONTACT OF CONNECTORS.</b>	Is there poor contact of connector between generator, battery and VDCCM&H/U?	Repair the connector.	Go to step 4.
4	<b>CHECK VDCCM&amp;H/U.</b> 1) Connect all connectors. 2) Clear the memory. <Ref. to VDC(diag)-26, OPERATION, Clear Memory Mode.> 3) Perform the Inspection Mode. <Ref. to VDC(diag)-25, PROCEDURE, Inspection Mode.> 4) Read the DTC. <Ref. to VDC(diag)-24, OPERATION, Read Diagnostic Trouble Code (DTC).>	Is the same DTC displayed?	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>	Go to step 5.
5	<b>CHECK OTHER DTC DETECTION.</b>	Is any other DTC displayed?	Perform the diagnosis according to DTC. <Ref. to VDC(diag)-41, List of Diagnostic Trouble Code (DTC).>	Temporary poor contact occurs.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)

## X: DTC C0041 ECM INTERNAL PROBLEM

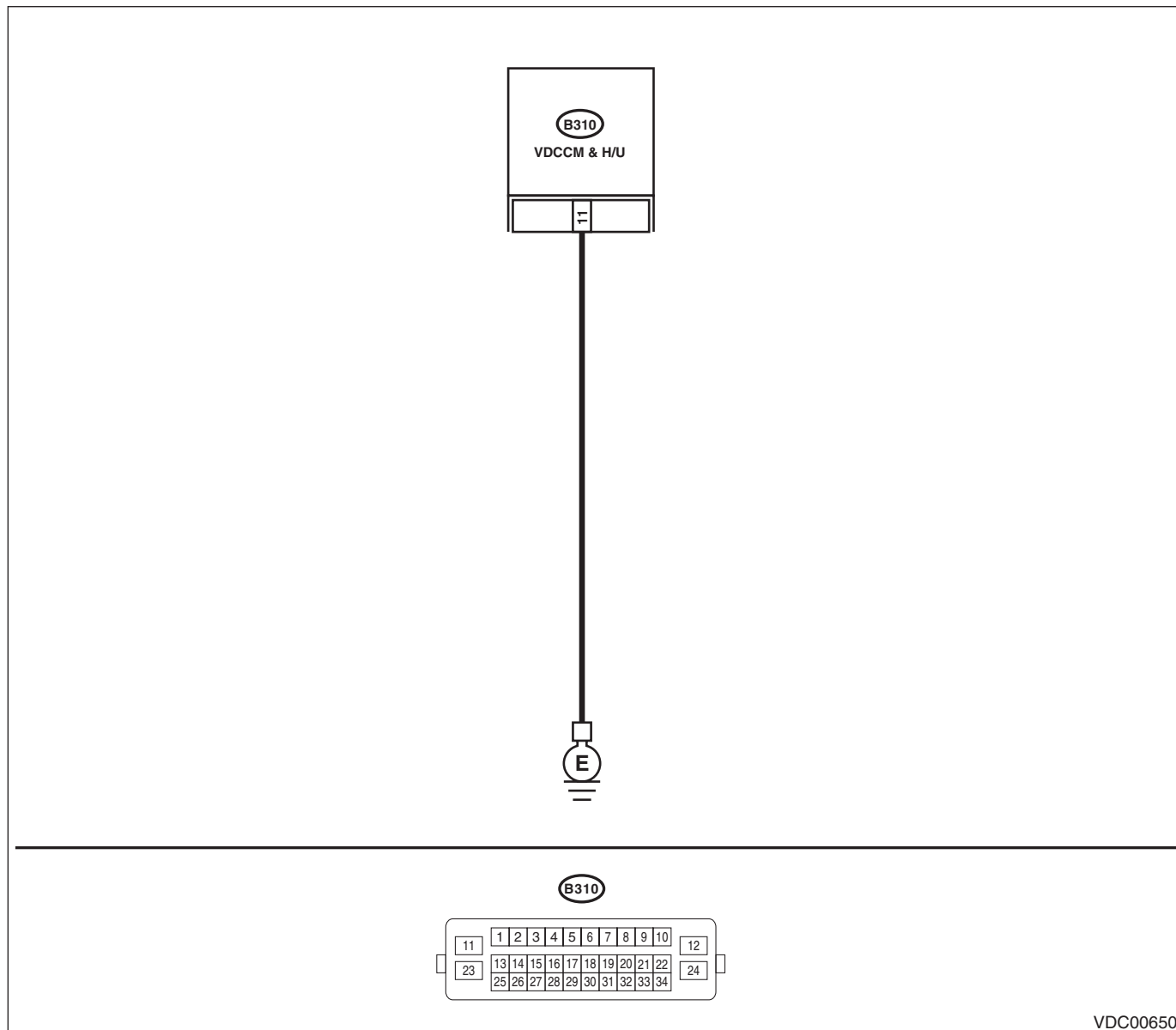
### DTC DETECTING CONDITION:

Defective VDCCM&H/U

### TROUBLE SYMPTOM:

- ABS does not operate.
- EBD does not operate.
- VDC does not operate.

### WIRING DIAGRAM:



VDC00650

	Step	Check	Yes	No
1	<b>CHECK VDCCM&amp;H/U GROUND CIRCUIT.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connector from the VDCCM&H/U. 3) Measure the resistance between VDCCM&H/U and chassis ground. <b>Connector &amp; terminal</b> <b>(B310) No. 11 — Chassis ground:</b>	Is the resistance less than 10 $\Omega$ ?	Go to step 2.	Repair the VDCCM&H/U ground harness.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)

Step	Check	Yes	No
<b>2</b>	<b>CHECK POOR CONTACT OF CONNECTORS.</b>	Is there poor contact of the connector between the battery, ignition switch and VDCCM&H/U?	Repair the connector. Go to step 3.
<b>3</b>	<b>CHECK CAUSE OF SIGNAL NOISE.</b>	Are the radio wave devices and electronic components installed correctly?	Go to step 4. Install the radio wave devices and electronic components properly.
<b>4</b>	<b>CHECK CAUSE OF SIGNAL NOISE.</b>	Is there a noise source (such as an antenna) installed near the sensor harness?	Install the noise sources apart from sensor harness. Go to step 5.
<b>5</b>	<b>CHECK VDCCM&amp;H/U.</b> 1) Connect all connectors. 2) Clear the memory. <Ref. to VDC(diag)-26, OPERATION, Clear Memory Mode.> 3) Perform the Inspection Mode. <Ref. to VDC(diag)-25, PROCEDURE, Inspection Mode.> 4) Read the DTC. <Ref. to VDC(diag)-24, OPERATION, Read Diagnostic Trouble Code (DTC).>	Is the same DTC displayed?	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).> Go to step 6.
<b>6</b>	<b>CHECK OTHER DTC DETECTION.</b>	Is any other DTC displayed?	Perform the diagnosis according to DTC. <Ref. to VDC(diag)-41, List of Diagnostic Trouble Code (DTC).> Temporary poor contact occurs.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)

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## **Y: DTC C0042 POWER VOLTAGE MALFUNCTION**

### **DTC DETECTING CONDITION:**

Improper VDCCM&H/U power supply voltage

### **TROUBLE SYMPTOM:**

- ABS does not operate.
- EBD does not operate.
- VDC does not operate.

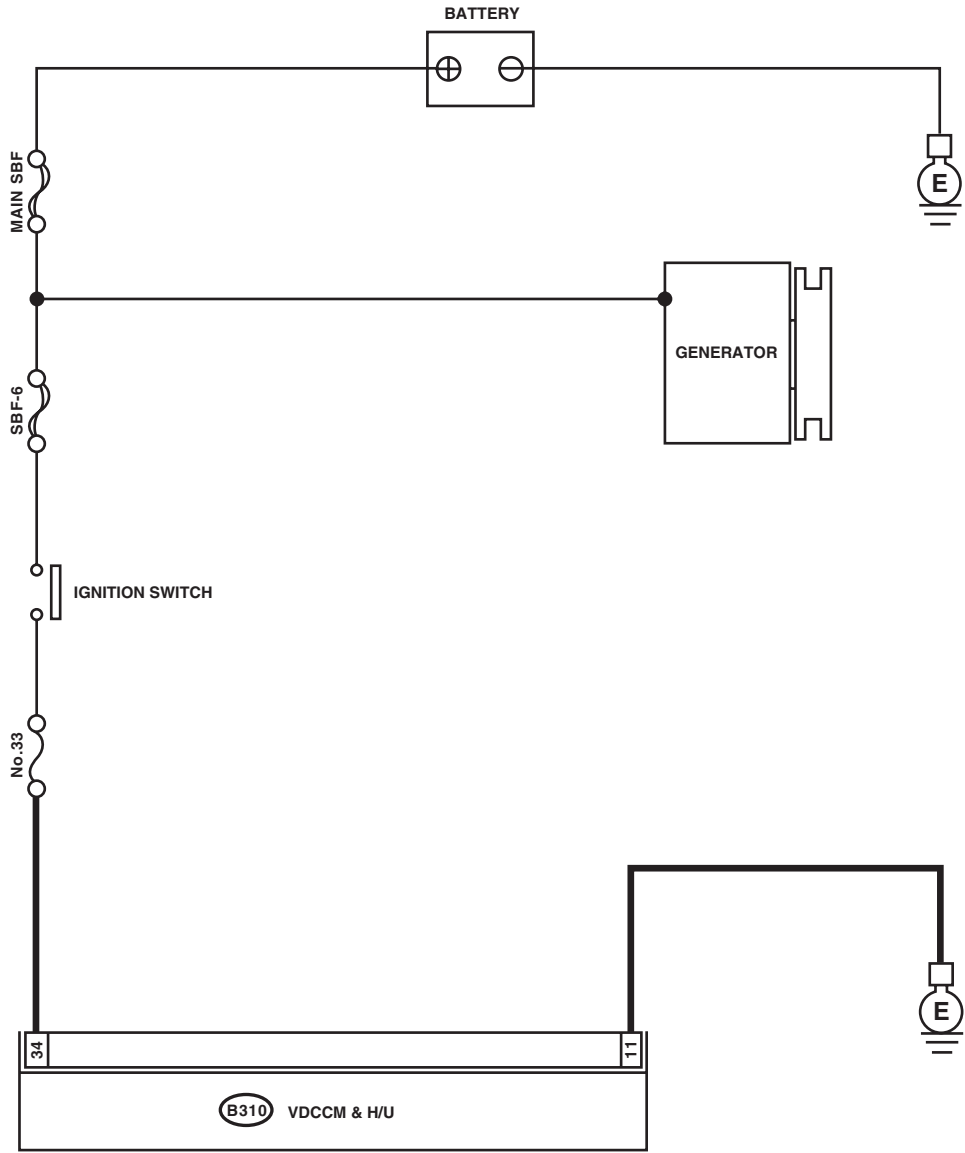
### **NOTE:**

Warning lights go off if voltage returns.

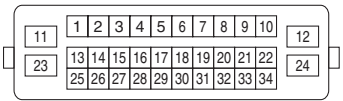
# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)

## WIRING DIAGRAM:



**B310**



VDC00624

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)

Step	Check	Yes	No
<b>1 CHECK GENERATOR.</b> 1) Start the engine. 2) Run the engine at idle after warming up. 3) Measure the voltage between generator terminal B and chassis ground. <b>Terminals</b> <b>Generator terminal B (+) — Chassis ground (-):</b>	Is the voltage 10 — 15 V?	Go to step 2.	Repair the generator. <Ref. to SC(H6DO)-13, Generator.>
<b>2 CHECK BATTERY TERMINAL.</b> Turn the ignition switch to OFF.	Are the positive and negative battery terminals clamped tightly?	Go to step 3.	Tighten the battery terminals.
<b>3 CHECK VDCCM&amp;H/U INPUT VOLTAGE.</b> 1) Disconnect the connector from the VDCCM&H/U. 2) Run the engine at idle. 3) Operate devices such as headlights, air conditioner, defogger, etc. which produce an electrical load. 4) Measure the voltage between VDCCM&H/U connector and chassis ground. <b>Connector &amp; terminal</b> <b>(B310) No. 34 (+) — Chassis ground (-):</b>	Is the voltage 10 — 15 V?	Go to step 4.	Repair the power supply circuit.
<b>4 CHECK VDCCM&amp;H/U GROUND CIRCUIT.</b> 1) Turn the ignition switch to OFF. 2) Measure the resistance between VDCCM&H/U connector and chassis ground. <b>Connector &amp; terminal</b> <b>(B310) No. 11 — Chassis ground:</b>	Is the resistance less than 10 $\Omega$ ?	Go to step 5.	Repair the VDCCM&H/U ground harness.
<b>5 CHECK POOR CONTACT OF CONNECTORS.</b>	Is there poor contact of connector between generator, battery and VDCCM&H/U?	Repair the connector.	Go to step 6.
<b>6 CHECK VDCCM&amp;H/U.</b> 1) Connect all connectors. 2) Clear the memory. <Ref. to VDC(diag)-26, OPERATION, Clear Memory Mode.> 3) Perform the Inspection Mode. <Ref. to VDC(diag)-25, PROCEDURE, Inspection Mode.> 4) Read the DTC. <Ref. to VDC(diag)-24, OPERATION, Read Diagnostic Trouble Code (DTC).>	Is the same DTC displayed?	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>	Go to step 7.
<b>7 CHECK OTHER DTC DETECTION.</b>	Is any other DTC displayed?	Perform the diagnosis according to DTC. <Ref. to VDC(diag)-41, List of Diagnostic Trouble Code (DTC).>	Temporary poor contact occurs.



# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)

## Z: DTC C0047 IMPROPER CAN COMMUNICATION

### DTC DETECTING CONDITION:

CAN communication line circuit is open or shorted.

### TROUBLE SYMPTOM:

- ABS does not operate.
- VDC does not operate.

Step	Check	Yes	No
<b>1</b> <b>CHECK LAN SYSTEM.</b> Perform the diagnosis for LAN system. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>	Is there any fault in LAN system?	Perform the diagnosis according to DTC for LAN system. <Ref. to LAN(diag)-31, List of Diagnostic Trouble Code (DTC).>	Go to step 2.
<b>2</b> <b>CHECK POOR CONTACT OF CONNECTORS.</b>	Is there poor contact of VDCCM&H/U connector?	Repair the connector.	Go to step 3.
<b>3</b> <b>CHECK VDCCM&amp;H/U.</b> 1) Connect all connectors. 2) Clear the memory. <Ref. to VDC(diag)-26, OPERATION, Clear Memory Mode.> 3) Perform the Inspection Mode. <Ref. to VDC(diag)-25, PROCEDURE, Inspection Mode.> 4) Read the DTC. <Ref. to VDC(diag)-24, OPERATION, Read Diagnostic Trouble Code (DTC).>	Is the same DTC displayed?	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>	Temporary poor contact occurs.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)

## AA:DTC C0051 VALVE RELAY OPEN CIRCUIT

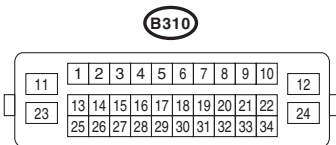
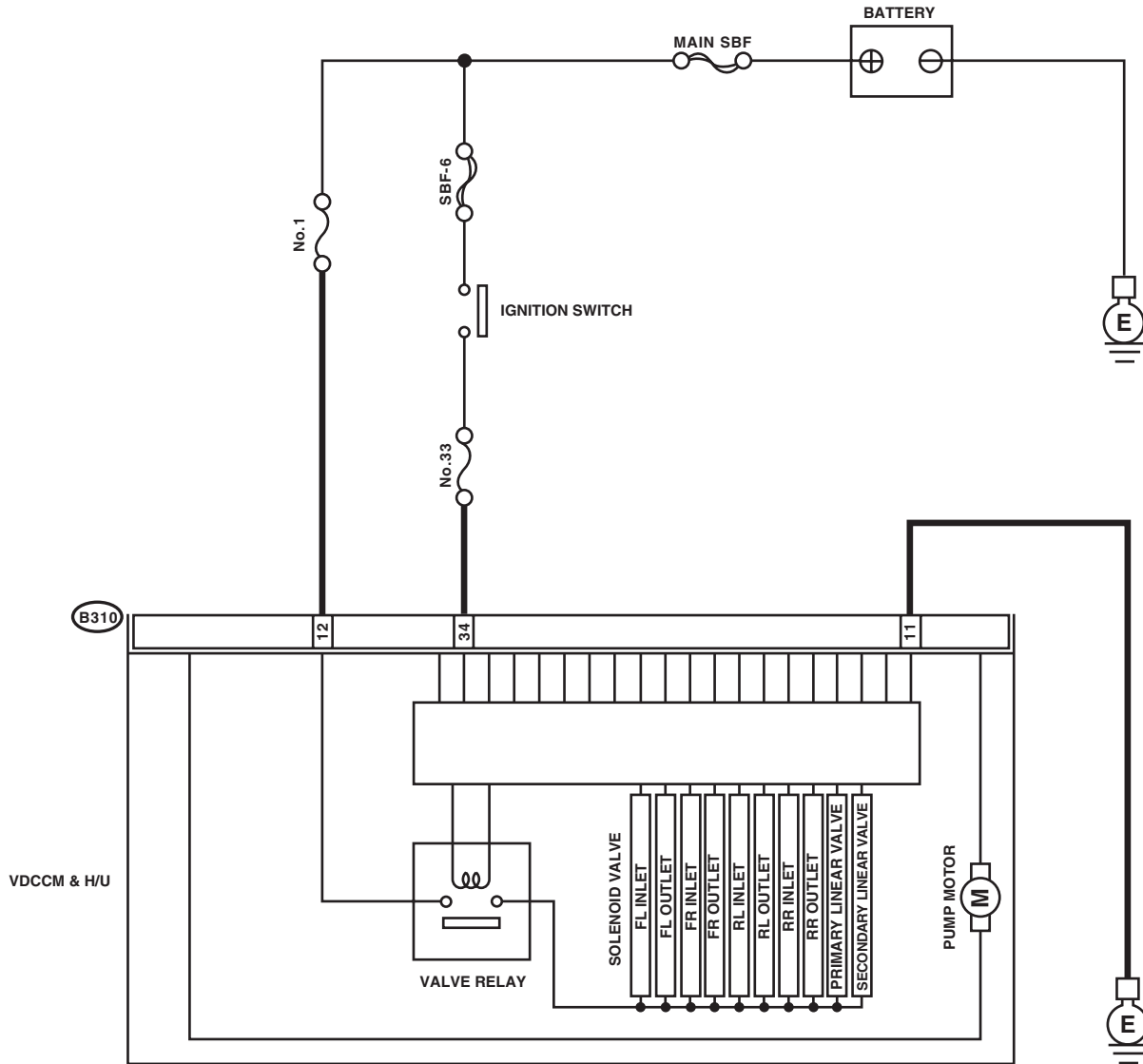
### DTC DETECTING CONDITION:

Defective valve relay

### TROUBLE SYMPTOM:

- ABS does not operate.
- EBD does not operate.
- VDC does not operate.

### WIRING DIAGRAM:



VDC00620

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)

	Step	Check	Yes	No
1	<b>CHECK VDCCM&amp;H/U INPUT VOLTAGE.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connector from the VDCCM&H/U. 3) Run the engine at idle. 4) Measure the voltage between VDCCM&H/U connector and chassis ground. <b>Connector &amp; terminal</b> <b>(B310) No. 12 (+) — Chassis ground (-):</b>	Is the voltage 10 — 15 V?	Go to step 2.	Repair the harness connector between battery and VDCCM&H/U.
2	<b>CHECK VDCCM&amp;H/U GROUND CIRCUIT.</b> 1) Turn the ignition switch to OFF. 2) Measure the resistance between VDCCM&H/U connector and chassis ground. <b>Connector &amp; terminal</b> <b>(B310) No. 11 — Chassis ground:</b>	Is the resistance less than 10 Ω?	Go to step 3.	Repair the VDCCM&H/U ground harness.
3	<b>CHECK POOR CONTACT OF CONNECTORS.</b>	Is there poor contact of connector between generator, battery and VDCCM&H/U?	Repair the connector.	Go to step 4.
4	<b>CHECK VDCCM&amp;H/U.</b> 1) Connect all connectors. 2) Clear the memory. <Ref. to VDC(diag)-26, OPERATION, Clear Memory Mode.> 3) Perform the Inspection Mode. <Ref. to VDC(diag)-25, PROCEDURE, Inspection Mode.> 4) Read the DTC. <Ref. to VDC(diag)-24, OPERATION, Read Diagnostic Trouble Code (DTC).>	Is the same DTC displayed?	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>	Go to step 5.
5	<b>CHECK OTHER DTC DETECTION.</b>	Is any other DTC displayed?	Perform the diagnosis according to DTC. <Ref. to VDC(diag)-41, List of Diagnostic Trouble Code (DTC).>	Temporary poor contact occurs.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)

## AB:DTC C0051 VALVE RELAY SHORT CIRCUIT

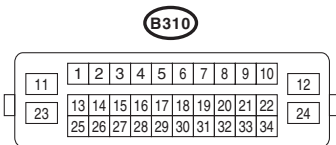
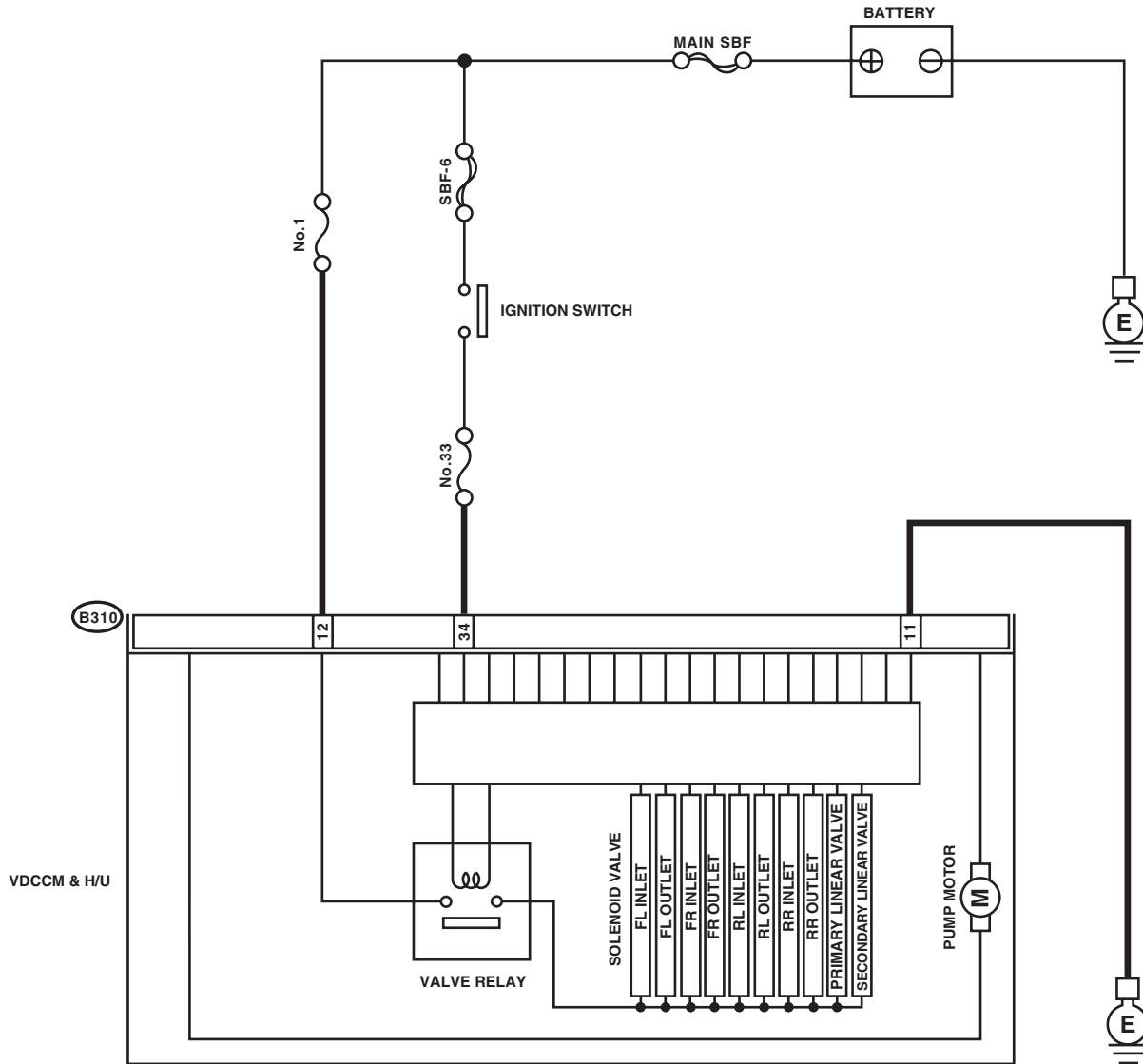
### DTC DETECTING CONDITION:

Defective valve relay

### TROUBLE SYMPTOM:

- ABS does not operate.
- VDC does not operate.
- EBD does not operate.

### WIRING DIAGRAM:



VDC00620

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)

Step	Check	Yes	No
<b>1</b> <b>CHECK VDCCM&amp;H/U VALVE RELAY.</b> 1) Disconnect the connector from the VDCCM&H/U. 2) Measure the resistance between VDCCM&H/U terminals. <b>Terminals</b> <b>No. 12 — No. 11:</b>	Is the resistance 1 MΩ or more?	Go to step 2.	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>
<b>2</b> <b>CHECK POOR CONTACT OF CONNECTORS.</b>	Is there poor contact of connector between generator, battery and VDCCM&H/U?	Repair the connector.	Go to step 3.
<b>3</b> <b>CHECK VDCCM&amp;H/U.</b> 1) Connect all connectors. 2) Clear the memory. <Ref. to VDC(diag)-26, OPERATION, Clear Memory Mode.> 3) Perform the Inspection Mode. <Ref. to VDC(diag)-25, PROCEDURE, Inspection Mode.> 4) Read the DTC. <Ref. to VDC(diag)-24, OPERATION, Read Diagnostic Trouble Code (DTC).>	Is the same DTC displayed?	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>	Go to step 4.
<b>4</b> <b>CHECK OTHER DTC DETECTION.</b>	Is any other DTC displayed?	Perform the diagnosis according to DTC. <Ref. to VDC(diag)-41, List of Diagnostic Trouble Code (DTC).>	Temporary poor contact occurs.

## AC:DTC C0052 MOTOR AND MOTOR RELAY OPEN CIRCUIT

NOTE:

For the diagnostic procedure, refer to “DTC C0052 MOTOR DO NOT WORK”. <Ref. to VDC(diag)-66, DTC C0052 MOTOR DO NOT WORK, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

## AD:DTC C0052 MOTOR MALFUNCTION

NOTE:

For the diagnostic procedure, refer to “DTC C0052 MOTOR DO NOT WORK”. <Ref. to VDC(diag)-66, DTC C0052 MOTOR DO NOT WORK, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

## AE:DTC C0052 MOTOR AND MOTOR RELAY SHORT CIRCUIT

NOTE:

For the diagnostic procedure, refer to “DTC C0052 FAIL SAFE RELAY SHORT CIRCUIT”. <Ref. to VDC(diag)-65, DTC C0052 MOTOR FAIL SAFE RELAY SHORT CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

## AF:DTC C0052 MOTOR FAIL SAFE RELAY SHORT CIRCUIT

### DTC DETECTING CONDITION:

- Defective motor relay
- Fail safe relay malfunction
- Defective harness connector

### TROUBLE SYMPTOM:

- ABS does not operate.
- VDC does not operate.
- EBD does not operate.

NOTE:

Motor relay and fail safe relay are built-in to the VDCCM&H/U.

Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)

## AG:DTC C0052 MOTOR DO NOT WORK

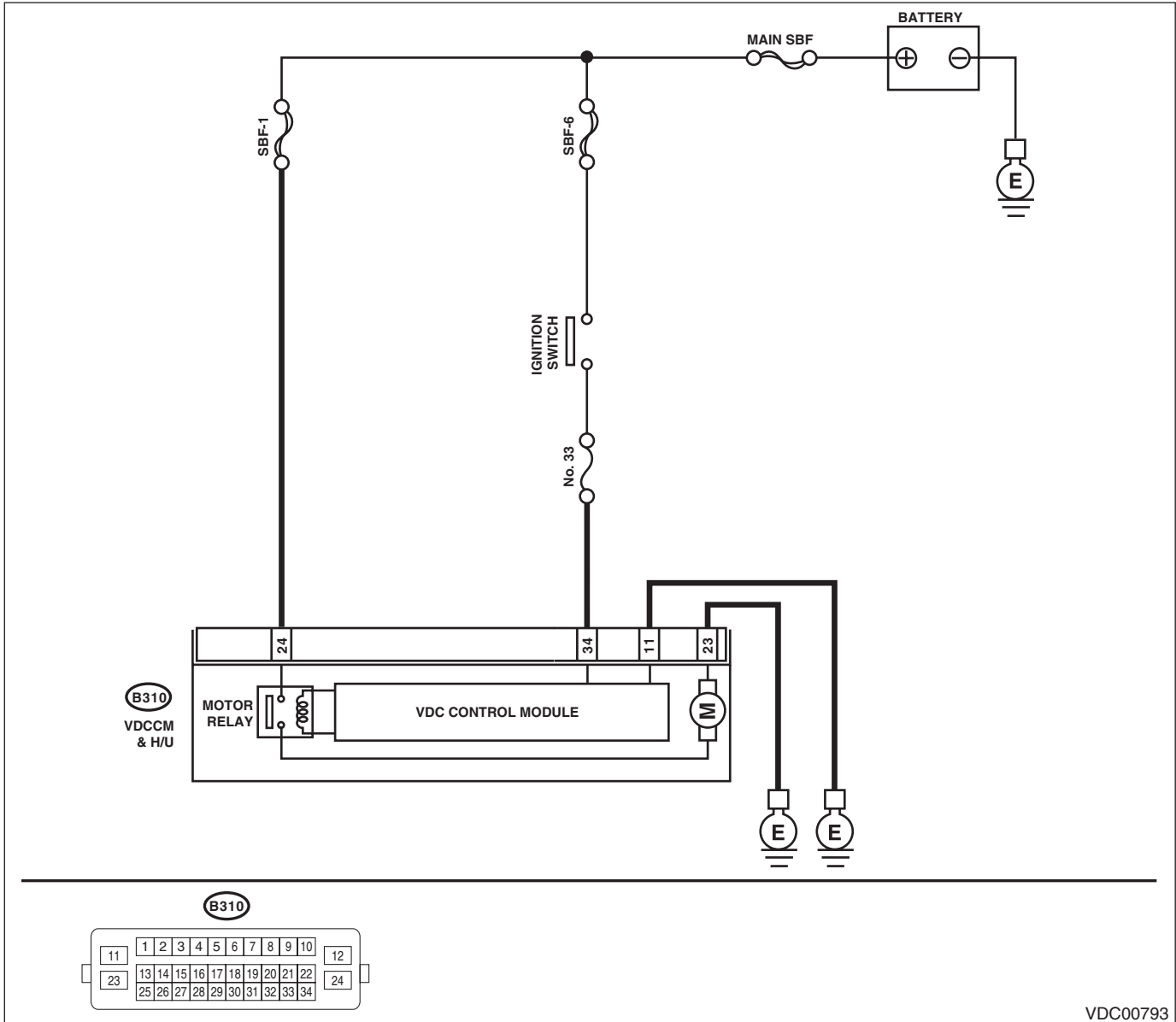
### DTC DETECTING CONDITION:

- Defective motor
- Defective harness connector

### TROUBLE SYMPTOM:

- ABS does not operate.
- VDC does not operate.
- EBD does not operate.

### WIRING DIAGRAM:



# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)

	Step	Check	Yes	No
1	<b>CHECK VDCCM&amp;H/U INPUT VOLTAGE.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connector from the VDCCM&H/U. 3) Turn the ignition switch to ON. 4) Measure the voltage between VDCCM&H/U connector and chassis ground. <b>Connector &amp; terminal</b> <b>(B310) No. 24 (+) — Chassis ground (-):</b> <b>(B310) No. 34 (+) — Chassis ground (-):</b>	Is the voltage 10 — 15 V?	Go to step 2.	Repair the VDCCM&H/U power supply circuit.
2	<b>CHECK INSTALLATION OF MOTOR GROUND.</b>	Is the motor ground terminal installation bolt tightened 33 N·m (3.3 kgf·m, 24.3 ft·lb)?	Go to step 3.	Tighten the motor ground terminal installation bolt.
3	<b>CHECK VDCCM&amp;H/U GROUND CIRCUIT.</b> 1) Turn the ignition switch to OFF. 2) Measure the resistance between VDCCM&H/U connector and chassis ground. <b>Connector &amp; terminal</b> <b>(B310) No. 11 — Chassis ground:</b> <b>(B310) No. 23 — Chassis ground:</b>	Is the resistance less than 10 Ω?	Go to step 4.	Repair the VDCCM&H/U ground harness.
4	<b>CHECK VDCCM&amp;H/U.</b> 1) Connect all connectors. 2) Clear the memory. <Ref. to VDC(diag)-26, OPERATION, Clear Memory Mode.> 3) Perform the Inspection Mode. <Ref. to VDC(diag)-25, PROCEDURE, Inspection Mode.> 4) Read the DTC. <Ref. to VDC(diag)-24, OPERATION, Read Diagnostic Trouble Code (DTC).>	Is the same DTC displayed?	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>	Go to step 5.
5	<b>CHECK OTHER DTC DETECTION.</b>	Is any other DTC displayed?	Perform the diagnosis according to DTC. <Ref. to VDC(diag)-41, List of Diagnostic Trouble Code (DTC).>	Temporary poor contact occurs.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)

## AH:DTC C0054 BRAKE LAMP SWITCH OPEN CIRCUIT

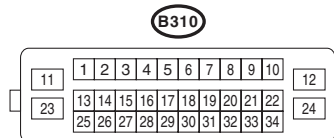
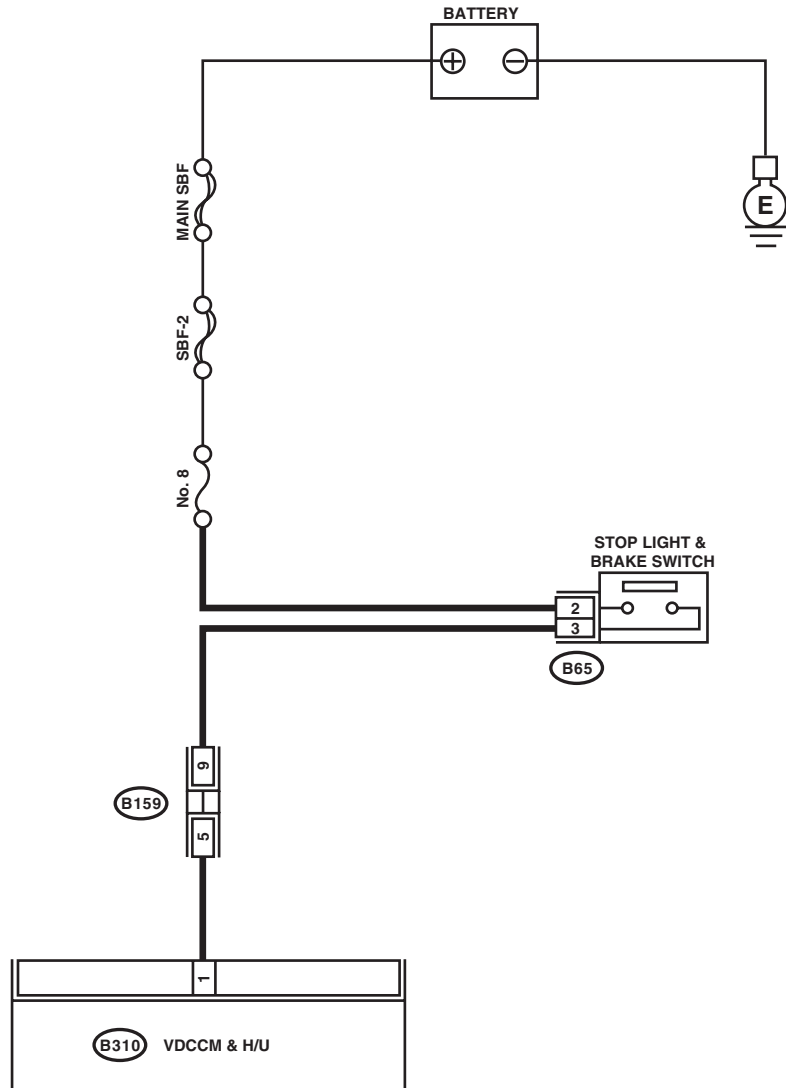
### DTC DETECTING CONDITION:

Defective stop light switch

### TROUBLE SYMPTOM:

- ABS does not operate.
- VDC does not operate.

### WIRING DIAGRAM:



VDC00826



# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)

	Step	Check	Yes	No
1	<b>CHECK OUTPUT OF STOP LIGHT SWITCH WITH SUBARU SELECT MONITOR.</b> 1) Select {Current Data Display & Save} in Subaru Select Monitor. 2) Release the brake pedal. 3) Read the stop light switch output in Subaru Select Monitor.	Is OFF displayed on the display screen?	Go to step 2.	Go to step 3.
2	<b>CHECK OUTPUT OF STOP LIGHT SWITCH WITH SUBARU SELECT MONITOR.</b> 1) Depress the brake pedal. 2) Read the stop light switch output in Subaru Select Monitor.	Is ON displayed on the display screen?	Go to step 5.	Go to step 3.
3	<b>CHECK IF STOP LIGHTS ILLUMINATE.</b> Depress the brake pedal.	Does the stop light illuminate?	Go to step 4.	Repair the stop light circuit.
4	<b>CHECK OPEN CIRCUIT OF HARNESS.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connector from the VDCCM&H/U. 3) Depress the brake pedal. 4) Measure the voltage between VDCCM&H/U connector and chassis ground. <b>Connector &amp; terminal</b> <b>(B310) No. 1 (+) — Chassis ground (-):</b>	Is the voltage 10 — 15 V?	Go to step 5.	Repair the harness between stop light switch and VDCCM&H/U connector.
5	<b>CHECK POOR CONTACT OF CONNECTORS.</b>	Is there poor contact of connector between stop light switch and VDCCM&H/U?	Repair the connector.	Go to step 6.
6	<b>CHECK VDCCM&amp;H/U.</b> 1) Connect all connectors. 2) Clear the memory. <Ref. to VDC(diag)-26, OPERATION, Clear Memory Mode.> 3) Perform the Inspection Mode. <Ref. to VDC(diag)-25, PROCEDURE, Inspection Mode.> 4) Read the DTC. <Ref. to VDC(diag)-24, OPERATION, Read Diagnostic Trouble Code (DTC).>	Is the same DTC displayed?	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>	Go to step 7.
7	<b>CHECK OTHER DTC DETECTION.</b>	Is any other DTC displayed?	Perform the diagnosis according to DTC. <Ref. to VDC(diag)-41, List of Diagnostic Trouble Code (DTC).>	Temporary poor contact occurs.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)

## AI: DTC C0056 G SENSOR OUTPUT FREEZE

### DTC DETECTING CONDITION:

Defective G sensor.

### TROUBLE SYMPTOM:

- ABS does not operate.
- VDC does not operate.

	Step	Check	Yes	No
1	<b>CHECK G SENSOR OUTPUT.</b> 1) Connect the Subaru Select Monitor to the vehicle. 2) Select {Current Data Display & Save} in Subaru Select Monitor. <Ref. to VDC(diag)-19, READ CURRENT DATA, OPERATION, Subaru Select Monitor.> 3) Read the G sensor output when braking.	Do the values on the monitor display change?	Go to step 2.	Replace the yaw rate & G sensor. <Ref. to VDC-18, Yaw Rate and G Sensor.>
2	<b>CHECK VDCCM&amp;H/U.</b> 1) Connect all connectors. 2) Clear the memory. <Ref. to VDC(diag)-26, OPERATION, Clear Memory Mode.> 3) Perform the Inspection Mode. <Ref. to VDC(diag)-25, PROCEDURE, Inspection Mode.> 4) Read the DTC. <Ref. to VDC(diag)-24, OPERATION, Read Diagnostic Trouble Code (DTC).>	Is the same DTC displayed?	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>	Go to step 3.
3	<b>CHECK OTHER DTC DETECTION.</b>	Is any other DTC displayed?	Perform the diagnosis according to DTC. <Ref. to VDC(diag)-41, List of Diagnostic Trouble Code (DTC).>	Temporary poor contact occurs.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)

## AJ:DTC C0056 G SENSOR SIGNAL MALFUNCTION

### DTC DETECTING CONDITION:

Defective G sensor.

### TROUBLE SYMPTOM:

- ABS does not operate.
- VDC does not operate.

	Step	Check	Yes	No
1	<b>CHECK YAW RATE &amp; G SENSOR INSTALLATION.</b> Check the yaw rate & lateral G sensor installation.	Is the yaw rate & lateral G sensor and bracket tightened to 7.5 N·m (0.76 kgf·m, 5.5 ft·lb)?	Go to step 2.	Tighten the yaw rate & lateral G sensor.
2	<b>CHECK G SENSOR OUTPUT.</b> 1) Connect the Subaru Select Monitor to the vehicle. 2) Select {Current Data Display & Save} in Subaru Select Monitor. <Ref. to VDC(diag)-19, READ CURRENT DATA, OPERATION, Subaru Select Monitor.> 3) Read the G sensor output displayed on screen.	Is the value on the monitor display $-1.5 \text{ — } 1.5 \text{ m/s}^2$ ?	Go to step 3.	Replace the yaw rate & G sensor. <Ref. to VDC-18, Yaw Rate and G Sensor.>
3	<b>CHECK VDCCM&amp;H/U.</b> 1) Connect all connectors. 2) Clear the memory. <Ref. to VDC(diag)-26, OPERATION, Clear Memory Mode.> 3) Perform the Inspection Mode. <Ref. to VDC(diag)-25, PROCEDURE, Inspection Mode.> 4) Read the DTC. <Ref. to VDC(diag)-24, OPERATION, Read Diagnostic Trouble Code (DTC).>	Is the same DTC displayed?	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>	Go to step 4.
4	<b>CHECK OTHER DTC DETECTION.</b>	Is any other DTC displayed?	Perform the diagnosis according to DTC. <Ref. to VDC(diag)-41, List of Diagnostic Trouble Code (DTC).>	Temporary poor contact occurs.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)

## AK:DTC C0056 YAW RATE G SENSOR POWER SUPPLY VOLTAGE MALFUNCTION

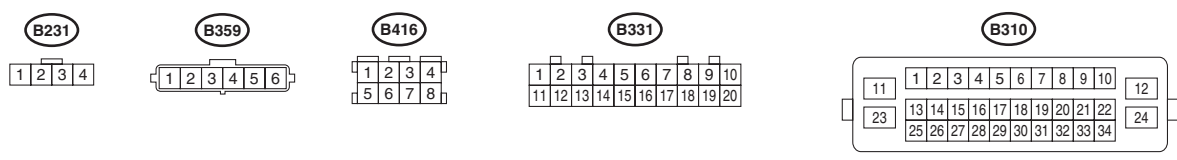
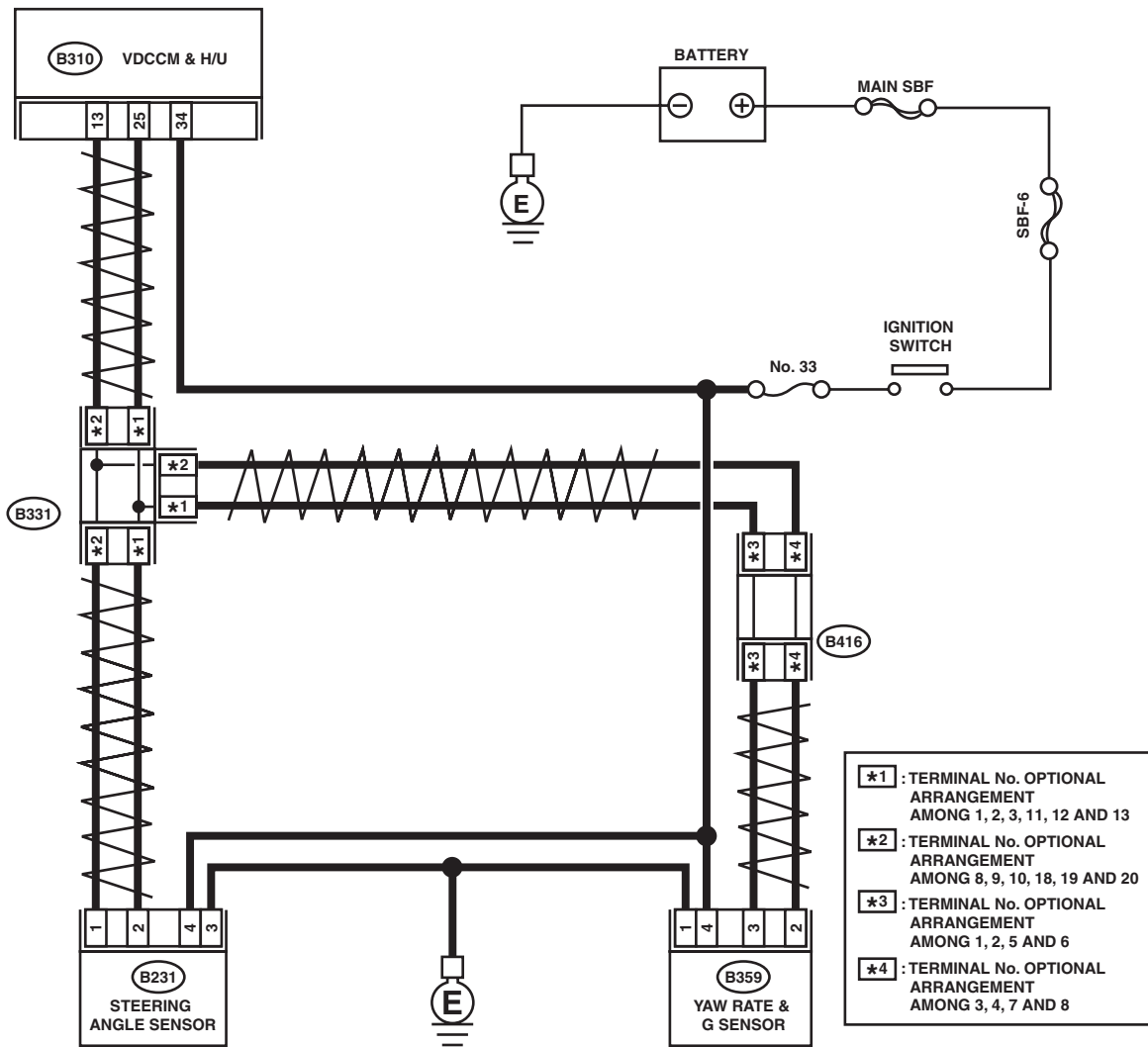
### DTC DETECTING CONDITION:

Defective G sensor.

### TROUBLE SYMPTOM:

- ABS does not operate.
- VDC does not operate.

### WIRING DIAGRAM:



VDC00794

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)

Step	Check	Yes	No
<p><b>1 CHECK YAW RATE &amp; LATERAL G SENSOR POWER SUPPLY.</b></p> <p>1) Turn the ignition switch to OFF.                      2) Disconnect the connector from yaw rate &amp; G sensor.                      3) Turn the ignition switch to ON.                      4) Measure the voltage between yaw rate &amp; G sensor and chassis ground.</p> <p><b>Connector &amp; terminal</b>  <b>(B359) No. 4 (+) — Chassis ground (-):</b></p>	<p>Is the voltage 10 — 15 V?</p>	<p>Go to step 2.</p>	<p>Replace the yaw rate &amp; lateral G sensor power supply circuit.</p>
<p><b>2 CHECK YAW RATE &amp; G SENSOR GROUND CIRCUIT.</b></p> <p>1) Turn the ignition switch to OFF.                      2) Measure the resistance between yaw rate &amp; lateral G sensor connector and chassis ground.</p> <p><b>Connector &amp; terminal</b>  <b>(B359) No. 1 — Chassis ground:</b></p>	<p>Is the resistance less than 10 <math>\Omega</math>?</p>	<p>Go to step 3.</p>	<p>Repair the yaw rate &amp; G sensor ground circuit.</p>
<p><b>3 CHECK YAW RATE &amp; G SENSOR.</b></p> <p>1) Connect all connectors.                      2) Clear the memory. &lt;Ref. to VDC(diag)-26, OPERATION, Clear Memory Mode.&gt;                      3) Perform the Inspection Mode. &lt;Ref. to VDC(diag)-25, PROCEDURE, Inspection Mode.&gt;                      4) Read the DTC. &lt;Ref. to VDC(diag)-24, OPERATION, Read Diagnostic Trouble Code (DTC).&gt;</p>	<p>Is the same DTC displayed?</p>	<p>Replace the VDCCM&amp;H/U. &lt;Ref. to VDC-7, VDC Control Module and Hydraulic Control Unit (VDCCM&amp;H/U).&gt;</p>	<p>Go to step 4.</p>
<p><b>4 CHECK OTHER DTC DETECTION.</b></p>	<p>Is any other DTC displayed?</p>	<p>Perform the diagnosis according to DTC. &lt;Ref. to VDC(diag)-41, List of Diagnostic Trouble Code (DTC).&gt;</p>	<p>Temporary poor contact occurs.</p>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)

## AL:DTC C0056 G SENSOR OUTPUT MALFUNCTION

### DTC DETECTING CONDITION:

Defective G sensor.

### TROUBLE SYMPTOM:

- ABS does not operate.
- VDC does not operate.

	Step	Check	Yes	No
1	<b>CHECK YAW RATE &amp; G SENSOR INSTALLATION.</b> Check the yaw rate & lateral G sensor installation.	Is the yaw rate & lateral G sensor and bracket tightened to 7.5 N·m (0.76 kgf·m, 5.5 ft·lb)?	Go to step 2.	Tighten the yaw rate & lateral G sensor.
2	<b>CHECK G SENSOR OUTPUT.</b> 1) Connect the Subaru Select Monitor to the vehicle. 2) Select {Current Data Display & Save} in Subaru Select Monitor. <Ref. to VDC(diag)-19, READ CURRENT DATA, OPERATION, Subaru Select Monitor.> 3) Drive at a constant speed of approximately 40 km/h (25 MPH) and read the G sensor output at that time.	Is the indicated reading on the monitor display $-1.5 - 1.5 \text{ m/s}^2$ ?	Go to step 3.	Replace the yaw rate & G sensor. <Ref. to VDC-18, Yaw Rate and G Sensor.>
3	<b>CHECK VDCCM&amp;H/U.</b> 1) Connect all connectors. 2) Clear the memory. <Ref. to VDC(diag)-26, OPERATION, Clear Memory Mode.> 3) Perform the Inspection Mode. <Ref. to VDC(diag)-25, PROCEDURE, Inspection Mode.> 4) Read the DTC. <Ref. to VDC(diag)-24, OPERATION, Read Diagnostic Trouble Code (DTC).>	Is the same DTC displayed?	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>	Go to step 4.
4	<b>CHECK OTHER DTC DETECTION.</b>	Is any other DTC displayed?	Perform the diagnosis according to DTC. <Ref. to VDC(diag)-41, List of Diagnostic Trouble Code (DTC).>	Temporary poor contact occurs.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)

## AM:DTC C0057 ECM COMMUNICATION

### DTC DETECTING CONDITION:

No CAN signal from ECM.

### TROUBLE SYMPTOM:

VDC does not operate.

	Step	Check	Yes	No
1	<b>CHECK LAN SYSTEM.</b> Perform the diagnosis for LAN system. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>	Is there any fault in LAN system?	Perform the diagnosis according to DTC for LAN system. <Ref. to LAN(diag)-31, List of Diagnostic Trouble Code (DTC).>	Go to step 2.
2	<b>CHECK POOR CONTACT OF CONNECTORS.</b>	Is there poor contact of ECM connector?	Repair the connector.	Go to step 3.
3	<b>CHECK ECM.</b> Perform the diagnosis for the engine system. <Ref. to EN(H6DO)(diag)-2, Basic Diagnostic Procedure.>	Is ECM normal?	Go to step 4.	Perform the diagnosis according to DTC for the engine system. <Ref. to EN(H6DO)(diag)-84, List of Diagnostic Trouble Code (DTC).>
4	<b>CHECK VDCCM&amp;H/U.</b> 1) Connect all connectors. 2) Clear the memory. <Ref. to VDC(diag)-26, OPERATION, Clear Memory Mode.> 3) Perform the Inspection Mode. <Ref. to VDC(diag)-25, PROCEDURE, Inspection Mode.> 4) Read the DTC. <Ref. to VDC(diag)-24, OPERATION, Read Diagnostic Trouble Code (DTC).>	Is the same DTC displayed?	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>	Go to step 5.
5	<b>CHECK OTHER DTC DETECTION.</b>	Is any other DTC displayed?	Perform the diagnosis according to DTC. <Ref. to VDC(diag)-41, List of Diagnostic Trouble Code (DTC).>	Temporary poor contact occurs.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)

## AN:DTC C0057 AT COMMUNICATION

### DTC DETECTING CONDITION:

No CAN signal from TCM.

### TROUBLE SYMPTOM:

- ABS does not operate.
- VDC does not operate.

	Step	Check	Yes	No
1	<b>CHECK LAN SYSTEM.</b> Perform the diagnosis for LAN system. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>	Is there any fault in LAN system?	Perform the diagnosis according to DTC for LAN system. <Ref. to LAN(diag)-31, List of Diagnostic Trouble Code (DTC).>	Go to step 2.
2	<b>CHECK POOR CONTACT OF CONNECTORS.</b>	Is there poor contact of TCM connector?	Repair the connector.	Go to step 3.
3	<b>CHECK TCM.</b> Perform the diagnosis for AT system. <Ref. to 5AT(diag)-2, Basic Diagnostic Procedure.>	Is the TCM normal?	Go to step 4.	Perform the diagnosis according to DTC for AT system. <Ref. to 5AT(diag)-31, List of Diagnostic Trouble Code (DTC).>
4	<b>CHECK VDCCM&amp;H/U.</b> 1) Connect all connectors. 2) Clear the memory. <Ref. to VDC(diag)-26, OPERATION, Clear Memory Mode.> 3) Perform the Inspection Mode. <Ref. to VDC(diag)-25, PROCEDURE, Inspection Mode.> 4) Read the DTC. <Ref. to VDC(diag)-24, OPERATION, Read Diagnostic Trouble Code (DTC).>	Is the same DTC displayed?	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>	Go to step 5.
5	<b>CHECK OTHER DTC DETECTION.</b>	Is any other DTC displayed?	Perform the diagnosis according to DTC. <Ref. to VDC(diag)-41, List of Diagnostic Trouble Code (DTC).>	Temporary poor contact occurs.



# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)

## AO:DTC C0057 TRANSMISSION SYSTEM FAILURE

### DTC DETECTING CONDITION:

Transmission System Defect

### TROUBLE SYMPTOM:

- ABS does not operate.
- VDC does not operate.

	Step	Check	Yes	No
1	<b>CHECK AT SYSTEM.</b> 1) Start the engine. 2) Check the DTC in AT system. <Ref. to 5AT(diag)-15, OPERATION, Subaru Select Monitor.>	Is DTC of AT system displayed?	Perform the diagnosis according to DTC for AT system. <Ref. to 5AT(diag)-31, List of Diagnostic Trouble Code (DTC).>	Go to step 2.
2	<b>CHECK VDCCM&amp;H/U.</b> 1) Connect all connectors. 2) Clear the memory. <Ref. to VDC(diag)-26, OPERATION, Clear Memory Mode.> 3) Perform the Inspection Mode. <Ref. to VDC(diag)-25, PROCEDURE, Inspection Mode.> 4) Read the DTC. <Ref. to VDC(diag)-24, OPERATION, Read Diagnostic Trouble Code (DTC).>	Is the same DTC displayed?	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>	Go to step 3.
3	<b>CHECK OTHER DTC DETECTION.</b>	Is any other DTC displayed?	Perform the diagnosis according to DTC. <Ref. to VDC(diag)-41, List of Diagnostic Trouble Code (DTC).>	Temporary poor contact occurs.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)

## AP:DTC C0057 ENGINE SYSTEM FAILURE

### DTC DETECTING CONDITION:

Defective engine system

### TROUBLE SYMPTOM:

- ABS does not operate.
- VDC does not operate.

Step	Check	Yes	No
<b>1</b> <b>CHECK ECM.</b> Read the DTC of the ECM. <Ref. to EN(H6DO)(diag)-44, OPERATION, Read Diagnostic Trouble Code (DTC).>	Is DTC displayed?	Perform the diagnosis according to DTC for the engine system. <Ref. to EN(H6DO)(diag)-84, List of Diagnostic Trouble Code (DTC).>	Go to step 2.
<b>2</b> <b>CHECK VDCCM&amp;H/U.</b> 1) Connect all connectors. 2) Clear the memory. <Ref. to VDC(diag)-26, OPERATION, Clear Memory Mode.> 3) Perform the Inspection Mode. <Ref. to VDC(diag)-25, PROCEDURE, Inspection Mode.> 4) Read the DTC. <Ref. to VDC(diag)-24, OPERATION, Read Diagnostic Trouble Code (DTC).>	Is the same DTC displayed?	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>	Go to step 3.
<b>3</b> <b>CHECK OTHER DTC DETECTION.</b>	Is any other DTC displayed?	Perform the diagnosis according to DTC. <Ref. to VDC(diag)-41, List of Diagnostic Trouble Code (DTC).>	Temporary poor contact occurs.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)

## AQ:DTC C0071 STEERING ANGLE SENSOR INTERNAL PROBLEM MALFUNCTION

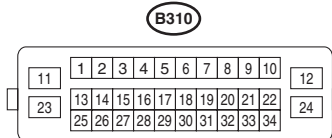
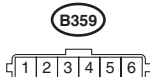
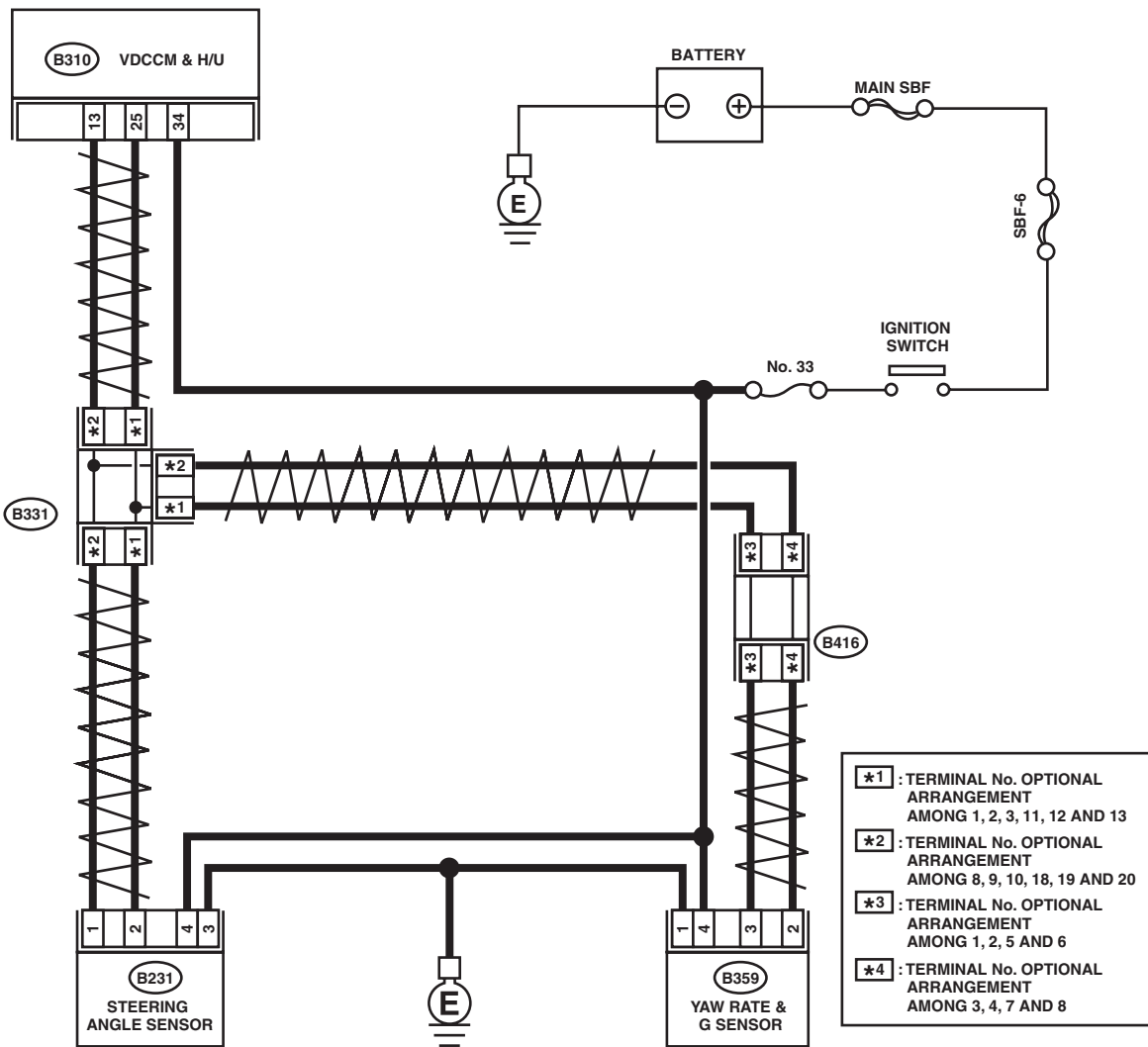
### DTC DETECTING CONDITION:

Defective steering angle sensor

### TROUBLE SYMPTOM:

VDC does not operate.

### WIRING DIAGRAM:



VDC00794

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)

Step	Check	Yes	No
<b>1 CHECK POWER SUPPLY OF STEERING ANGLE SENSOR.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connector from steering angle sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between steering angle sensor and chassis ground. <b>Connector &amp; terminal</b> <b>(B231) No. 4 (+) — Chassis ground (-):</b>	Is the voltage 10 — 15 V?	Go to step 2.	Repair the steering angle sensor power supply circuit.
<b>2 CHECK GROUND CIRCUIT OF STEERING ANGLE SENSOR.</b> Measure the resistance between steering angle sensor and chassis ground. <b>Connector &amp; terminal</b> <b>(B231) No. 3 — Chassis ground:</b>	Is the resistance less than 10 $\Omega$ ?	Go to step 3.	Repair ground circuit in the steering angle sensor.
<b>3 CHECK POOR CONTACT OF STEERING ANGLE SENSOR CONNECTOR.</b>	Is there poor contact of connector?	Repair or replace the steering angle sensor connector.	Go to step 4.
<b>4 CHECK STEERING ANGLE SENSOR.</b> 1) Turn the ignition switch to OFF. 2) Connect all connectors. 3) Clear the memory. <Ref. to VDC(diag)-26, OPERATION, Clear Memory Mode.> 4) Perform the Inspection Mode. <Ref. to VDC(diag)-25, PROCEDURE, Inspection Mode.> 5) Read the DTC. <Ref. to VDC(diag)-24, OPERATION, Read Diagnostic Trouble Code (DTC).>	Is the same DTC displayed?	Replace the steering angle sensor. <Ref. to VDC-19, REPLACEMENT, Steering Angle Sensor.>	Go to step 5.
<b>5 CHECK OTHER DTC DETECTION.</b>	Is any other DTC displayed?	Perform the diagnosis according to DTC. <Ref. to VDC(diag)-41, List of Diagnostic Trouble Code (DTC).>	Temporary poor contact occurs.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)

## AR:DTC C0071 STEERING ANGLE SENSOR COMMUNICATION MALFUNCTION

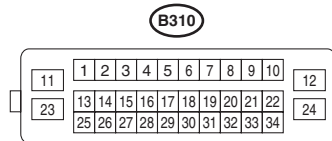
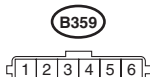
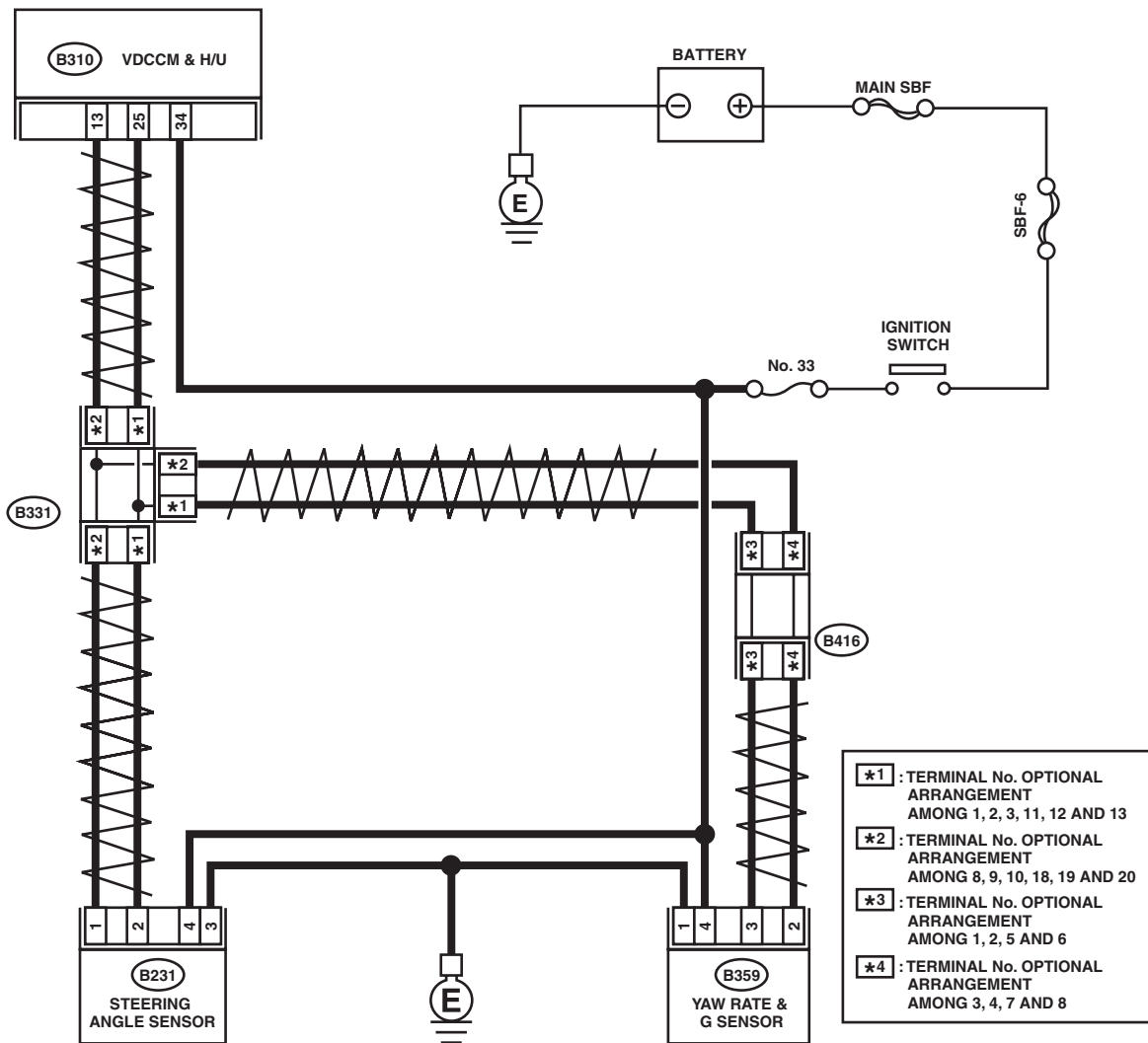
### DTC DETECTING CONDITION:

Signal does not come from steering angle sensor.

### TROUBLE SYMPTOM:

VDC does not operate.

### WIRING DIAGRAM:



VDC00794

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)

Step	Check	Yes	No
<b>1 CHECK STEERING WHEEL.</b> 1) Drive the vehicle on a flat road. 2) Park the vehicle straight. 3) Check the steering wheel for deviation from center.	Is the deviation from the center of steering wheel less than 5°?	Go to step 2.	Perform the centering adjustment of steering wheel.
<b>2 CHECK LAN SYSTEM.</b> Perform the diagnosis for LAN system. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>	Is there any fault in LAN system?	Perform the diagnosis according to DTC for LAN system. <Ref. to LAN(diag)-31, List of Diagnostic Trouble Code (DTC).>	Go to step 3.
<b>3 CHECK POWER SUPPLY FOR STEERING ANGLE SENSOR.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connector from steering angle sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between steering angle sensor and chassis ground. <i>Connector &amp; terminal (B231) No. 4 (+) — Chassis ground (-):</i>	Is the voltage 10 — 15 V?	Go to step 4.	Repair the power supply circuit.
<b>4 CHECK GROUND CIRCUIT OF STEERING ANGLE SENSOR.</b> Measure the resistance between steering angle sensor and chassis ground. <i>Connector &amp; terminal (B231) No. 3 — Chassis ground:</i>	Is the resistance less than 10 Ω?	Go to step 5.	Repair ground circuit in the steering angle sensor.
<b>5 CHECK STEERING ANGLE SENSOR HARNESS.</b> 1) Disconnect the connector from the VDCCM&H/U. 2) Measure the resistance between VDCCM&H/U and steering angle sensor. <i>Connector &amp; terminal (B231) No. 1 — (B310) No. 13: (B231) No. 2 — (B310) No. 25:</i>	Is the resistance less than 1 Ω?	Go to step 6.	Repair the harness between the steering angle sensor and VDCCM&H/U.
<b>6 CHECK GROUND SHORT CIRCUIT OF STEERING ANGLE SENSOR HARNESS.</b> Measure the resistance between steering angle sensor and chassis ground. <i>Connector &amp; terminal (B231) No. 1 — Chassis ground: (B231) No. 2 — Chassis ground:</i>	Is the resistance 1 MΩ or more?	Go to step 7.	Repair the harness between the steering angle sensor and VDCCM&H/U.
<b>7 CHECK STEERING ANGLE SENSOR.</b> 1) Turn the ignition switch to OFF. 2) Connect all connectors. 3) Clear the memory. <Ref. to VDC(diag)-26, OPERATION, Clear Memory Mode.> 4) Perform the Inspection Mode. <Ref. to VDC(diag)-25, PROCEDURE, Inspection Mode.> 5) Read the DTC. <Ref. to VDC(diag)-24, OPERATION, Read Diagnostic Trouble Code (DTC).>	Is the same DTC displayed?	Go to step 8.	Go to step 9.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)

Step	Check	Yes	No
<b>8 CHECK VDCCM&amp;H/U.</b> 1) Turn the ignition switch to OFF. 2) Replace the steering angle sensor. <Ref. to VDC-19, REPLACEMENT, Steering Angle Sensor.> 3) Clear the memory. <Ref. to VDC(diag)-26, OPERATION, Clear Memory Mode.> 4) Perform the Inspection Mode. <Ref. to VDC(diag)-25, PROCEDURE, Inspection Mode.> 5) Read the DTC. <Ref. to VDC(diag)-24, OPERATION, Read Diagnostic Trouble Code (DTC).>	Is the same DTC displayed?	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>	Go to step 10.
<b>9 CHECK OTHER DTC DETECTION.</b>	Is any other DTC displayed?	Perform the diagnosis according to DTC. <Ref. to VDC(diag)-41, List of Diagnostic Trouble Code (DTC).>	Temporary poor contact occurs.
<b>10 CHECK OTHER DTC DETECTION.</b>	Is any other DTC displayed?	Perform the diagnosis according to DTC. <Ref. to VDC(diag)-41, List of Diagnostic Trouble Code (DTC).>	Original steering angle sensor malfunction

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)

## AS:DTC C0071 STEERING ANGLE SENSOR SIGNAL FREEZE

### DTC DETECTING CONDITION:

Defective steering angle sensor

### TROUBLE SYMPTOM:

VDC does not operate.

Step	Check	Yes	No
<b>1 CHECK STEERING WHEEL.</b> 1) Drive the vehicle on a flat road. 2) Park the vehicle straight. 3) Check the steering wheel for deviation from center.	Is the deviation from the center of steering wheel less than 5°?	Go to step 2.	Perform the centering adjustment of steering wheel.
<b>2 CHECK DRIVING PLACE.</b> Check if the vehicle ran the road with banks or sandy surface (which does not mean a dirt road).	Did the vehicle run the road with banks or sandy surface (which does not mean a dirt road)?	VDCCM&H/U may record DTC when the vehicle ran the road with banks or sandy surface (which does not mean a dirt road).	Go to step 3.
<b>3 CHECK OUTPUT OF STEERING ANGLE SENSOR WITH SUBARU SELECT MONITOR.</b> 1) Select {Current Data Display & Save} in Subaru Select Monitor. <Ref. to VDC(diag)-19, READ CURRENT DATA, OPERATION, Subaru Select Monitor.> 2) Read the steering angle sensor output displayed on display.	Does the steering angle sensor output value on the display vary in accordance with steering operation when turning the steering wheel to the right or left?	Go to step 4.	Replace the steering angle sensor. <Ref. to VDC-19, REPLACEMENT, Steering Angle Sensor.>
<b>4 CHECK VDCCM&amp;H/U.</b> 1) Turn the ignition switch to OFF. 2) Connect all connectors. 3) Clear the memory. <Ref. to VDC(diag)-26, OPERATION, Clear Memory Mode.> 4) Perform the Inspection Mode. <Ref. to VDC(diag)-25, PROCEDURE, Inspection Mode.> 5) Read the DTC. <Ref. to VDC(diag)-24, OPERATION, Read Diagnostic Trouble Code (DTC).>	Is the same DTC displayed?	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>	Go to step 5.
<b>5 CHECK OTHER DTC DETECTION.</b>	Is any other DTC displayed?	Perform the diagnosis according to DTC. <Ref. to VDC(diag)-41, List of Diagnostic Trouble Code (DTC).>	Temporary poor contact occurs.



## Diagnostic Procedure with Diagnostic Trouble Code (DTC)

VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)

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### **AT:DTC C0071 STEERING ANGLE SENSOR CALIBRATION NON COMPLETION**

#### **DTC DETECTING CONDITION:**

Steering angle sensor calibration is incomplete.

#### **TROUBLE SYMPTOM:**

VDC does not operate.

Calibrate the steering angle sensor. <Ref. to VDC-11, ADJUSTMENT, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>

### **AU:DTC C0072 YAW RATE SENSOR OSCILLATION MALFUNCTION**

#### **NOTE:**

For the diagnostic procedure, refer to “DTC C0072 YAW RATE SENSOR SIGNAL MALFUNCTION”. <Ref. to VDC(diag)-86, DTC C0072 YAW RATE SENSOR SIGNAL MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)

## AV:DTC C0072 YAW RATE SENSOR SIGNAL MALFUNCTION

### DTC DETECTING CONDITION:

Defective yaw rate sensor

### TROUBLE SYMPTOM:

VDC does not operate.

Step	Check	Yes	No
<b>1 CHECK DRIVING PLACE.</b> Check if the vehicle ran the road with banks or sandy surface (which does not mean a dirt road).	Did the vehicle run the road with banks or sandy surface (which does not mean a dirt road)?	VDCCM&H/U may record DTC when the vehicle ran the road with banks or sandy surface (which does not mean a dirt road).	Go to step 2.
<b>2 CHECK YAW RATE &amp; G SENSOR INSTALLATION.</b>	Is the yaw rate & G sensor installation bolt tightened to 7.5 N·m (0.76 kgf-m, 5.5 ft-lb)?	Go to step 3.	Tighten the yaw rate & G sensor attachment bolt.
<b>3 CHECK OUTPUT OF YAW RATE &amp; G SENSOR WITH SUBARU SELECT MONITOR.</b> 1) Drive the vehicle on a flat road. 2) Park the vehicle straight. 3) Select {Current Data Display & Save} in Subaru Select Monitor. <Ref. to VDC(diag)-19, READ CURRENT DATA, OPERATION, Subaru Select Monitor.> 4) Read the yaw rate output displayed on display.	Is the reading indicated on monitor display -4 — 4 deg/s?	Go to step 4.	Replace the yaw rate & G sensor. <Ref. to VDC-18, Yaw Rate and G Sensor.>
<b>4 CHECK OUTPUT OF STEERING ANGLE SENSOR WITH SUBARU SELECT MONITOR.</b> 1) Drive the vehicle on a flat road. 2) Park the vehicle straight. 3) Select {Current Data Display & Save} in Subaru Select Monitor. <Ref. to VDC(diag)-19, READ CURRENT DATA, OPERATION, Subaru Select Monitor.> 4) Read the steering angle sensor output displayed on display.	Is the reading indicated on monitor display -5 — 5°?	Go to step 5.	Calibrate the steering angle sensor. <Ref. to VDC-11, ADJUSTMENT, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>
<b>5 CHECK YAW RATE &amp; G SENSOR.</b> 1) Turn the ignition switch to OFF. 2) Connect all connectors. 3) Clear the memory. <Ref. to VDC(diag)-26, OPERATION, Clear Memory Mode.> 4) Perform the Inspection Mode. <Ref. to VDC(diag)-25, PROCEDURE, Inspection Mode.> 5) Read the DTC. <Ref. to VDC(diag)-24, OPERATION, Read Diagnostic Trouble Code (DTC).>	Is the same DTC displayed?	Go to step 6.	Go to step 7.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)

Step	Check	Yes	No
<b>6</b> <b>CHECK VDCCM&amp;H/U.</b> 1) Turn the ignition switch to OFF. 2) Replace the yaw rate & G sensor. <Ref. to VDC-18, Yaw Rate and G Sensor.> 3) Clear the memory. <Ref. to VDC(diag)-26, OPERATION, Clear Memory Mode.> 4) Perform the Inspection Mode. <Ref. to VDC(diag)-25, PROCEDURE, Inspection Mode.> 5) Read the DTC. <Ref. to VDC(diag)-24, OPERATION, Read Diagnostic Trouble Code (DTC).>	Is the same DTC displayed?	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>	Go to step <b>8</b> .
<b>7</b> <b>CHECK OTHER DTC DETECTION.</b>	Is any other DTC displayed?	Perform the diagnosis according to DTC. <Ref. to VDC(diag)-41, List of Diagnostic Trouble Code (DTC).>	Temporary poor contact occurs.
<b>8</b> <b>CHECK OTHER DTC DETECTION.</b>	Is any other DTC displayed?	Perform the diagnosis according to DTC. <Ref. to VDC(diag)-41, List of Diagnostic Trouble Code (DTC).>	Malfunction is found in original yaw rate & G sensor.

## AW:DTC C0056 G SENSOR INTERNAL PROBLEM MALFUNCTION

### NOTE:

For the diagnostic procedure, refer to "DTC C0072 YAW RATE SENSOR INTERNAL PROBLEM MALFUNCTION". <Ref. to VDC(diag)-88, DTC C0072 YAW RATE SENSOR INTERNAL PROBLEM MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

## Diagnostic Procedure with Diagnostic Trouble Code (DTC)

VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)

### AX:DTC C0072 YAW RATE SENSOR INTERNAL PROBLEM MALFUNCTION

#### DTC DETECTING CONDITION:

Defective yaw rate & G sensor

#### TROUBLE SYMPTOM:

- ABS does not operate.
- VDC does not operate.

	Step	Check	Yes	No
1	<b>CHECK YAW RATE &amp; G SENSOR.</b> 1) Clear the memory. <Ref. to VDC(diag)-26, OPERATION, Clear Memory Mode.> 2) Perform the Inspection Mode. <Ref. to VDC(diag)-25, PROCEDURE, Inspection Mode.> 3) Read the DTC. <Ref. to VDC(diag)-24, OPERATION, Read Diagnostic Trouble Code (DTC).>	Is the same DTC displayed?	Replace the yaw rate & G sensor. <Ref. to VDC-18, Yaw Rate and G Sensor.>	Go to step 2.
2	<b>CHECK OTHER DTC DETECTION.</b>	Is any other DTC displayed?	Perform the diagnosis according to DTC. <Ref. to VDC(diag)-41, List of Diagnostic Trouble Code (DTC).>	Temporary poor contact occurs.

### AY:DTC C0056 G SENSOR COMMUNICATION MALFUNCTION

#### NOTE:

For the diagnostic procedure, refer to "DTC C0072 YAW RATE SENSOR COMMUNICATION FAILURE". <Ref. to VDC(diag)-89, DTC C0072 YAW RATE SENSOR COMMUNICATION MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)

## AZ:DTC C0072 YAW RATE SENSOR COMMUNICATION MALFUNCTION

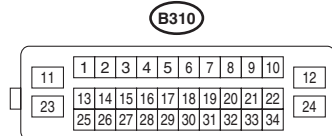
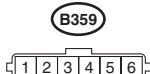
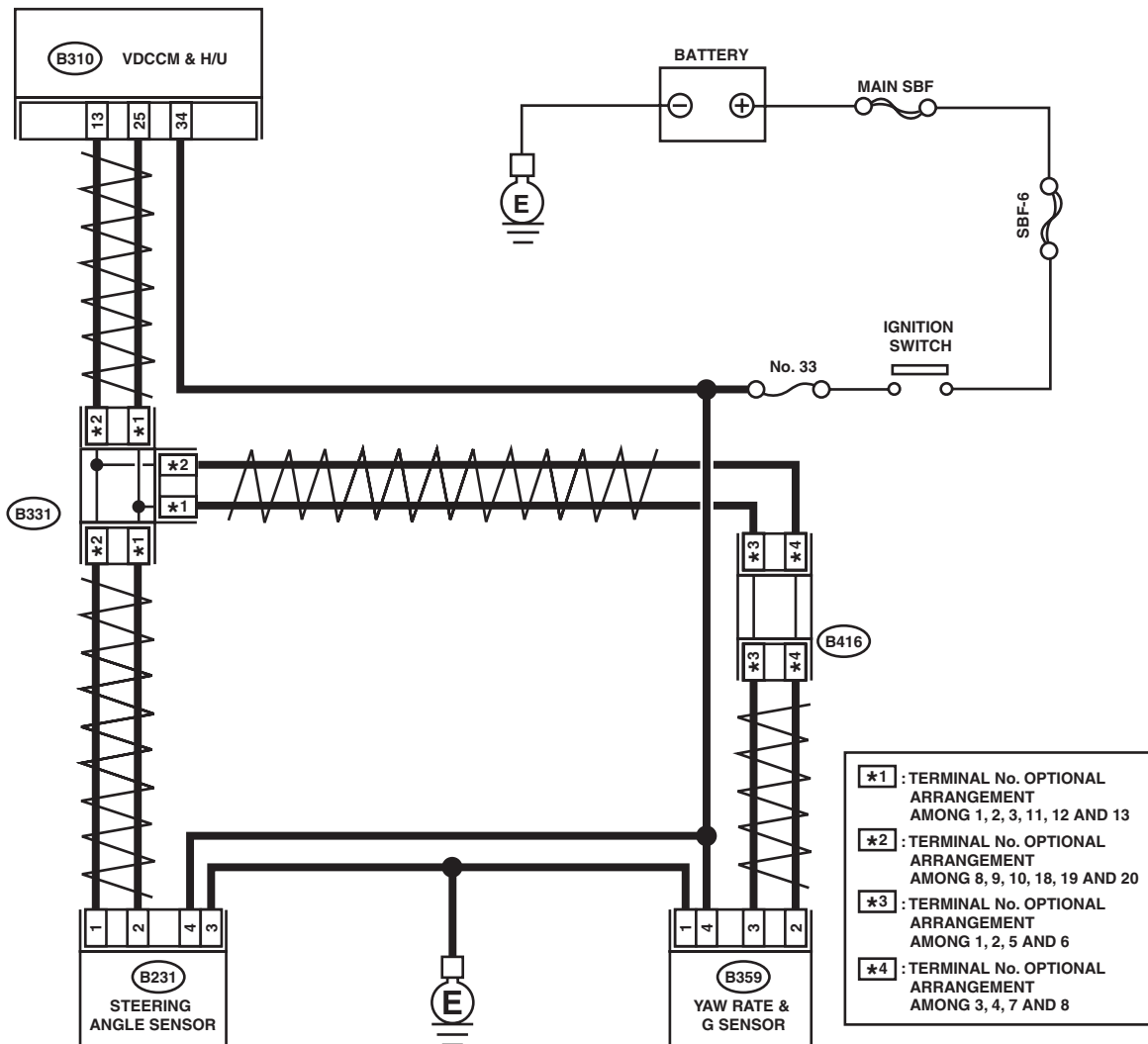
### DTC DETECTING CONDITION:

Defective yaw rate & G sensor

### TROUBLE SYMPTOM:

- ABS does not operate.
- VDC does not operate.

### WIRING DIAGRAM:



VDC00794

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)

	Step	Check	Yes	No
1	<b>CHECK LAN SYSTEM.</b> Perform the diagnosis for LAN system. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>	Is there any fault in LAN system?	Perform the diagnosis according to DTC for LAN system. <Ref. to LAN(diag)-31, List of Diagnostic Trouble Code (DTC).>	Go to step 2.
2	<b>CHECK POWER SUPPLY OF YAW RATE &amp; G SENSOR.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connector from yaw rate & G sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between yaw rate & G sensor and chassis ground. <b>Connector &amp; terminal</b> <b>(B359) No. 4 (+) — Chassis ground (-):</b>	Is the voltage 10 — 15 V?	Go to step 3.	Replace the yaw rate & lateral G sensor power supply circuit.
3	<b>CHECK YAW RATE &amp; G SENSOR GROUND CIRCUIT.</b> 1) Turn the ignition switch to OFF. 2) Measure the resistance between yaw rate & lateral G sensor connector and chassis ground. <b>Connector &amp; terminal</b> <b>(B359) No. 1 — Chassis ground:</b>	Is the resistance less than 10 $\Omega$ ?	Go to step 4.	Repair the yaw rate & G sensor ground circuit.
4	<b>CHECK POOR CONTACT OF YAW RATE &amp; G SENSOR CONNECTOR.</b>	Is there poor contact of connector?	Repair or replace the yaw rate & G sensor connector.	Go to step 5.
5	<b>CHECK YAW RATE &amp; G SENSOR.</b> 1) Turn the ignition switch to OFF. 2) Connect all connectors. 3) Clear the memory. <Ref. to VDC(diag)-26, OPERATION, Clear Memory Mode.> 4) Perform the Inspection Mode. <Ref. to VDC(diag)-25, PROCEDURE, Inspection Mode.> 5) Read the DTC. <Ref. to VDC(diag)-24, OPERATION, Read Diagnostic Trouble Code (DTC).>	Is the same DTC displayed?	Replace the yaw rate & G sensor. <Ref. to VDC-18, Yaw Rate and G Sensor.>	Go to step 6.
6	<b>CHECK OTHER DTC DETECTION.</b>	Is any other DTC displayed?	Perform the diagnosis according to DTC. <Ref. to VDC(diag)-41, List of Diagnostic Trouble Code (DTC).>	Temporary poor contact occurs.

### BA:DTC C0074 PRESSURE SENSOR SIGNAL FREEZE

#### NOTE:

For the diagnostic procedure, refer to “DTC C0074 PRESSURE SENSOR OPEN CIRCUIT”. <Ref. to VDC(diag)-91, DTC C0074 PRESSURE SENSOR OPEN CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

### BB:DTC C0074 PRESSURE SENSOR OUTPUT RISE

#### NOTE:

For the diagnostic procedure, refer to “DTC C0074 PRESSURE SENSOR OPEN CIRCUIT”. <Ref. to VDC(diag)-91, DTC C0074 PRESSURE SENSOR OPEN CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)

## BC:DTC C0074 PRESSURE SENSOR OPEN CIRCUIT

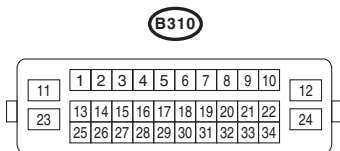
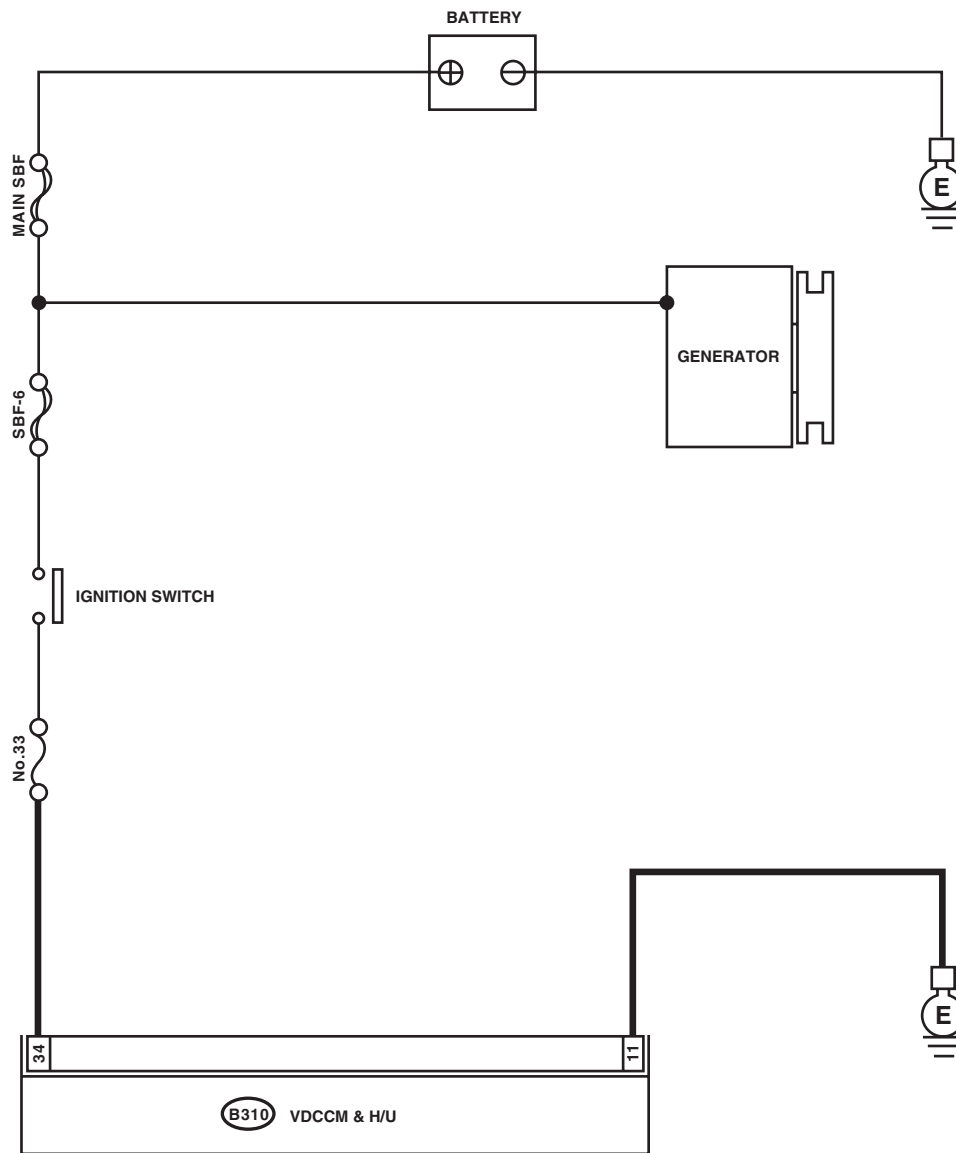
### DTC DETECTING CONDITION:

Defective pressure sensor

### TROUBLE SYMPTOM:

- ABS does not operate.
- VDC does not operate.

### WIRING DIAGRAM:



VDC00624

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)

Step	Check	Yes	No
<b>1 CHECK VDCCM&amp;H/U POWER VOLTAGE.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connector from the VDCCM&H/U. 3) Turn the ignition switch to ON. 4) Measure the voltage between VDCCM&H/U connector and chassis ground. <b>Connector &amp; terminal</b> <b>(B310) No. 34 (+) — Chassis ground (-):</b>	Is the voltage 10 — 15 V?	Go to step 2.	Repair the power supply circuit.
<b>2 CHECK VDCCM&amp;H/U GROUND CIRCUIT.</b> 1) Turn the ignition switch to OFF. 2) Measure the resistance between VDCCM&H/U connector and chassis ground. <b>Connector &amp; terminal</b> <b>(B310) No. 11 — Chassis ground:</b>	Is the resistance less than 10 $\Omega$ ?	Go to step 3.	Repair the VDCCM&H/U ground harness.
<b>3 CHECK PRESSURE SENSOR.</b> 1) Connect the Subaru Select Monitor to the vehicle. 2) Select "Current Data Display & Save" in the Subaru Select Monitor. <Ref. to VDC(diag)-19, READ CURRENT DATA, OPERATION, Subaru Select Monitor.> 3) Depress the brake pedal. 4) Read the pressure sensor output using the Subaru Select Monitor.	Do the values on the monitor display change when the pedal is depressed?	Go to step 4.	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>
<b>4 CHECK VDCCM&amp;H/U.</b> 1) Connect all connectors. 2) Clear the memory. <Ref. to VDC(diag)-26, OPERATION, Clear Memory Mode.> 3) Perform the Inspection Mode. <Ref. to VDC(diag)-25, PROCEDURE, Inspection Mode.> 4) Read the DTC. <Ref. to VDC(diag)-24, OPERATION, Read Diagnostic Trouble Code (DTC).>	Is the same DTC displayed?	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>	Go to step 5.
<b>5 CHECK OTHER DTC DETECTION.</b>	Is any other DTC displayed?	Perform the diagnosis according to DTC. <Ref. to VDC(diag)-41, List of Diagnostic Trouble Code (DTC).>	Temporary poor contact occurs.



# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)

## BD:DTC C0074 PRESSURE SENSOR 0 POINT

### DTC DETECTING CONDITION:

Defective pressure sensor

### TROUBLE SYMPTOM:

- ABS does not operate.
- VDC does not operate.

Step	Check	Yes	No
<b>1 CHECK OUTPUT OF STOP LIGHT SWITCH WITH SUBARU SELECT MONITOR.</b> 1) Select "Current Data Display & Save" in the Subaru Select Monitor. <Ref. to VDC(diag)-19, READ CURRENT DATA, OPERATION, Subaru Select Monitor.> 2) Release the brake pedal. 3) Read the stop light switch output in Subaru Select Monitor.	Is OFF displayed on the display screen?	Go to step 2.	Go to step 3.
<b>2 CHECK OUTPUT OF STOP LIGHT SWITCH WITH SUBARU SELECT MONITOR.</b> 1) Depress the brake pedal. 2) Read the stop light switch output in Subaru Select Monitor.	Is ON displayed on the display screen?	Go to step 4.	Go to step 3.
<b>3 CHECK IF STOP LIGHTS ILLUMINATE.</b> Depress the brake pedal.	Does the stop light illuminate?	Go to step 4.	Repair the stop light circuit.
<b>4 CHECK PRESSURE SENSOR.</b> 1) Depress the brake pedal. 2) Read the pressure sensor output in the Subaru Select Monitor.	Do the output values on the monitor display change as the pedal is depressed?	Go to step 5.	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>
<b>5 CHECK VDCCM&amp;H/U.</b> 1) Connect all connectors. 2) Clear the memory. <Ref. to VDC(diag)-26, OPERATION, Clear Memory Mode.> 3) Perform the Inspection Mode. <Ref. to VDC(diag)-25, PROCEDURE, Inspection Mode.> 4) Read the DTC. <Ref. to VDC(diag)-24, OPERATION, Read Diagnostic Trouble Code (DTC).>	Is the same DTC displayed?	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>	Go to step 6.
<b>6 CHECK OTHER DTC DETECTION.</b>	Is any other DTC displayed?	Perform the diagnosis according to DTC. <Ref. to VDC(diag)-41, List of Diagnostic Trouble Code (DTC).>	Temporary poor contact occurs.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)

## BE:DTC C0074 PRESSURE SENSOR NOISE

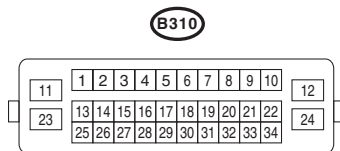
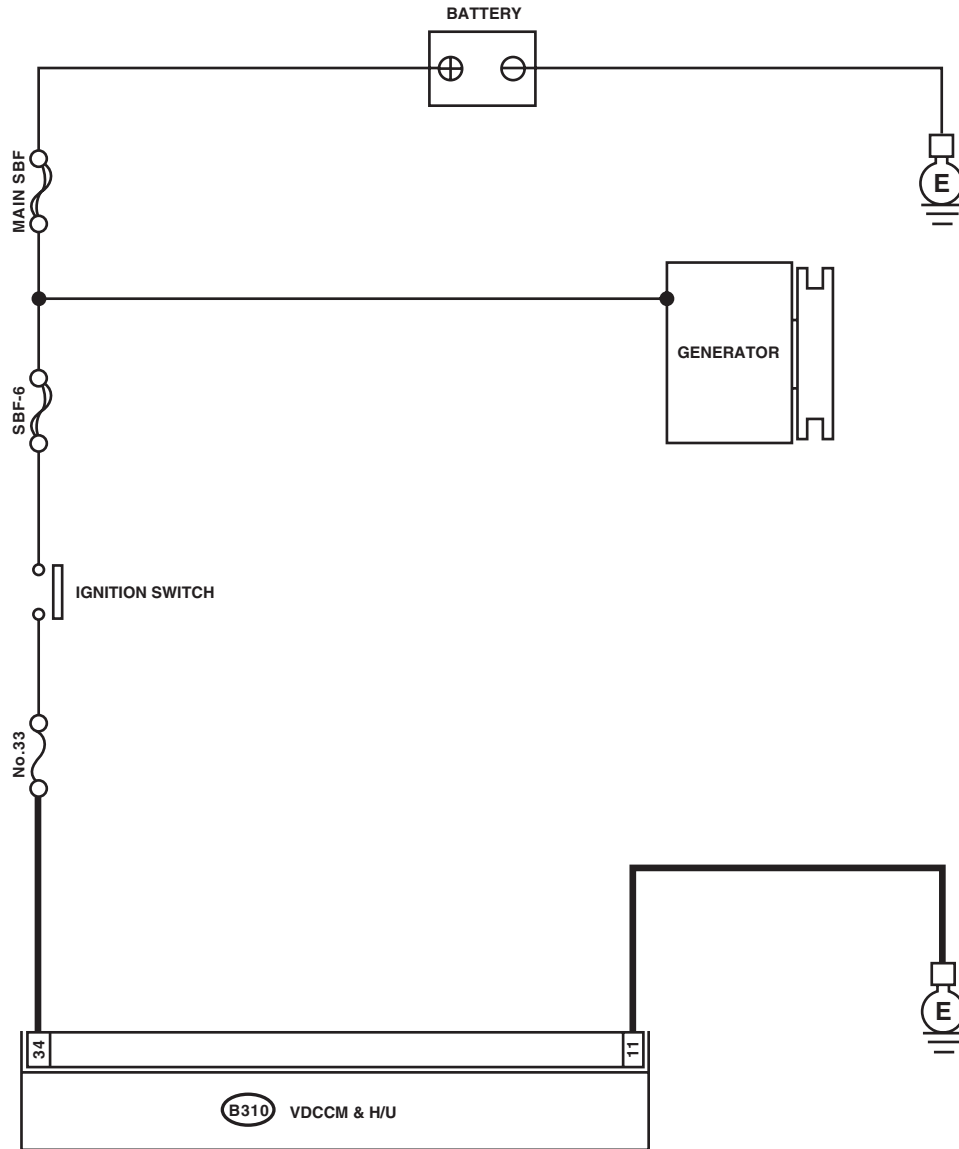
### DTC DETECTING CONDITION:

Defective pressure sensor

### TROUBLE SYMPTOM:

- ABS does not operate.
- VDC does not operate.

### WIRING DIAGRAM:



VDC00624

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)

	Step	Check	Yes	No
1	<b>CHECK VDCCM&amp;H/U POWER VOLTAGE.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connector from the VDCCM&H/U. 3) Turn the ignition switch to ON. 4) Measure the voltage between VDCCM&H/U connector and chassis ground. <b>Connector &amp; terminal</b> <b>(B310) No. 34 (+) — Chassis ground (-):</b>	Is the voltage 10 — 15 V?	Go to step 2.	Repair the power supply circuit.
2	<b>CHECK VDCCM&amp;H/U GROUND CIRCUIT.</b> 1) Turn the ignition switch to OFF. 2) Measure the resistance between VDCCM&H/U connector and chassis ground. <b>Connector &amp; terminal</b> <b>(B310) No. 11 — Chassis ground:</b>	Is the resistance less than 10 $\Omega$ ?	Go to step 3.	Repair the VDCCM&H/U ground harness.
3	<b>CHECK CAUSE OF SIGNAL NOISE.</b> Check if noise sources (such as an antenna) are installed near the VDCCM&H/U.	Is there a source of noise installed nearby?	Install the noise sources away from the VDCCM&H/U.	Go to step 4.
4	<b>CHECK PRESSURE SENSOR.</b> 1) Select {Current Data Display & Save} in Subaru Select Monitor. <Ref. to VDC(diag)-19, READ CURRENT DATA, OPERATION, Subaru Select Monitor.> 2) Depress the brake pedal. 3) Read the pressure sensor output using the Subaru Select Monitor.	Do the output values on the monitor display change as the pedal is depressed?	Go to step 5.	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>
5	<b>CHECK VDCCM&amp;H/U.</b> 1) Connect all connectors. 2) Clear the memory. <Ref. to VDC(diag)-26, OPERATION, Clear Memory Mode.> 3) Perform the Inspection Mode. <Ref. to VDC(diag)-25, PROCEDURE, Inspection Mode.> 4) Read the DTC. <Ref. to VDC(diag)-24, OPERATION, Read Diagnostic Trouble Code (DTC).>	Is the same DTC displayed?	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>	Go to step 6.
6	<b>CHECK OTHER DTC DETECTION.</b>	Is any other DTC displayed?	Perform the diagnosis according to DTC. <Ref. to VDC(diag)-41, List of Diagnostic Trouble Code (DTC).>	Temporary poor contact occurs.

# General Diagnostic Table

VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)

## 13. General Diagnostic Table

### A: INSPECTION

Symptoms		Main probable cause	Other probable cause
Poor brake performance	Long braking/stopping distance	<ul style="list-style-type: none"> <li>• VDCCM&amp;H/U</li> <li>• Brake pad</li> <li>• Aeration to brake line</li> <li>• Tire specifications, tire wear and air pressures</li> <li>• Incorrect wiring or piping connections</li> </ul>	<ul style="list-style-type: none"> <li>• Defective ABS wheel speed sensor or sensor gap</li> <li>• Defective steering angle sensor or improper neutral position</li> <li>• Defective yaw rate &amp; G sensor or improper installation</li> <li>• Master cylinder</li> <li>• Brake caliper</li> <li>• Disc rotor</li> <li>• Brake pipe</li> <li>• Brake booster</li> </ul>
	Wheel lock	<ul style="list-style-type: none"> <li>• VDCCM&amp;H/U</li> <li>• Defective ABS wheel speed sensor or sensor gap</li> <li>• Incorrect wiring or piping connections</li> </ul>	<ul style="list-style-type: none"> <li>• Defective steering angle sensor or improper neutral position</li> <li>• Defective yaw rate &amp; G sensor or improper installation</li> <li>• Brake caliper</li> <li>• Brake pipe</li> </ul>
	Brake drag	<ul style="list-style-type: none"> <li>• VDCCM&amp;H/U</li> <li>• Defective ABS wheel speed sensor or sensor gap</li> <li>• Master cylinder</li> <li>• Brake caliper</li> <li>• Parking brake</li> <li>• Axle and wheels</li> <li>• Brake pedal play</li> </ul>	<ul style="list-style-type: none"> <li>• Defective steering angle sensor or improper neutral position</li> <li>• Defective yaw rate &amp; G sensor or improper installation</li> <li>• Brake pad</li> <li>• Brake pipe</li> </ul>
	Long brake pedal stroke	<ul style="list-style-type: none"> <li>• Aeration to brake line</li> <li>• Brake pedal play</li> </ul>	<ul style="list-style-type: none"> <li>• VDCCM&amp;H/U</li> <li>• Master cylinder</li> <li>• Brake caliper</li> <li>• Brake pad</li> <li>• Brake pipe</li> <li>• Brake booster</li> </ul>
	Vehicle vertical pitching	<ul style="list-style-type: none"> <li>• VDCCM&amp;H/U</li> <li>• Road surface (uneven)</li> <li>• Suspension play or fatigue (reduced damping)</li> <li>• Incorrect wiring or piping connections</li> </ul>	<ul style="list-style-type: none"> <li>• Defective ABS wheel speed sensor or sensor gap</li> <li>• Defective steering angle sensor or improper neutral position</li> <li>• Defective yaw rate &amp; G sensor or improper installation</li> </ul>
Poor brake performance	Unstable or uneven braking	<ul style="list-style-type: none"> <li>• VDCCM&amp;H/U</li> <li>• Defective ABS wheel speed sensor or sensor gap</li> <li>• Brake caliper</li> <li>• Brake pad</li> <li>• Road surface (uneven)</li> <li>• Tire specifications, tire wear and air pressures</li> <li>• Incorrect wiring or piping connections</li> </ul>	<ul style="list-style-type: none"> <li>• Defective ABS wheel speed sensor or sensor gap</li> <li>• Defective steering angle sensor or improper neutral position</li> <li>• Defective yaw rate &amp; G sensor or improper installation</li> <li>• Master cylinder</li> <li>• Disc rotor</li> <li>• Brake pipe</li> <li>• Axle and wheels</li> <li>• Road with crowns or banks</li> <li>• Suspension play or fatigue (reduced damping)</li> </ul>

# General Diagnostic Table

## VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)

Symptoms		Main probable cause	Other probable cause
Vibration or noise • When braking suddenly • When accelerating suddenly • While driving on a slippery road	Excessive brake pedal vibration	<ul style="list-style-type: none"> <li>• Road surface (uneven)</li> <li>• Incorrect wiring or piping connections</li> </ul>	<ul style="list-style-type: none"> <li>• VDCCM&amp;H/U</li> <li>• Brake booster</li> <li>• Suspension play or fatigue (reduced damping)</li> </ul>
	Noise from VDCH/U	<ul style="list-style-type: none"> <li>• VDCCM&amp;H/U (mount bushing)</li> <li>• Defective ABS wheel speed sensor or sensor gap</li> <li>• Brake pipe</li> </ul>	<ul style="list-style-type: none"> <li>• VDCCM&amp;H/U</li> <li>• Defective steering angle sensor or improper neutral position</li> <li>• Defective yaw rate &amp; G sensor or improper installation</li> </ul>
	Noise from the front side of vehicle	<ul style="list-style-type: none"> <li>• VDCCM&amp;H/U (mount bushing)</li> <li>• Defective ABS wheel speed sensor or sensor gap</li> <li>• Master cylinder</li> <li>• Brake caliper</li> <li>• Brake pad</li> <li>• Disc rotor</li> <li>• Brake pipe</li> <li>• Brake booster</li> <li>• Suspension play or fatigue (reduced damping)</li> </ul>	<ul style="list-style-type: none"> <li>• Axle and wheels</li> <li>• Tire specifications, tire wear and air pressures</li> </ul>
	Noise inside passenger seat		<ul style="list-style-type: none"> <li>• VDCCM&amp;H/U</li> <li>• Defective steering angle sensor or improper neutral position</li> <li>• Defective yaw rate &amp; G sensor or improper installation</li> </ul>
	Noise from the rear side of vehicle	<ul style="list-style-type: none"> <li>• Defective ABS wheel speed sensor or sensor gap</li> <li>• Brake caliper</li> <li>• Brake pad</li> <li>• Disc rotor</li> <li>• Parking brake</li> <li>• Brake pipe</li> <li>• Suspension play or fatigue (reduced damping)</li> </ul>	<ul style="list-style-type: none"> <li>• Axle and wheels</li> <li>• Tire specifications, tire wear and air pressures</li> </ul>
Engine does not accelerate or goes into a stall when accelerating suddenly or driving on a slippery surface.	<ul style="list-style-type: none"> <li>• VDCCM&amp;H/U</li> <li>• Defective ABS wheel speed sensor or sensor gap</li> <li>• Master cylinder</li> <li>• Brake caliper</li> <li>• Parking brake</li> <li>• Incorrect wiring or piping</li> </ul>	<ul style="list-style-type: none"> <li>• Defective steering angle sensor or improper neutral position</li> <li>• Defective yaw rate &amp; G sensor or improper installation</li> <li>• Brake pad</li> <li>• Brake pipe</li> </ul>	

# General Diagnostic Table

## VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)

Symptoms		Main probable cause	Other probable cause
Poor change-direction-operation stability of TCS	Deviation to right or left direction	<ul style="list-style-type: none"> <li>• VDCCM&amp;H/U</li> <li>• Defective ABS wheel speed sensor or sensor gap</li> <li>• Defective steering angle sensor or improper neutral position</li> <li>• Defective yaw rate &amp; G sensor or improper installation</li> <li>• Brake caliper</li> <li>• Brake pad</li> <li>• Wheel alignment</li> <li>• Road surface (uneven)</li> <li>• Road with crowns or banks</li> <li>• Tire specifications, tire wear and air pressures</li> <li>• Incorrect wiring or piping connections</li> </ul>	<ul style="list-style-type: none"> <li>• Disc rotor</li> <li>• Brake pipe</li> <li>• Axle and wheels</li> <li>• Suspension play or fatigue (reduced damping)</li> </ul>
	Vehicle spin	<ul style="list-style-type: none"> <li>• VDCCM&amp;H/U</li> <li>• Defective ABS wheel speed sensor or sensor gap</li> <li>• Defective steering angle sensor or improper neutral position</li> <li>• Defective yaw rate &amp; G sensor or improper installation</li> <li>• Brake pad</li> <li>• Tire specifications, tire wear and air pressures</li> <li>• Incorrect wiring or piping connections</li> </ul>	<ul style="list-style-type: none"> <li>• Brake caliper</li> <li>• Brake pipe</li> </ul>
Steering wheel drag while driving		<ul style="list-style-type: none"> <li>• VDCCM&amp;H/U</li> <li>• Defective ABS wheel speed sensor or sensor gap</li> <li>• Defective steering angle sensor or improper neutral position</li> <li>• Defective yaw rate &amp; G sensor or improper installation</li> <li>• Incorrect wiring or piping connections</li> <li>• Power steering system</li> </ul>	<ul style="list-style-type: none"> <li>• Brake caliper</li> <li>• Brake pad</li> <li>• Disc rotor</li> <li>• Wheel alignment</li> <li>• Road surface (uneven)</li> <li>• Road with crowns or banks</li> <li>• Suspension play or fatigue (reduced damping)</li> <li>• Tire specifications, tire wear and air pressures</li> </ul>
VDC operates while driving normally.		<ul style="list-style-type: none"> <li>• VDCCM&amp;H/U</li> <li>• Defective ABS wheel speed sensor or sensor gap</li> <li>• Defective steering angle sensor or improper neutral position</li> <li>• Defective yaw rate &amp; G sensor or improper installation</li> <li>• Wheel alignment</li> <li>• Road surface (uneven)</li> <li>• Road with crowns or banks</li> <li>• Suspension play or fatigue (reduced damping)</li> <li>• Tire specifications, tire wear and air pressures</li> <li>• Incorrect wiring or piping connections</li> <li>• Power steering system</li> </ul>	

# General Diagnostic Table

## VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)

Symptoms	Main probable cause	Other probable cause
<p>TCS OFF indicator light does not come on when the TCS OFF switch is depressed.</p> <p>NOTE: When pressing the TCS OFF switch for 10 seconds or more, the TCS OFF indicator light turns off and operation cannot be continued. When turning the ignition switch from OFF to ON, the previous status is restored.</p>	<ul style="list-style-type: none"><li>• Harness</li><li>• Combination meter</li><li>• TCS OFF switch</li></ul>	

# General Diagnostic Table

VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)

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# BRAKE

# BR

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# General Description

## BRAKE

### 1. General Description

#### A: SPECIFICATION

Front disc brake	Type		Disc (Floating type, ventilated)
	Effective disc diameter	mm (in)	261 (10.28)
	Disc thickness × Diameter	mm (in)	30 × 316 (1.18 × 12.44)
	Effective cylinder diameter		42.8 (1.685) × 2
	Pad dimensions (Length × Width × Thickness)	mm (in)	130.0 × 53.5 × 11.0 (5.118 × 2.106 × 0.433)
	Clearance adjustment		Automatic adjustment
Rear disc brake	Type		Disc (Floating type, ventilated)
	Effective disc diameter	mm (in)	284.5 (11.2)
	Disc thickness × Diameter	mm (in)	18 × 320 (0.71 × 12.59)
	Effective cylinder diameter	mm (in)	40.46 (1.592)
	Pad dimensions (Length × Width × Thickness)	mm (in)	95.5 × 34.8 × 11.0 (3.759 × 1.370 × 0.433)
	Clearance adjustment		Automatic adjustment
Master cylinder	Type		Tandem
	Effective diameter	mm (in)	23.8 (15/16)
	Reservoir type		Sealed type
	Brake fluid reservoir capacity	cm <sup>3</sup> (cu in)	285 (17.39)
Brake booster	Type		Vacuum suspended
	Effective diameter	mm (in)	238 + 261 (9.37 + 10.28)
Brake line			Dual circuit system
Brake fluid <b>CAUTION:</b> <ul style="list-style-type: none"> <li>• Avoid mixing brake fluid of different brands to prevent fluid performance from degrading.</li> <li>• When filling with brake fluid, be careful not to allow any dust to enter the reservoir.</li> <li>• Use new SUBARU genuine brake fluid when replacing or refilling the fluid.</li> </ul>			FMVSS No. 116, DOT3, or DOT4

# General Description

BRAKE

**NOTE:**

Refer to "PB" section for parking brake specifications. <Ref. to PB-2, SPECIFICATION, General Description.>

Item		Standard	Limit
Front brake	Pad thickness mm (in)	11 (0.43)	1.5 (0.059)
	Disc thickness mm (in)	30 (1.18)	28 (1.10)
	Disc runout mm (in)	—	0.05 (0.0020)
Rear brake (disc type)	Pad thickness mm (in)	11.0 (0.433)	1.5 (0.059)
	Disc thickness mm (in)	18 (0.71)	16 (0.63)
	Disc runout mm (in)	—	0.05 (0.0020)
Parking brake	Inside diameter mm (in)	210 (8.27)	211 (8.31)
	Lining thickness mm (in)	4.0 (0.157)	1.5 (0.059)
	Pedal stroke	5 to 6 notches/300 N (30 kgf, 67.5 lb)	

		Brake pedal force N (kgf, lb)	Fluid pressure kPa (kgf/cm <sup>2</sup> , psi)
Brake booster	Brake fluid pressure with engine stopped	147 (15, 33)	590 (6, 86)
		294 (30, 66)	1,654 (17, 240)
	Brake fluid pressure with engine running and vacuum pressure at 66.7 kPa (500 mmHg, 19.69 inHg)	147 (15, 33)	8,539 (87, 1,238)
		294 (30, 66)	15,373 (157, 2,229)

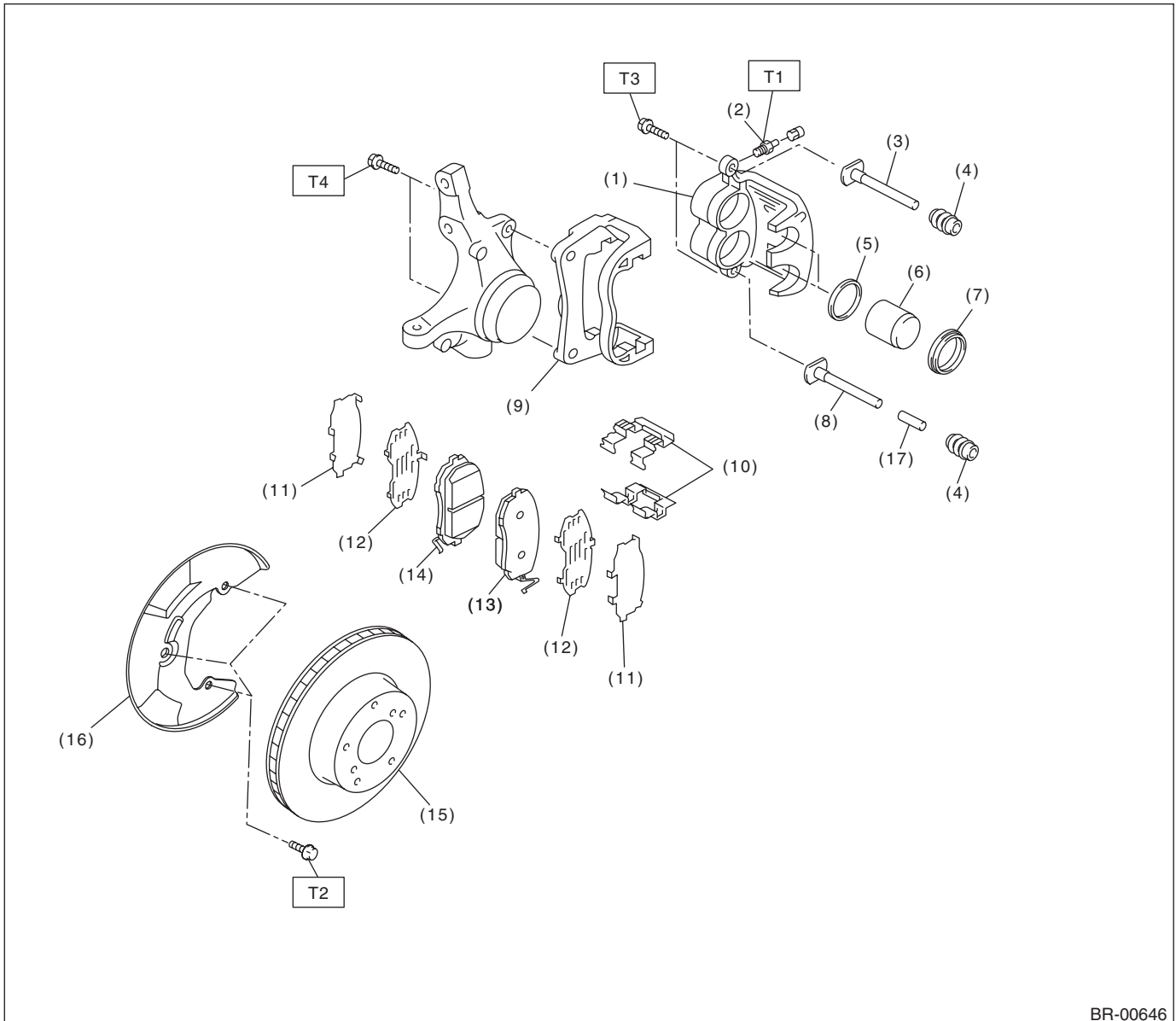
Brake pedal	Free play mm (in)	0.5 — 2 (0.02 — 0.08) [When pulling the brake pedal upward with a force of less than 10 N (1 kgf, 2 lb)]
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# General Description

BRAKE

## B: COMPONENT

### 1. FRONT DISC BRAKE



BR-00646

- (1) Caliper body
- (2) Air bleeder screw
- (3) Guide pin (gray)
- (4) Pin boot
- (5) Piston seal
- (6) Piston
- (7) Piston boot
- (8) Lock pin (silver)

- (9) Support
- (10) Pad clip
- (11) Outer shim
- (12) Inner shim
- (13) Pad (outside)
- (14) Pad (inside)
- (15) Disc rotor

- (16) Disc cover
- (17) Bushing

**Tightening torque: N-m (kgf-m, ft-lb)**

**T1: 8 (0.8, 5.8)**

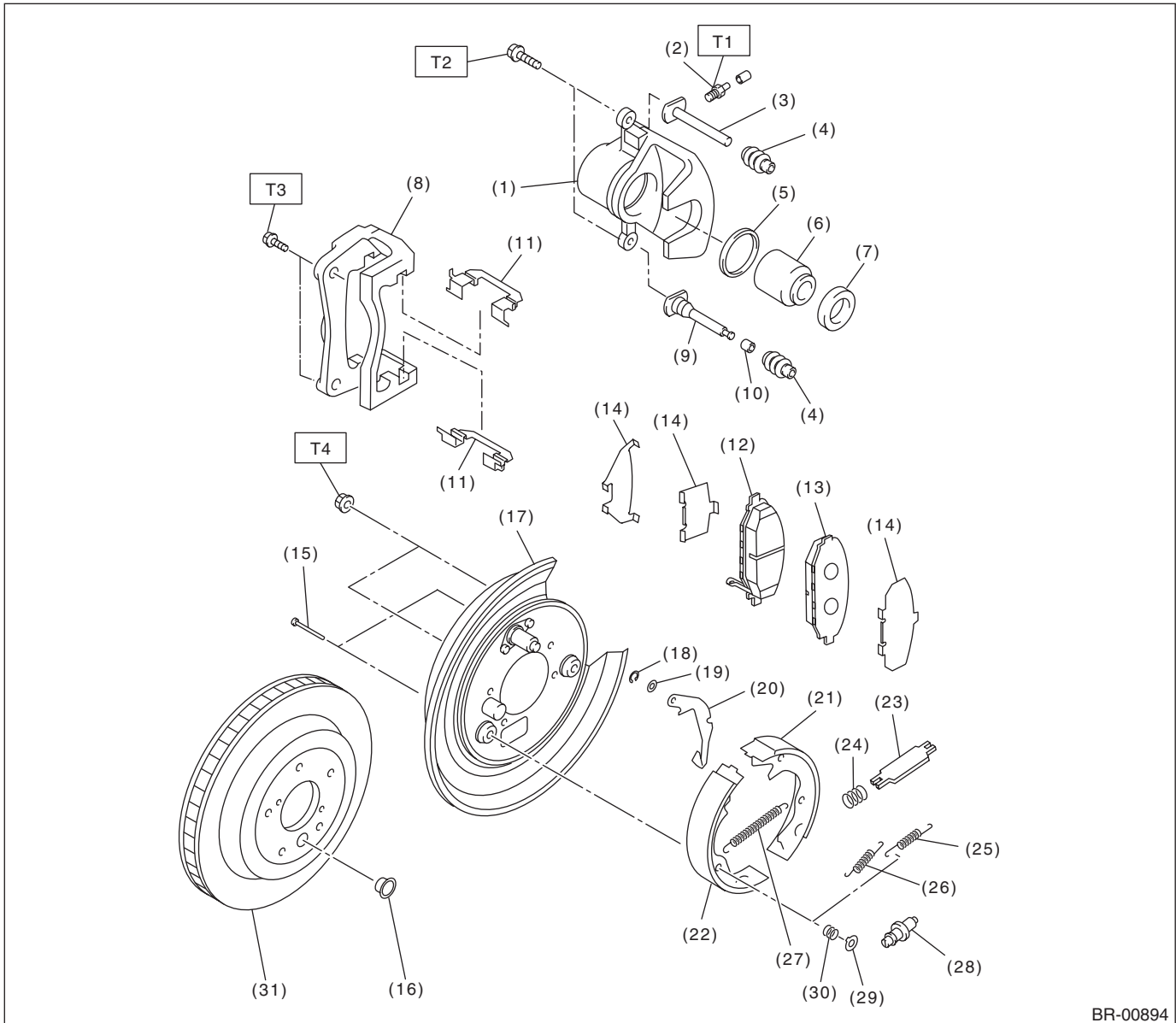
**T2: 18 (1.8, 13.3)**

**T3: 27 (2.8, 19.9)**

**T4: 120 (12.2, 88.5)**

# General Description

## 2. REAR DISC BRAKE



- |                       |                                     |                        |
|-----------------------|-------------------------------------|------------------------|
| (1) Caliper body      | (14) Shim                           | (27) Adjusting spring  |
| (2) Air bleeder screw | (15) Shoe hold pin                  | (28) Adjuster          |
| (3) Guide pin (gray)  | (16) Cover                          | (29) Brake shoe cup    |
| (4) Pin boot          | (17) Back plate                     | (30) Brake shoe spring |
| (5) Piston seal       | (18) Retainer                       | (31) Disc rotor        |
| (6) Piston            | (19) Spring washer                  |                        |
| (7) Piston boot       | (20) Parking brake lever            |                        |
| (8) Support           | (21) Parking brake shoe (secondary) |                        |
| (9) Lock pin (silver) | (22) Parking brake shoe (primary)   |                        |
| (10) Bushing          | (23) Strut                          |                        |
| (11) Pad clip         | (24) Strut shoe spring              |                        |
| (12) Inner pad        | (25) Secondary shoe return spring   |                        |
| (13) Outer pad        | (26) Primary shoe return spring     |                        |

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**Tightening torque: N·m (kgf·m, ft·lb)**

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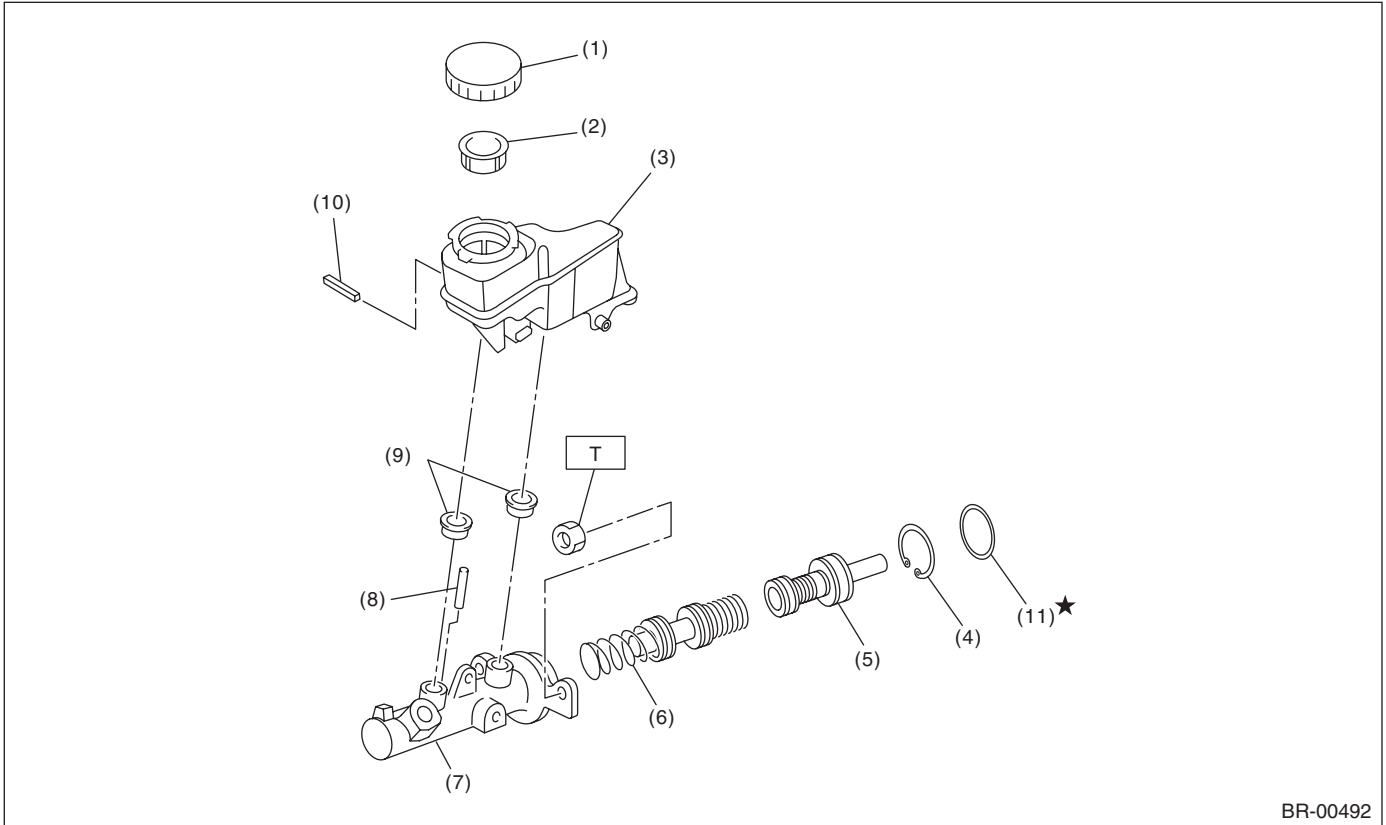
**T1: 8 (0.8, 5.8)****T2: 27 (2.8, 19.9)****T3: 66 (6.7, 48.7)****T4: 75 (7.6, 55.3)**

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# General Description

## BRAKE

### 3. MASTER CYLINDER



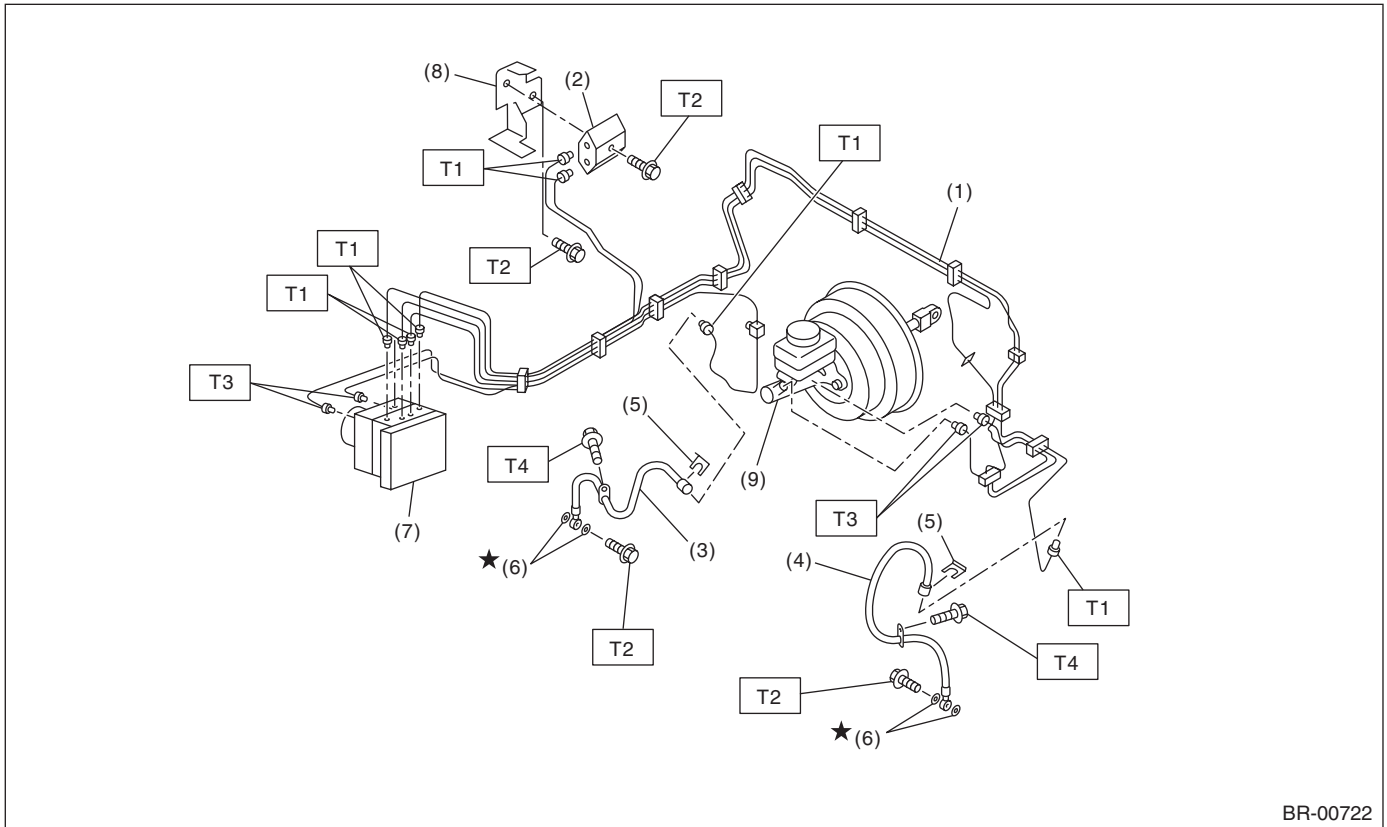
BR-00492

- |                    |                      |             |
|--------------------|----------------------|-------------|
| (1) Cap            | (6) Secondary piston | (11) O-ring |
| (2) Filter         | (7) Cylinder body    |             |
| (3) Reservoir tank | (8) Cylinder pin     |             |
| (4) C-ring         | (9) Seal             |             |
| (5) Primary piston | (10) Pin             |             |

**Tightening torque: N·m (kgf-m, ft-lb)**

**T: 25 (2.5, 18.4)**

## 4. FRONT BRAKE PIPES AND HOSES



BR-00722

- |                           |   |
|---------------------------|---|
| (1) Front brake pipe ASSY | (6) Gasket  |
| (2) Two-way connector     | (7) VDC control module & hydraulic control unit (VDCCM&H/U) |
| (3) Front brake hose RH   | (8) Bracket   |
| (4) Front brake hose LH   | (9) Master cylinder   |
| (5) Clamp                 |   |

**Tightening torque: N·m (kgf·m, ft·lb)**

**T1: 15 (1.5, 10.8)**

**T2: 18 (1.8, 13.3)**

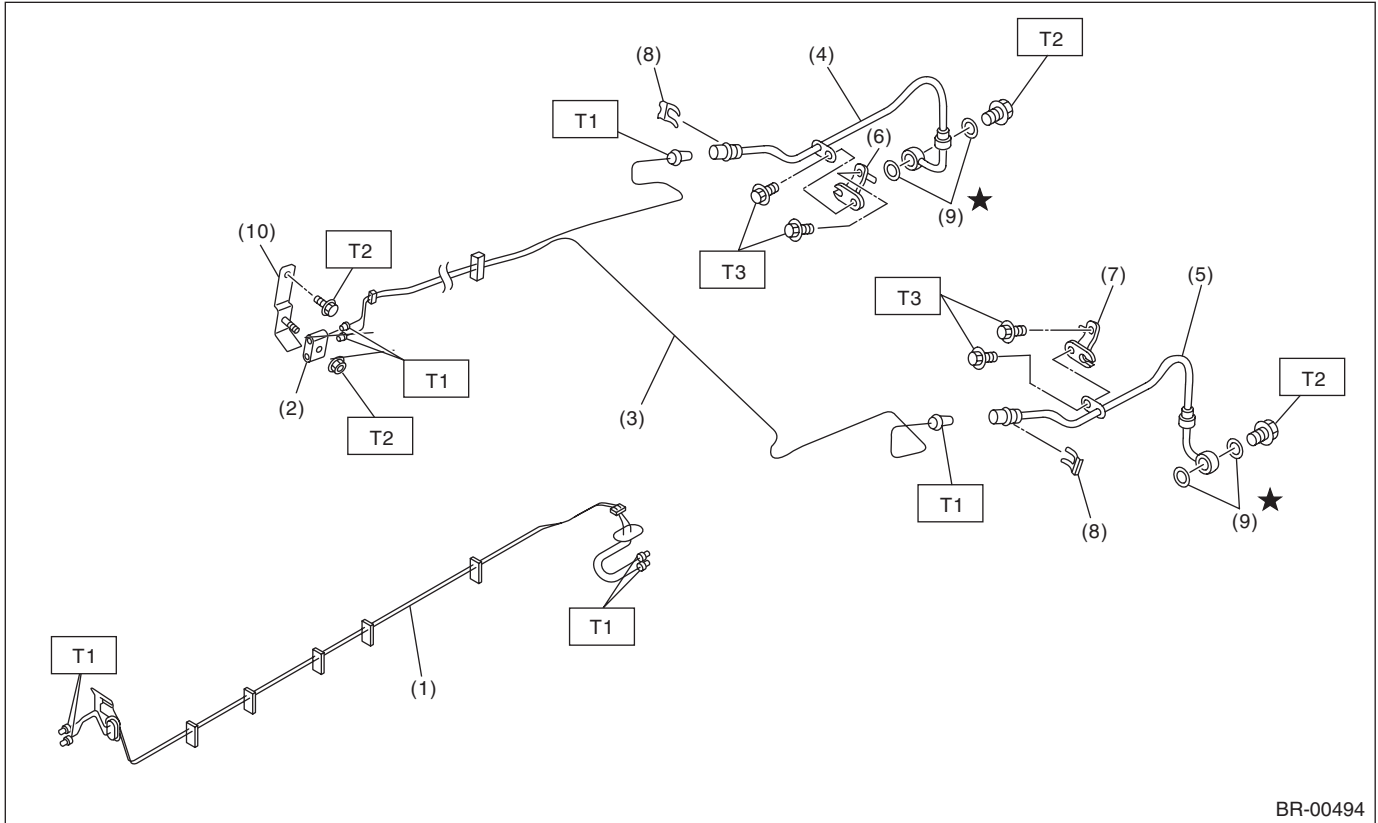
**T3: 19 (1.9, 14.0)**

**T4: 33 (3.4, 24.3)**

# General Description

## BRAKE

### 5. CENTER AND REAR BRAKE PIPES AND HOSES



BR-00494

- |                            |                                |
|----------------------------|--------------------------------|
| (1) Center brake pipe ASSY | (6) Rear brake hose bracket RH |
| (2) Two-way connector      | (7) Rear brake hose bracket LH |
| (3) Rear brake pipe ASSY   | (8) Clamp                      |
| (4) Rear brake hose RH     | (9) Gasket                     |
| (5) Rear brake hose LH     | (10) Bracket                   |

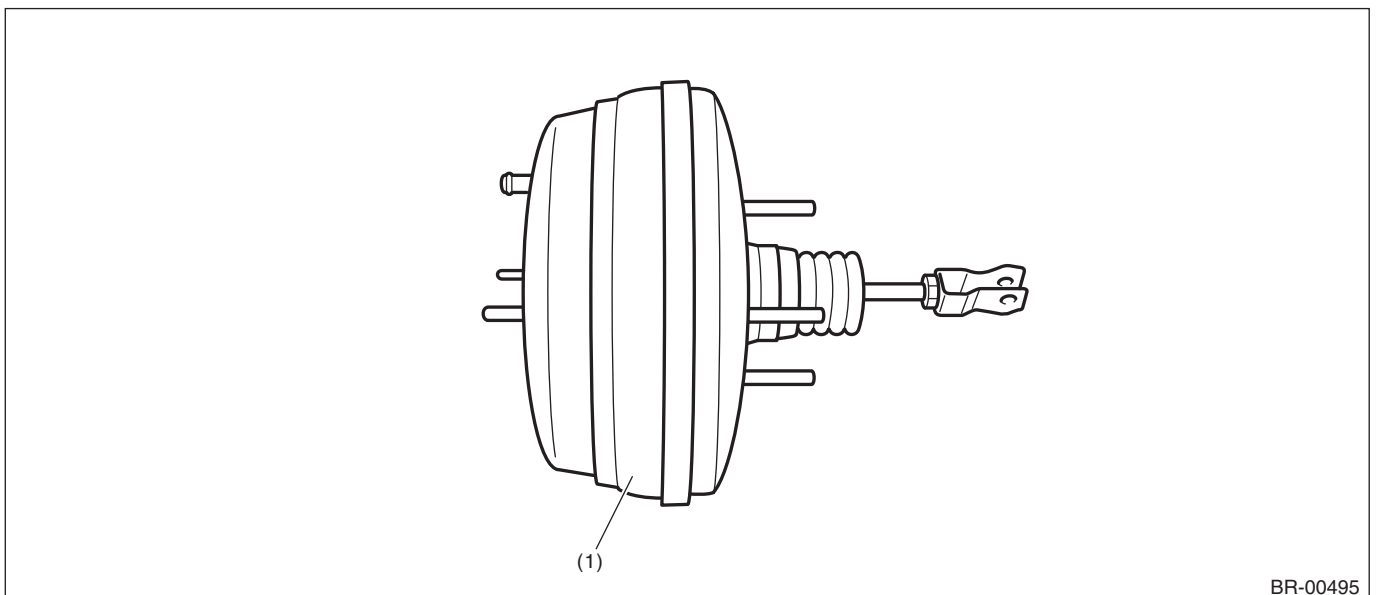
**Tightening torque: N·m (kgf·m, ft·lb)**

**T1: 15 (1.5, 10.8)**

**T2: 18 (1.8, 13.3)**

**T3: 33 (3.4, 24.3)**

### 6. BRAKE BOOSTER

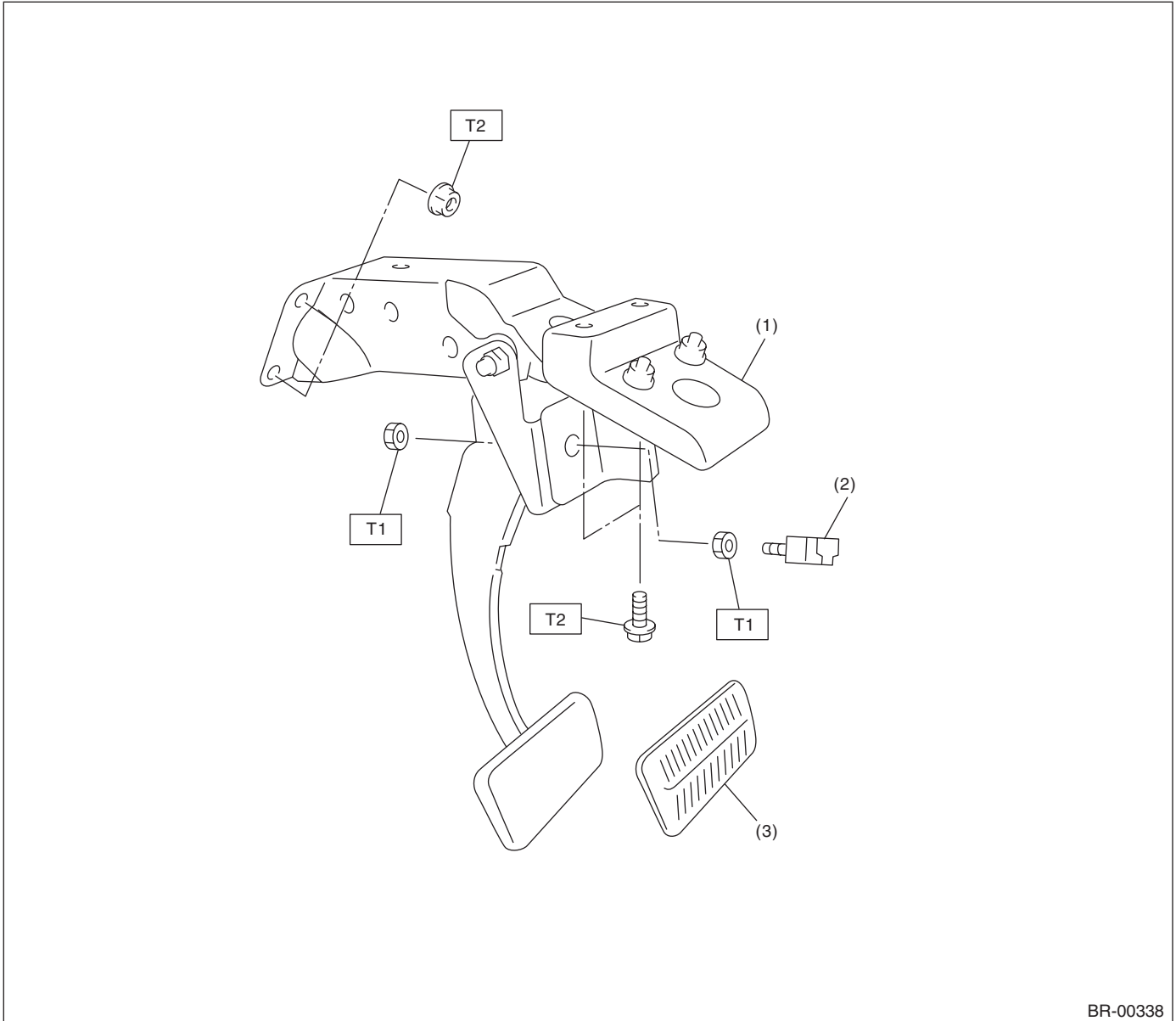


BR-00495

- (1) Brake booster



## 7. BRAKE PEDAL



BR-00338

- (1) Brake pedal ASSY
- (2) Stop light switch
- (3) Brake pedal pad

**Tightening torque: N·m (kgf-m, ft-lb)**

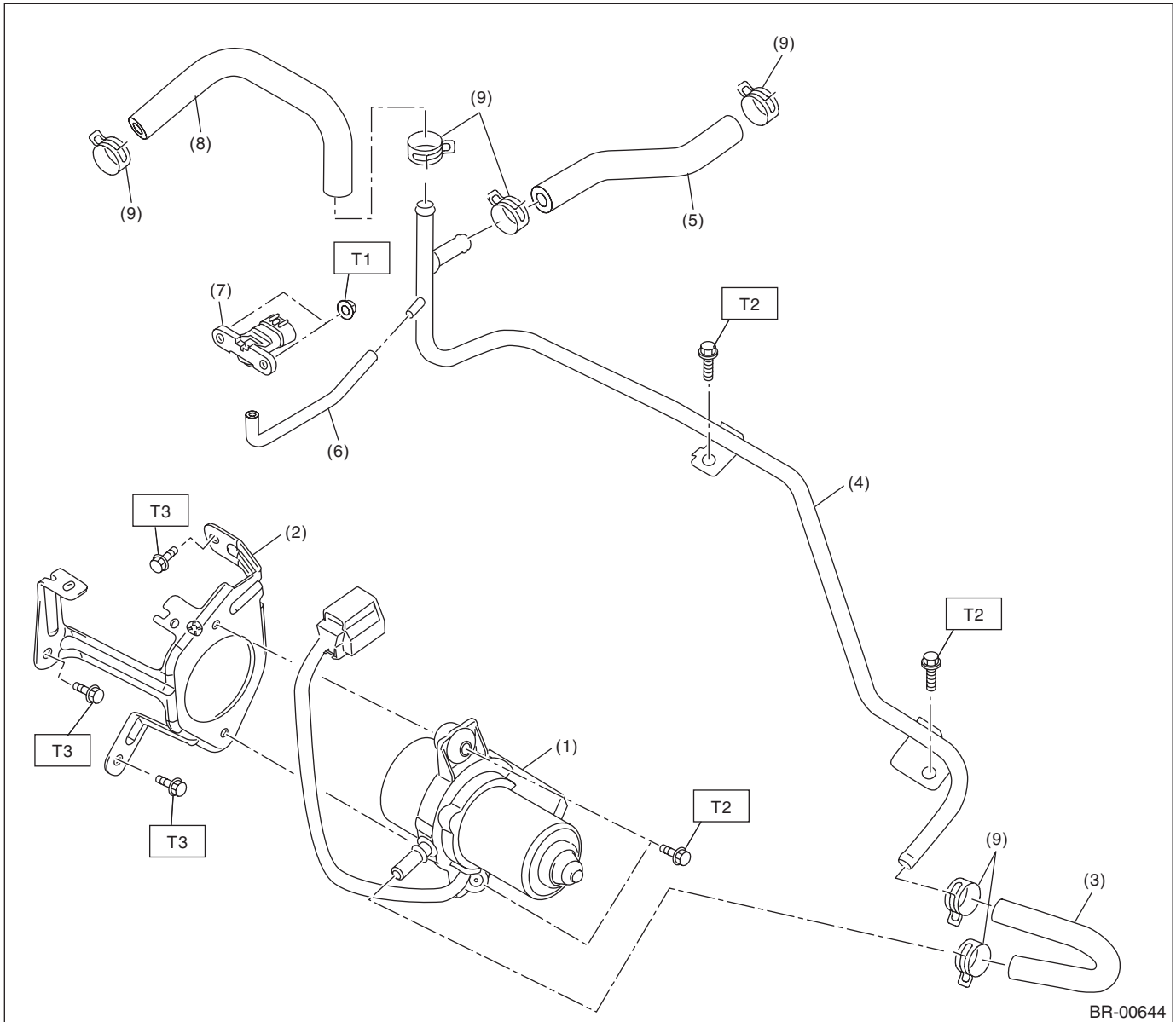
**T1: 8 (0.8, 5.8)**

**T2: 18 (1.8, 13.3)**

# General Description

## BRAKE

### 8. BRAKE VACUUM PUMP



- |                               |                                 |
|-------------------------------|---------------------------------|
| (1) Vacuum pump               | (6) Vacuum hose (vacuum sensor) |
| (2) Vacuum pump bracket       | (7) Vacuum sensor               |
| (3) Vacuum hose (vacuum pump) | (8) Vacuum hose (brake booster) |
| (4) Vacuum pipe               | (9) Hose clamp                  |
| (5) Vacuum hose (engine)      |                                 |

**Tightening torque: N-m (kgf-m, ft-lb)**

**T1: 5 (0.5, 3.7)**

**T2: 7.5 (0.76, 5.5)**

**T3: 25 (2.5, 18.4)**

## C: CAUTION

Please understand and adhere to the following general precautions. They must be strictly followed to avoid any injury to the person performing the work or persons in the area.

### 1. OPERATION

- Wear appropriate work clothing, including a cap, protective goggles and protective shoes when performing any work.
- Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
- Use SUBARU genuine grease etc. or equivalent. Do not mix grease etc. of different grades or manufacturers.
- Before securing a part in a vise, place cushioning material such as wood blocks, aluminum plate or cloth between the part and the vise.
- Be sure to tighten fasteners including bolts and nuts to the specified torque.
- Place shop jacks or rigid racks at the specified points.

### 2. OIL

When handling oil, follow the rules below to prevent unexpected accidents.

- Prepare container and waste cloths when performing work which oil could possibly spill. If oil spills, wipe it off immediately to prevent from penetrating into floor or flowing outside, for environmental protection.
- Follow all government and local regulations concerning waste disposal.

### 3. BRAKE FLUID

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.

Follow all government and local regulations concerning waste disposal.

## D: PREPARATION TOOL

### 1. GENERAL TOOL

TOOL NAME	REMARKS
Snap ring pliers	Used for removing and installing snap rings.

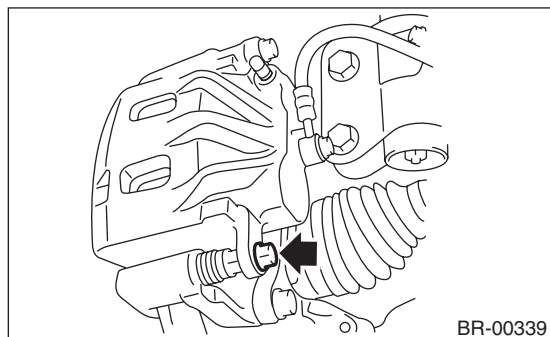
# Front Brake Pad

BRAKE

## 2. Front Brake Pad

### A: REMOVAL

- 1) Lift up the vehicle, and remove the front wheels.
- 2) Remove the caliper bolt.

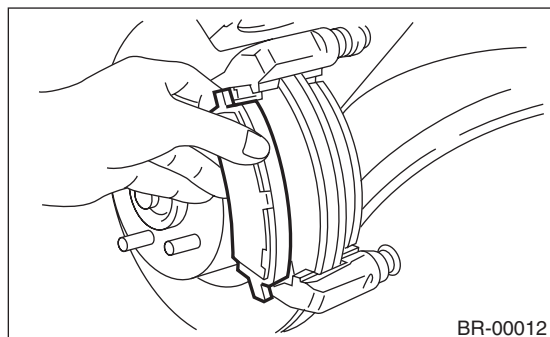


- 3) Raise the caliper body and support it.

#### NOTE:

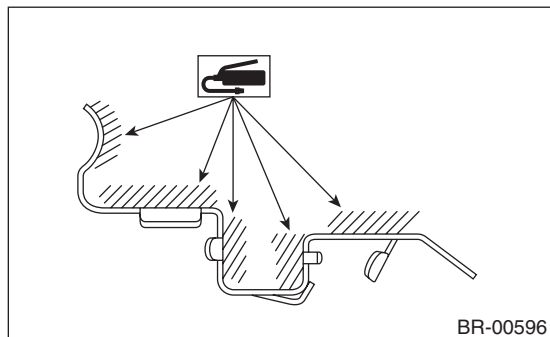
Do not disconnect the brake hose from the caliper body.

- 4) Remove the pad.

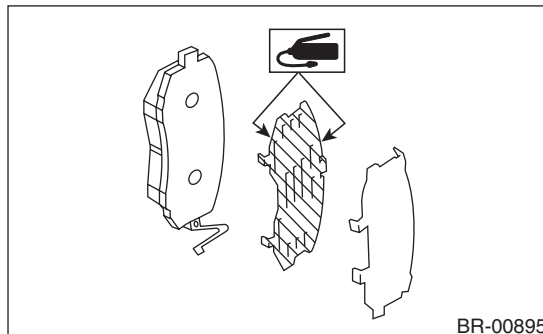


### B: INSTALLATION

- 1) Apply a thin coat of Molykote M7439 (Part No. K0770YA000) or grease contained in the pad kit to the pad clip.



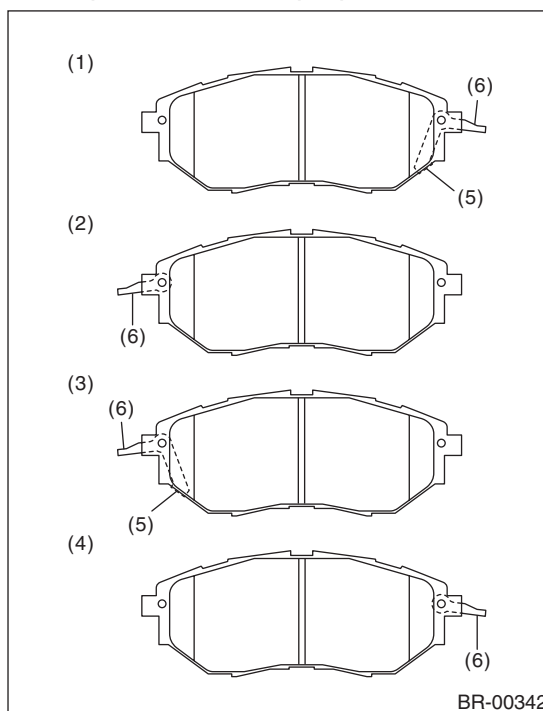
- 2) Apply a thin coat of Molykote AS880N (Part No. K0777YA010) or grease contained in the pad kit to both surfaces of the pad and inner shim.



- 3) Install the pad to support.

#### NOTE:

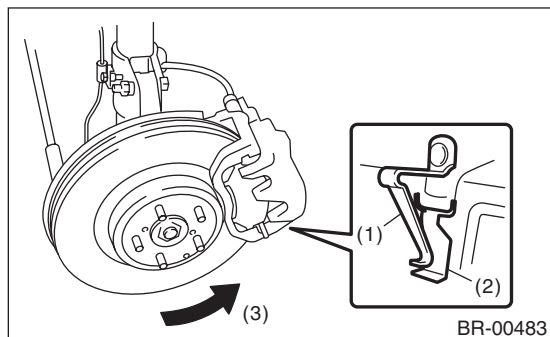
Install the pad indicator in proper direction.



- (1) LH — IN
- (2) LH — OUT
- (3) RH — IN
- (4) RH — OUT
- (5) Pad indicator
- (6) Pad return spring

**CAUTION:**

- Be sure to install so that the pad return spring faces the input side of the direction of brake rotor rotation, as shown in the figure.
- Correctly install the pad return spring to the supporting surface of the pad clip as shown in the figure.
- If the pad return spring is deformed or damaged, replace the brake pad.



- (1) Pad return spring
- (2) Supporting surface of pad clip
- (3) Direction of brake rotor rotation

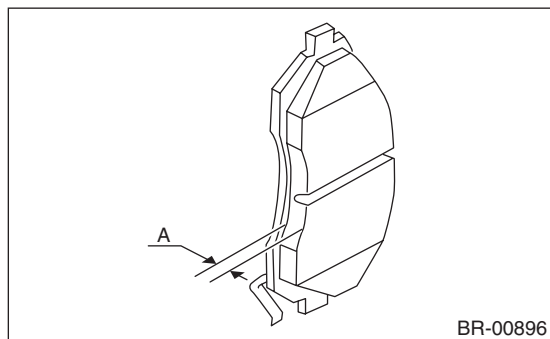
4) Install the caliper body to the support.

**Tightening torque:**

**27 N·m (2.8 kgf·m, 19.9 ft·lb)**

**C: INSPECTION**

Check the pad thickness A.



Pad thickness mm (in)	Standard	11 (0.433)
	Wear limit	1.5 (0.059)

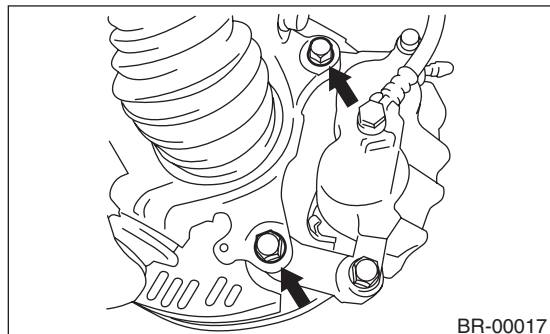
**NOTE:**

- Always replace the pads of both wheels and both sides as a set.
- Replace pad clips if they are twisted or worn.
- A wear indicator is installed on the inner disc brake pad. If the pad is worn to the limit, the end of wear indicator contacts disc rotor, and a squeaking sound is heard as the wheel rotates. If the sound is heard, replace the pad.
- Replace the pad if there is oil or grease on it.

## 3. Front Disc Rotor

### A: REMOVAL

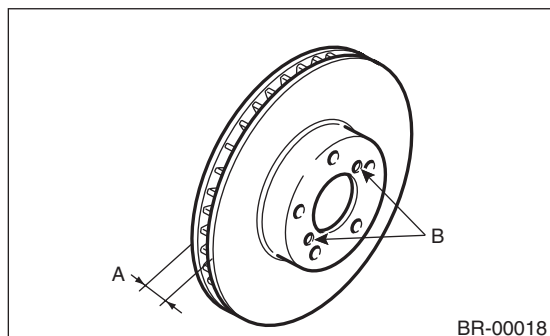
- 1) Lift up the vehicle, and remove the front wheels.
- 2) Remove the caliper body and the support from housing, and suspend it from the strut using a wire.



- 3) Remove the disc rotor.

#### NOTE:

If it is difficult to remove the disc rotor from the hub, drive an 8 mm bolt into the threaded section (B) of the rotor, then remove the rotor.



- 4) Remove mud and foreign matter from the caliper body assembly and the support.

### B: INSTALLATION

- 1) Install the disc rotor.
- 2) Install the caliper body and the support to housing.

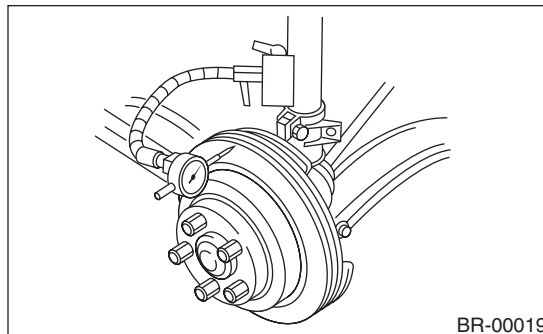
#### Tightening torque:

**120 N·m (12.2 kgf·m, 88.5 ft·lb)**

- 3) Install the front wheels.

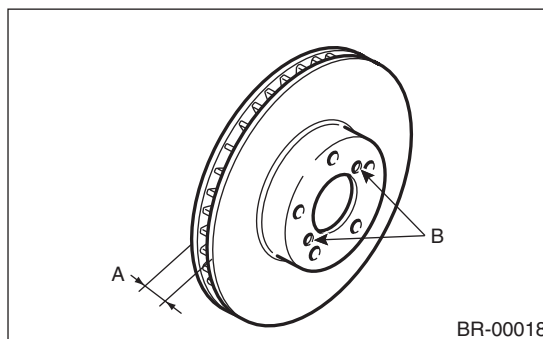
### C: INSPECTION

- 1) Check the front wheel bearing play and axle hub runout before the inspection of disc rotor runout limit. <Ref. to DS-16, INSPECTION, Front Axle.>
- 2) Secure the disc rotor by tightening the five wheel nuts.
- 3) Set a dial gauge 10 mm (0.39 in) inward from the disc rotor outer circumference. Rotate the disc rotor to check runout. If the disc rotor runout exceeds the limit, resurface the disc rotor. After resurfacing, check disc rotor thickness as in step 4).



#### Disc rotor runout limit: 0.05 mm (0.0020 in)

- 4) Set a micrometer 10 mm (0.39 in) inward from the disc rotor outer perimeter, and then measure the disc rotor thickness. If the thickness of disc rotor exceeds the service limit, replace with a new disc rotor.



	Standard	Limit	Disc rotor outer diameter
Disc rotor thickness A mm (in)	30 (1.18)	28 (1.10)	316 (12.44)

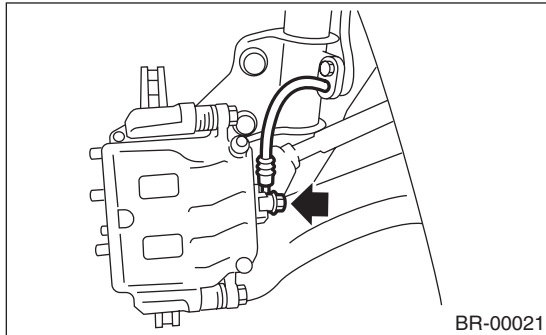
## 4. Front Disc Brake Assembly

### A: REMOVAL

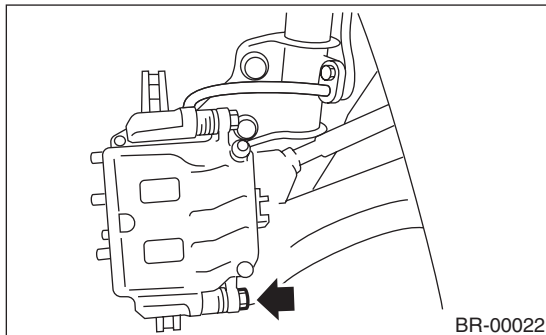
#### CAUTION:

Do not allow brake fluid to come in contact with vehicle body. If it does, wash off with water and wipe away completely.

- 1) Lift up the vehicle, and remove the front wheels.
- 2) Remove the union bolt, and disconnect the brake hose from the caliper body assembly.



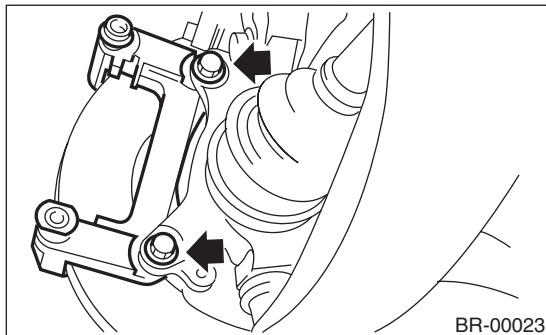
- 3) Remove the bolt securing the lock pin to caliper body.



- 4) Raise the caliper body, and then move it toward vehicle center to separate it from the support.
- 5) Remove the support from housing.

#### NOTE:

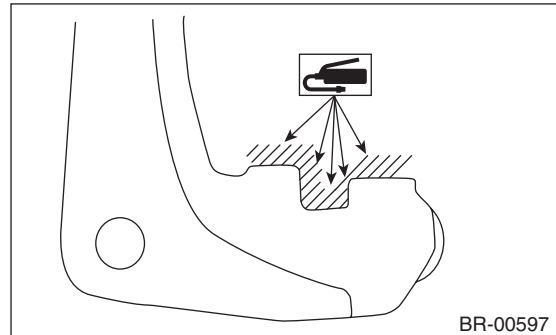
Remove the support only when replacing the rotor or support. It is not necessary to remove it when servicing the caliper body assembly.



- 6) Remove mud and foreign matter from the caliper body assembly and the support.

### B: INSTALLATION

- 1) Apply a thin coat of Molykote M7439 (Part No. K0770YA000) or grease contained in the pad kit to the support.

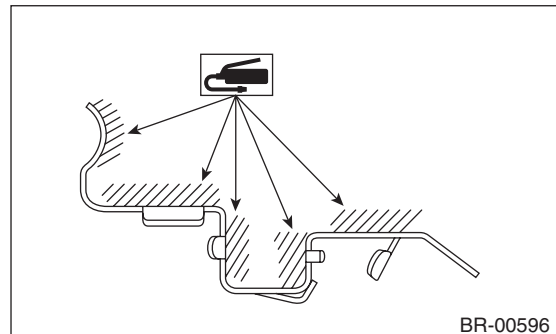


- 2) Install the support to the housing.

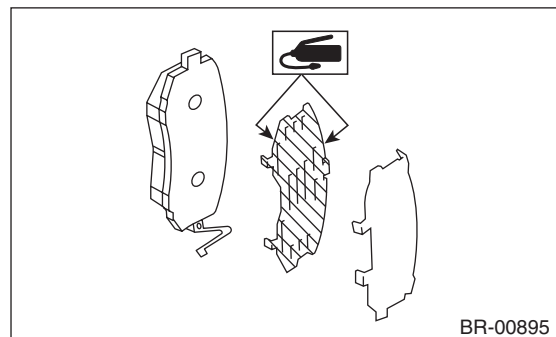
#### Tightening torque:

**120 N·m (12.2 kgf·m, 88.5 ft·lb)**

- 3) Apply a thin coat of Molykote M7439 (Part No. K0770YA000) or grease contained in the pad kit to the pad clip.



- 4) Apply a thin coat of Molykote AS880N (Part No. K0777YA010) or grease contained in the pad kit to both surfaces of the inner shim.



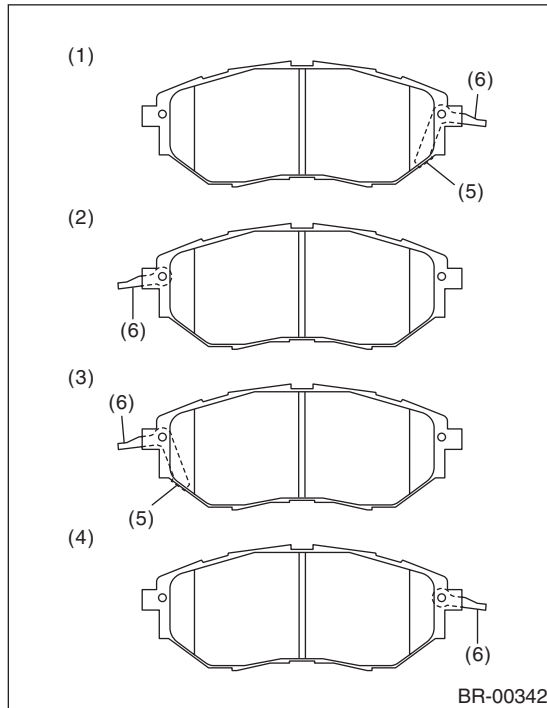
# Front Disc Brake Assembly

## BRAKE

5) Install the pad to support.

### NOTE:

Install the pad indicator in proper direction.

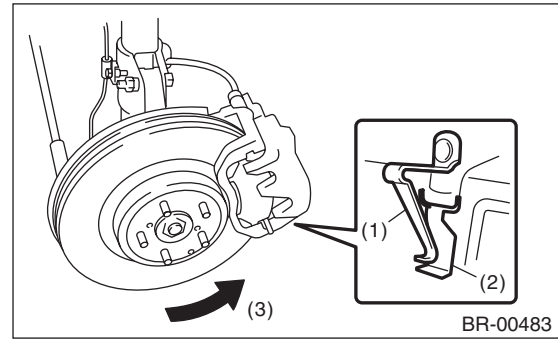


- (1) LH — IN
- (2) LH — OUT
- (3) RH — IN
- (4) RH — OUT
- (5) Pad indicator
- (6) Pad return spring

### CAUTION:

- Be sure to install so that the pad return spring faces the input side of the direction of brake rotor rotation, as shown in the figure.
- Correctly install the pad return spring to the supporting surface of the pad clip as shown in the figure.

- If the pad return spring is deformed or damaged, replace the brake pad.



- (1) Pad return spring
- (2) Supporting surface of pad clip
- (3) Direction of brake rotor rotation

6) Install the caliper body to the support.

### Tightening torque:

**27 N·m (2.8 kgf·m, 19.9 ft·lb)**

7) Connect the brake hose using a new brake hose gasket.

### Tightening torque:

**18 N·m (1.8 kgf·m, 13.3 ft·lb)**

8) Bleed air from the brake system.

## C: DISASSEMBLY

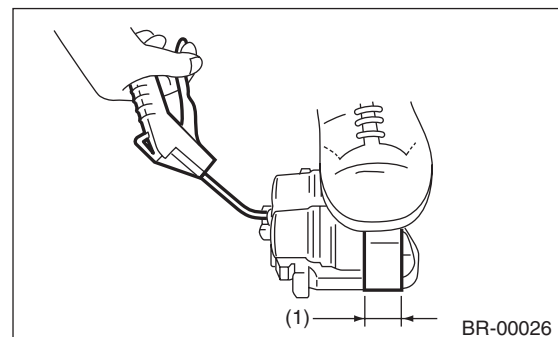
1) Remove mud and foreign matter from the caliper body assembly and the support.

### CAUTION:

**Be careful not to allow foreign matter to enter the brake hose connector.**

2) Place a wooden block in the caliper body as shown in the figure to prevent the piston from jumping out and being damaged.

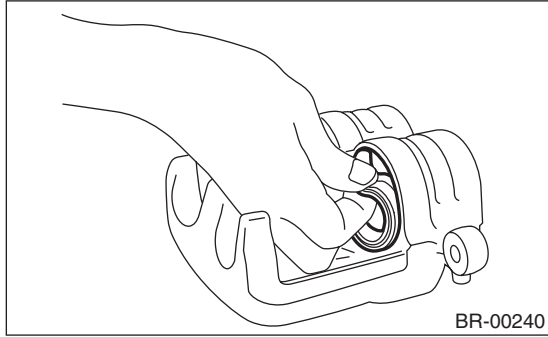
3) Gradually apply compressed air via the brake hose installation hole to push the piston out.



- (1) Place a wood block of 30 mm (1.18 in) width.

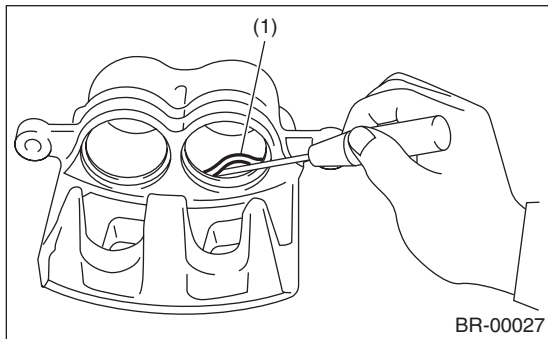


4) Remove the piston boot.



5) Remove the piston seal from caliper body cylinder.

**CAUTION:**  
Do not damage the cylinder and piston seal groove.



(1) Piston seal

6) Remove the guide pin and boot from caliper body.

## D: ASSEMBLY

1) Clean the inside of the caliper body using brake fluid.

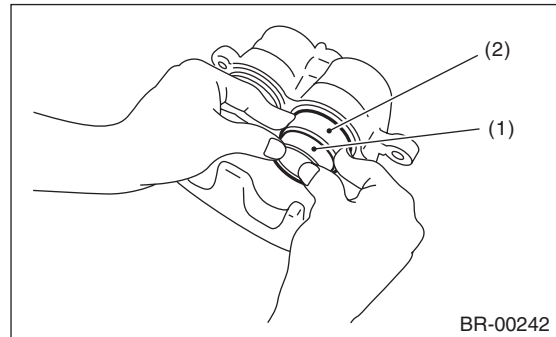
2) Apply a coat of brake fluid to piston seal and install the piston seal to the caliper body groove.

3) Apply a coat of brake fluid to the inner surface of cylinder and the entire outer surface of the piston.

4) Apply grease contained in the piston seal kit to the boot, and install it to the groove at the ends of the cylinder.

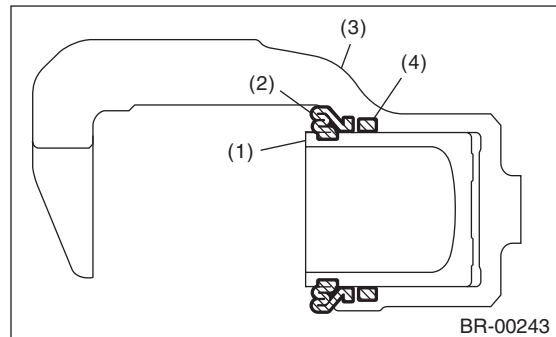
5) Insert the piston into cylinder.

**CAUTION:**  
Do not force the piston into cylinder.



(1) Piston  
(2) Piston boot

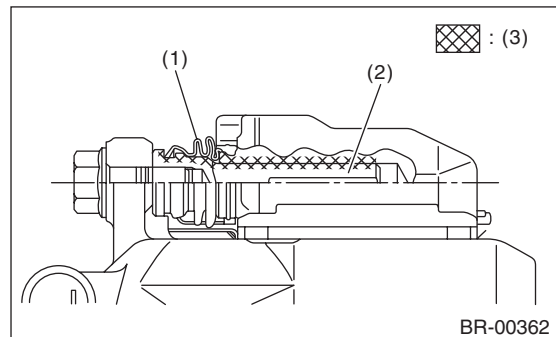
6) Position the boot in the grooves on cylinder and piston.



(1) Piston  
(2) Piston boot  
(3) Caliper body  
(4) Piston seal

7) Apply grease contained in the piston seal kit to the lock pin and guide pin outer surface, cylinder inner surface, and boot grooves.

8) Insert the lock pin and guide pin boot into the support.



(1) Pin boot  
(2) Lock pin or guide pin  
(3) Grease applied area

# Front Disc Brake Assembly

BRAKE

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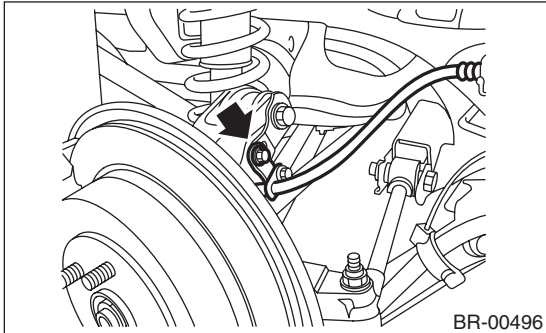
## **E: INSPECTION**

- 1) Repair or replace the faulty parts.
- 2) Check the caliper body and piston for uneven wear, damage or rust.
- 3) Check the rubber parts for damage or deterioration.

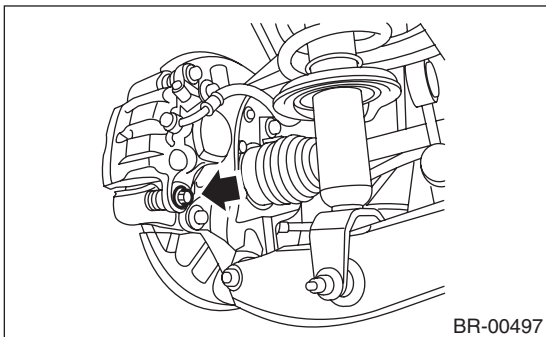
## 5. Rear Brake Pad

### A: REMOVAL

- 1) Lift up the vehicle, and then remove the rear wheels.
- 2) Remove the brake hose bracket.



- 3) Remove the caliper bolt.

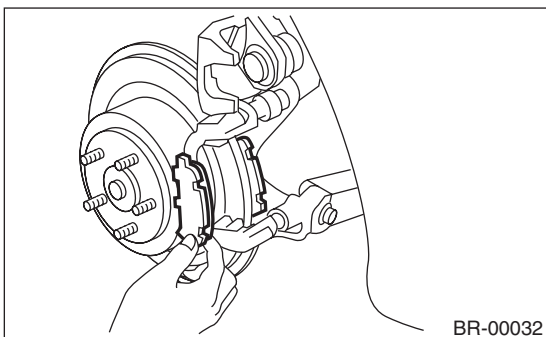


- 4) Raise the caliper body and support it.

#### NOTE:

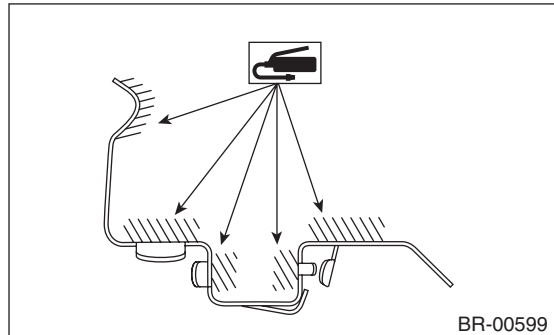
Do not disconnect the brake hose from the caliper body.

- 5) Remove the pad.

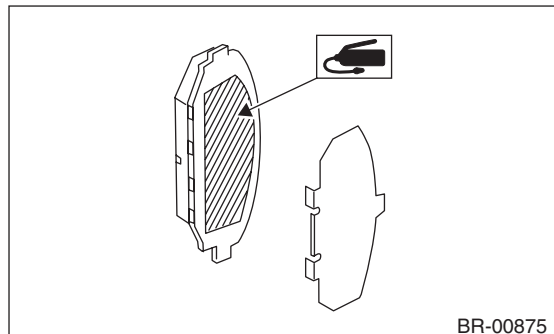


### B: INSTALLATION

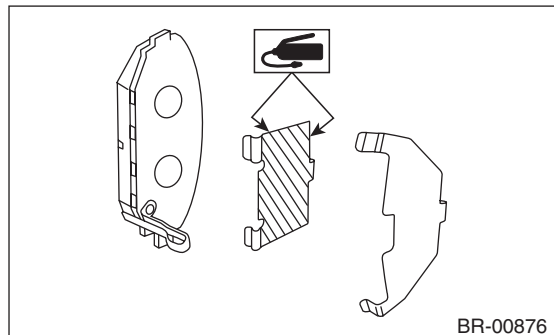
- 1) Apply a thin coat of Molykote M7439 (Part No. K0770YA000) or grease contained in the pad kit to the pad clip.



- 2) Apply a thin coat of Molykote AS880N (Part No. K0777YA010) or the grease contained in the pad kit to the contact surface between the outer-side pad and shim.



- 3) Apply a thin coat of Molykote AS880N (Part No. K0777YA010) or grease contained in the pad kit to both surfaces of the inner pad inner shim.



- 4) Install the pad to support.
- 5) Install the caliper body to the support.

#### **Tightening torque:**

**27 N·m (2.8 kgf-m, 19.9 ft-lb)**

- 6) Install the brake hose bracket.

#### **Tightening torque:**

**33 N·m (3.4 kgf-m, 24.3 ft-lb)**

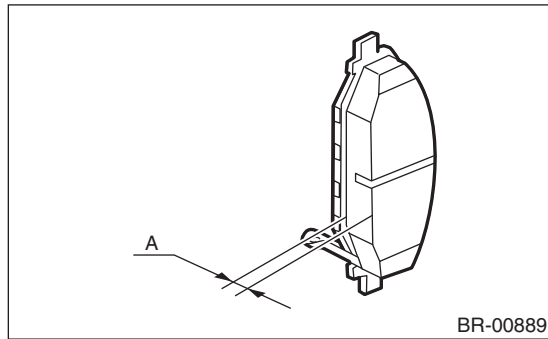
# Rear Brake Pad

## BRAKE

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### C: INSPECTION

Check the pad thickness A.



Pad thickness mm (in)	Standard	11.0 (0.433)
	Wear limit	1.5 (0.059)

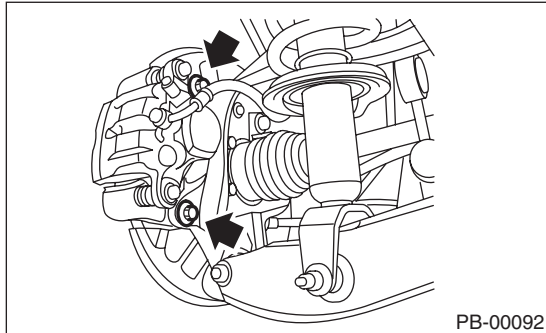
#### NOTE:

- Always replace the pads of both wheels and both sides as a set.
- Replace pad clips if they are twisted or worn.
- A wear indicator is installed on the inner disc brake pad. If the pad is worn to the limit, the end of wear indicator contacts disc rotor, and a squeaking sound is heard as the wheel rotates. If the sound is heard, replace the pad.
- Replace the pad if there is oil or grease on it.

## 6. Rear Disc Rotor

### A: REMOVAL

- 1) Lift up the vehicle, and then remove the rear wheels.
- 2) Release the parking brake.
- 3) Remove the two mounting bolts, and remove the rear disc brake assembly.

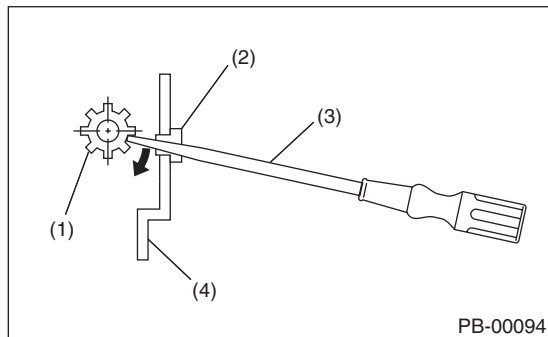


- 4) Suspend the rear disc brake assembly so that the hose is not stretched.
- 5) Remove the rear disc brake rotor.

#### NOTE:

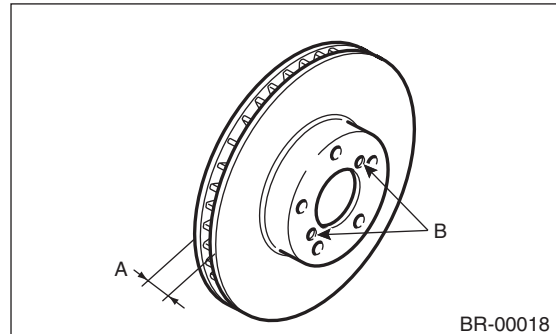
If the disc rotor is difficult to remove, try the following two methods in order.

- (1) Turn the adjusting screw using a flat tip screwdriver until the brake shoe moves adequately away from the disc rotor.



- (1) Adjusting screw
- (2) Cover
- (3) Flat tip screwdriver
- (4) Disc rotor

- (2) If it is difficult to remove the disc rotor from the hub, drive an 8 mm bolt into the threads B of the rotor, then remove the rotor.



### B: INSTALLATION

- 1) Install in the reverse order of removal.

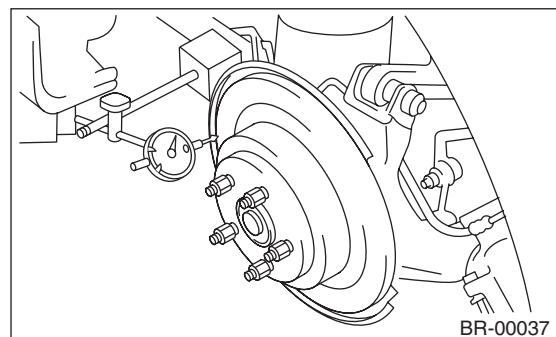
#### Tightening torque:

**66 N·m (6.7 kgf-m, 48.7 ft-lb)**

- 2) Adjust the parking brake. <Ref. to PB-9, ADJUSTMENT, Parking Brake Assembly (Rear Disc Brake).>

### C: INSPECTION

- 1) Check the rear wheel bearing play and axle hub runout before inspecting the disc rotor runout limit. <Ref. to DS-24, INSPECTION, Rear Hub Unit Bearing.>
- 2) Secure the disc rotor by tightening the five wheel nuts.
- 3) Set a dial gauge 10 mm (0.39 in) inward from the disc rotor outer circumference. Rotate the disc rotor to check runout. If the disc rotor runout exceeds the limit, resurface the disc rotor. After resurfacing, check disc rotor thickness as in step 4).



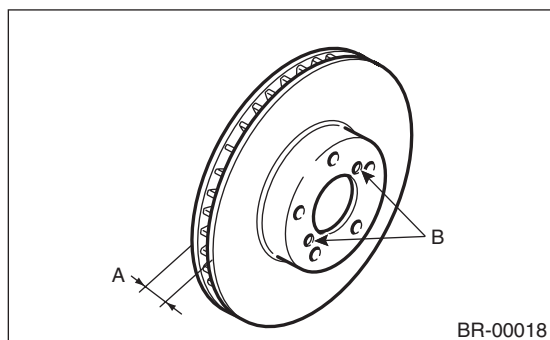
**Disc rotor runout limit:**  
**0.05 mm (0.0020 in)**

## Rear Disc Rotor

### BRAKE

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4) Set a micrometer 10 mm (0.39 in) inward from the disc rotor outer perimeter, and then measure the disc rotor thickness. If the thickness of disc rotor exceeds the service limit, replace with a new disc rotor.



	Specifica- tion	Service limit	Disc rotor outer diameter
Disc rotor thickness A mm (in)	18 (0.71)	16 (0.63)	320 (12.59)

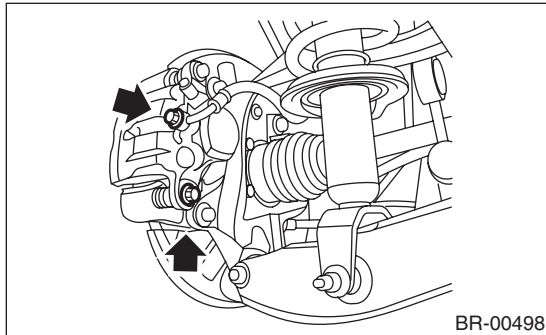
## 7. Rear Disc Brake Assembly

### A: REMOVAL

**CAUTION:**

Do not allow brake fluid to come in contact with vehicle body. If it does, wash off with water and wipe away completely.

- 1) Lift up the vehicle, and then remove the rear wheels.
- 2) Disconnect the brake hose from caliper body assembly.
- 3) Remove the caliper lower bolt.



- 4) Raise the caliper body, and then move it toward vehicle center to separate it from the support.
- 5) Remove the support from housing.

**NOTE:**

Remove the support only when replacing the rotor or support. It is not necessary to remove it when servicing the caliper body assembly.

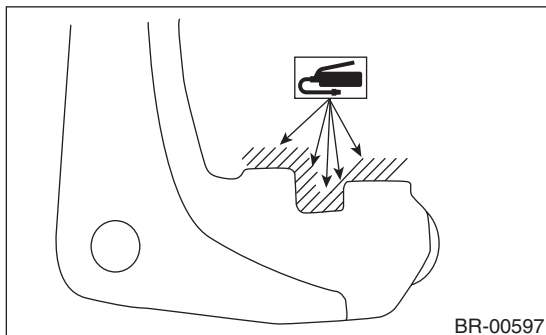
- 6) Remove mud and foreign matter from the caliper body assembly and the support.

**CAUTION:**

Be careful not to allow foreign matter to enter the brake hose connector.

### B: INSTALLATION

- 1) Apply a thin coat of Molykote M7439 (Part No. K0770YA000) or grease contained in the pad kit to the support.

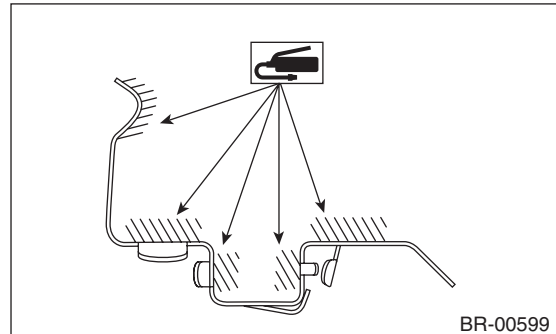


- 2) Install the support to the housing.

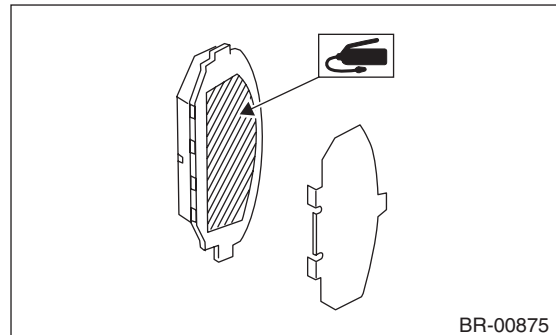
**Tightening torque:**

**66 N·m (6.7 kgf-m, 48.7 ft-lb)**

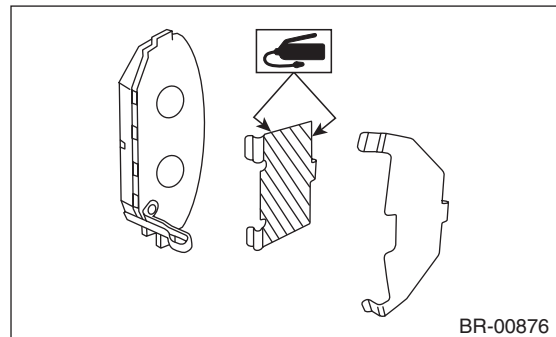
- 3) Apply a thin coat of Molykote M7439 (Part No. K0770YA000) or grease contained in the pad kit to the pad clip.



- 4) Apply a thin coat of Molykote AS880N (Part No. K0777YA010) or the grease contained in the pad kit to the contact surface between the outer-side pad and shim.



- 5) Apply a thin coat of Molykote AS880N (Part No. K0777YA010) or grease contained in the pad kit to both surfaces of the inner pad inner shim.



- 6) Install the pad to support.
- 7) Install the caliper body to the support.

**Tightening torque:**

**27 N·m (2.8 kgf-m, 19.9 ft-lb)**

- 8) Connect the brake hose using a new brake hose gasket.

**Tightening torque:**

**18 N·m (1.8 kgf-m, 13.3 ft-lb)**

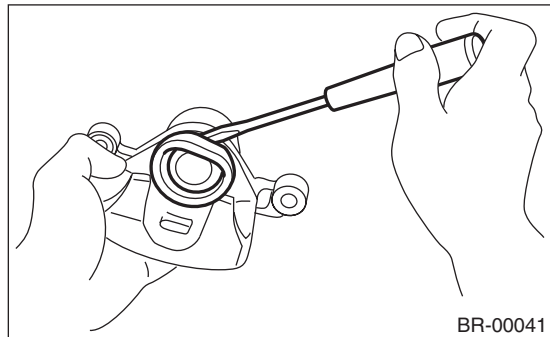
- 9) Bleed air from the brake system.

# Rear Disc Brake Assembly

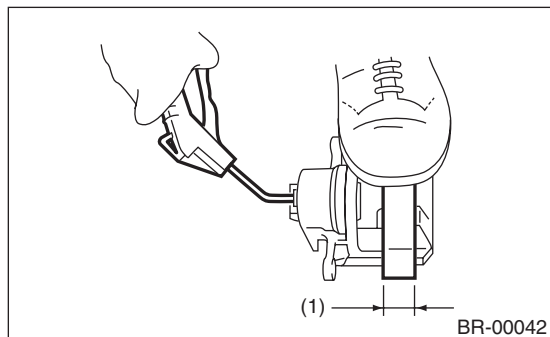
## BRAKE

### C: DISASSEMBLY

- 1) Remove the piston boot.



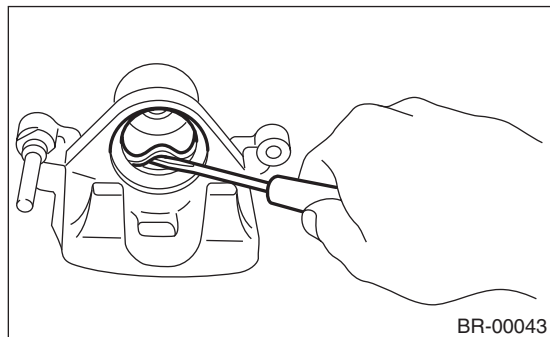
- 2) Place a wooden block in the caliper body as shown in the figure to prevent the piston from jumping out and being damaged.
- 3) Gradually apply compressed air via the brake hose installation hole to push the piston out.



- (1) Place a wood block of 18 mm (0.71 in) width.

- 4) Remove the piston seal from caliper body cylinder.

**CAUTION:**  
Do not damage the cylinder and piston seal groove.



- 5) Remove the lock pin sleeve and boot from caliper body.
- 6) Remove the guide pin boot.

### D: ASSEMBLY

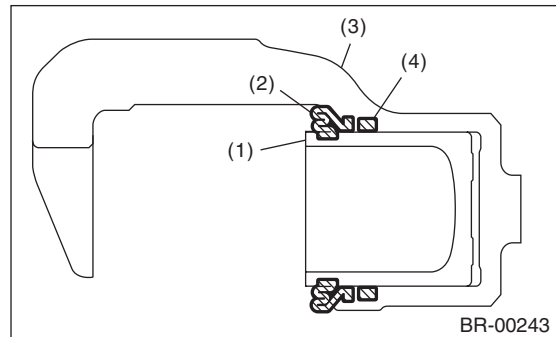
- 1) Clean the inside of the caliper body using brake fluid.
- 2) Apply a coat of brake fluid to piston seal and install the piston seal to the caliper body groove.

- 3) Apply a coat of brake fluid to the inner surface of cylinder and the entire outer surface of the piston.
- 4) Apply grease contained in the piston seal kit to the boot, and install it to the groove at the ends of the cylinder.
- 5) Insert the piston into cylinder.

#### CAUTION:

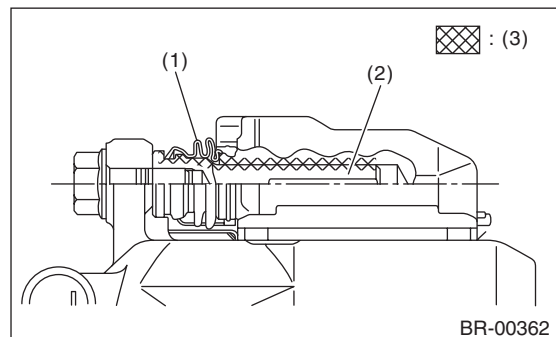
**Do not force the piston into cylinder.**

- 6) Position the boot in the grooves on piston and cylinder.



- (1) Piston
- (2) Piston boot
- (3) Caliper body
- (4) Piston seal

- 7) Apply grease contained in the piston seal kit to the guide pin, outer surface, sleeve outer surface, cylinder inner surface, and boot grooves.



- (1) Pin boot
- (2) Lock pin or guide pin
- (3) Grease applied area

- 8) Insert the guide pin boot to the support.
- 9) Insert the lock pin boot to support, and then insert the lock pin sleeve into the specified position.

### E: INSPECTION

- 1) Repair or replace the faulty parts.
- 2) Check the caliper body and piston for uneven wear, damage or rust.
- 3) Check the rubber parts for damage or deterioration.



## 8. Master Cylinder

### A: REMOVAL

#### CAUTION:

Do not allow brake fluid to come in contact with vehicle body. If it does, wash off with water and wipe away completely.

- 1) Drain brake fluid from the reservoir tank completely.
- 2) Disconnect the harness connector of the fluid level gauge.
- 3) Remove the brake pipe from the master cylinder.
- 4) Remove the master cylinder mounting nuts, and remove the master cylinder from the brake booster.

### B: INSTALLATION

- 1) Install in the reverse order of removal.

#### Tightening torque:

**Master cylinder mounting nut**  
25 N·m (2.5 kgf·m, 18.4 ft·lb)

**Brake pipe**  
19 N·m (1.9 kgf·m, 14.0 ft·lb)

#### CAUTION:

Be sure to use recommended brake fluid.

- 2) Bleed air from brake system. <Ref. to BR-33, PROCEDURE, Air Bleeding.>

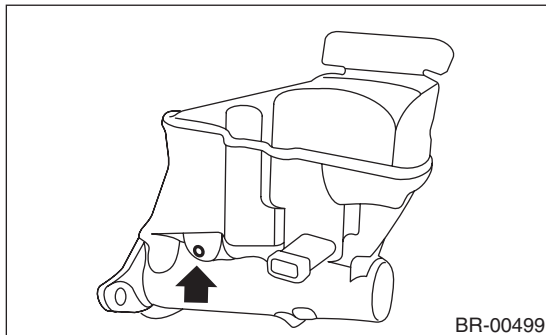
### C: REPLACEMENT

- 1) Remove mud and dirt from the surface of brake master cylinder.
- 2) Secure the master cylinder in a vise.

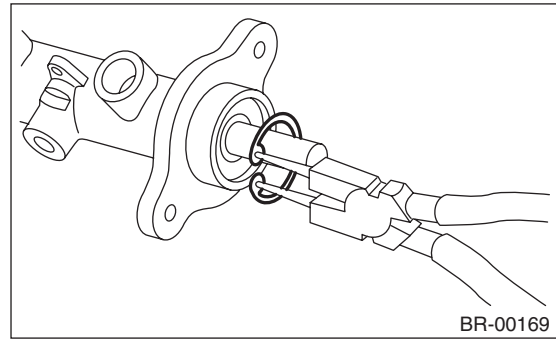
#### NOTE:

To avoid damaging the master cylinder, place between aluminum plates or other material when holding with a vise.

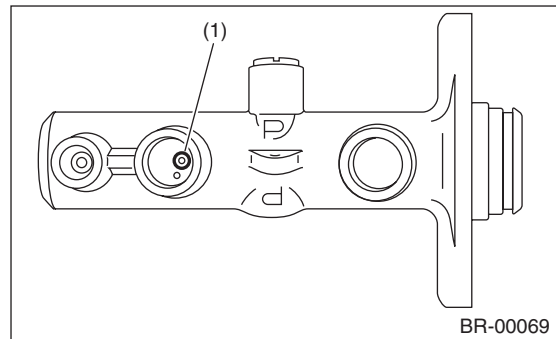
- 3) Remove the pin which secures the master cylinder and reservoir tank, then remove the reservoir tank and seal.



- 4) While pushing in the primary piston, remove the C-ring using pliers.



- 5) While pushing in the primary piston, remove the straight pin from the port on the reservoir tank attachment location using a magnet pick-up tool.



(1) Straight pin

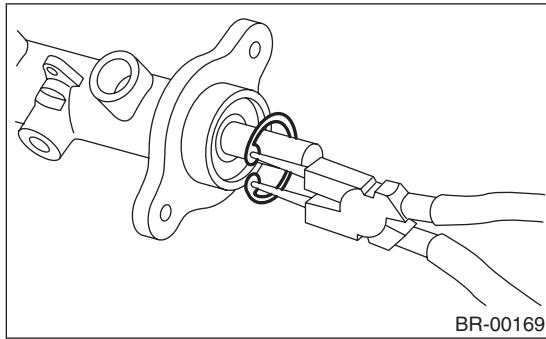
- 6) Extract the primary piston assembly and secondary piston assembly straight out while taking care not to scratch the inner surface of the cylinder.
- 7) Clean the inside of master cylinder with brake fluid. Check the inside of the cylinder for damage, deformation and wear. Replace the master cylinder as assembly if faulty.
- 8) Apply brake fluid to the inner surface of master cylinder and piston assembly.
- 9) Make sure that the inner surface of master cylinder and the piston assembly are free of foreign matter. Install the primary piston assembly and the secondary piston assembly to master cylinder, while taking care not to scratch the master cylinder inner surface.
- 10) While pushing-in the primary piston, install the cylinder pin.

# Master Cylinder

## BRAKE

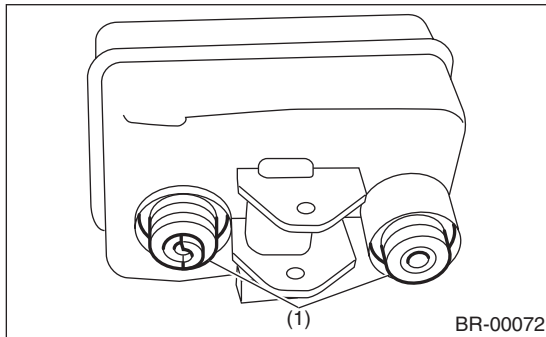
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11) While pushing-in the primary piston, install the C-ring to the groove using pliers.



**CAUTION:**  
Make sure the C-ring is installed to the groove securely.

12) Install the seal to reservoir tank.



(1) Seal

13) Install the reservoir tank to the master cylinder, and secure with pin.

## D: INSPECTION

Inspect for oil leakage from the master cylinder.

### NOTE:

After replacing the piston kit, if an oil leakage is found even though there is no damage or scratches on the inside of the cylinder, the master cylinder inner wall may be worn. In this case, replace the master cylinder as an assembly.

## 9. Brake Booster

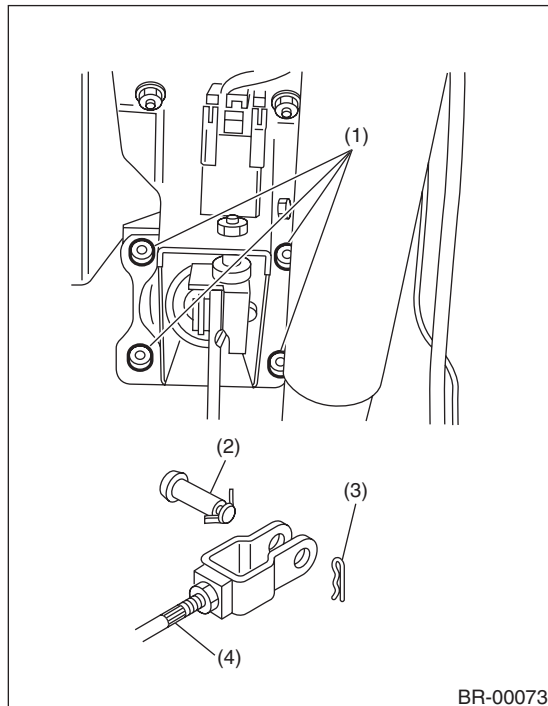
### A: REMOVAL

1) Remove or disconnect the following parts in the engine compartment.

- (1) Remove the brake master cylinder.
- (2) Disconnect the vacuum hose from brake booster.

2) Remove the following parts from the pedal bracket.

- (1) Snap pin and clevis pin
- (2) Four brake booster installation nuts



- (1) Nut
- (2) Clevis pin
- (3) Snap pin
- (4) Operating rod

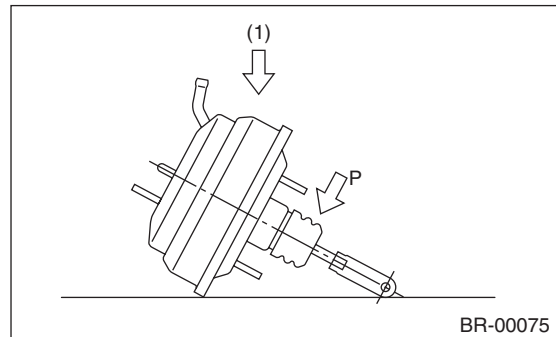
3) Remove the brake booster while avoiding the brake pipe.

#### NOTE:

- Make sure that the booster shell and vacuum pipe are not subject to strong impacts.
- Be careful not to drop the brake booster. If the booster is dropped, replace it.
- Use special care when handling the operating rod. If excessive force is applied to the operating rod, the angle may change by  $\pm 3^\circ$ , and it may result in damage to power piston cylinder.
- Be careful when placing the brake booster on floor.
- Do not change the push rod length.

#### CAUTION:

- Do not disassemble the brake booster.
- If external force is applied from above when brake booster is placed in this position, the resin portion as indicated by "P" may become damaged.



- (1) Force

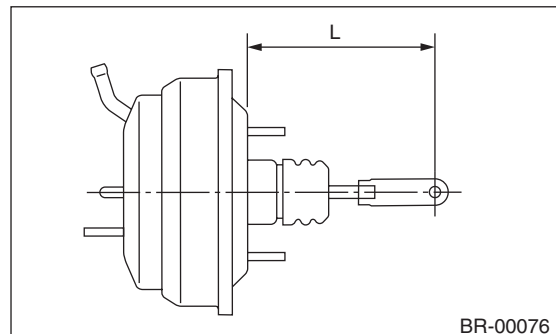
### B: INSTALLATION

1) Check and adjust the operating rod of the brake booster.

#### Specification L:

**137.6 mm (5.42 in)**

If it is out of specification, adjust it with the brake booster operating rod.

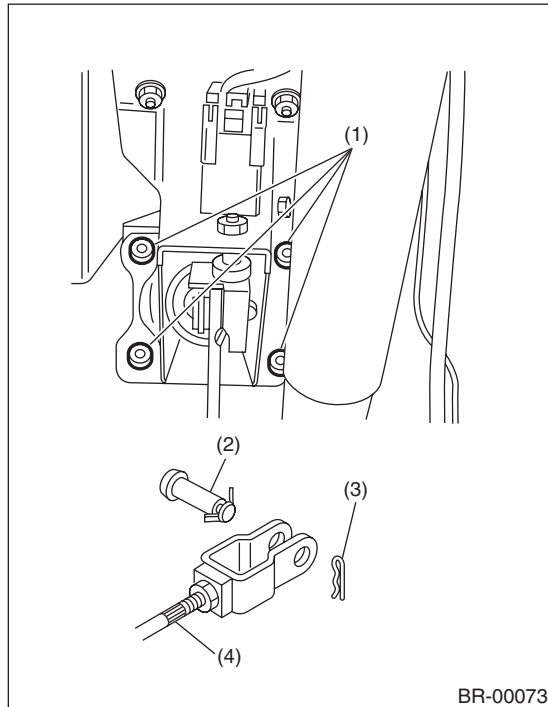


2) Mount the brake booster in position.

# Brake Booster

## BRAKE

3) Connect the operating rod to brake pedal with clevis pin and snap pin.



- (1) Nut
- (2) Clevis pin
- (3) Snap pin
- (4) Operating rod

### NOTE:

- Replace with a new clevis pin.
  - Apply NIGTIGHT LYW NO. 2 grease to the clevis pin.
- 4) Connect the vacuum hose to the brake booster.  
5) Mount the master cylinder onto the brake booster.  
6) Connect the brake pipes to the master cylinder.  
7) Connect the connector of the brake fluid level gauge.

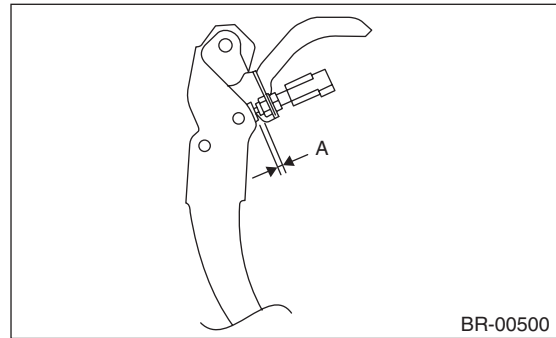
8) Measure the clearance between the threaded end of the stop light switch and the stopper.

If it is not within the specification, adjust it by adjusting the position of the stop light switch. <Ref. to BR-40, ADJUSTMENT, Stop Light Switch.>

### CAUTION:

**Be careful not to rotate the stop light switch.**

**Stop light switch clearance A:**  
**0.8 mm (0.031 in)**



9) Apply grease to the operating rod connecting pin to prevent it from wear.

10) Bleed air from brake system.

**Tightening torque (air bleeder screw):**  
**8 N·m (0.8 kgf-m, 5.8 ft-lb)**

11) Perform a road test to make sure the brakes do not drag.

## C: INSPECTION

### 1. OPERATION CHECK (WITHOUT GAUGE)

#### CAUTION:

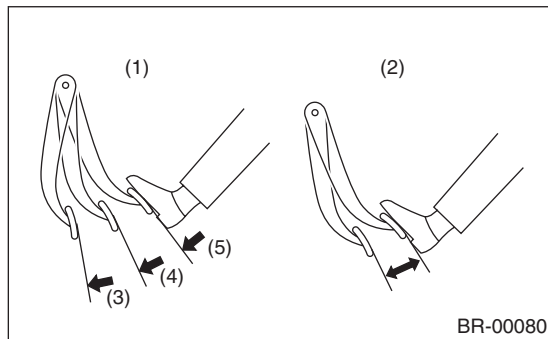
When checking operation, be sure to apply the parking brake securely.

#### Check without gauge

This method can not determine exactly what part is defective. But it is possible to identify the general type of defect if the following inspection is performed.

#### Air tightness check

Start the engine, and idle it for 1 to 2 minutes, then turn it OFF. Depress the brake pedal several times applying the normal pedal force. The pedal stroke should be the longest at the 1st depression, and it should become shorter at each successive depression. If no change occurs in the pedal height when pressed, the brake booster is faulty.



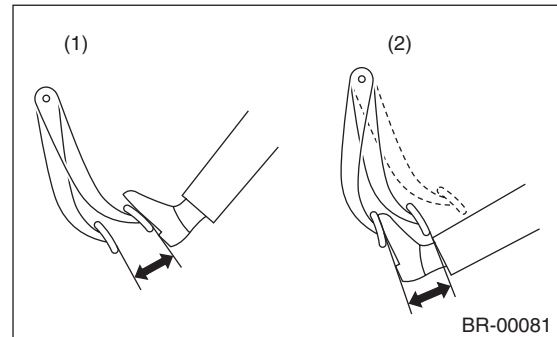
- (1) Normal
- (2) Not OK
- (3) 1st
- (4) 2nd
- (5) 3rd

#### NOTE:

- In case of defective operation, inspect the condition of the check valve and vacuum hose as well.
- Replace them if faulty, and perform the test again.
- If the defective condition is not improved, check accurately using a gauge.

### Operation check

1) While the engine is OFF, depress the brake pedal several times applying the same pedal force, to check for a change in pedal height.



- (1) When engine is stopped
- (2) When engine is started

2) With the brake pedal depressed, start the engine.

3) As the engine starts, the brake pedal should move slowly toward the floor. If the pedal height does not change, the brake booster is faulty.

#### NOTE:

If faulty, perform an accurate check with a gauge.

#### Loaded air tightness check

Depress the brake pedal while the engine is running, and turn the engine OFF while the pedal is depressed. Keep the pedal depressed for 30 seconds. If the pedal height does not change, the function of brake booster is normal. If the pedal height increases, it is faulty.

#### NOTE:

If faulty, perform an accurate check with a gauge.

# Brake Booster

## BRAKE

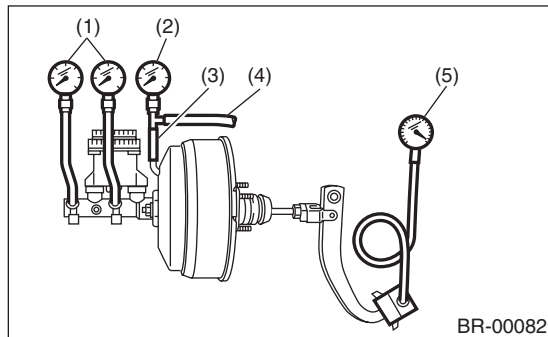
### 2. OPERATION CHECK (WITH GAUGE)

#### CAUTION:

When checking operation, be sure to apply the parking brake securely.

#### Check with gauge

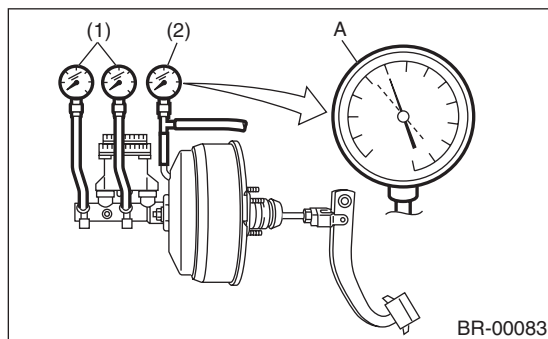
Connect the gauge as shown in the figure. After bleeding air from the pressure gauge, perform the checks.



- (1) Pressure gauge
- (2) Vacuum gauge
- (3) Adapter hose
- (4) Vacuum hose
- (5) Pedal force gauge

#### Air tightness check

1) Start the engine and keep it running until vacuum pressure indicates point A of the vacuum gauge = 66.7 kPa (500 mmHg, 19.69 inHg). Do not depress the brake pedal at this time.



- (1) Pressure gauge
- (2) Vacuum gauge

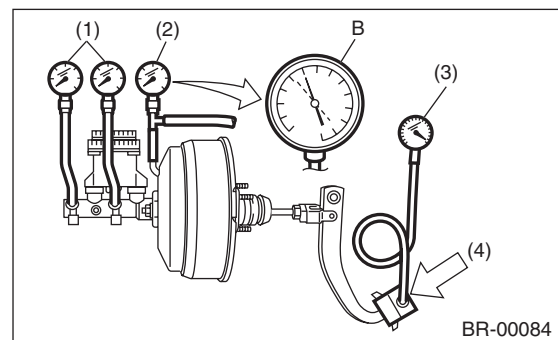
2) Stop the engine and check the gauge. If the vacuum pressure drop within 15 seconds after stopping the engine is 3.3 kPa (25 mmHg, 0.98 inHg) or less, the function of brake booster is normal.

If faulty, the cause may be one of the following.

- Check valve malfunction
- Leak from vacuum hose
- Leak from shell joint section or stud bolt welded section
- Damaged diaphragm
- Leak from valve body seal and bearing section
- Leak from plate and seal assembly section
- Leak from poppet valve assembly section

#### Loaded air tightness check

1) Start the engine and depress the brake pedal with a pedal force of 196 N (20 kgf, 44 lb). Keep the engine running and keep the pedal pressed until a vacuum of point B = 66.7 kPa (500 mmHg, 19.69 inHg) is indicated on the vacuum gauge.



- (1) Pressure gauge
- (2) Vacuum gauge
- (3) Pedal force gauge
- (4) Depressed

2) Stop the engine and check the vacuum gauge. If the vacuum pressure drop within 15 seconds after stopping the engine is 3.3 kPa (25 mmHg, 0.98 inHg) or less, the function of brake booster is normal.

If defective, refer to "Air tightness check".

<Ref. to BR-29, INSPECTION, Brake Booster.>

3) If the brake booster is faulty, replace it with a new part.

#### Lack of boost action check

Turn the engine OFF, and set the value of the vacuum gauge to "0". Then, check the fluid pressure when the brake pedal is depressed. The pressure must be greater than the specification listed.

Brake pedal operation force N (kgf, lb)	147 (15, 33)	294 (30, 66)
Fluid pressure kPa (kg/cm <sup>2</sup> , psi)	590 (6, 86)	1,654 (17, 240)

## Boosting action check

Set the vacuum gauge reading to 66.7 kPa (500 mmHg, 19.69 inHg) with the engine running. Then, check the fluid pressure when the brake pedal is depressed. The pressure must be greater than the specification listed.

Brake pedal operation force N (kgf, lb)	147 (15, 33)	294 (30, 66)
Fluid pressure kPa (kg/cm <sup>2</sup> , psi)	8,539 (87, 1,238)	15,373 (157, 2,229)

## 10.Brake Fluid

### A: INSPECTION

1) Check that the brake fluid level is between “MIN” and “MAX”. If out of the specified range, refill or drain fluid. If the fluid level is close to “MIN”, check the brake pad for wear and refill the fluid.

2) Check the fluid for discoloration. If the fluid color has changed excessively, drain the fluid and refill with new fluid.

### B: REPLACEMENT

#### CAUTION:

- Do not let brake fluid come into contact with the painted surface of the vehicle body. Wash away with water immediately and wipe off if it is spilled by accident.
- Avoid mixing brake fluids of different brands to prevent fluid performance from degrading.
- Be careful not to allow dirt or dust to enter the reservoir tank.

#### NOTE:

- During the operation, keep the reservoir tank filled with brake fluid to eliminate entry of air.
- Operate the brake pedal slowly.
- For convenience and safety, two people should work together.
- The required amount of brake fluid is approximately 600 mℓ (20 US fl oz, 21 Imp fl oz) for entire brake system.

1) Lift up the vehicle and set rigid racks at the specified locations, or keep the vehicle lifted.

2) Remove both the front and rear wheels.

3) Drain brake fluid from the reservoir tank.

4) Refill the reservoir tank with the recommended brake fluid.

#### **Recommended brake fluid:**

**Refer to the specification. <Ref. to BR-2, SPECIFICATION, General Description.>**

Perform the same procedure as for bleeding the brake line, until new brake fluid comes out from vinyl tube. <Ref. to BR-33, PROCEDURE, Air Bleeding.>



## 11. Air Bleeding

### A: PROCEDURE

#### CAUTION:

- Do not let brake fluid come into contact with the painted surface of the vehicle body. Wash away with water immediately and wipe off if it is spilled by accident.
- Avoid mixing brake fluids of different brands to prevent fluid performance from degrading.
- Be careful not to allow dirt or dust to enter the reservoir tank.

#### 1. MASTER CYLINDER

##### NOTE:

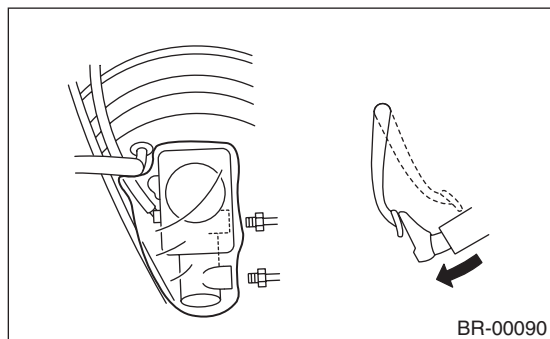
- When the master cylinder is disassembled or the reservoir tank is empty, bleed the master cylinder.
- If bleeding of the master cylinder is not necessary, omit the following procedures, and perform bleeding of the brake line. <Ref. to BR-33, BRAKE LINE, PROCEDURE, Air Bleeding.>

1) Fill the reservoir tank of the master cylinder with brake fluid.

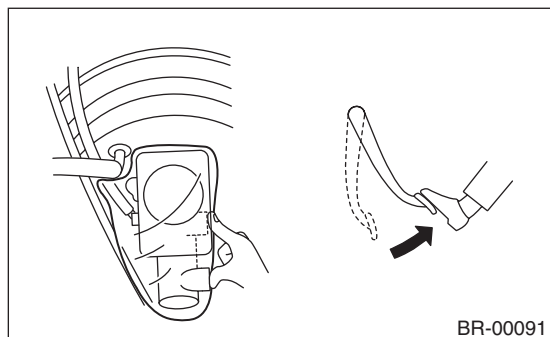
##### NOTE:

While bleeding air, keep the reservoir tank filled with brake fluid to prevent entry of air.

- 2) Disconnect the brake line at primary and secondary sides.
- 3) Wrap the master cylinder with a plastic bag.
- 4) Depress the brake pedal slowly and hold it.



5) Plug the outlet plug with your finger, and then release the brake pedal.



- 6) Repeat the step 4) and 5) several times.
- 7) Remove the plastic bag.

8) Install the brake pipe to the master cylinder.

#### Tightening torque:

**19 N·m (1.9 kgf·m, 14.0 ft·lb)**

9) Bleed air from the brake line. <Ref. to BR-33, BRAKE LINE, PROCEDURE, Air Bleeding.>

#### 2. BRAKE LINE

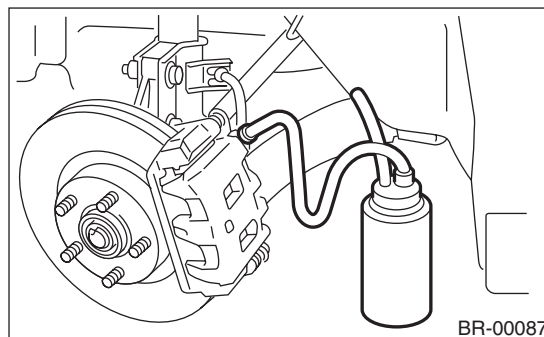
1) When the master cylinder is disassembled or the reservoir tank is empty, bleed the master cylinder before bleeding the brake line. <Ref. to BR-33, MASTER CYLINDER, PROCEDURE, Air Bleeding.>

2) Fill the reservoir tank of the master cylinder with brake fluid.

##### NOTE:

While bleeding air, keep the reservoir tank filled with brake fluid to prevent entry of air.

3) Attach one end of the vinyl tube to the air bleeder and the other end to the brake fluid container.



4) Depress the brake pedal several times, and hold it.

5) Loosen the air bleeder screw to drain brake fluid. Tighten the air bleeder quickly, and release the brake pedal.

6) Repeat the steps 4) to 5) until there are no more air bubbles in the vinyl tube.

7) Repeat the steps from 2) to 6) above to bleed air from each wheel.

##### NOTE:

Perform air bleed starting in the order from the farthest wheel cylinder from the master cylinder.

8) Securely tighten the air bleeder screws.

#### Tightening torque:

**8 N·m (0.8 kgf·m, 5.8 ft·lb)**

9) Check that there are no brake fluid leaks in the entire system.

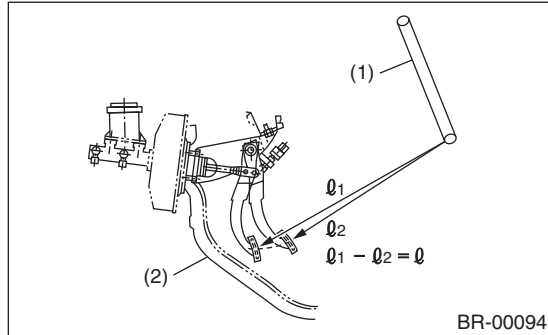
# Air Bleeding

## BRAKE

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10) Check the pedal stroke.

Run the engine at idle after warming up the engine, and depress the brake pedal with a force of 500 N (51 kgf, 112 lb). Measure the distance between the brake pedal and steering wheel. Release the pedal, and measure the distance between pedal and steering wheel again.



- (1) Steering wheel
- (2) Toe board

### **Specification of pedal stroke:**

***When depressing the pedal with a force of 500 N (51 kgf, 112 lbf).***

***115 mm (4.53 in) or less***

11) If the distance is more than specification, there is a possibility of air being caught in the brake line. Bleed the brake line of all air until the pedal stroke meets the specification.

12) Operate the hydraulic control unit in the sequence control mode. <Ref. to VDC-15, VDC Sequence Control.>

13) Check the pedal stroke again.

14) If the distance is more than specification, there is a possibility of air being caught in the hydraulic unit. Repeat above steps 2) to 9) until the pedal stroke meets the specification.

15) Fill the reservoir tank with brake fluid up to the "MAX" level.

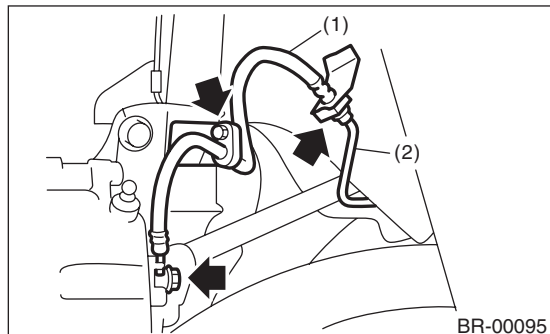
16) Test run the vehicle and ensure that the brakes operate normally.

## 12.Brake Hose

### A: REMOVAL

#### 1. FRONT BRAKE HOSE

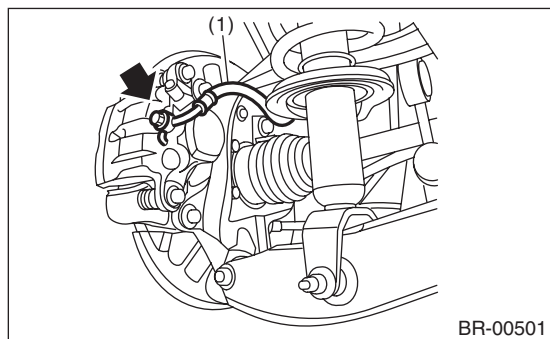
- 1) Separate the brake pipe from brake hose using a flare nut wrench.
- 2) Remove the clamp, the strut mount bolts and union bolt.



- (1) Brake hose
- (2) Brake pipe

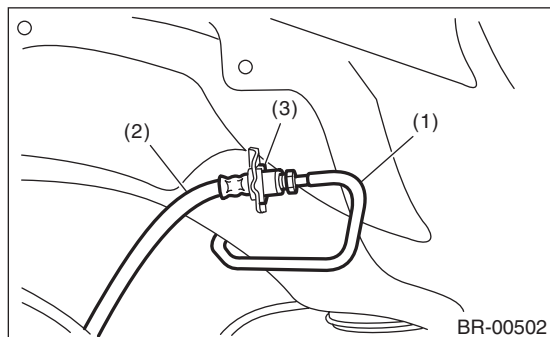
#### 2. REAR BRAKE HOSE

- 1) Remove the union bolt from the rear brake caliper.



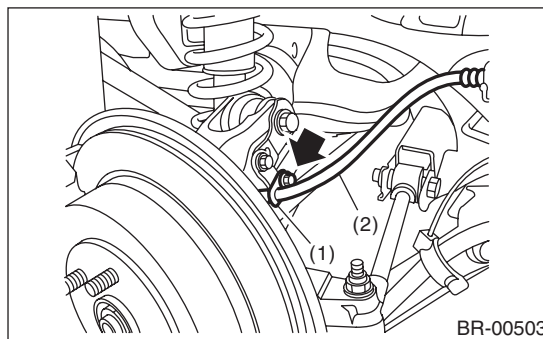
- (1) Brake hose

- 2) Separate the brake pipe from brake hose using a flare nut wrench.



- (1) Brake pipe
- (2) Brake hose
- (3) Brake hose clamp

- 3) Remove the brake hose bracket, then remove the brake hose.



- (1) Brake hose bracket
- (2) Brake hose

### B: INSTALLATION

#### 1. FRONT BRAKE HOSE

- 1) Secure the brake hose to strut mount.

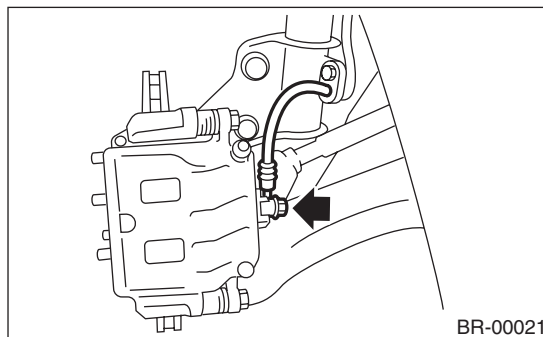
##### **Tightening torque:**

**33 N·m (3.4 kgf-m, 24.3 ft-lb)**

- 2) Install the brake hose to the caliper using a new gasket.

##### **Tightening torque (union bolt):**

**18 N·m (1.8 kgf-m, 13.3 ft-lb)**



- 3) Position the disc in straight position and route the brake hose through the hole in the bracket on the wheel apron side.

##### **CAUTION:**

**Do not twist the brake hose.**

- 4) Temporarily tighten the flare nut which connects brake pipe and hose.
- 5) Secure the brake hose to wheel apron bracket with clamp.
- 6) Tighten the flare nut to the specified torque.

##### **Tightening torque (brake pipe flare nut):**

**15 N·m (1.5 kgf-m, 10.8 ft-lb)**

- 7) Bleed air from brake system.

# Brake Hose

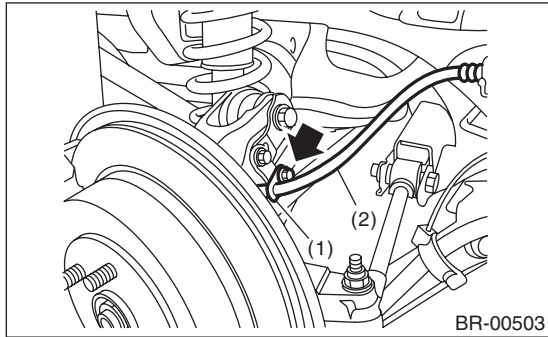
## BRAKE

### 2. REAR BRAKE HOSE

1) Install the brake hose bracket.

**Tightening torque:**

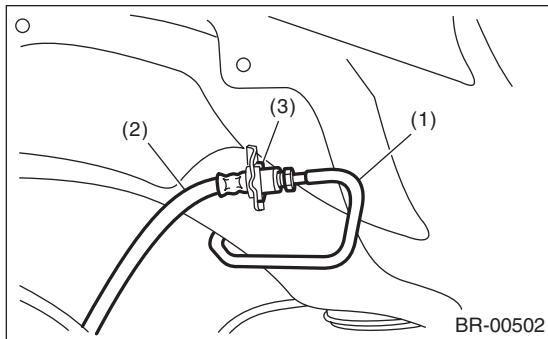
**33 N·m (3.4 kgf·m, 24.3 ft·lb)**



- (1) Brake hose bracket
- (2) Brake hose

2) Connect the brake hose to the brake pipe.

3) Insert the clamp to secure brake hose.

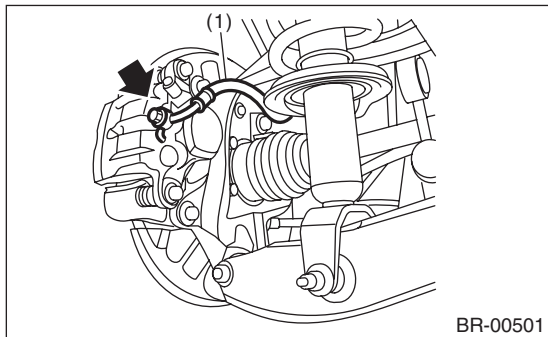


- (1) Brake pipe
- (2) Brake hose
- (3) Brake hose clamp

4) Install the brake hose to rear brake caliper using a new gasket.

**Tightening torque (union bolt):**

**18 N·m (1.8 kgf·m, 13.3 ft·lb)**



- (1) Brake hose

5) Tighten the flare nut to the specified torque.

**Tightening torque (brake pipe flare nut):**

**15 N·m (1.5 kgf·m, 10.8 ft·lb)**

6) Bleed air from the brake system.

### C: INSPECTION

Make sure there are no cracks, breakage or damage on hoses. Check the joint for fluid leakage. If any cracks, breakage, damage or fluid leakage is found, repair or replace the hose.

## 13. Brake Pipe

### A: REMOVAL

**NOTE:**

The 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 the electrical test equipment on these circuits.
- Be careful not to damage the airbag system wiring harness when servicing the center brake pipe.
- When removing the brake pipe, do not bend.

### B: INSTALLATION

**NOTE:**

The 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 the electrical test equipment on these circuits.
- Be careful not to damage the airbag system wiring harness when servicing the center brake pipe.
- When installing the brake pipe, do not bend.
- After installing the brake pipe and hose, perform air bleed.
- After installing the brake hoses, make sure that they do not contact the tires or suspension assembly, etc.

***Brake pipe tightening torque:***  
*15 N·m (1.5 kgf·m, 10.8 ft·lb)*

### C: INSPECTION

Make sure there are no cracks, breakage or damage on hoses. Check the joint for fluid leakage. If any cracks, breakage, damage or fluid leakage is found, repair or replace the pipes.

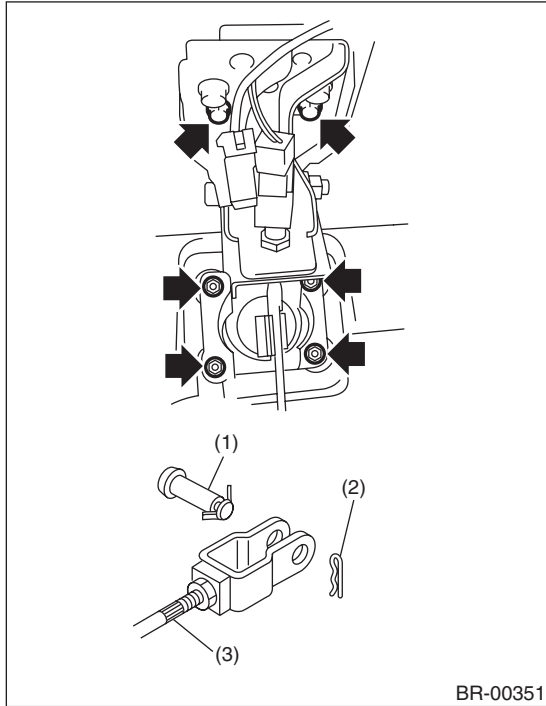
**NOTE:**

Use a mirror when inspecting back sides and other locations which are hard to see.

## 14. Brake Pedal

### A: REMOVAL

- 1) Remove the steering shaft.
- 2) Disconnect the connector (stop light switch etc.) from the pedal bracket.
- 3) Remove the clevis pin which secures the lever and push rod.
- 4) Remove the bolt and nut which secures the pedal bracket.



- (1) Clevis pin
- (2) Snap pin
- (3) Operating rod

### B: INSTALLATION

- 1) Install in the reverse order of removal.

#### NOTE:

- Replace with a new clevis pin.
  - Apply NIGTIGHT LYW NO. 2 grease to the clevis pin.
- 2) Check the brake pedal after installation. <Ref. to BR-38, INSPECTION, Brake Pedal.>

### C: INSPECTION

- 1) Move the brake pedal pads in a horizontal direction with a force of approx. 10 N (1 kgf, 2 lb), and check that the pedal deflection is in the range of specifications.

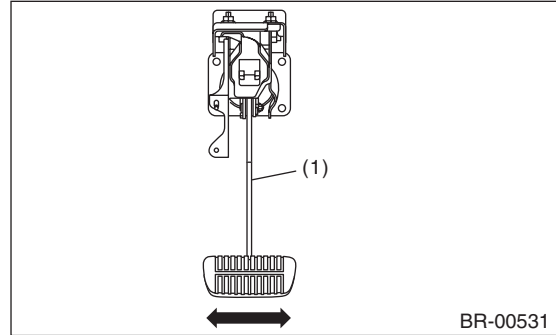
#### CAUTION:

If excessive deflection is noted, replace with a new bushing.

#### Deflection of brake pedal:

##### Limit

4.0 mm (0.157 in) or less



- (1) Brake pedal

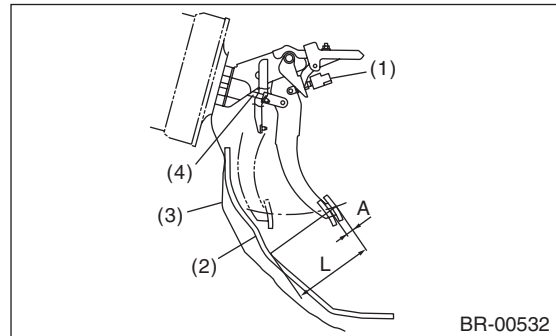
- 2) Check the position of the pedal pad.

#### Pedal height L:

155 — 175 mm (6.10 — 6.89 in)

#### Brake pedal free play A:

0.5 — 2 mm (0.02 — 0.08 in) [When pulling the brake pedal upward with a force of less than 10 N (1 kgf, 2 lb).]



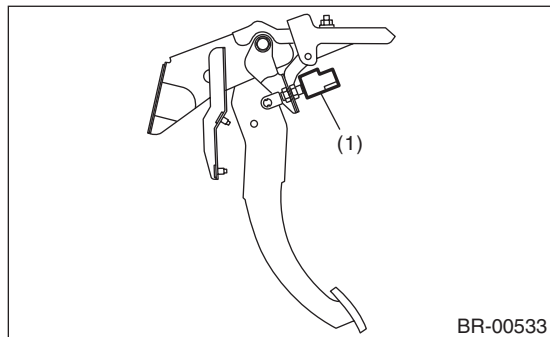
- (1) Stop light switch
- (2) Mat
- (3) Toe board
- (4) Brake booster operating rod

- 3) If it is not within the specification, adjust it by adjusting the brake booster operating rod length.

## 15. Stop Light Switch

### A: REMOVAL

- 1) Disconnect the ground cable from the battery.
- 2) Disconnect the stop light switch connector.
- 3) Loosen the nuts, unscrew the stop light switch, and remove stop light switch.



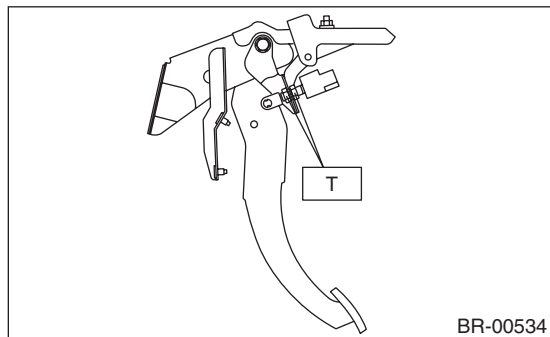
(1) Stop light switch

### B: INSTALLATION

- 1) Install the stop light switch onto the bracket with screws and position it with the nut.
  - 2) Adjust the stop light switch position, and then tighten the nut.
- <Ref. to BR-40, ADJUSTMENT, Stop Light Switch.>

#### Tightening torque:

**8 N·m (0.8 kgf·m, 5.8 ft·lb)**



### C: INSPECTION

#### 1. CHECK SPECIFIED POSITION

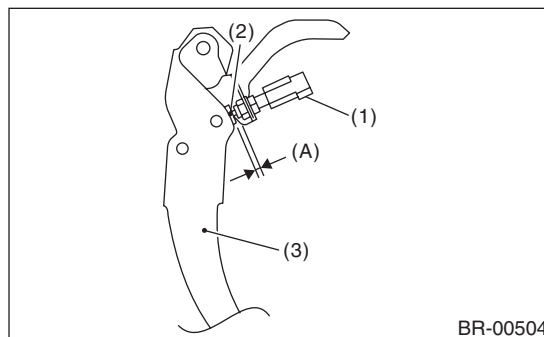
- 1) If the stop light switch does not operate properly (or if it is not secured at the specified position), replace with a new part.
- 2) Measure the clearance between the threaded end of the stop light switch and the stopper.

#### CAUTION:

**Be careful not to rotate the stop light switch.**

#### Stop light switch clearance A:

**0.8±0.5 mm (0.031±0.02 in)**



- (1) Stop light switch
- (2) Stopper
- (3) Brake pedal

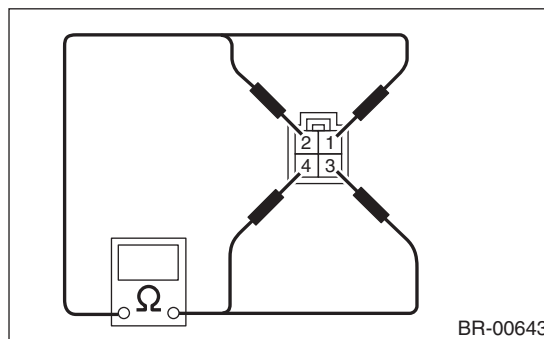
- 3) If it is not within the specification, adjust it by adjusting the position of the stop light switch.

#### CAUTION:

**Be careful not to rotate the stop light switch.**

#### 2. CHECK RESISTANCE

- 1) If the stop light switch does not operate properly, replace with a new part.
- 2) Measure the resistance of the stop light switch.



Pedal	Terminal No.	Standard
Released	1 and 4	Less than 1 Ω
	2 and 3	1 MΩ or more
Depressed	1 and 4	1 MΩ or more
	2 and 3	Less than 1 Ω

# Stop Light Switch

BRAKE

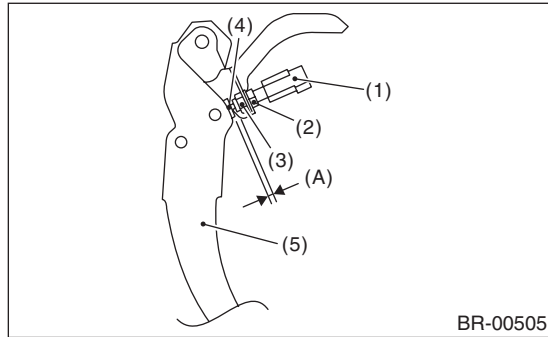
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## D: ADJUSTMENT

Loosen the lock nut, and adjust the stop light switch position until the clearance (A) between the threaded end of the stop light switch and stopper becomes  $0.8 \pm 0.5$  mm ( $0.031 \pm 0.02$  in). Then, tighten the lock nut.

### **Tightening torque:**

**8 N·m (0.8 kgf·m, 5.8 ft-lb)**



- (1) Stop light switch
- (2) Lock nut A
- (3) Lock nut B
- (4) Stopper
- (5) Brake pedal

### NOTE:

Tighten lock nut B until the threaded end of switch contacts the stopper. Hold the switch so that it does not rotate, and loosen the lock nut B approx.  $60^\circ$ . The clearance (A) will become  $0.8 \pm 0.5$  mm ( $0.031 \pm 0.02$  in).

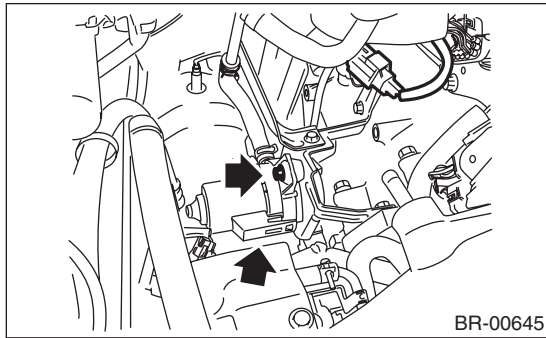


## 16.Brake Vacuum Pump

### A: REMOVAL

#### 1. BRAKE VACUUM PUMP

- 1) Disconnect the ground cable from the battery.
- 2) Disconnect the brake vacuum pump connector.
- 3) Remove the vacuum hose.
- 4) Remove the bolt, and remove the brake vacuum pump.



#### 2. VACUUM HOSE

Remove the clip and remove the vacuum hose.

### B: INSTALLATION

#### 1. BRAKE VACUUM PUMP

Install in the reverse order of removal.

#### *Tightening torque:*

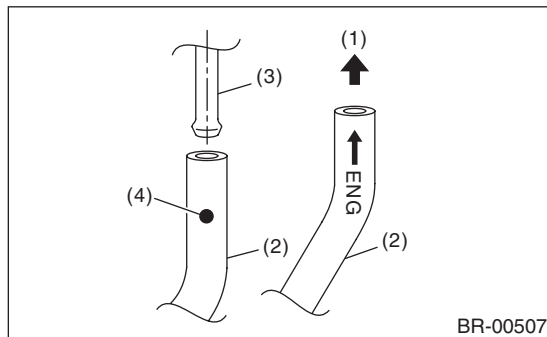
**7.5 N·m (0.76 kgf-m, 5.5 ft-lb)**

#### 2. VACUUM HOSE

Install in the reverse order of removal.

#### **CAUTION:**

**The vacuum hose has an installation direction.  
Make sure to install in the proper direction.**



- (1) To engine
- (2) Vacuum hose
- (3) Vacuum pipe
- (4) Marking (Marking to vacuum pipe side)

### C: INSPECTION

#### 1. BRAKE VACUUM PUMP

Inspect for whether or not the pump operates when battery voltage is applied to the connector terminal.

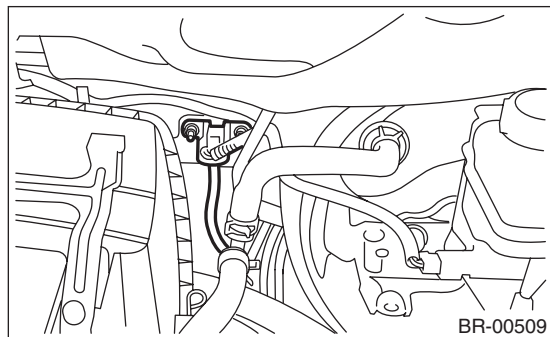
#### 2. VACUUM HOSE

Check to see that air only flows in one direction, when air is blown into or sucked from the hose.

## 17.Brake Vacuum Sensor

### A: REMOVAL

- 1) Disconnect the ground cable from the battery.
- 2) Disconnect the brake vacuum sensor connector.
- 3) Remove the vacuum hose from the brake vacuum sensor.
- 4) Remove the bolt, and remove the brake vacuum sensor.



### B: INSTALLATION

Install in the reverse order of removal.

**Tightening torque:**

**5 N·m (0.5 kgf-m, 3.7 ft-lb)**

## 18. General Diagnostic Table

### A: INSPECTION

	Trouble and possible cause	Corrective action
<b>1. Insufficient braking performance</b>	(1) Fluid leakage from the hydraulic mechanism	Correct or replace. (cup, piston seal, piston boot, master cylinder piston kit, pipe or hose)
	(2) Entry of air into the hydraulic mechanism	Bleed air.
	(3) Wear, deteriorated surface material, water or fluid on lining	Replace, grind or clean.
	(4) Improper operation of master cylinder, disc caliper, brake booster or check valve	Correct or replace.
<b>2. Unstable or uneven braking</b>	(1) Fluid on lining or rotor	Correct the cause of fluid leakage, and clean or replace.
	(2) Rotor defective	Repair or replace the rotor.
	(3) Improper lining contact, deteriorated surface, deteriorated or worn lining material	Repair by grinding, or replace.
	(4) Deformed back plate	Correct or replace.
	(5) Overinflation of tires	Adjust air pressure.
	(6) Defective wheel alignment	Adjust alignment.
	(7) Loose back plate or support installation bolt	Tighten to the specified torque.
	(8) Faulty wheel bearing	Replace.
	(9) Defective hydraulic system	Replace the cylinder, brake pipe or hose.
	(10) Unstable performance of parking brake	Check, adjust or replace the rear brake and cable system.
<b>3. Excessive pedal stroke</b>	(1) Entry of air into the hydraulic mechanism	Bleed air.
	(2) Excessive play in the master cylinder push rod	Adjust.
	(3) Fluid leakage from the hydraulic mechanism	Correct or replace. (cup, piston seal, piston boot, master cylinder piston kit, pipe or hose)
	(4) Improper lining contact or worn lining	Correct or replace.
<b>4. Brake dragging or improper brake return</b>	(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	Repair or adjust.
	(5) Weakened spring tension or breakage of shoe return spring	Replace the spring.
	(6) Improper disc caliper operation	Correct or replace.
	(7) Faulty wheel bearing	Replace.
<b>5. Brake noise (1) (creaking sound)</b>	(1) Hardened or deteriorated brake pad	Replace the pad.
	(2) Worn brake pad	Replace the pad.
	(3) Loose back plate or support installation bolt	Tighten to the specified torque.
	(4) Loose wheel bearing	Tighten to the specified torque.
	(5) Dirty rotor	Clean the rotor, or clean and replace brake assembly.
<b>6. Brake noise (2) (hissing sound)</b>	(1) Worn brake pad	Replace the pad.
	(2) Improperly installed pad	Correct or replace the pad.
	(3) Loose or bent rotor	Retighten or replace.
<b>7. Brake noise (3) (click sound)</b>	Excessively worn pad or support	Replace the pad or the support.

# General Diagnostic Table

BRAKE

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# BRAKE VACUUM CONTROL (BVC) (DIAGNOSTICS)

## *BVC(diag)*

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	<b>Page</b>
1. Basic Diagnostic Procedure .....	2
2. Check List for Interview .....	3
3. General Description .....	5
4. Electrical Component Location .....	6
5. Engine Control Module (ECM) I/O Signal .....	8
6. Subaru Select Monitor .....	9
7. Read Diagnostic Trouble Code (DTC) .....	11
8. Inspection Mode .....	12
9. Clear Memory Mode .....	13
10. List of Diagnostic Trouble Code (DTC) .....	14
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# Basic Diagnostic Procedure

## BRAKE VACUUM CONTROL (BVC) (DIAGNOSTICS)

### 1. Basic Diagnostic Procedure

#### A: PROCEDURE

##### CAUTION:

- Subaru Select Monitor is required for reading DTC, reading the current data and clearing the memory.
- Remove foreign matter (dust, water, oil, etc.) from the engine control module (ECM) connector when removing or installing.

##### NOTE:

- To check the harness for open or short circuits, shake problem spot or connector.
- Refer to "Check List for Interview". <Ref. to BVC(diag)-3, Check List for Interview.>

	Step	Check	Yes	No
1	<b>CHECK PRE-INSPECTION.</b> 1) Ask the customer when and how the trouble occurred using the interview check list. <Ref. to BVC(diag)-3, Check List for Interview.> 2) Check the error display. (Odo/trip meter)	Is "Er-bb" displayed on the screen?	Go to step 3.	Go to step 2.
2	<b>BASIC INSPECTION.</b> Check the components which might affect the brake vacuum control. <Ref. to BVC(diag)-5, INSPECTION, General Description.>	Is the component that might affect the brake vacuum control normal?	Go to step 3.	Repair or replace each component.
3	<b>CHECK INDICATION OF DTC.</b> 1) Turn the ignition switch to OFF. 2) Connect the Subaru Select Monitor to data link connector. 3) Turn the ignition switch to ON and run the Subaru Select Monitor. 4) Read the DTC. <Ref. to BVC(diag)-11, OPERATION, Read Diagnostic Trouble Code (DTC).> 5) Record all DTC.	Is DTC displayed?	Go to step 5.	Go to step 4.
4	<b>PERFORM GENERAL DIAGNOSTICS.</b> Perform the inspection by referring to "General Diagnostic Table". <Ref. to BVC(diag)-31, INSPECTION, General Diagnostic Table.>	Is result of inspection OK?	Finish the diagnosis.	Go to step 5.
5	<b>PERFORM DIAGNOSIS.</b> 1) Correct the cause of trouble according to the DTC. <Ref. to BVC(diag)-14, LIST, List of Diagnostic Trouble Code (DTC).> 2) Perform the Clear Memory Mode. <Ref. to BVC(diag)-13, OPERATION, Clear Memory Mode.> 3) Perform the Inspection Mode. <Ref. to BVC(diag)-12, PROCEDURE, Inspection Mode.> 4) Read the DTC. <Ref. to BVC(diag)-11, OPERATION, Read Diagnostic Trouble Code (DTC).>	Is DTC displayed?	Repeat step 5 until DTC is not shown.	Finish the diagnosis.

## Check List for Interview

BRAKE VACUUM CONTROL (BVC) (DIAGNOSTICS)

### 2. Check List for Interview

#### A: CHECK

Check the following items about the vehicle's state.

#### 1. STATUS OF THE ERROR DISPLAY

An error is displayed in odo/trip meter.	<input type="checkbox"/> Always <input type="checkbox"/> Sometimes <input type="checkbox"/> Only once <input type="checkbox"/> Does not illuminate • When/How long does it come on?															
Ignition key position	<input type="checkbox"/> LOCK <input type="checkbox"/> ACC <input type="checkbox"/> ON (before starting engine) <input type="checkbox"/> START <input type="checkbox"/> ON (after starting engine, while engine is running) <input type="checkbox"/> ON (after starting engine, engine is stopped)															
Timing	<input type="checkbox"/> Immediately after turning the ignition switch to ON <input type="checkbox"/> Immediately after turning the ignition switch to START															
	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 60%; padding: 2px;"><input type="checkbox"/> When accelerating</td> <td style="width: 20%; text-align: center; padding: 2px;">—</td> <td style="width: 20%; text-align: right; padding: 2px;">km/h</td> </tr> <tr> <td></td> <td style="text-align: center; padding: 2px;">—</td> <td style="text-align: right; padding: 2px;">MPH</td> </tr> <tr> <td style="padding: 2px;"><input type="checkbox"/> While traveling at a constant speed</td> <td style="text-align: center; padding: 2px;">km/h</td> <td style="text-align: right; padding: 2px;">MPH</td> </tr> <tr> <td style="padding: 2px;"><input type="checkbox"/> Decelerating</td> <td style="text-align: center; padding: 2px;">—</td> <td style="text-align: right; padding: 2px;">km/h</td> </tr> <tr> <td></td> <td style="text-align: center; padding: 2px;">—</td> <td style="text-align: right; padding: 2px;">MPH</td> </tr> </table>	<input type="checkbox"/> When accelerating	—	km/h		—	MPH	<input type="checkbox"/> While traveling at a constant speed	km/h	MPH	<input type="checkbox"/> Decelerating	—	km/h		—	MPH
<input type="checkbox"/> When accelerating	—	km/h														
	—	MPH														
<input type="checkbox"/> While traveling at a constant speed	km/h	MPH														
<input type="checkbox"/> Decelerating	—	km/h														
	—	MPH														

## Check List for Interview

BRAKE VACUUM CONTROL (BVC) (DIAGNOSTICS)

### 2. CONDITIONS UNDER WHICH TROUBLE OCCURS

Environment	a) Weather	<input type="checkbox"/> Fine <input type="checkbox"/> Cloudy <input type="checkbox"/> Rainy <input type="checkbox"/> Snowy <input type="checkbox"/> Others:	
	b) Ambient temperature	°C (°F)	
	c) Altitude	m (ft)	
	d) Road	<input type="checkbox"/> Inner city <input type="checkbox"/> Suburbs <input type="checkbox"/> Highway <input type="checkbox"/> General road <input type="checkbox"/> Uphill <input type="checkbox"/> Downhill <input type="checkbox"/> Paved road <input type="checkbox"/> Gravel road <input type="checkbox"/> Muddy road <input type="checkbox"/> Sandy place <input type="checkbox"/> Straight road <input type="checkbox"/> Sharp curve <input type="checkbox"/> Gentle road <input type="checkbox"/> S-curve <input type="checkbox"/> Road with a slope on both sides <input type="checkbox"/> Others:	
Condition	a) Brakes	Deceleration: _____ G	
		<input type="checkbox"/> continuous / <input type="checkbox"/> Intermittent	
	b) Accelerator	Acceleration: _____ G	
	<input type="checkbox"/> continuous / <input type="checkbox"/> Intermittent		
c) Vehicle speed	km/h	MPH	
	<input type="checkbox"/> Advancing <input type="checkbox"/> Accelerating <input type="checkbox"/> Decelerating <input type="checkbox"/> Low speed <input type="checkbox"/> Turning <input type="checkbox"/> Others:	<input type="checkbox"/> Immediately after starting the engine <input type="checkbox"/> Idling, etc.	



# General Description

BRAKE VACUUM CONTROL (BVC) (DIAGNOSTICS)

## 3. General Description

### A: CAUTION

#### 1. SRS AIRBAG SYSTEM

The airbag system wiring harness is routed near the main relay and ECM.

#### CAUTION:

- Do not use electrical test equipment on wiring harness and connector circuits of the airbag system.
- Be careful not to damage the airbag system wiring harness.

### B: INSPECTION

Before performing diagnosis, check the following items which might affect the brake vacuum control.

#### 1. BATTERY

Measure the battery voltage and check electrolyte.

**Standard voltage: 12 V or more**

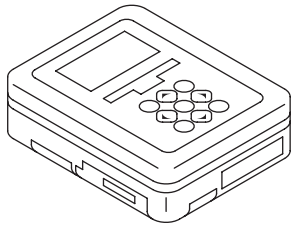
**Specific gravity: Above 1.260**

#### 2. BRAKE VACUUM HOSE

Make sure that the brake vacuum hose is not cracked or loose.

### C: PREPARATION TOOL

#### 1. SPECIAL TOOL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST1B022XU0	1B022XU0	SUBARU SELECT MONITOR III KIT	Used for troubleshooting the electrical system.

#### 2. GENERAL TOOL

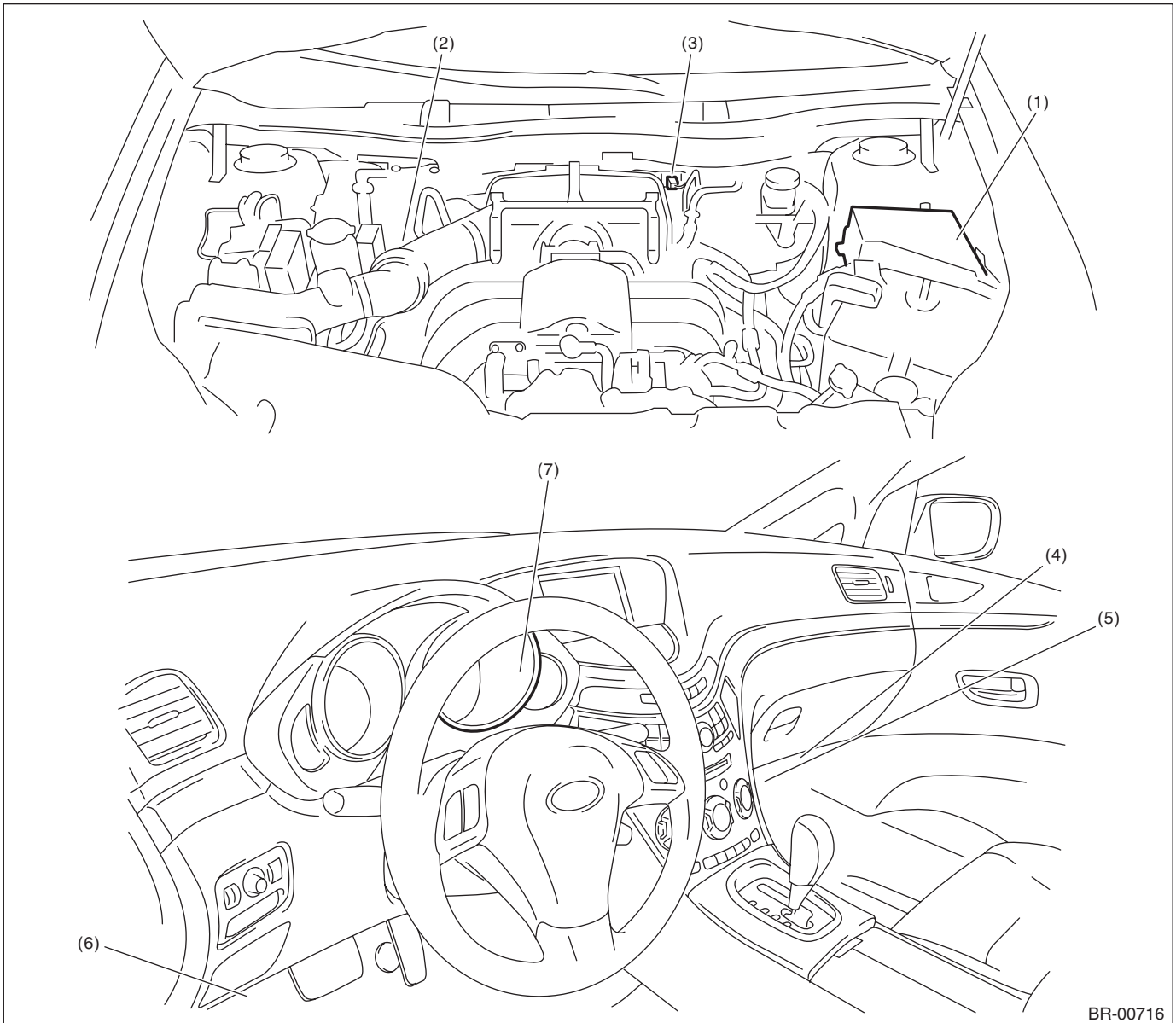
TOOL NAME	REMARKS
Circuit tester	Used for measuring resistance, voltage and current.
Oscilloscope	Used for measuring the sensor.

# Electrical Component Location

## BRAKE VACUUM CONTROL (BVC) (DIAGNOSTICS)

### 4. Electrical Component Location

#### A: LOCATION

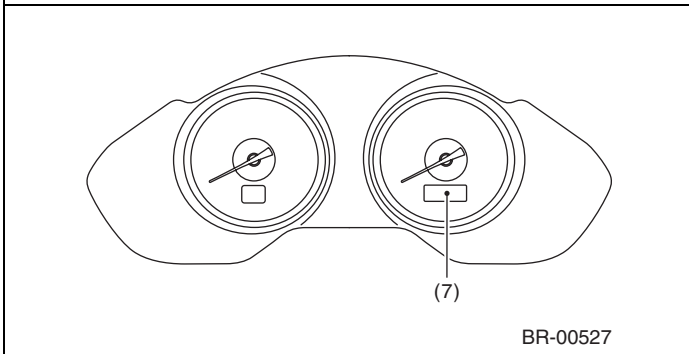
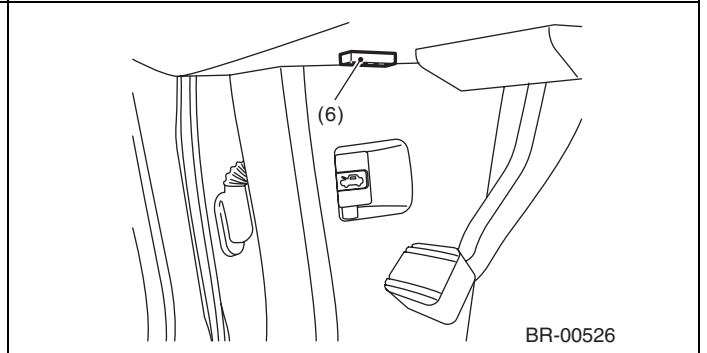
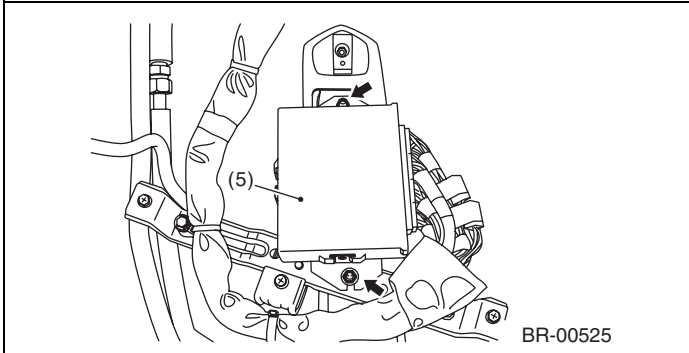
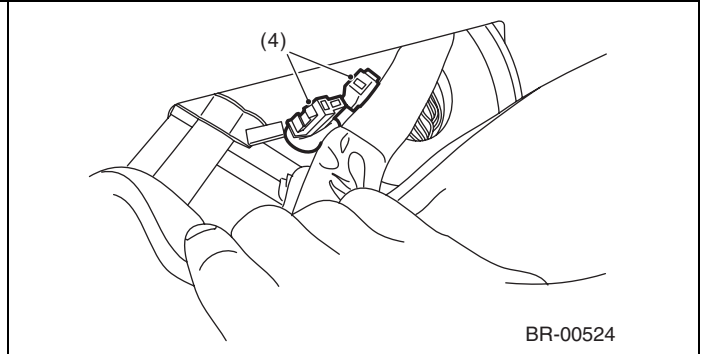
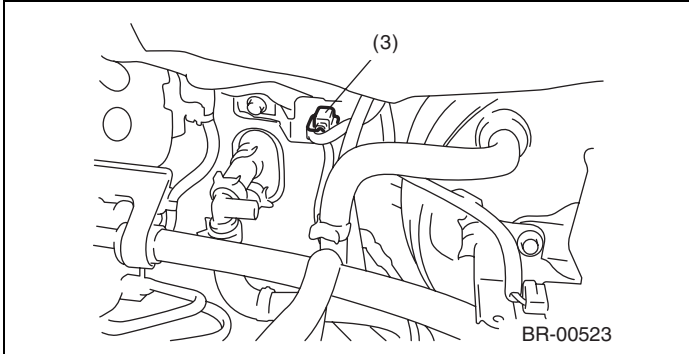
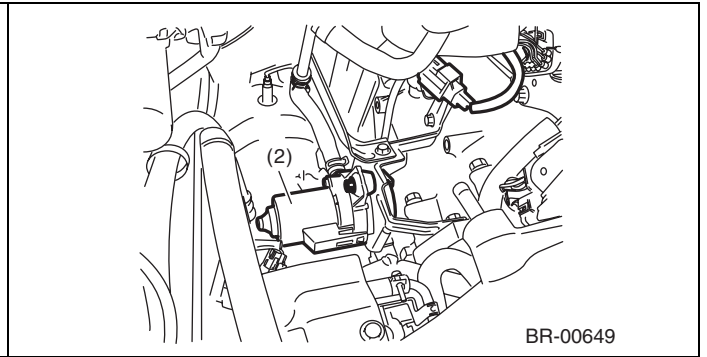
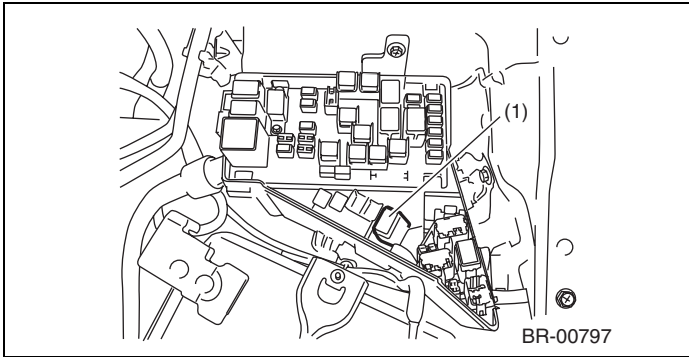


BR-00716

- |                             |                                    |                         |
|-----------------------------|------------------------------------|-------------------------|
| (1) Brake vacuum pump relay | (4) Delivery (test) mode connector | (6) Data link connector |
| (2) Brake vacuum pump       | (5) Engine control module (ECM)    | (7) Odo/trip meter      |
| (3) Brake vacuum sensor     |                                    |                         |

# Electrical Component Location

## BRAKE VACUUM CONTROL (BVC) (DIAGNOSTICS)

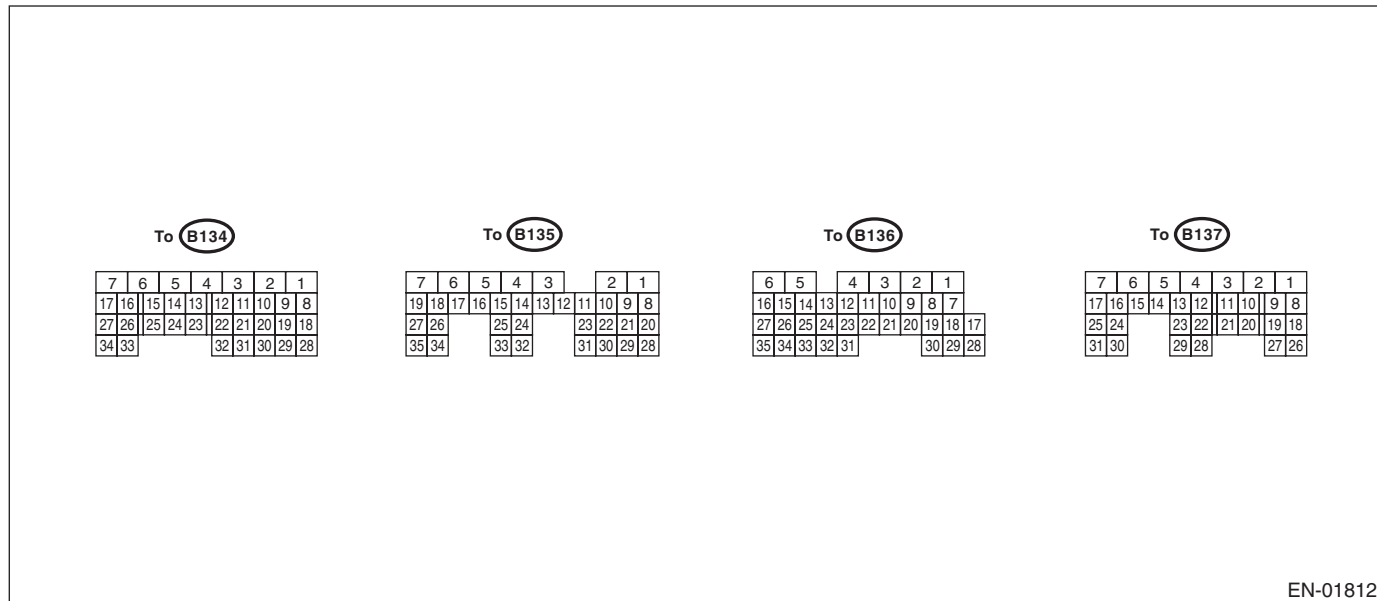


# Engine Control Module (ECM) I/O Signal

BRAKE VACUUM CONTROL (BVC) (DIAGNOSTICS)

## 5. Engine Control Module (ECM) I/O Signal

### A: ELECTRICAL SPECIFICATION



EN-01812

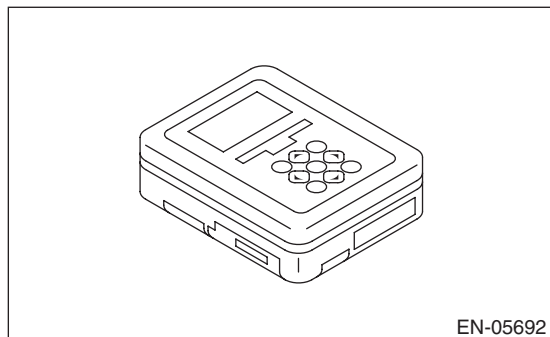
Description	Connector No.	Terminal No.	Signal (V)		Index	
			Ignition SW ON (engine OFF)	Engine ON (idling)		
Brake vacuum sensor	Signal	B137	9	1 — 3.8	—	
	Power supply	B135	22	5	—	
	Ground	B135	30	0	—	
Self-shutoff control	B135	13	0	0	—	
Brake vacuum pump	Relay drive	B135	27	10 — 13 (When pump is OFF)	12 — 14 (When pump is ON)	—
				0 (When pump is ON)	0 (When pump is ON)	
Brake vacuum pump	Electric load	B136	8	0 (When pump is OFF)	0 (When pump is OFF)	—
				10 — 13 (When pump is ON)	12 — 14 (When pump is ON)	
SSM communication line	B135	14	1 or less ←→ 4 or more	1 or less ←→ 4 or more	—	

## 6. Subaru Select Monitor

### A: OPERATION

#### 1. HOW TO USE THE SUBARU SELECT MONITOR

1) Prepare the Subaru Select Monitor kit. <Ref. to BVC(diag)-5, SPECIAL TOOL, PREPARATION TOOL, General Description.>



2) Prepare PC with Subaru Select Monitor installed.

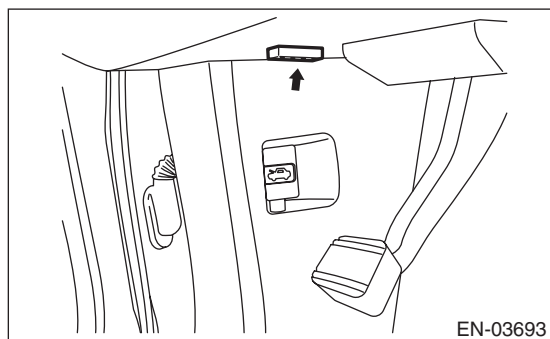
3) Connect the USB cable to SDI (Subaru Diagnosis Interface) and USB port on the personal computer (dedicated port for the Subaru Select Monitor).

#### NOTE:

The dedicated port for the Subaru Select Monitor means the USB port which was used to install the Subaru Select Monitor.

4) Connect the diagnosis cable to SDI.

5) Connect SDI to data link connector located in the lower portion of the instrument panel (on the driver's side).



#### CAUTION:

**Do not connect the scan tools other than the Subaru Select Monitor.**

6) Start the PC.

7) Turn the ignition switch to ON (engine OFF) and run the "PC application for Subaru Select Monitor".

#### NOTE:

For details concerning the operation procedure, refer to "PC application help for Subaru Select Monitor".

8) Record the DTC and data.

# Subaru Select Monitor

## BRAKE VACUUM CONTROL (BVC) (DIAGNOSTICS)

### 2. READ CURRENT DATA

- 1) On «Main Menu» display, select {Each System Check}.
- 2) On «System Selection Menu» display, select {Brake Vacuum Pump System}.
- 3) Click on the [OK] after the {3.6 DOHC} is displayed.
- 4) On the «Brake Vacuum Pump Sys Diagnosis Menu» display screen, select the {Current Data Display & Save}.
- 5) On «Data Display Menu» display, select {Data Display}.
- 6) Using the scroll key, scroll the display screen up or down until necessary data is shown.
  - A list of the support data is shown in the following table.

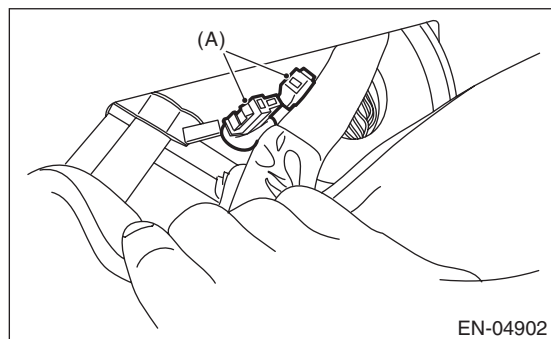
Display	Contents to be displayed	Unit of measure
Atmosphere Pressure	Atmospheric pressure is displayed.	mmHg, kPa or psig
Brake Booster Pressure	Brake booster pressure is displayed.	mmHg, kPa or psig
Test Mode Signal	Connection status of test mode terminal is displayed.	D check or U check
Vacuum Pump Motor	Operation status of vacuum pump motor is displayed.	ON or OFF
Vacuum Pump Motor Relay	Operation status of vacuum pump motor relay is displayed.	ON or OFF

#### NOTE:

For details concerning the operation procedure, refer to “PC application help for Subaru Select Monitor”.

### 3. SEQUENCE CONTROL MODE

- 1) Connect the delivery (test) mode connector located under the glove box.



(A) Delivery (test) mode connector

- 2) Turn the ignition switch to ON (engine OFF) and run the Subaru Select Monitor.
- 3) On the «Main Menu» display screen, select the {Each System Check}.
- 4) On the «System Selection Menu» display screen, select the {Brake Vacuum Pump System}.
- 5) Click the [OK] button after the {3.6 DOHC} is displayed.
- 6) On the «Brake Vacuum Pump Sys Diagnosis Menu» display screen, select the {Function Check Mode}.
- 7) When the “Sequence Control Mode will be started” is shown on the screen, click the [OK] button.
- 8) When the “Depress Brake Pedal Five Times” is shown on the screen, depress the brake pedal 5 times, and click the [OK] button while brake pedal is not depressed.
- 9) Click the [OK] button after the {OK} is displayed.

## Read Diagnostic Trouble Code (DTC)

BRAKE VACUUM CONTROL (BVC) (DIAGNOSTICS)

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### 7. Read Diagnostic Trouble Code (DTC)

#### A: OPERATION

- 1) On the «Main Menu» display, select {Each System Check}.
- 2) On the «System Selection Menu» display screen, select the {Brake Vacuum Pump System}.
- 3) Click the [OK] button after the {3.6 DOHC} is displayed.
- 4) On the «Brake Vacuum Pump Sys Diagnosis Menu» display screen, select the {Diagnostic Code(s) Display}.
- 5) Record the DTC and data.

#### NOTE:

- For details concerning the operation procedure, refer to the “PC application help for Subaru Select Monitor”.
- For details concerning DTCs, refer to “List of Diagnostic Trouble Code (DTC)”. <Ref. to BVC(diag)-14, List of Diagnostic Trouble Code (DTC).>

## Inspection Mode

BRAKE VACUUM CONTROL (BVC) (DIAGNOSTICS)

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### 8. Inspection Mode

#### A: PROCEDURE

Reproduce the malfunction occurrence condition as much as possible.

Drive the vehicle at least ten minutes.



## 9. Clear Memory Mode

### A: OPERATION

- 1) On the «Main Menu» display, select {Each System Check}.
- 2) On the «System Selection Menu» display screen, select the {Brake Vacuum Pump System}.
- 3) Click the [OK] button after the {3.6 DOHC} is displayed.
- 4) On the «Brake Vacuum Pump Sys Diagnosis», select {Clear Memory}.
- 5) When the “Clear Memory?” is shown on the screen, click the [YES] button.
- 6) When “Done” and “Turn ignition switch to OFF” are shown on the display screen, turn the ignition switch to OFF.

#### NOTE:

For details concerning the operation procedure, refer to the “PC application help for Subaru Select Monitor”.

## List of Diagnostic Trouble Code (DTC)

BRAKE VACUUM CONTROL (BVC) (DIAGNOSTICS)

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### 10. List of Diagnostic Trouble Code (DTC)

#### A: LIST

DTC	Display	Content of diagnosis	Reference
11	Sensor Output Out of Range	Brake vacuum sensor output error	<Ref. to BVC(diag)-15, DTC 11 SENSOR OUTPUT OUT OF RANGE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
12	Compare Error in Other Sensor	Brake booster relative pressure comparison error	<Ref. to BVC(diag)-17, DTC 12 COMPARE ERROR IN OTHER SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
13	Pressure Sensor Output	Brake vacuum sensor stuck error	<Ref. to BVC(diag)-20, DTC 13 PRESSURE SENSOR OUTPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
21	Discrepancy in Relays (ON)	Unmatched drive of brake vacuum pump relay and brake vacuum pump	<Ref. to BVC(diag)-23, DTC 21 DISCREPANCY IN RELAYS (ON), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
22	Discrepancy in Relays (OFF)	Unmatched drive of brake vacuum pump relay and brake vacuum pump	<Ref. to BVC(diag)-26, DTC 22 DISCREPANCY IN RELAYS (OFF), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
23	Pump Continuous Work	Continuous drive error of brake vacuum pump	<Ref. to BVC(diag)-29, DTC 23 PUMP CONTINUOUS WORK, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

BRAKE VACUUM CONTROL (BVC) (DIAGNOSTICS)

## 11. Diagnostic Procedure with Diagnostic Trouble Code (DTC)

### A: DTC 11 SENSOR OUTPUT OUT OF RANGE

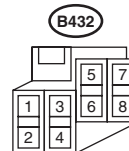
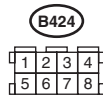
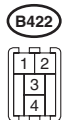
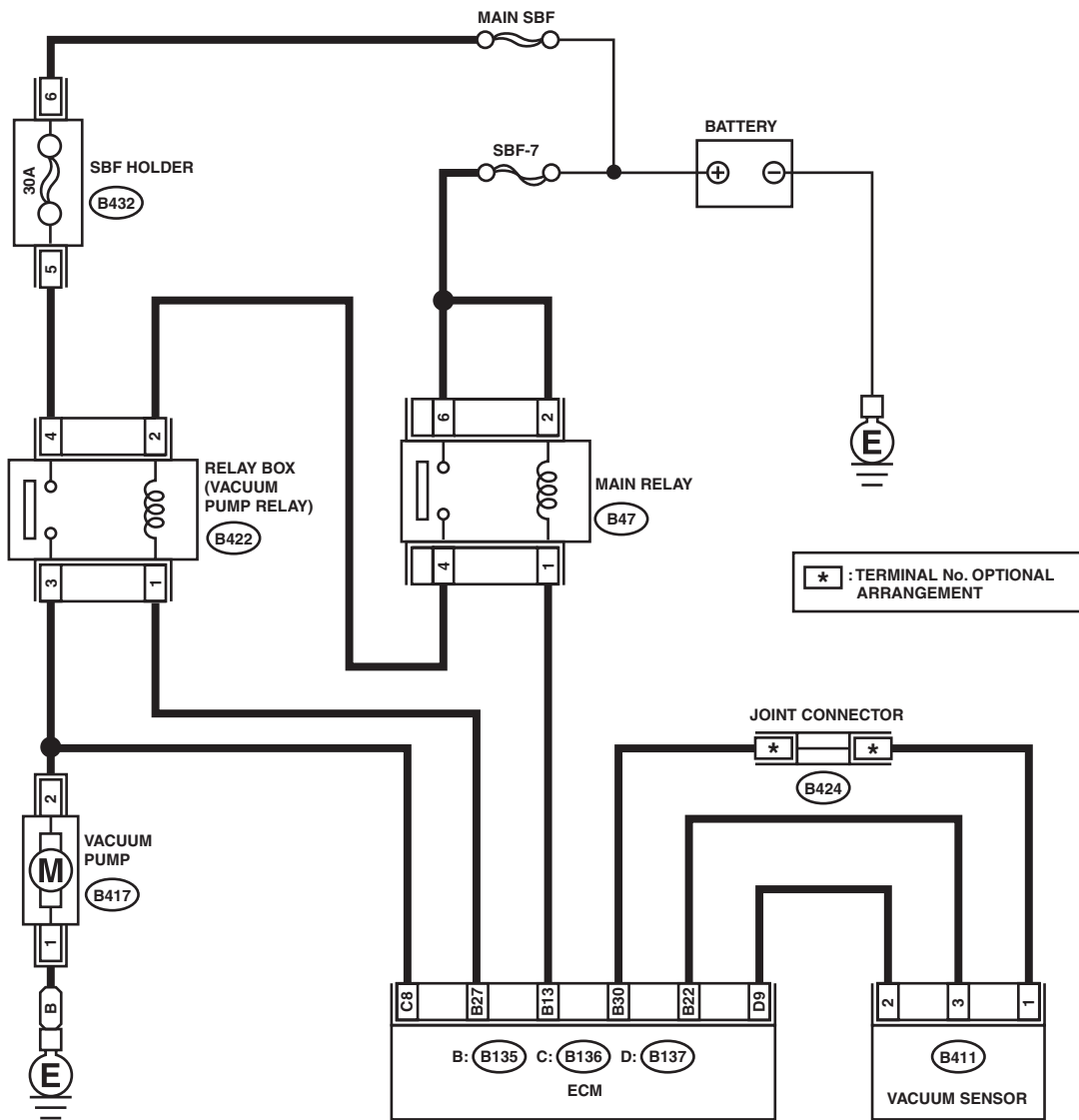
#### DTC DETECTING CONDITION:

Brake vacuum sensor output error

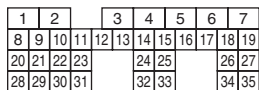
#### TROUBLE SYMPTOM:

Brake vacuum pump does not operate.

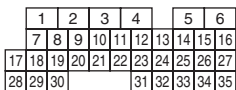
#### WIRING DIAGRAM:



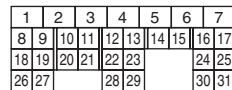
B: B135



C: B136



D: B137



BR-00786

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## BRAKE VACUUM CONTROL (BVC) (DIAGNOSTICS)

Step	Check	Yes	No
<b>1 CHECK BRAKE VACUUM SENSOR.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the brake vacuum sensor connector. 3) Remove the brake vacuum sensor. <Ref. to BR-42, REMOVAL, Brake Vacuum Sensor.> 4) Measure the resistance between brake vacuum sensor connector terminals. <b>Terminals</b> <b>No. 1 — No. 3:</b> <b>No. 2 — No. 3:</b>	Is the resistance 15 k $\Omega$ or less?	Go to step 2.	Replace the brake vacuum sensor. <Ref. to BR-42, Brake Vacuum Sensor.>
<b>2 CHECK HARNESS BETWEEN ECM AND BRAKE VACUUM SENSOR CONNECTOR.</b> 1) Disconnect the connectors from ECM. 2) Measure the resistance of harness between ECM and brake vacuum sensor connector terminal. <b>Connector &amp; terminal</b> <b>(B135) No. 30 — (B411) No. 1:</b> <b>(B135) No. 22 — (B411) No. 3:</b> <b>(B137) No. 9 — (B411) No. 2:</b>	Is the resistance less than 1 $\Omega$ ?	Go to step 3.	Repair the open circuit of harness between ECM and brake vacuum sensor connector terminal.
<b>3 CHECK HARNESS BETWEEN ECM AND BRAKE VACUUM SENSOR CONNECTOR.</b> Measure the resistance of harness between ECM and chassis ground. <b>Connector &amp; terminal</b> <b>(B135) No. 30 — Chassis ground:</b> <b>(B135) No. 22 — Chassis ground:</b> <b>(B137) No. 9 — Chassis ground:</b>	Is the resistance 1 M $\Omega$ or more?	Go to step 4.	Repair the ground short circuit of harness between ECM and brake vacuum sensor connector terminal.
<b>4 CHECK HARNESS BETWEEN ECM AND BRAKE VACUUM SENSOR CONNECTOR.</b> Measure the voltage between ECM connector and chassis ground. <b>Connector &amp; terminal</b> <b>(B135) No. 30 (+) — Chassis ground (-):</b> <b>(B135) No. 22 (+) — Chassis ground (-):</b> <b>(B137) No. 9 (+) — Chassis ground (-):</b>	Is the voltage 0.5 V or less?	Go to step 5.	Repair the battery short circuit between ECM and brake vacuum sensor connector.
<b>5 CHECK BRAKE VACUUM SENSOR POWER SUPPLY.</b> 1) Connect the connectors to ECM and brake vacuum sensor. 2) Turn the ignition switch to ON. 3) Measure the voltage between ECM connector terminals. <b>Connector &amp; terminal</b> <b>(B135) No. 22 (+) — (B135) No. 30 (-):</b>	Is the voltage 4.75 — 5.25 V?	Go to step 6.	Replace the ECM. <Ref. to FU(H6DO)-52, Engine Control Module (ECM).>
<b>6 CHECK CURRENT DATA.</b> 1) Turn the ignition switch to ON. 2) Depress the brake pedal several times, until the pedal becomes firm. 3) Read the current data of the brake vacuum pressure pump system using the Subaru Select Monitor. <Ref. to BVC(diag)-9, Subaru Select Monitor.>	Is the barometric pressure — brake booster pressure -8 — +8 mmHg?	Temporary poor contact occurs.	Replace the ECM. <Ref. to FU(H6DO)-52, Engine Control Module (ECM).>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

BRAKE VACUUM CONTROL (BVC) (DIAGNOSTICS)

## B: DTC 12 COMPARE ERROR IN OTHER SENSOR

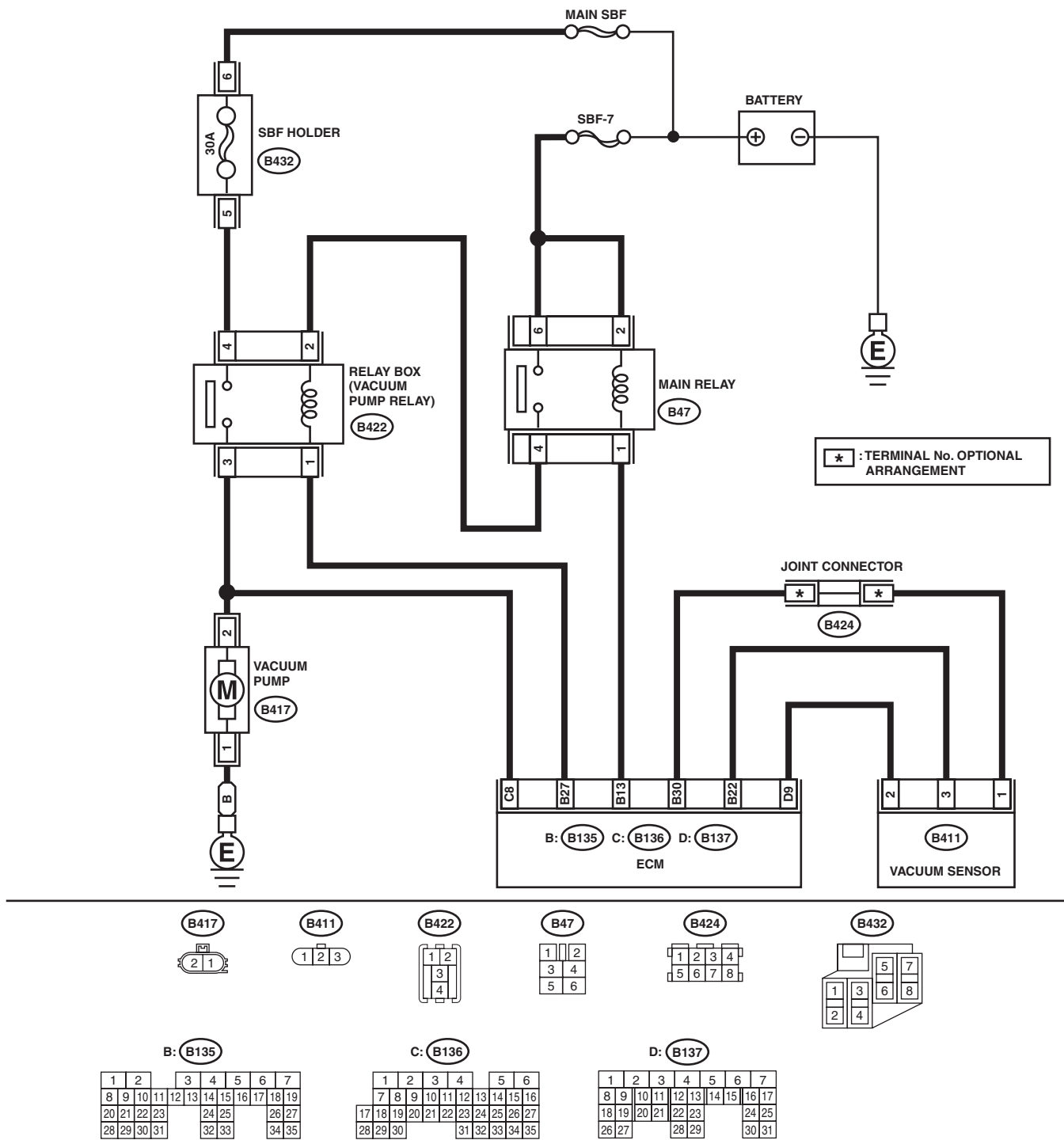
### DTC DETECTING CONDITION:

Error in comparison with other brake booster relative pressure

### TROUBLE SYMPTOM:

Brake vacuum pump does not operate.

### WIRING DIAGRAM:



BR-00786

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## BRAKE VACUUM CONTROL (BVC) (DIAGNOSTICS)

Step	Check	Yes	No
<b>1 CHECK BRAKE VACUUM HOSE.</b> 1) Turn the ignition switch to OFF. 2) Check the status of the brake vacuum hose connection.	Is the brake vacuum hose connected firmly?	Go to step 2.	Connect the brake vacuum hose.
<b>2 CHECK BRAKE VACUUM HOSE.</b> 1) Turn the ignition switch to ON and start engine. 2) Check for leakage from the brake vacuum hose.	Is there a leak from the brake vacuum hose?	Replace the brake vacuum hose.	Go to step 3.
<b>3 CHECK BRAKE VACUUM SENSOR.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the brake vacuum sensor connector. 3) Remove the brake vacuum sensor. <Ref. to BR-42, REMOVAL, Brake Vacuum Sensor.> 4) Measure the resistance between brake vacuum sensor connector terminals. <b>Terminals</b> <b>No. 1 — No. 3:</b> <b>No. 2 — No. 3:</b>	Is the resistance 15 k $\Omega$ or less?	Go to step 4.	Replace the brake vacuum sensor. <Ref. to BR-42, Brake Vacuum Sensor.>
<b>4 CHECK HARNESS BETWEEN ECM AND BRAKE VACUUM SENSOR CONNECTOR.</b> 1) Disconnect the connectors from ECM. 2) Measure the resistance of harness between ECM and brake vacuum sensor connector terminal. <b>Connector &amp; terminal</b> <b>(B135) No. 30 — (B411) No. 1:</b> <b>(B135) No. 22 — (B411) No. 3:</b> <b>(B137) No. 9 — (B411) No. 2:</b>	Is the resistance less than 1 $\Omega$ ?	Go to step 5.	Repair the open circuit of harness between ECM and brake vacuum sensor connector terminal.
<b>5 CHECK HARNESS BETWEEN ECM AND BRAKE VACUUM SENSOR CONNECTOR.</b> Measure the resistance of harness between ECM and chassis ground. <b>Connector &amp; terminal</b> <b>(B135) No. 30 — Chassis ground:</b> <b>(B135) No. 22 — Chassis ground:</b> <b>(B137) No. 9 — Chassis ground:</b>	Is the resistance 1 M $\Omega$ or more?	Go to step 6.	Repair the ground short circuit between the ECM and brake vacuum sensor connector terminal.
<b>6 CHECK HARNESS BETWEEN ECM AND BRAKE VACUUM SENSOR CONNECTOR.</b> Measure the voltage between ECM and chassis ground. <b>Connector &amp; terminal</b> <b>(B135) No. 30 (+) — Chassis ground (-):</b> <b>(B135) No. 22 (+) — Chassis ground (-):</b> <b>(B137) No. 9 (+) — Chassis ground (-):</b>	Is the voltage 0.5 V or less?	Go to step 7.	Repair the battery short of the harness between ECM and brake vacuum sensor connector.
<b>7 CHECK BRAKE VACUUM SENSOR POWER SUPPLY.</b> 1) Connect the connectors to ECM and brake vacuum sensor. 2) Turn the ignition switch to ON. 3) Measure the voltage between ECM connector terminals. <b>Connector &amp; terminal</b> <b>(B135) No. 22 (+) — (B135) No. 30 (-):</b>	Is the voltage 4.75 — 5.25 V?	Go to step 8.	Replace the ECM. <Ref. to FU(H6DO)-52, Engine Control Module (ECM).>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## BRAKE VACUUM CONTROL (BVC) (DIAGNOSTICS)

Step	Check	Yes	No
<b>8</b> <b>CHECK CURRENT DATA.</b> 1) Turn the ignition switch to ON. 2) Depress the brake pedal several times, until the pedal becomes firm. 3) Read the current data of the brake vacuum pressure pump system using the Subaru Select Monitor. <Ref. to BVC(diag)-9, Subaru Select Monitor.>	Is the barometric pressure — brake booster pressure -8 — +8 mmHg?	Temporary poor contact occurs.	Replace the ECM. <Ref. to FU(H6DO)-52, Engine Control Module (ECM).>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## BRAKE VACUUM CONTROL (BVC) (DIAGNOSTICS)

### C: DTC 13 PRESSURE SENSOR OUTPUT

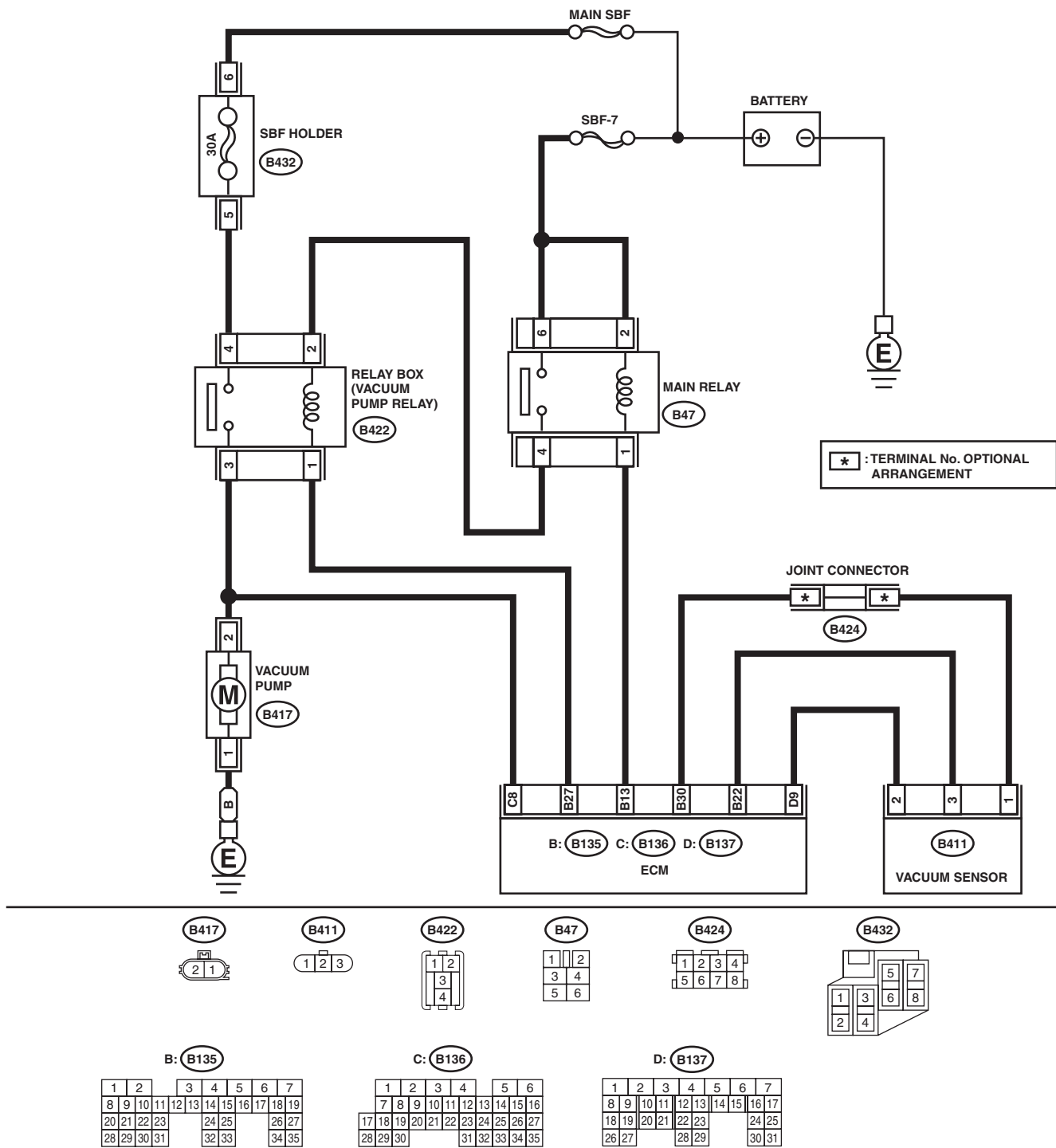
#### DTC DETECTING CONDITION:

Brake vacuum sensor seizure malfunction

#### TROUBLE SYMPTOM:

Brake vacuum pump does not operate.

#### WIRING DIAGRAM:



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# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## BRAKE VACUUM CONTROL (BVC) (DIAGNOSTICS)

Step	Check	Yes	No	
1	<b>CHECK BRAKE VACUUM HOSE.</b> 1) Turn the ignition switch to OFF. 2) Check the status of the brake vacuum hose connection.	Is the brake vacuum hose connected firmly?	Go to step 2.	Connect the brake vacuum hose.
2	<b>CHECK BRAKE VACUUM HOSE.</b> 1) Turn the ignition switch to ON and start engine. 2) Check for leakage from the brake vacuum hose.	Is there a leak from the brake vacuum hose?	Replace the brake vacuum hose.	Go to step 3.
3	<b>CHECK BRAKE VACUUM SENSOR CONNECTOR.</b> Check the status of the brake vacuum sensor connector connection.	Is the brake vacuum sensor connector connected firmly?	Go to step 4.	Connect the brake vacuum sensor connector.
4	<b>CHECK BRAKE VACUUM SENSOR.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the brake vacuum sensor connector. 3) Remove the brake vacuum sensor. <Ref. to BR-42, REMOVAL, Brake Vacuum Sensor.> 4) Measure the resistance between brake vacuum sensor connector terminals. <b>Connector &amp; terminal</b> <b>No. 1 — No. 3:</b> <b>No. 2 — No. 3:</b>	Is the resistance 15 kΩ or less?	Go to step 5.	Replace the brake vacuum sensor. <Ref. to BR-42, Brake Vacuum Sensor.>
5	<b>CHECK HARNESS BETWEEN ECM AND BRAKE VACUUM SENSOR CONNECTOR.</b> 1) Disconnect the connectors from ECM. 2) Measure the resistance of harness between ECM and brake vacuum sensor connector terminal. <b>Connector &amp; terminal</b> <b>(B135) No. 30 — (B411) No. 1:</b> <b>(B135) No. 22 — (B411) No. 3:</b> <b>(B137) No. 9 — (B411) No. 2:</b>	Is the resistance less than 1 Ω?	Go to step 6.	Repair the open circuit of harness between ECM and brake vacuum sensor connector terminal.
6	<b>CHECK HARNESS BETWEEN ECM AND BRAKE VACUUM SENSOR CONNECTOR.</b> Measure the resistance of harness between ECM and chassis ground. <b>Connector &amp; terminal</b> <b>(B135) No. 30 — Chassis ground:</b> <b>(B135) No. 22 — Chassis ground:</b> <b>(B137) No. 9 — Chassis ground:</b>	Is the resistance 1 MΩ or more?	Go to step 7.	Repair the ground short circuit of harness between ECM and brake vacuum sensor connector terminal.
7	<b>CHECK HARNESS BETWEEN ECM AND BRAKE VACUUM SENSOR CONNECTOR.</b> Measure the voltage between ECM and chassis ground. <b>Connector &amp; terminal</b> <b>(B135) No. 30 (+) — Chassis ground (-):</b> <b>(B135) No. 22 (+) — Chassis ground (-):</b> <b>(B137) No. 9 (+) — Chassis ground (-):</b>	Is the voltage 0.5 V or less?	Go to step 8.	Repair the battery short of the harness between ECM and brake vacuum sensor connector.
8	<b>CHECK BRAKE VACUUM SENSOR POWER SUPPLY.</b> 1) Connect the connectors to ECM and brake vacuum sensor. 2) Turn the ignition switch to ON. 3) Measure the voltage between ECM connector terminals. <b>Connector &amp; terminal</b> <b>(B135) No. 22 (+) — (B135) No. 30 (-):</b>	Is the voltage 4.75 — 5.25 V?	Go to step 9.	Replace the ECM. <Ref. to FU(H6DO)-52, Engine Control Module (ECM).>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## BRAKE VACUUM CONTROL (BVC) (DIAGNOSTICS)

Step	Check	Yes	No
<b>9</b> <b>CHECK CURRENT DATA.</b> 1) Turn the ignition switch to ON. 2) Depress the brake pedal several times, until the pedal becomes firm. 3) Read the current data of the brake vacuum pressure pump system using the Subaru Select Monitor. <Ref. to BVC(diag)-9, Subaru Select Monitor.>	Is the barometric pressure — brake booster pressure –8 — +8 mmHg?	Temporary poor contact occurs.	Replace the ECM. <Ref. to FU(H6DO)-52, Engine Control Module (ECM).>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

BRAKE VACUUM CONTROL (BVC) (DIAGNOSTICS)

## D: DTC 21 DISCREPANCY IN RELAYS (ON)

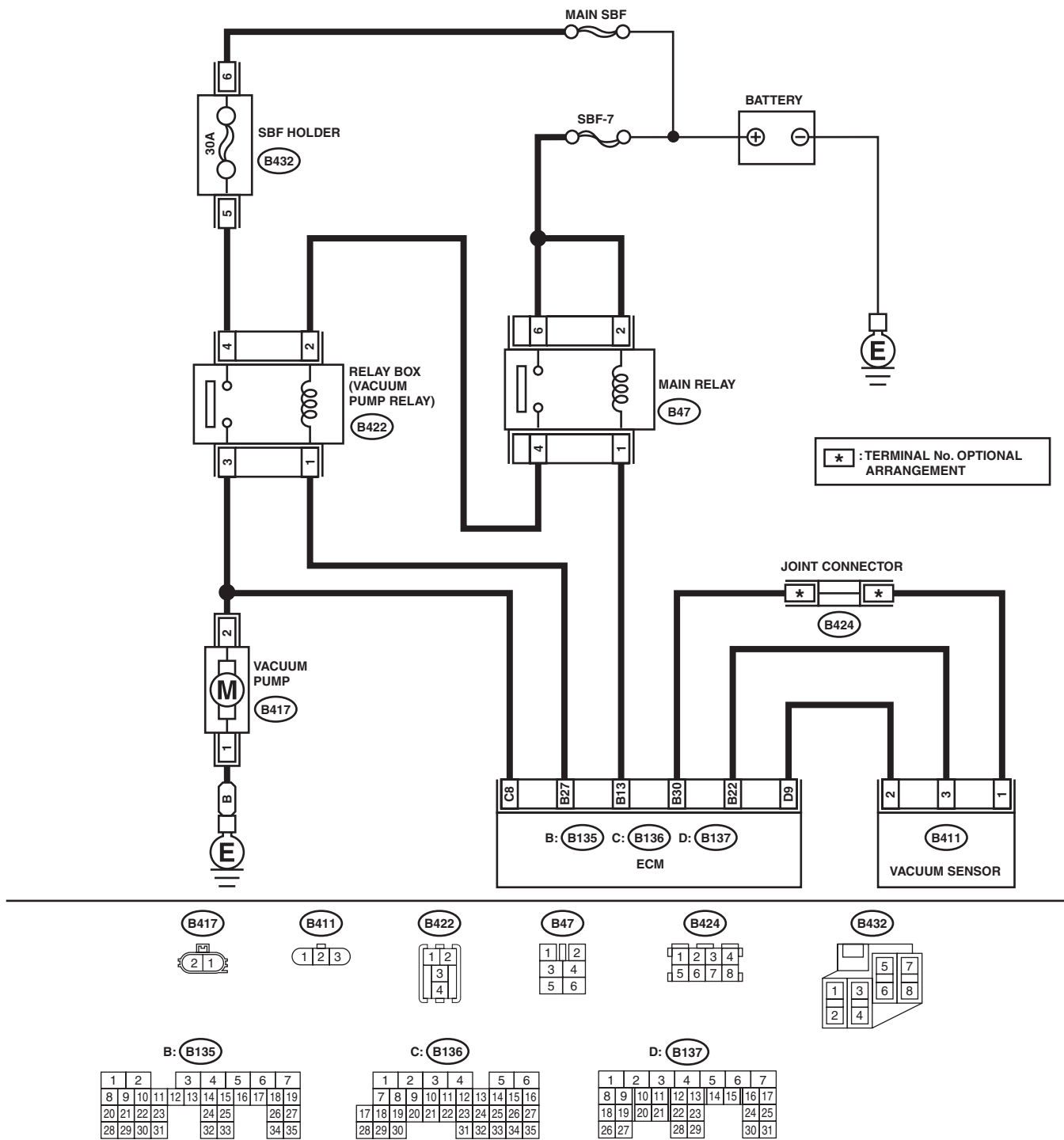
### DTC DETECTING CONDITION:

Drive does not match between brake vacuum pump relay and brake vacuum pump.

### TROUBLE SYMPTOM:

Brake vacuum pump does not operate.

### WIRING DIAGRAM:



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# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## BRAKE VACUUM CONTROL (BVC) (DIAGNOSTICS)

Step	Check	Yes	No
<b>1 CHECK CONNECTOR.</b> Check the status of the brake vacuum sensor and brake vacuum pump connection.	Are the brake vacuum sensor and brake vacuum pump connected firmly?	Go to step 2.	Connect the connector.
<b>2 CHECK FUSE.</b> 1) Turn the ignition switch to OFF. 2) Remove the brake vacuum pump fuse. 3) Check the condition of fuse.	Is the fuse blown out?	Replace the fuse.	Go to step 3.
<b>3 CHECK BRAKE VACUUM PUMP RELAY.</b> 1) Turn the ignition switch to OFF. 2) Remove the brake vacuum pump relay from relay box. 3) Connect the battery to the brake vacuum pump relay terminals No. 1 and No. 2. 4) Measure the resistance between brake vacuum pump relay terminals. <i>Terminals</i> <i>No. 3 — No. 4:</i>	Is the resistance less than 1 $\Omega$ ?	Go to step 4.	Replace the brake vacuum pump relay.
<b>4 CHECK BRAKE VACUUM PUMP RELAY POWER SUPPLY.</b> 1) Turn the ignition switch to ON. 2) Measure the voltage between brake vacuum pump relay connector and chassis ground. <i>Connector &amp; terminal</i> <i>(B422) No. 2 (+) — Chassis ground (-):</i> <i>(B422) No. 4 (+) — Chassis ground (-):</i>	Is the voltage 10 V or more?	Go to step 5.	Repair the open or ground short circuit of power supply circuit.
<b>5 CHECK HARNESS BETWEEN ECM AND BRAKE VACUUM PUMP RELAY CONNECTOR.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the ECM connector. 3) Measure the resistance of harness between ECM and brake vacuum pump relay connector terminal. <i>Connector &amp; terminal</i> <i>(B135) No. 27 — (B422) No. 1:</i>	Is the resistance less than 1 $\Omega$ ?	Go to step 6.	Repair the open circuit of harness between ECM and the brake vacuum pump relay connector terminal.
<b>6 CHECK HARNESS BETWEEN THE BRAKE VACUUM PUMP AND BRAKE VACUUM PUMP RELAY CONNECTOR.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the brake vacuum pump connector. 3) Measure the resistance of harness between brake vacuum pump and brake vacuum pump relay connector terminal. <i>Connector &amp; terminal</i> <i>(B422) No. 3 — (B417) No. 2:</i>	Is the resistance less than 1 $\Omega$ ?	Go to step 7.	Repair the open circuit of harness between brake vacuum pump and brake vacuum pump relay connector terminal.
<b>7 CHECK HARNESS BETWEEN ECM AND BRAKE VACUUM PUMP CONNECTOR.</b> Measure the resistance of harness between brake vacuum pump connector and chassis ground. <i>Connector &amp; terminal</i> <i>(B417) No. 2 — Chassis ground:</i>	Is the resistance 1 M $\Omega$ or more?	Go to step 8.	Repair the ground short circuit of harness between ECM and brake vacuum pump connector terminal.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## BRAKE VACUUM CONTROL (BVC) (DIAGNOSTICS)

Step	Check	Yes	No
<b>8</b> <b>CHECK HARNESS BETWEEN ECM AND BRAKE VACUUM PUMP CONNECTOR.</b> Measure the voltage between brake vacuum pump connector and chassis ground. <b>Connector &amp; terminal</b> <b>(B417) No. 2 (+) — Chassis ground (-):</b>	Is the voltage 0.5 V or less?	Go to step 9.	Repair the battery short of the harness between the ECM and the brake vacuum pump connector.
<b>9</b> <b>CHECK BRAKE VACUUM PUMP.</b> 1) Turn the ignition switch to OFF. 2) Remove the brake vacuum pump. <Ref. to BR-41, REMOVAL, Brake Vacuum Pump.> 3) Connect the battery positive terminal to the brake vacuum pump terminal No. 2, and the negative terminal to terminal No. 1.	Does the brake vacuum pump operate?	Go to step 10.	Replace the brake vacuum pump. <Ref. to BR-41, Brake Vacuum Pump.>
<b>10</b> <b>CHECK BRAKE VACUUM PUMP.</b> 1) Connect the brake vacuum pump relay. 2) Connect the connectors to the brake vacuum pump and ECM. 3) Turn the ignition switch to ON. 4) Execute the Function Check Mode of the brake negative pressure pump system using the Subaru Select Monitor. <Ref. to BVC(diag)-9, Subaru Select Monitor.>	Does the brake vacuum pump operate?	Temporary poor contact occurs.	Replace the ECM. <Ref. to FU(H6DO)-52, Engine Control Module (ECM).>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## BRAKE VACUUM CONTROL (BVC) (DIAGNOSTICS)

### E: DTC 22 DISCREPANCY IN RELAYS (OFF)

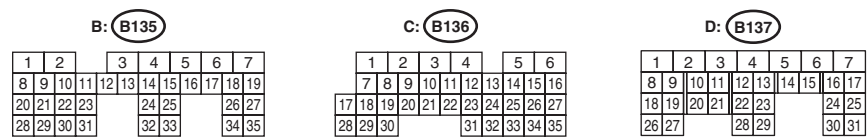
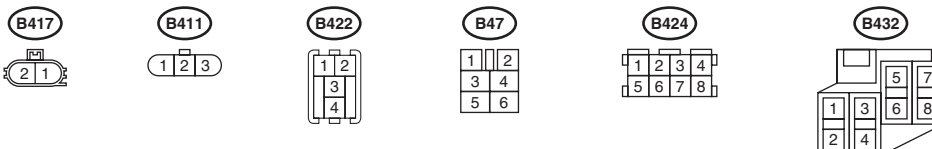
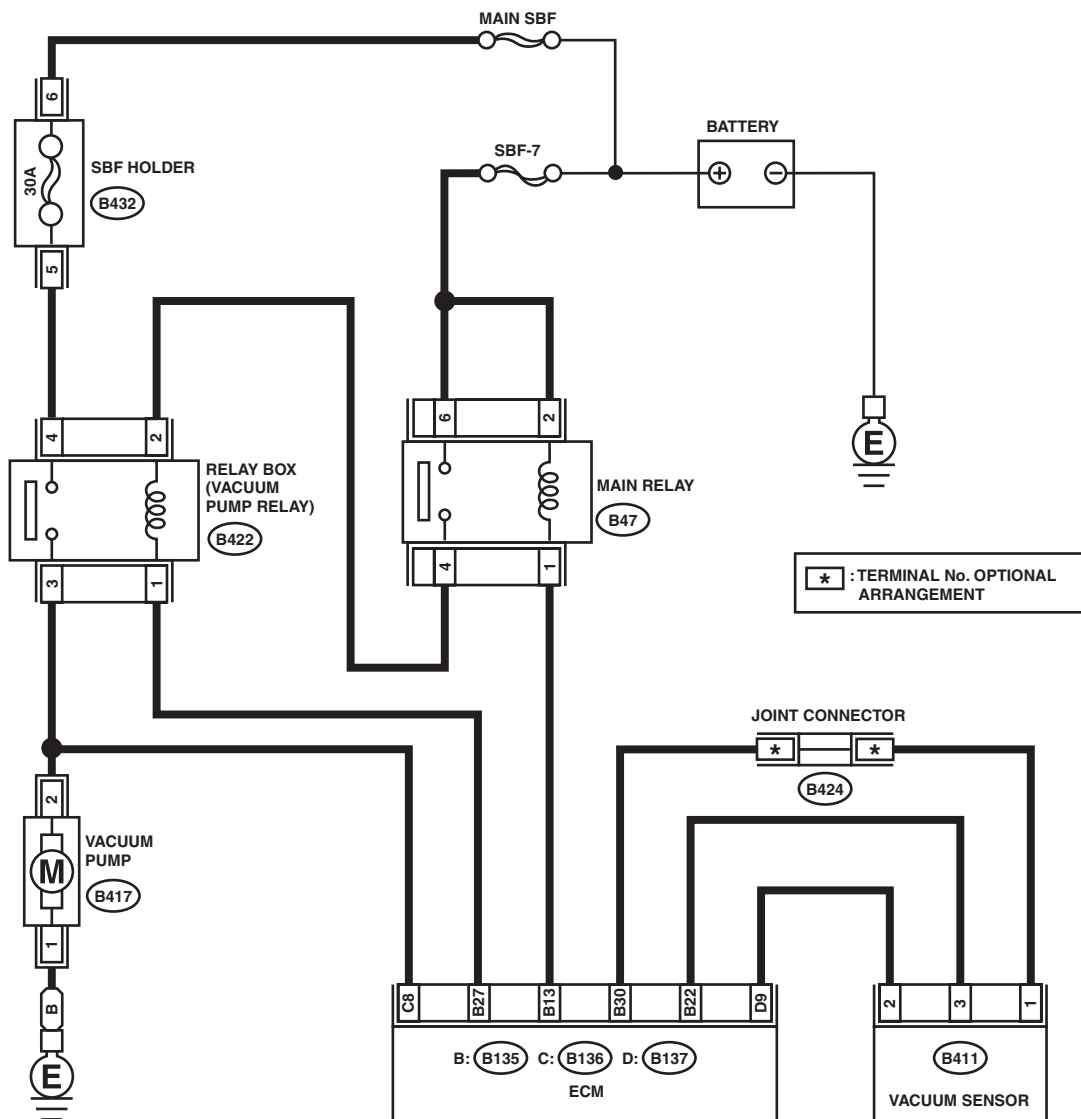
#### DTC DETECTING CONDITION:

Drive does not match between brake vacuum pump relay and brake vacuum pump.

#### TROUBLE SYMPTOM:

Vacuum pump does not operate properly.

#### WIRING DIAGRAM:



BR-00786

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## BRAKE VACUUM CONTROL (BVC) (DIAGNOSTICS)

	Step	Check	Yes	No
1	<b>CHECK BRAKE VACUUM PUMP RELAY.</b> 1) Turn the ignition switch to OFF. 2) Remove the brake vacuum pump relay from relay box. 3) Connect the battery to the brake vacuum pump relay terminals No. 1 and No. 2. 4) Measure the resistance between brake vacuum pump relay terminals. <b>Terminals</b> <b>No. 3 — No. 4:</b>	Is the resistance less than 1 $\Omega$ ?	Go to step 2.	Replace the brake vacuum pump relay.
2	<b>CHECK BRAKE VACUUM PUMP RELAY POWER SUPPLY.</b> 1) Turn the ignition switch to ON. 2) Measure the voltage between brake vacuum pump relay connector and chassis ground. <b>Connector &amp; terminal</b> <b>(B422) No. 2 (+) — Chassis ground (-):</b> <b>(B422) No. 4 (+) — Chassis ground (-):</b>	Is the voltage 10 V or more?	Go to step 3.	Repair the open or ground short circuit of power supply circuit.
3	<b>CHECK HARNESS BETWEEN ECM AND BRAKE VACUUM PUMP RELAY CONNECTOR.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the ECM connector. 3) Measure the resistance of harness between ECM and brake vacuum pump relay connector terminal. <b>Connector &amp; terminal</b> <b>(B135) No. 27 — (B422) No. 1:</b> <b>(B136) No. 8 — (B422) No. 3:</b>	Is the resistance less than 1 $\Omega$ ?	Go to step 4.	Repair the open circuit of harness between ECM and the brake vacuum pump relay connector terminal.
4	<b>CHECK HARNESS BETWEEN THE BRAKE VACUUM PUMP AND BRAKE VACUUM PUMP RELAY CONNECTOR.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the brake vacuum pump connector. 3) Measure the resistance of harness between brake vacuum pump and brake vacuum pump relay connector terminal. <b>Connector &amp; terminal</b> <b>(B422) No. 3 — (B417) No. 2:</b>	Is the resistance less than 1 $\Omega$ ?	Go to step 5.	Repair the open circuit of harness between brake vacuum pump and brake vacuum pump relay connector terminal.
5	<b>CHECK MOTOR GROUND.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the brake vacuum pump connector. 3) Measure the resistance between brake vacuum pump connector and chassis ground. <b>Connector &amp; terminal</b> <b>(B417) No. 1 — Chassis ground:</b>	Is the resistance less than 1 $\Omega$ ?	Go to step 6.	Repair the ground circuit.
6	<b>CHECK BRAKE VACUUM PUMP.</b> 1) Turn the ignition switch to OFF. 2) Remove the brake vacuum pump. <Ref. to BR-41, REMOVAL, Brake Vacuum Pump.> 3) Connect the battery to the brake vacuum pump terminals No. 2 (+) and No. 1 (-).	Does the brake vacuum pump operate?	Go to step 7.	Replace the brake vacuum pump. <Ref. to BR-41, Brake Vacuum Pump.>

## Diagnostic Procedure with Diagnostic Trouble Code (DTC)

### BRAKE VACUUM CONTROL (BVC) (DIAGNOSTICS)

	Step	Check	Yes	No
7	<b>CHECK ECM.</b> 1) Connect the brake vacuum pump, brake vacuum pump relay, and connector. 2) Perform the Sequence Control Mode. <Ref. to BVC(diag)-10, SEQUENCE CONTROL MODE, OPERATION, Subaru Select Monitor.>	Does the brake vacuum pump operate?	Temporary poor contact occurs.	Replace the ECM. <Ref. to FU(H6DO)-52, Engine Control Module (ECM).>



# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

BRAKE VACUUM CONTROL (BVC) (DIAGNOSTICS)

## F: DTC 23 PUMP CONTINUOUS WORK

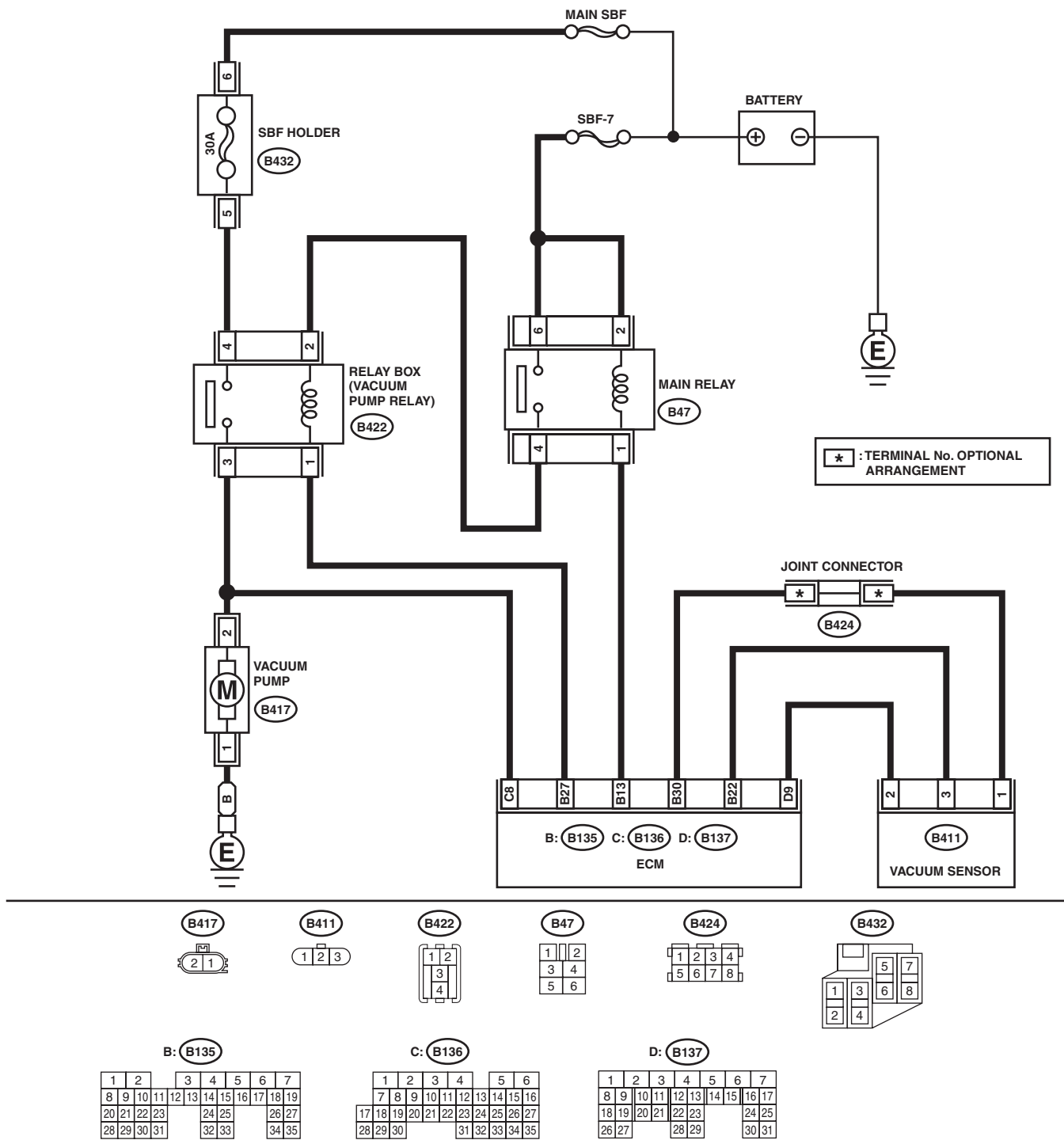
### DTC DETECTING CONDITION:

Malfunction in brake vacuum pump continuous drive error

### TROUBLE SYMPTOM:

Brake vacuum pump operates continuously.

### WIRING DIAGRAM:



BR-00786

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## BRAKE VACUUM CONTROL (BVC) (DIAGNOSTICS)

Step	Check	Yes	No
<b>1 CHECK BRAKE VACUUM HOSE.</b> 1) Turn the ignition switch to OFF. 2) Check the status of the brake vacuum hose connection.	Is the brake vacuum hose connected firmly?	Go to step 2.	Connect the brake vacuum hose.
<b>2 CHECK BRAKE VACUUM HOSE.</b> 1) Turn the ignition switch to ON and start engine. 2) Check for leakage from the brake vacuum hose.	Is there a leak from the brake vacuum hose?	Replace the brake vacuum hose.	Go to step 3.
<b>3 CHECK BRAKE VACUUM PUMP RELAY.</b> 1) Turn the ignition switch to OFF. 2) Remove the brake vacuum pump relay from relay box. 3) Connect the battery to the brake vacuum pump relay terminals No. 1 and No. 2. 4) Measure the resistance between brake vacuum pump relay terminals. <i>Terminals</i> <i>No. 3 — No. 4:</i>	Is the resistance less than 1 $\Omega$ ?	Go to step 4.	Replace the brake vacuum pump relay.
<b>4 CHECK BRAKE VACUUM PUMP RELAY POWER SUPPLY.</b> 1) Turn the ignition switch to ON. 2) Measure the voltage between brake vacuum pump relay connector and chassis ground. <i>Connector &amp; terminal</i> <i>(B422) No. 2 (+) — Chassis ground (-):</i> <i>(B422) No. 4 (+) — Chassis ground (-):</i>	Is the voltage 10 V or more?	Go to step 5.	Repair the open or ground short circuit of power supply circuit.
<b>5 CHECK HARNESS BETWEEN ECM AND BRAKE VACUUM PUMP RELAY CONNECTOR.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the ECM connector. 3) Measure the resistance of harness between ECM and brake vacuum pump relay connector terminal. <i>Connector &amp; terminal</i> <i>(B135) No. 27 — (B422) No. 1:</i> <i>(B136) No. 8 — (B422) No. 3:</i>	Is the resistance less than 1 $\Omega$ ?	Go to step 6.	Repair the open circuit of harness between ECM and the brake vacuum pump relay connector terminal.
<b>6 CHECK HARNESS BETWEEN THE BRAKE VACUUM PUMP AND BRAKE VACUUM PUMP RELAY CONNECTOR.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the brake vacuum pump connector. 3) Measure the resistance of harness between brake vacuum pump and brake vacuum pump relay connector terminal. <i>Connector &amp; terminal</i> <i>(B422) No. 3 — (B417) No. 2:</i>	Is the resistance less than 1 $\Omega$ ?	Go to step 7.	Repair the open circuit of harness between brake vacuum pump and brake vacuum pump relay connector terminal.
<b>7 CHECK ECM.</b> 1) Connect the brake vacuum pump, brake vacuum pump relay, and connector. 2) Perform the Sequence Control Mode. <Ref. to BVC(diag)-10, SEQUENCE CONTROL MODE, OPERATION, Subaru Select Monitor.>	Does the brake vacuum pump operate?	Temporary poor contact occurs.	Replace the ECM. <Ref. to FU(H6DO)-52, Engine Control Module (ECM).>

# General Diagnostic Table

BRAKE VACUUM CONTROL (BVC) (DIAGNOSTICS)

## 12. General Diagnostic Table

### A: INSPECTION

Symptom		Main probable cause	Other probable cause
Poor brake performance	Long braking/ stopping distance	<ul style="list-style-type: none"> <li>• Brake pad</li> <li>• Aeration to brake line</li> <li>• Tire specifications, tire wear and air pressures</li> <li>• Incorrect wiring or piping connections</li> </ul>	<ul style="list-style-type: none"> <li>• Master cylinder</li> <li>• Brake caliper</li> <li>• Disc rotor</li> <li>• Brake pipe</li> <li>• Brake booster</li> </ul>
	Long brake pedal stroke	<ul style="list-style-type: none"> <li>• Aeration to brake line</li> <li>• Brake pedal play</li> </ul>	<ul style="list-style-type: none"> <li>• Master cylinder</li> <li>• Brake caliper</li> <li>• Brake pad</li> <li>• Brake pipe</li> <li>• Brake booster</li> </ul>
	Short brake pedal stroke	<ul style="list-style-type: none"> <li>• Brake vacuum pump</li> <li>• Brake vacuum sensor</li> <li>• Brake vacuum hose</li> </ul>	<ul style="list-style-type: none"> <li>• Master cylinder</li> <li>• Brake caliper</li> <li>• Brake pad</li> <li>• Brake pipe</li> <li>• Brake booster</li> </ul>

# General Diagnostic Table

BRAKE VACUUM CONTROL (BVC) (DIAGNOSTICS)

---

# PARKING BRAKE

# *PB*

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3. Parking Brake Cable .....	5
4. Parking Brake Assembly (Rear Disc Brake) .....	7
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# General Description

## PARKING BRAKE

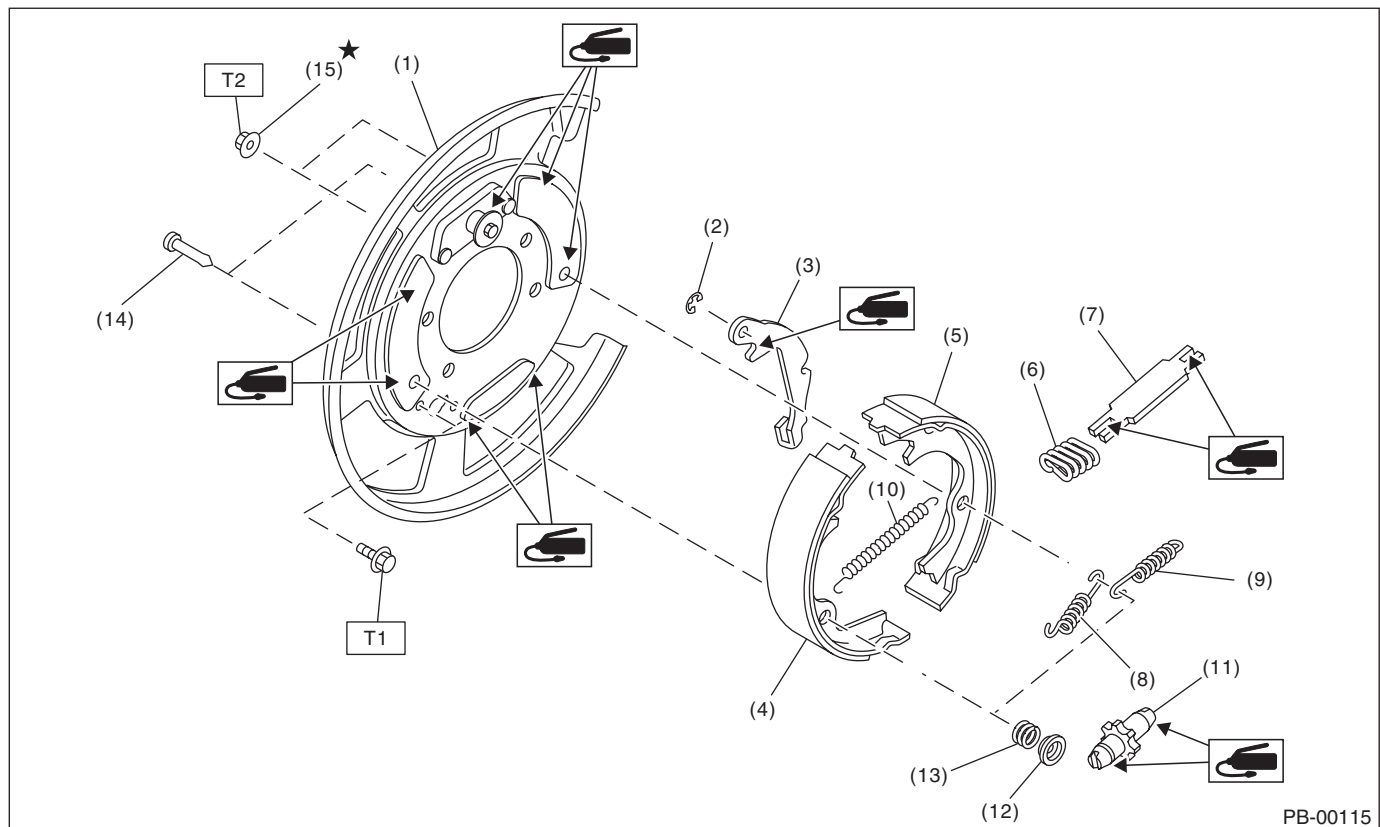
### 1. General Description

#### A: SPECIFICATION

Type		Mechanical, drum in disc rear brakes
Effective drum diameter	mm (in)	210 (8.27)
Lining dimensions (Length × Width × Thickness)	mm (in)	238.2 × 30.0 × 4.0 (9.378 × 1.181 × 0.157)
Clearance adjustment		Manual adjustment
Pedal stroke	notches/N (kgf, lb)	5 — 6/300 (30.6, 67)

#### B: COMPONENT

##### 1. PARKING BRAKE (REAR DISC BRAKE)



PB-00115

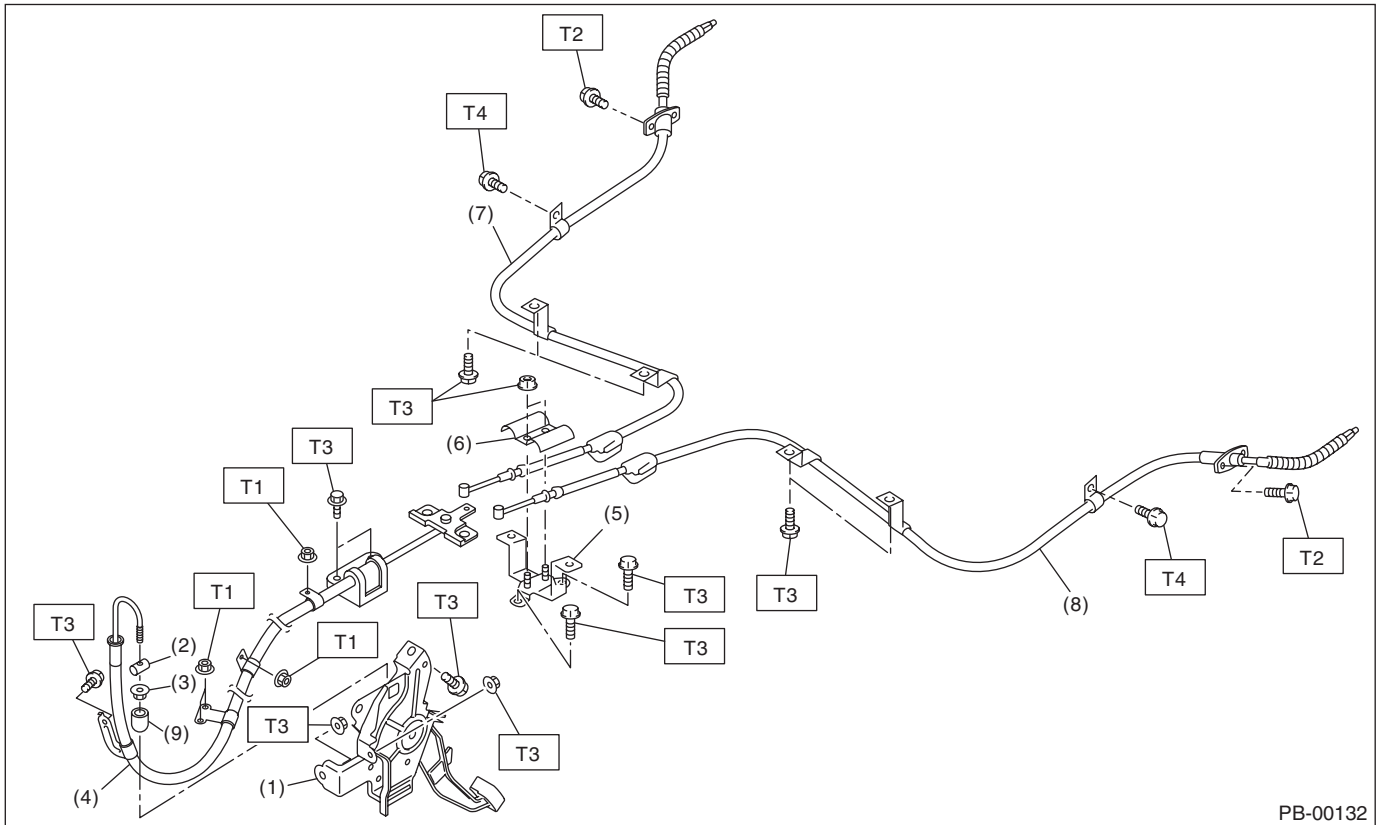
- |                                    |                             |                                  |
|------------------------------------|-----------------------------|----------------------------------|
| (1) Back plate                     | (8) Primary return spring   | (14) Shoe hold pin               |
| (2) Retainer                       | (9) Secondary return spring | (15) Self locking nut (with WAX) |
| (3) Lever                          | (10) Adjusting spring       |                                  |
| (4) Parking brake shoe (primary)   | (11) Adjuster               |                                  |
| (5) Parking brake shoe (secondary) | (12) Brake shoe cup         |                                  |
| (6) Strut spring                   | (13) Brake shoe spring      |                                  |
| (7) Strut                          |                             |                                  |

**Tightening torque: N·m (kgf·m, ft·lb)**

**T1: 8 (0.8, 5.9)**

**T2: 75 (7.6, 55.3)**

## 2. PARKING BRAKE CABLE



PB-00132

- |                                      |                                 |
|--------------------------------------|---------------------------------|
| (1) Parking brake pedal              | (6) Clamp                       |
| (2) Spacer                           | (7) Rear parking brake cable RH |
| (3) Adjusting nut (Self-locking nut) | (8) Rear parking brake cable LH |
| (4) Front parking brake cable        | (9) Adjuster cap                |
| (5) Bracket                          |                                 |

**Tightening torque: N-m (kgf-m, ft-lb)**

- T1: 7.5 (0.76, 5.5)**  
**T2: 8 (0.8, 5.9)**  
**T3: 18 (1.8, 13.3)**  
**T4: 33 (3.4, 24.3)**

### C: CAUTION

- Wear appropriate work clothing, including a cap, protective goggles and protective shoes when performing any work.
- Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
- Vehicle components are extremely hot after driving. Be wary of receiving burns from heated parts.
- Use SUBARU genuine grease etc. or equivalent. Do not mix grease etc. of different grades or manufacturers.
- Be sure to tighten fasteners including bolts and nuts to the specified torque.
- Place shop jacks or rigid racks at the specified points.
- Before securing a part in a vise, place cushioning material such as wood blocks, aluminum plate or cloth between the part and the vise.
- Make sure grease does not come into contact with the parking shoes.

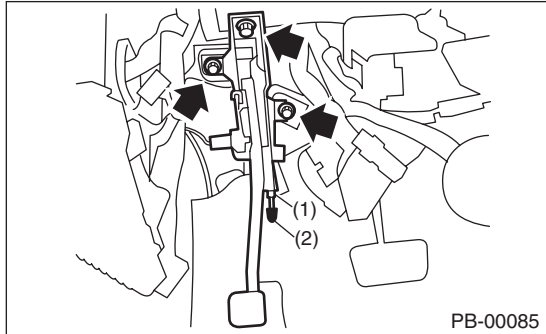
# Parking Brake Pedal

## PARKING BRAKE

### 2. Parking Brake Pedal

#### A: REMOVAL

- 1) Set the wheel stoppers to tires.
- 2) Remove the instrument panel lower cover. <Ref. to EI-37, REMOVAL, Instrument Panel Lower Cover.>
- 3) Disconnect the parking brake switch connector.
- 4) Remove the parking brake lever.



- (1) Adjusting nut (Self-locking nut)
- (2) Adjuster cap

- 5) Remove the adjuster cap and parking cable adjusting nut (self-locking nut).
- 6) Remove the clip from the parking brake pedal, and remove the front parking brake cable.



- (1) Clip

#### B: INSTALLATION

- 1) Install in the reverse order of removal.

#### *Tightening torque:*

#### **Parking brake pedal**

**18 N·m (1.8 kgf·m, 13.3 ft·lb)**

- 2) Install a new adjusting nut (self-locking nut).
- 3) Adjust the pedal stroke. <Ref. to PB-4, ADJUSTMENT, Parking Brake Pedal.>

#### C: INSPECTION

- 1) Operate the parking brake pedal 3 to 4 times and fully return the pedal.
- 2) Step on the parking brake pedal slowly and count the notches.

#### **Pedal stroke:**

**When stepped on with a force of 300 N (30.6 kgf, 67 lb): 5-6 notches**

If it is not within the specified value, adjust the parking brake. <Ref. to PB-9, ADJUSTMENT, Parking Brake Assembly (Rear Disc Brake).>

#### D: ADJUSTMENT

Adjust the parking brake pedal stroke. <Ref. to PB-9, PEDAL STROKE, ADJUSTMENT, Parking Brake Assembly (Rear Disc Brake).>

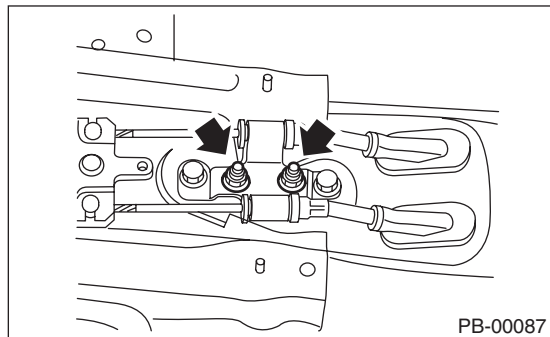


## 3. Parking Brake Cable

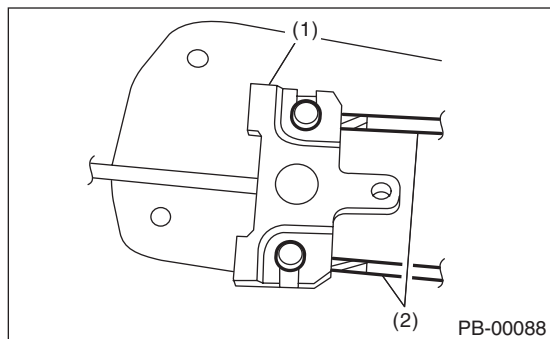
### A: REMOVAL

#### 1. FRONT PARKING BRAKE CABLE

- 1) Remove the driver's seat.
- 2) Remove the console box.
- 3) Lift the floor mat.
- 4) Remove the parking brake pedal. <Ref. to PB-4, REMOVAL, Parking Brake Pedal.>
- 5) Roll up the floor mat and remove the clamps.

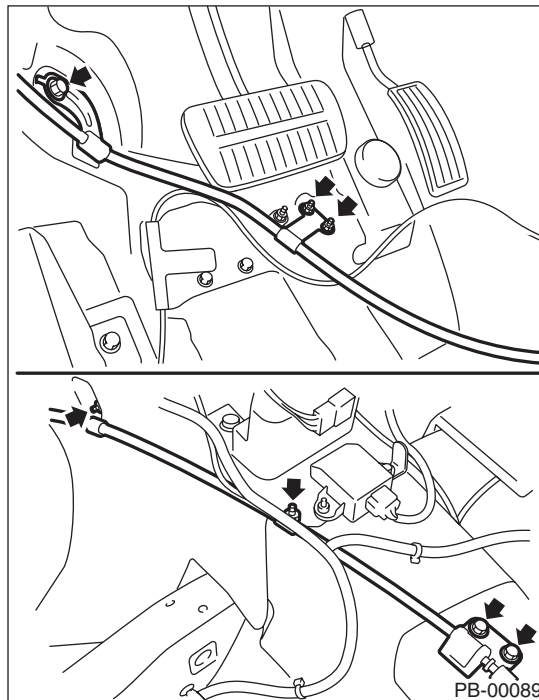


- 6) Remove the cable end from the equalizer.



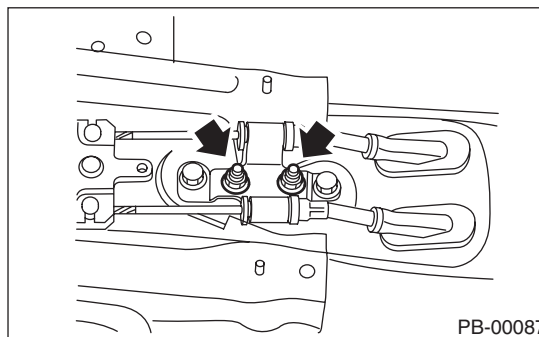
- (1) Equalizer
- (2) Cable end

- 7) Remove the parking brake cable bracket on the driver's side floor, and remove the front parking brake cable.

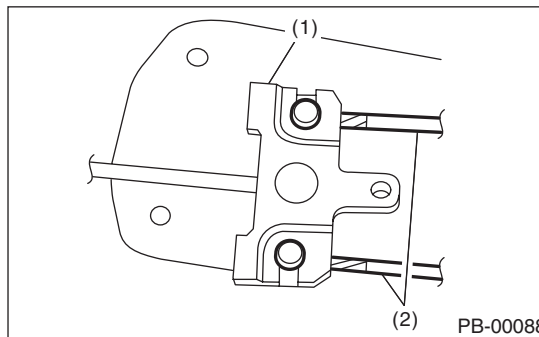


#### 2. REAR PARKING BRAKE CABLE

- 1) Set the vehicle on a lift.
- 2) Remove the console box.
- 3) Roll up the floor mat and remove the clamps.



- 4) Remove the cable end from the equalizer.



- (1) Equalizer
- (2) Cable end

# Parking Brake Cable

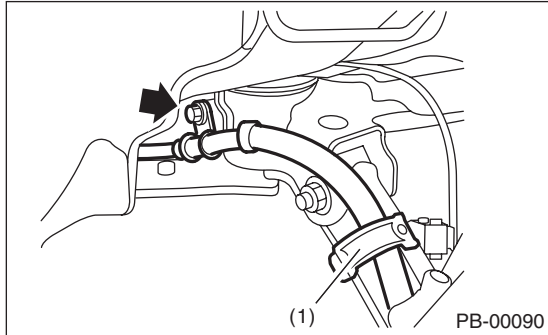
## PARKING BRAKE

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5) Lift up the vehicle, and then remove the rear wheels.

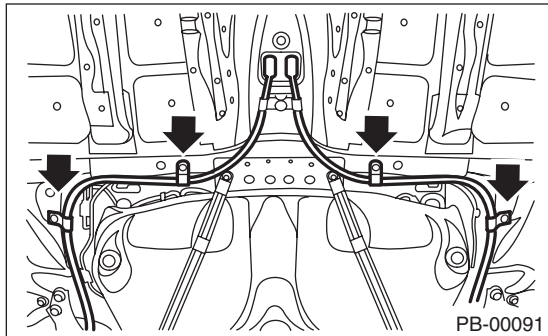
6) Remove the rear parking brake cable from the rear brake. <Ref. to PB-7, REMOVAL, Parking Brake Assembly (Rear Disc Brake).>

7) Remove the cable clamp, and remove the parking brake cable from the guide.



(1) Guide

8) Remove the cable clamp from rear floor.



9) Remove the cable assembly.

## **B: INSTALLATION**

1) Install in the reverse order of removal.

2) Adjust the parking brake pedal stroke. <Ref. to PB-4, ADJUSTMENT, Parking Brake Pedal.>

### ***Tightening torque:***

<Ref. to PB-2, COMPONENT, General Description.>

## **C: INSPECTION**

Check and replace the removed cable if damaged, rusty or faulty.

1) Check the cable for smooth operation.

2) Check the front parking brake cable for damage and rust.

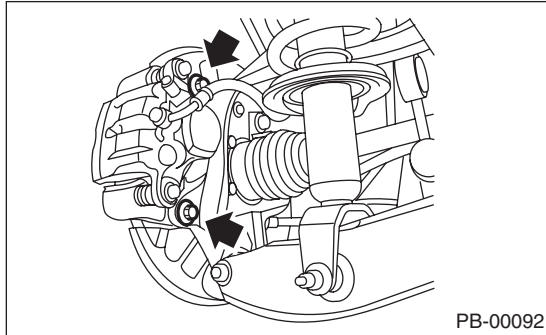
3) Check the rear parking brake cable for damage, bends and cracks.

4) Check the boot for damage, cracks, and corrosion.

## 4. Parking Brake Assembly (Rear Disc Brake)

### A: REMOVAL

- 1) Release the parking brake.
- 2) Lift up the vehicle, and then remove the rear wheels.
- 3) Remove the two mounting bolts and remove the disc brake caliper assembly.

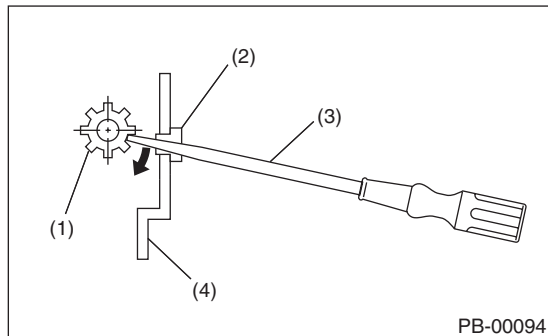


- 4) Suspend the rear disc brake caliper assembly so that the brake hose is not stretched.
- 5) Remove the rear disc brake rotor.

#### NOTE:

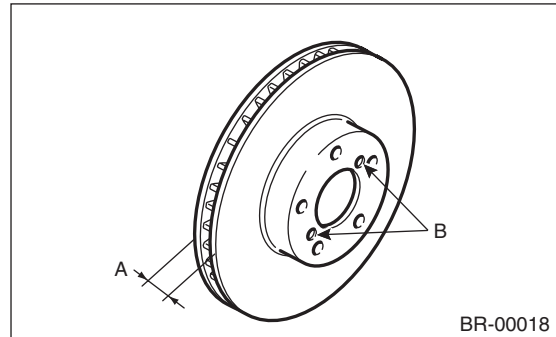
If the disc rotor is difficult to remove, try the following two methods in order.

- (1) Turn the adjusting screw using a flat tip screwdriver until the brake shoe moves adequately away from the disc rotor.

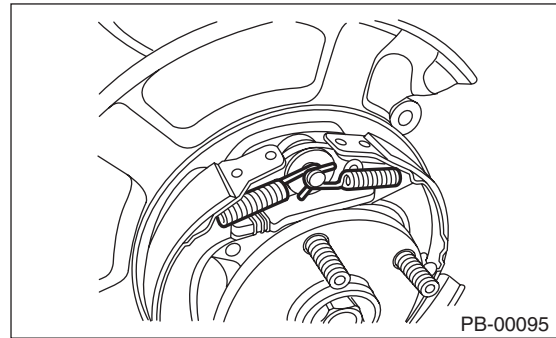


- (1) Adjuster
- (2) Adjusting hole cover (rubber)
- (3) Flat tip screwdriver
- (4) Disc rotor

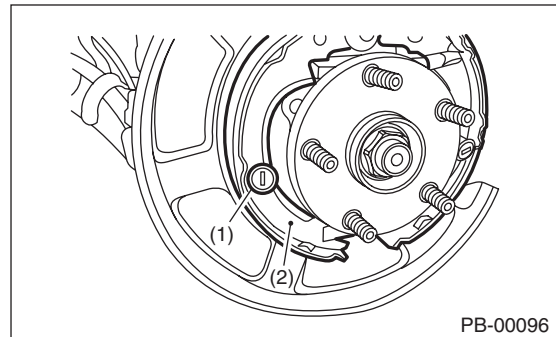
- (2) If disc rotor is seized up on the hub, drive the disc rotor out by pushing two 8-mm bolts in holes B on the rotor.



- 6) Remove the shoe return spring.



- 7) Remove the brake shoe cup and brake shoe spring, then remove the primary brake shoe.



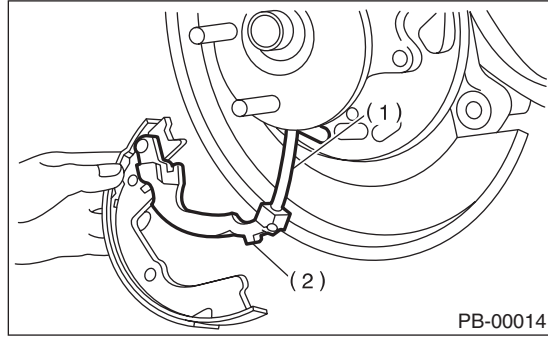
- (1) Brake shoe cup
- (2) Primary brake shoe

- 8) Remove the strut and strut spring.
- 9) Remove the adjuster assembly.
- 10) Remove the brake shoe cup and brake shoe spring, then remove the secondary brake shoe.

# Parking Brake Assembly (Rear Disc Brake)

## PARKING BRAKE

11) Remove the parking brake cable from lever.



- (1) Parking brake cable
- (2) Lever

12) Remove the retainer from the secondary side brake shoe. Remove the parking lever and washer from brake shoe.

## B: INSTALLATION

### CAUTION:

**Be sure the lining surface is free from oil and grease.**

1) Apply brake grease to the following locations.

### Brake grease:

#### Brake Grease (Part No. 003602002)

- Six contact surfaces of brake shoe rim and back plate gasket
- Contact surface of the brake shoe and the anchor pin
- Contact surface of the lever and strut
- Contact surface of the brake shoe and the adjuster assembly
- Contact surface of the brake shoe and the strut
- Contact surface of the lever and brake shoe

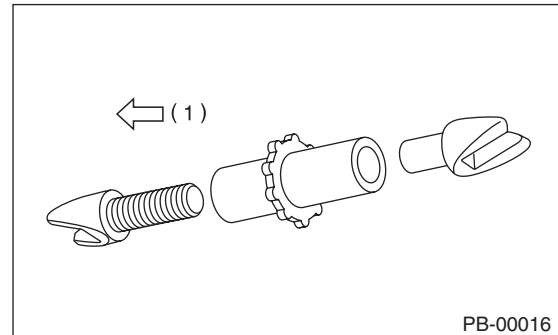
2) Install the parking lever to the secondary side brake shoe, then clamp and lock the retainer securely.

3) Attach the parking brake cable to the parking brake lever.

4) Attach the adjuster assembly and adjusting spring to the brake shoe.

### NOTE:

Install the adjuster assembly so that the screw section will be towards the rear of the vehicle.



- (1) Rearward

5) Check the parking brake cable is not fallen from the cable guide.

6) Install the brake shoe to the back plate using shoe hold pins, brake shoe spring and brake shoe cup.

7) Install the strut and strut spring to the brake shoe.

### NOTE:

Install the strut spring so that it is placed on the front of vehicle.

8) Install the primary side return spring, then the secondary side return spring.

9) Adjust the parking brake. <Ref. to PB-9, ADJUSTMENT, Parking Brake Assembly (Rear Disc Brake).>

10) When replacing with a new brake shoe, drive the vehicle to break-in the parking brake lining.

(1) Drive the vehicle at about 35 km/h (22 MPH).

(2) Lightly step on the parking brake pedal.

(3) Drive the vehicle for about 200 m (0.12 mile) in this condition.

(4) Wait 5 to 10 minutes for the parking brake to cool down. Repeat again from step (1).

(5) After breaking-in, readjust the parking brakes.

## C: INSPECTION

1) Measure the brake disc rotor inside diameter. If the disc is scored or worn, replace the brake disc rotor.

### **Disc rotor inside diameter:**

#### **Standard:**

**210 mm (8.27 in)**

#### **Service limit:**

**211 mm (8.31 in)**

2) Measure the lining thickness. If it exceeds the limit, replace shoe assembly.

### **Lining thickness:**

#### **Standard:**

**4.0 mm (0.157 in)**

#### **Service limit:**

**1.5 mm (0.059 in)**

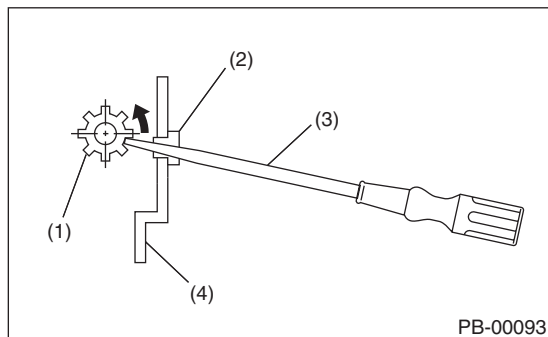
### **NOTE:**

Replace the right and left brake shoe as a set.

## D: ADJUSTMENT

### 1. SHOE CLEARANCE

- 1) Return the parking brake lever fully.
- 2) Remove the adjusting hole cover from the disc rotor.
- 3) Turn the adjusting screw using a flat tip screwdriver until the brake shoe is in close contact with the disc rotor.



- (1) Adjusting screw
- (2) Adjusting hole cover (rubber)
- (3) Flat tip screwdriver
- (4) Disc rotor

4) Turn back (downward) the adjusting screw 3 to 4 notches.

### **CAUTION:**

#### **Check there is no brake drag.**

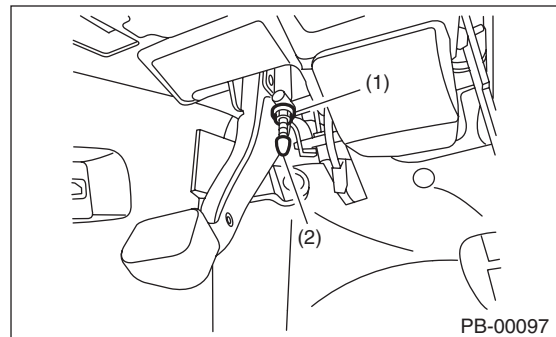
- 5) Install the adjusting hole cover to the disc rotor.
- 6) Adjust the parking brake pedal stroke. <Ref. to PB-9, PEDAL STROKE, ADJUSTMENT, Parking Brake Assembly (Rear Disc Brake).>

## 2. PEDAL STROKE

- 1) Adjust the shoe clearance before adjusting pedal stroke. <Ref. to PB-9, SHOE CLEARANCE, ADJUSTMENT, Parking Brake Assembly (Rear Disc Brake).>
- 2) Operate the parking brake pedal 3 to 4 times.
- 3) Remove the adjuster cap from the parking brake pedal.
- 4) Turn the adjusting nut until the pedal stroke is at the specified value.

### **Pedal stroke:**

**When stepped on with a force of 300 N (30.6 kgf, 67 lb): 5-6 notches**



- (1) Adjusting nut (Self-locking nut)
- (2) Adjuster cap

- 5) Check there is no brake drag.
- 6) Install the adjuster cap.

# General Diagnostic Table

PARKING BRAKE

---

## 5. General Diagnostic Table

### A: INSPECTION

Symptom	Possible cause	Corrective action
Brake drag	Parking brake pedal is misadjusted.	Adjust.
	Parking brake cable does not move.	Correct or replace.
	Parking brake shoe clearance is maladjusted.	Adjust.
	Return spring is faulty.	Replace.
Noise from brake	Return spring is faulty.	Replace.
	Brake shoe spring fault	Replace.

# POWER ASSISTED SYSTEM (POWER STEERING)

# PS

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# General Description

## POWER ASSISTED SYSTEM (POWER STEERING)

### 1. General Description

#### A: SPECIFICATION

Whole system	Minimum turning radius		m (ft)	5.7 (18.7)
	Steering angle	Inner wheel		37.0°±1.5°
		Outer wheel		32.0°±1.5
	Steering wheel diameter		mm (in)	375 (14.76)
	Lock to lock turn			3.44
Gearbox	Type			Rack and Pinion, Integral
	Backlash			0 (Automatic adjusting)
	Valve (Power steering system)			Rotary valve
Pump (Power steering system)	Type			Vane pump
	Oil tank			Installed on body
	Specific output		cm <sup>3</sup> (cu in)/rev.	9.6 (0.586)
	Relief pressure		kPa (kg/cm <sup>2</sup> , psi)	8,800 — 9,400 (90 — 96, 1,276 — 1,363)
	Hydraulic fluid control			Engine speed sensitive
	Hydraulic fluid		ℓ (US qt, Imp qt)	1,000 rpm: 7.0 (7.4, 6.2) 3,000 rpm: 6.0 (6.3, 5.3)
	RPM range		rpm	500 — 8,600
Direction of rotation			Clockwise	
Hydraulic oil (Power steering system)	Capacity		Oil tank	0.2 (0.2, 0.2)
	ℓ (US qt, Imp qt)		Whole system	0.9 (1.0, 0.8)

Steering wheel	Free play		mm (in)	17 (0.67)	
Steering shaft	Clearance between the steering wheel and column cover		mm (in)	3.0 (0.12)	
Steering gearbox (Power steering system)	Sliding resistance		N (kgf, lb)	343 (35, 77) or less Difference between right and left sliding resistance: 20% or less	
	Rack shaft play in the radial direction	Right-turn steering		mm (in)	0.4 (0.016) or less
		Left-turn steering		mm (in)	Play in the horizontal direction: 0.6 (0.024) or less Play in the vertical direction: 0.4 (0.016) or less
	Input shaft play	In radial direction		mm (in)	0.26 (0.0102) or less
		In axial direction		mm (in)	Without play
Rotation resistance		N (kgf, lb)	Maximum allowable value: 10.5 (1.07, 2.36) or less Difference between right and left sliding resistance: 20% or less		
Oil pump (Power steering system)	Pulley shaft	Radial play		mm (in)	0.2 (0.008) or less
		Axial play		mm (in)	0.6 (0.024) or less
	Pulley	Ditch deflection		mm (in)	1.0 (0.039) or less
		Rotation resistance		N (kgf, lb)	9.22 (0.94, 2.07) or less
Regular pressure (Unloaded)		kPa (kg/cm <sup>2</sup> , psi)		981 (10, 142) or less	
Steering wheel effort (Power steering system)	At standstill with engine idling on paved road		N (kgf, lb)	29.4 (3.0, 6.6) or less	
	At standstill with engine stalled on paved road		N (kgf, lb)	294.2 (30, 66.2) or less	

Recommended power steering fluid
SUBARU ATF or ATF DEXRON III

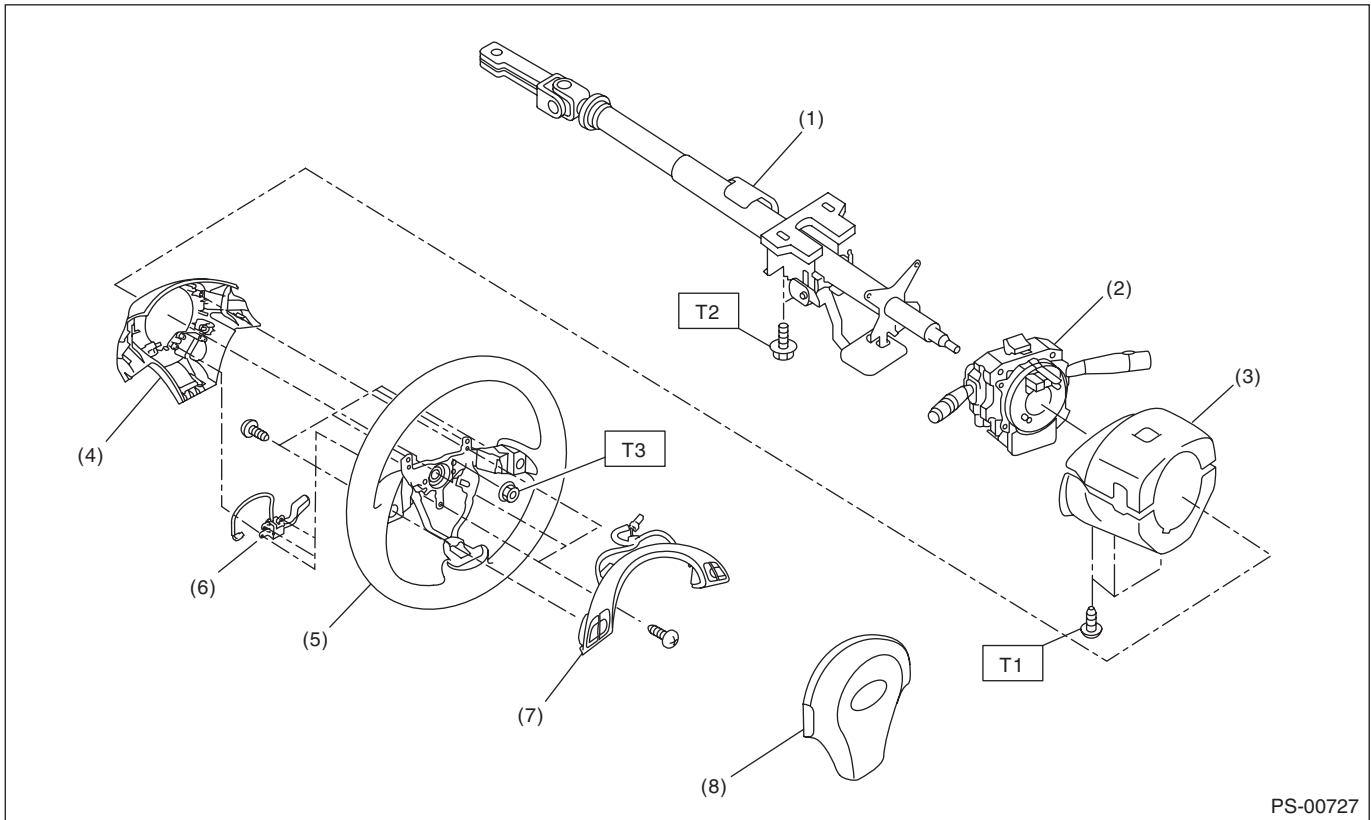


# General Description

POWER ASSISTED SYSTEM (POWER STEERING)

## B: COMPONENT

### 1. STEERING WHEEL AND COLUMN



- |                                |                           |
|--------------------------------|---------------------------|
| (1) Steering shaft             | (5) Steering wheel        |
| (2) Steering roll connector    | (6) Cruise control switch |
| (3) Column cover               | (7) Satellite switch      |
| (4) Steering wheel lower cover | (8) Airbag module         |

**Tightening torque: N·m (kgf-m, ft-lb)**

**T1: 1.2 (0.12, 0.89)**

**T2: 20 (2.0, 14.8)**

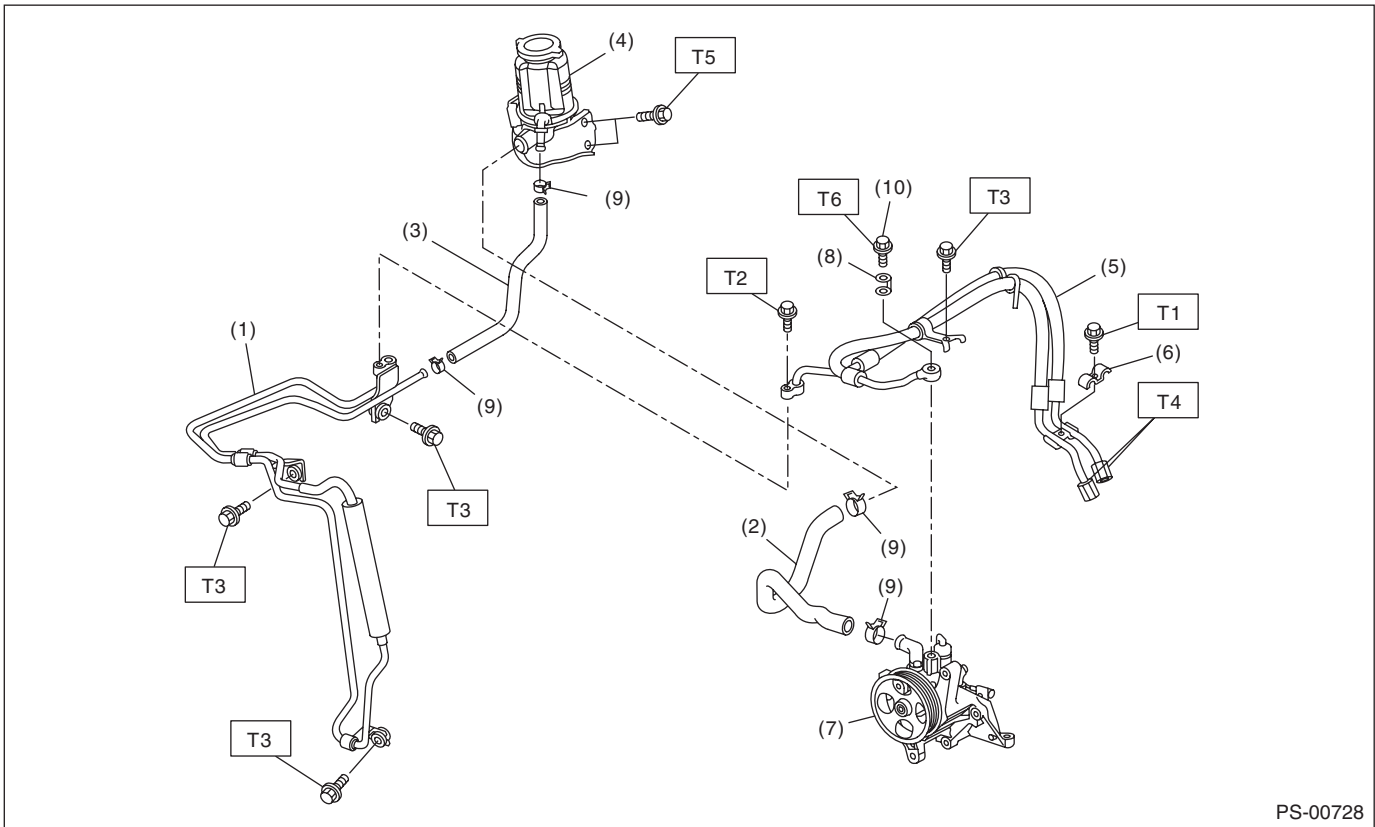
**T3: 45 (4.6, 33.2)**

# General Description

## POWER ASSISTED SYSTEM (POWER STEERING)

### 2. POWER ASSISTED SYSTEM

- Hose and tank



- |                     |                     |
|---------------------|---------------------|
| (1) Oil cooler pipe | (8) Eye bolt gasket |
| (2) Suction hose    | (9) Clip            |
| (3) Return hose     | (10) Eye bolt       |
| (4) Reservoir tank  |                     |
| (5) Hose            |                     |
| (6) Clamp E         |                     |
| (7) Oil pump        |                     |

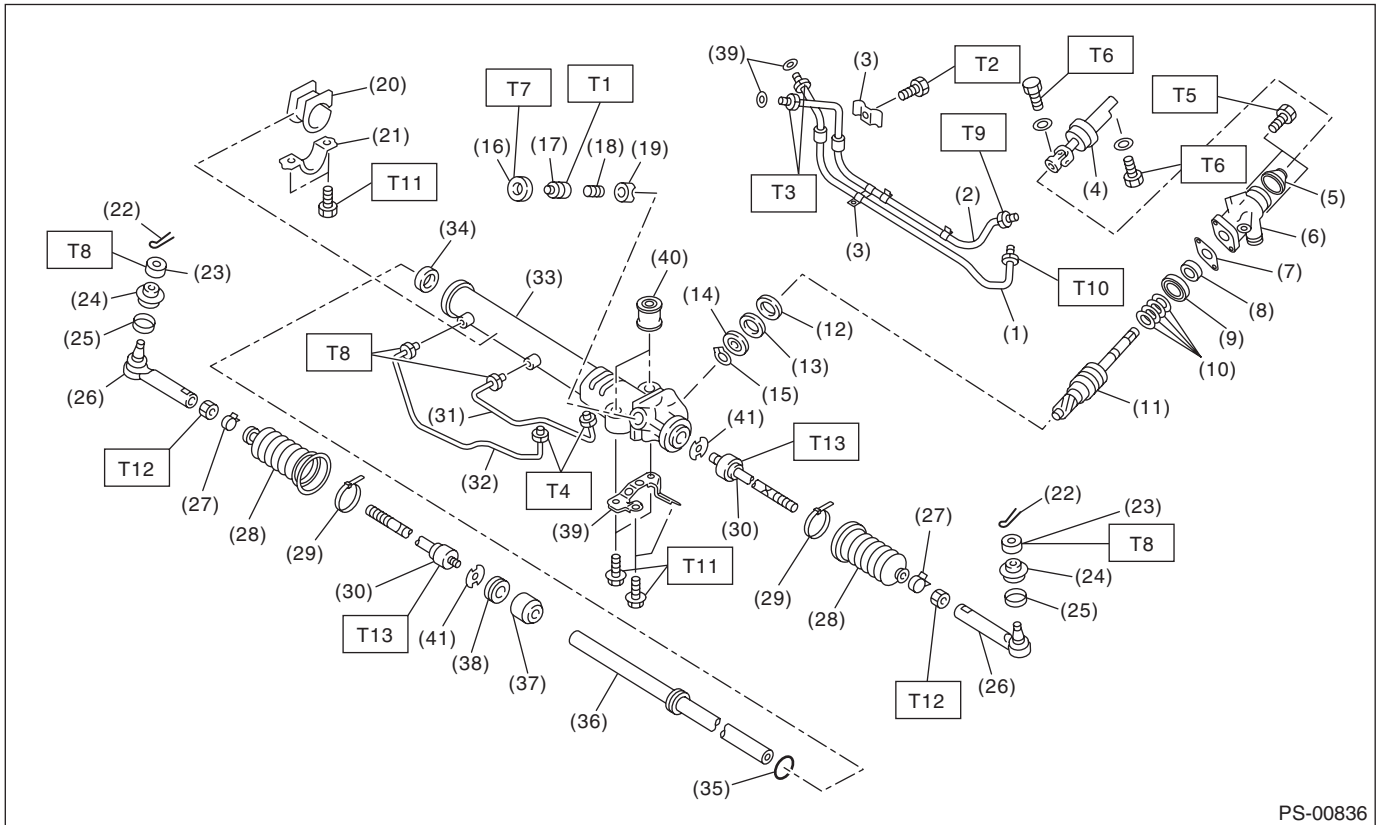
**Tightening torque: N·m (kgf·m, ft·lb)**

- |                           |
|---------------------------|
| <b>T1: 8 (0.8, 5.9)</b>   |
| <b>T2: 10 (1.0, 7.4)</b>  |
| <b>T3: 13 (1.3, 9.6)</b>  |
| <b>T4: 15 (1.5, 11.1)</b> |
| <b>T5: 33 (3.4, 24.3)</b> |
| <b>T6: 40 (4.1, 29.5)</b> |

# General Description

## POWER ASSISTED SYSTEM (POWER STEERING)

### • Gearbox



PS-00836

(1) Pipe C	(20) Adapter	(39) Bracket
(2) Pipe D	(21) Clamp	(40) Bushing
(3) Clamp plate	(22) Cotter pin	(41) Lock washer
(4) Universal joint	(23) Castle nut	
(5) Dust seal	(24) Dust cover	
(6) Valve housing	(25) Clip	
(7) Gasket	(26) Tie-rod end	
(8) Oil seal	(27) Clip	
(9) Bushing	(28) Boot	
(10) Seal ring	(29) Band	
(11) Pinion and valve ASSY	(30) Tie-rod	
(12) Oil seal	(31) Pipe B	
(13) Back-up washer	(32) Pipe A	
(14) Ball bearing	(33) Steering body	
(15) Snap ring	(34) Oil seal	
(16) Lock nut	(35) Piston ring	
(17) Adjusting screw	(36) Rack	
(18) Spring	(37) Rack bushing	
(19) Sleeve	(38) Holder	

#### **Tightening torque:N·m (kgf·m, ft·lb)**

**T1: 5.9 (0.6, 4.4)**

**T2: 9 (0.9, 6.6)**

**T3: 15 (1.5, 11.1)**

**T4: 17 (1.7, 12.5)**

**T5: 20 (2.0, 14.8)**

**T6: 24 (2.4, 17.7)**

**T7: 25 (2.5, 18.4)**

**T8: 27 (2.8, 19.9)**

**T9: 29 (3.0, 21.4)**

**T10: 37 (3.8, 27.3)**

**T11: 60 (6.1, 44.3)**

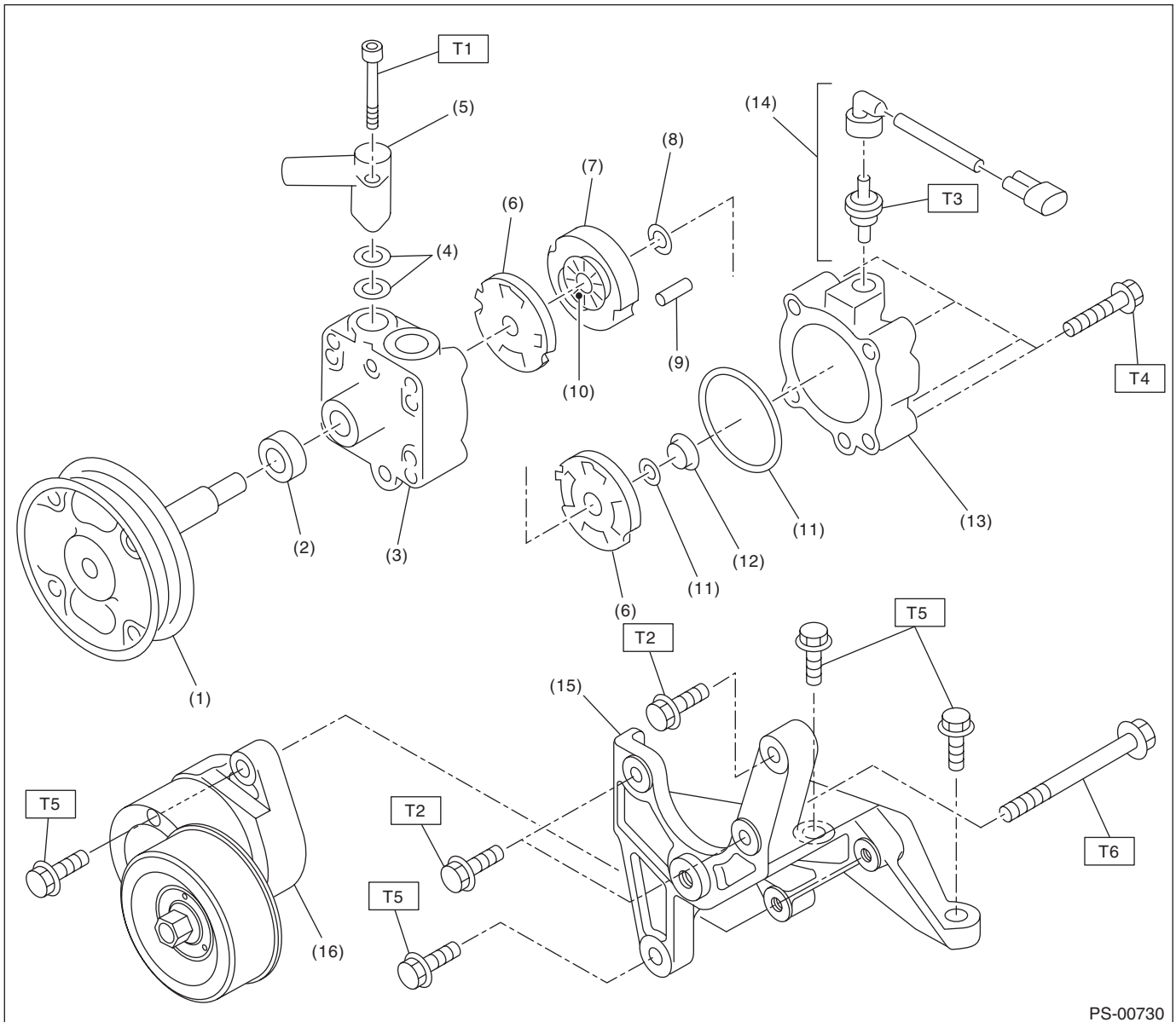
**T12: 85 (8.7, 62.7)**

**T13: 128 (13.1, 94.4)**

# General Description

## POWER ASSISTED SYSTEM (POWER STEERING)

### 3. OIL PUMP



PS-00730

- |                    |                     |
|--------------------|---------------------|
| (1) Pulley         | (9) Straight pin    |
| (2) Oil seal       | (10) Rotor          |
| (3) Front casing   | (11) O-ring         |
| (4) O-ring         | (12) Seal ring      |
| (5) Socket         | (13) Rear body      |
| (6) Pressure plate | (14) Connector      |
| (7) Cam ring       | (15) Bracket        |
| (8) Snap ring      | (16) Belt tensioner |

#### **Tightening torque: N·m (kgf·m, ft·lb)**

**T1: 3.73 (0.38, 2.75)**

**T2: 15.7 (1.6, 11.6)**

**T3: 19.6 (2.0, 14.5)**

**T4: 27.5 (2.8, 20.3)**

**T5: 33 (3.4, 24.3)**

**T6: 36.8 (3.8, 27.1)**

# General Description

POWER ASSISTED SYSTEM (POWER STEERING)

## C: CAUTION

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

### 1. OPERATION

- Wear appropriate work clothing, including a cap, protective goggles and protective shoes when performing any work.
- Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
- Vehicle components are extremely hot after driving. Be wary of receiving burns from heated parts.
- Use SUBARU genuine power steering fluid, grease etc. or the equivalent. Do not mix fluid, grease etc. of different grades or manufacturers.
- Be sure to tighten fasteners including bolts and nuts to the specified torque.
- Place shop jacks or rigid racks at the specified points.
- Before securing a part on a vise, place cushioning material such as wooden blocks, aluminum plate or cloth between the part and the vise.

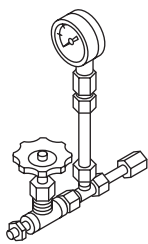
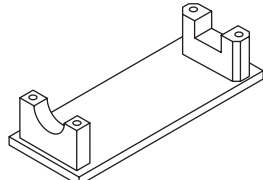
### 2. OIL

When handling oil, follow the rules below to prevent unexpected accidents.

- Prepare container and waste cloths when performing work which oil could possibly spill. If oil spills, wipe it off immediately to prevent from penetrating into floor or flowing outside, for environmental protection.
- Follow all government and local regulations concerning waste disposal.

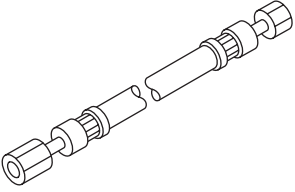
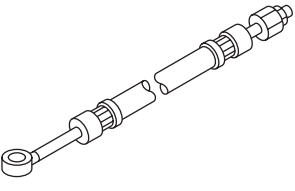
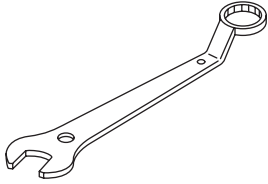
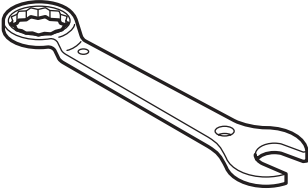
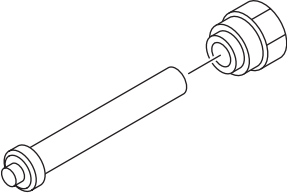
## D: PREPARATION TOOL

### 1. SPECIAL TOOL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-925711000	925711000	PRESSURE GAUGE	Used for measuring oil pressure.
 ST-926200000	926200000	STAND	<ul style="list-style-type: none"><li>• Used when inspecting characteristic of gear-box assembly and disassembling it.</li><li>• Used together with BOSS D (34199AG000).</li></ul>

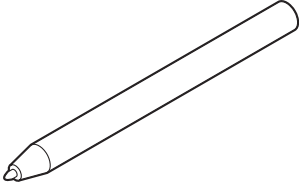
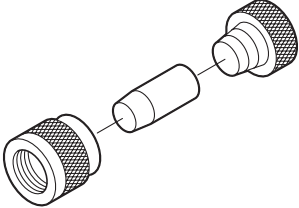
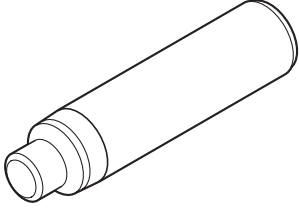
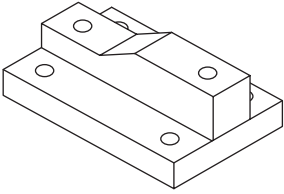
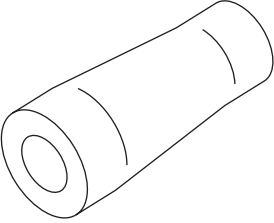
## General Description

### POWER ASSISTED SYSTEM (POWER STEERING)

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p style="text-align: center;">ST34099AC010</p>	34099AC010	ADAPTER HOSE A	Used together with PRESSURE GAUGE (925711000).
 <p style="text-align: center;">ST34099AC020</p>	34099AC020	ADAPTER HOSE B	Used together with PRESSURE GAUGE (925711000).
 <p style="text-align: center;">ST-926230000</p>	926230000	SPANNER	For the lock nut when adjusting backlash of gearbox.
 <p style="text-align: center;">ST34099PA100</p>	34099PA100	SPANNER	Used when measuring the rotating resistance of gearbox assembly.
 <p style="text-align: center;">ST-926420000</p>	926420000	PLUG	When fluid leaks from pinion side of gearbox assembly, remove pipe B from valve housing, attach this tool and check fluid leaking points.

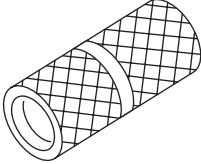
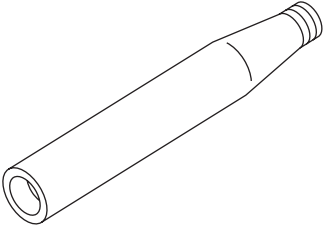
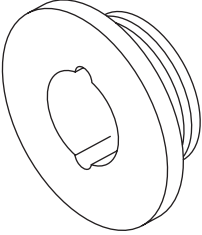
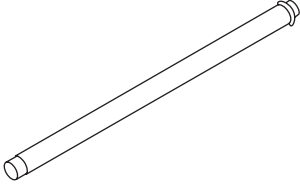
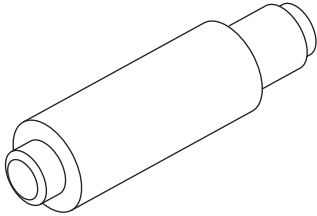
# General Description

## POWER ASSISTED SYSTEM (POWER STEERING)

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>ST34099FA060</p>	34099FA060	PUNCH HOLDER	Used for crimping.
 <p>ST34199FE040</p>	34199FE040	INSTALLER A, B, C	Used for installing the oil seal to the rack assembly.
 <p>ST34199XA030</p>	34199XA030	INSTALLER & REMOVER 44	Used for removing and installing the rack oil seal (outer and inner).
 <p>ST34199AG000</p>	34199AG000	BOSS D	<ul style="list-style-type: none"> <li>• Used when inspecting characteristic of gear-box assembly and disassembling it.</li> <li>• Used together with STAND (926200000).</li> </ul>
 <p>ST34199XA010</p>	34199XA010	GUIDE 44	Used for installing seal ring of rack.

## General Description

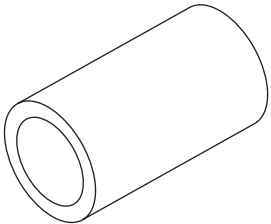
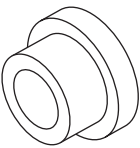
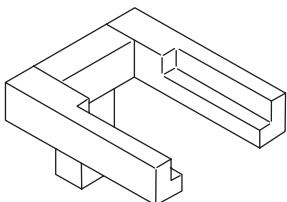
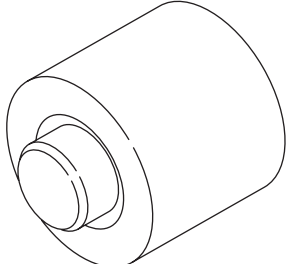
### POWER ASSISTED SYSTEM (POWER STEERING)

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p style="text-align: center;">ST34199AG070</p>	34199AG070	FORMER	Used for forming seal ring of pinion.
 <p style="text-align: center;">ST34199AG020</p>	34199AG020	GUIDE	Used for installing seal ring of pinion.
 <p style="text-align: center;">ST34199AG060</p>	34199AG060	GUIDE G (26)	<ul style="list-style-type: none"> <li>• Used for forming seal ring of rack.</li> <li>• Used with FORMER PISTON (34199XA020).</li> </ul>
 <p style="text-align: center;">ST34199XA060</p>	34199XA060	OIL SEAL REMOVER	Used for removing oil seal.
 <p style="text-align: center;">ST34199AG090</p>	34199AG090	INSTALLER & REMOVER	<ul style="list-style-type: none"> <li>• Used for installing oil seal of valve housing.</li> <li>• Used for installing ball bearing of valve housing.</li> <li>• Used for removing oil seal and ball bearing from valve housing.</li> </ul>



# General Description

## POWER ASSISTED SYSTEM (POWER STEERING)

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>ST34199XA020</p>	34199XA020	FORMER PISTON 44	<ul style="list-style-type: none"> <li>• Used for forming seal ring of rack.</li> <li>• Used together with GUIDE G (26) (34199AG060).</li> </ul>
 <p>ST34199XA000</p>	34199XA000	INSTALLER 44	Used for pressing-fit oil seal of gearbox cylinder.
 <p>ST34199AE020</p>	34199AE020	ATTACHMENT	Used for removing oil pump.
 <p>ST34199AE030</p>	34199AE030	INSTALLER	Used for installing the oil seal to the oil pump.

# Steering Wheel

## POWER ASSISTED SYSTEM (POWER STEERING)

### 2. Steering Wheel

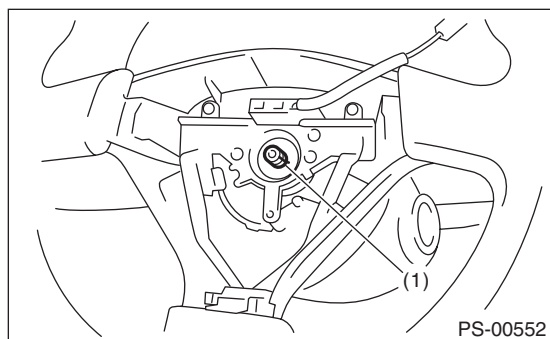
#### A: REMOVAL

- 1) Disconnect the ground cable from battery.
- 2) Set the tire to the straight-ahead position.
- 3) Remove the airbag module. <Ref. to AB-14, REMOVAL, Driver's Airbag Module.>

#### WARNING:

Always refer to "Airbag System" before performing service on the airbag modules. <Ref. to AB-4, CAUTION, General Description.>

- 4) Place alignment marks on the steering wheel and steering shaft.



(1) Alignment mark

- 5) Remove the steering wheel nut, and then draw out the steering wheel from shaft using steering puller.

#### B: INSTALLATION

#### WARNING:

Always refer to "Airbag System" before performing service on the airbag modules. <Ref. to AB-4, CAUTION, General Description.>

- 1) Align the center position of the roll connector. <Ref. to AB-24, ADJUSTMENT, Roll Connector.>
- 2) Install in the reverse order of removal.

#### NOTE:

Align the alignment marks on the steering wheel and steering shaft.

#### Tightening torque:

*45 N·m (4.6 kgf·m, 33.2 ft·lb)*

#### Column cover-to-steering wheel clearance:

*2 — 4 mm (0.08 — 0.16 in)*

#### CAUTION:

Insert the roll connector guide pin into the guide hole on the lower end of the steering wheel surface. Avoid damaging the pin.

#### C: INSPECTION

- 1) Check the steering wheel for deformation. If the deformation is excessive, replace the steering wheel.
- 2) Check the splines on the steering wheel for damage. If the damage is excessive, replace the steering wheel.

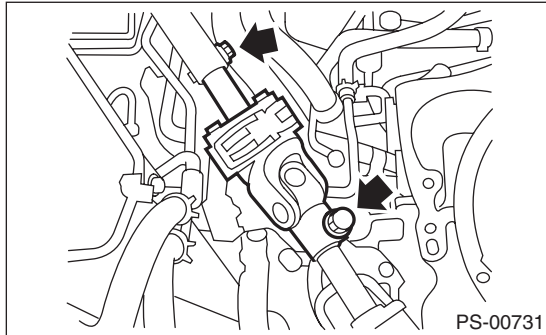
# Universal Joint

POWER ASSISTED SYSTEM (POWER STEERING)

## 3. Universal Joint

### A: REMOVAL

- 1) Remove the steering wheel. <Ref. to PS-12, REMOVAL, Steering Wheel.>
- 2) Place alignment marks on universal joint.
- 3) Remove the universal joint bolt, and then remove the universal joint.



### B: INSTALLATION

- 1) Align the cutout portion at serrated section of the column shaft and yoke, then install the universal joint into column shaft.
- 2) Install the universal joint to the serrations of gearbox assembly by matching alignment marks.
- 3) Tighten the bolts on the gearbox side first, and then the column shaft side.

#### **Tightening torque:**

**24 N·m (2.4 kgf·m, 17.7 ft·lb)**

#### **CAUTION:**

**Be sure to follow the tightening order and tightening torque of universal joint to avoid the steering effort from becoming heavy.**

#### **Clearance between coupling of universal joint to AT level gauge:**

**10 mm (0.39 in) or more**

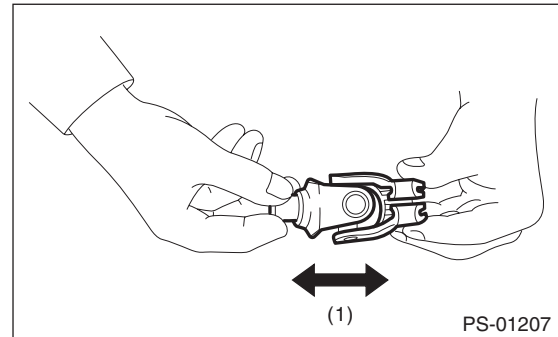
- 4) Align the center position of the roll connector. <Ref. to AB-24, ADJUSTMENT, Roll Connector.>
- 5) Install the steering wheel. <Ref. to PS-12, INSTALLATION, Steering Wheel.>

### C: INSPECTION

Check for wear, damage or any other faults. Replace as necessary

#### **Service limit:**

**Universal joint play: 0 mm (0 in)**

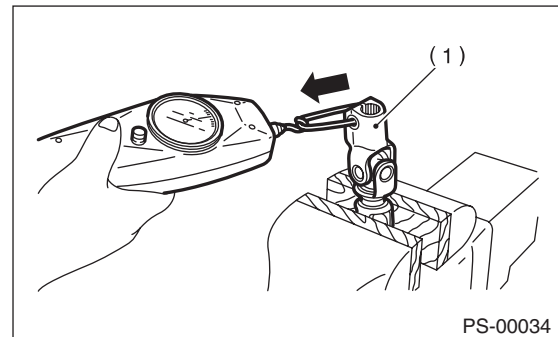


(1) Play

Measure the swing torque of universal joint.

#### **Service limit:**

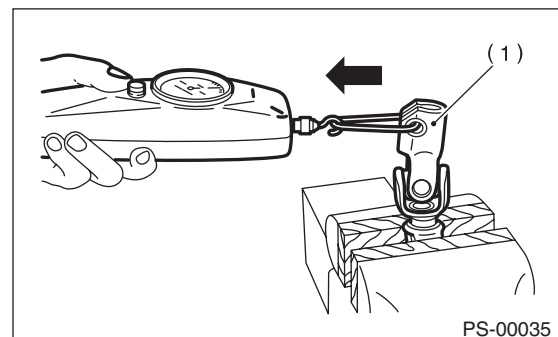
**Maximum load: 3.8 N (0.39 kgf, 0.86 lb) or less**



(1) Yoke (Gearbox side)

#### **Service limit:**

**Maximum load: 3.8 N (0.39 kgf, 0.86 lb) or less**



(1) Yoke (Gearbox side)

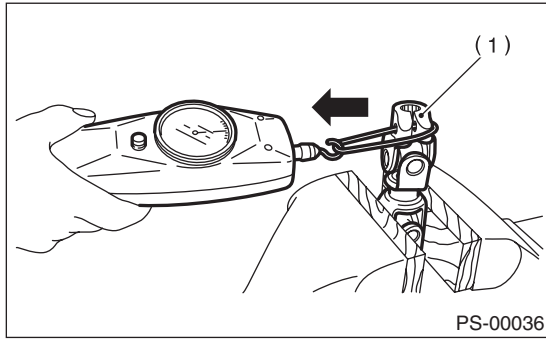
# Universal Joint

## POWER ASSISTED SYSTEM (POWER STEERING)

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### **Service limit:**

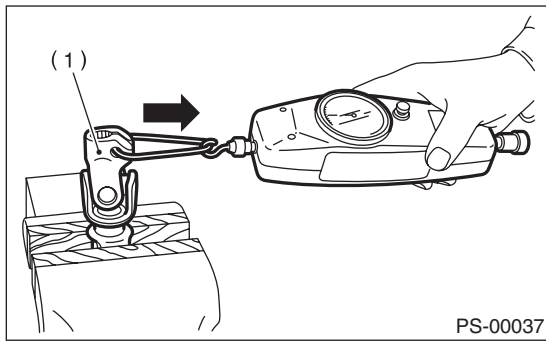
**Maximum load: 7.3 N (0.74 kgf, 1.64 lb) or less**



(1) Yoke (Steering column side)

### **Service limit:**

**Maximum load: 7.3 N (0.74 kgf, 1.64 lb) or less**



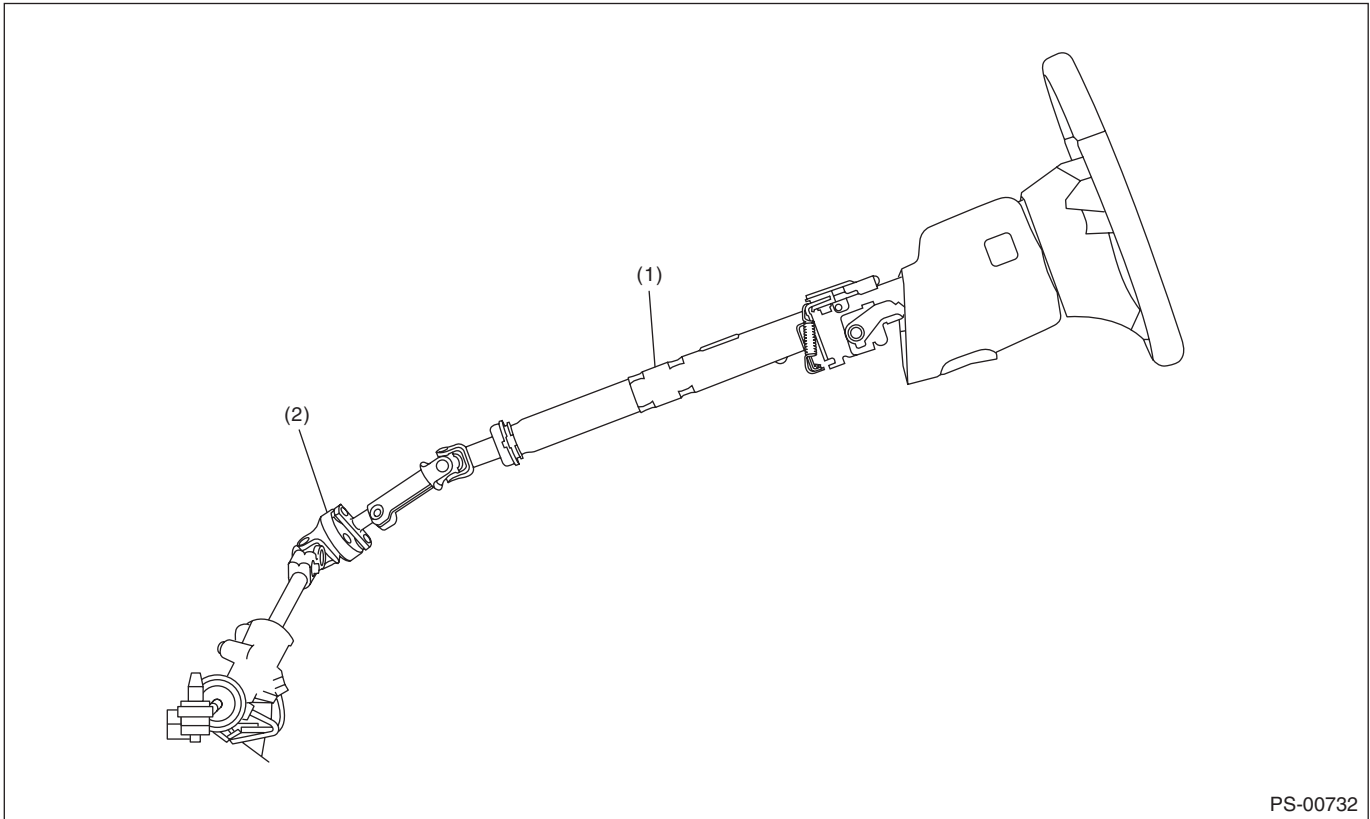
(1) Yoke (Steering column side)

# Tilt Steering Column

POWER ASSISTED SYSTEM (POWER STEERING)

## 4. Tilt Steering Column

### A: REMOVAL



PS-00732

- (1) Tilt steering column                      (2) Universal joint

1) Remove the steering wheel. <Ref. to PS-12, REMOVAL, Steering Wheel.>

2) Remove the universal joint. <Ref. to PS-13, REMOVAL, Universal Joint.>

#### **CAUTION:**

**Always remove the universal joint before removing the steering column installation bolt to avoid damage to the universal joint.**

3) Remove the instrument panel lower cover under.

4) Remove the instrument panel lower cover upper.

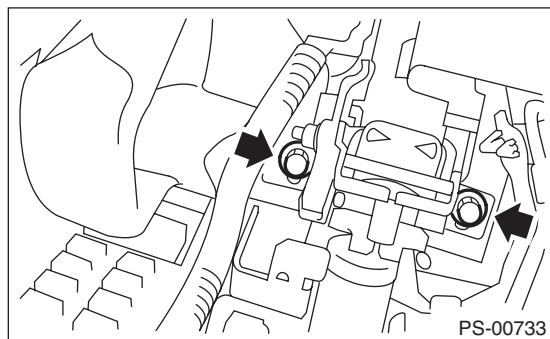
5) Remove the screws which secure the column cover lower, then remove the column cover lower.

6) Remove all connectors from the steering column.

## Tilt Steering Column

### POWER ASSISTED SYSTEM (POWER STEERING)

7) Remove the two bolts under instrument panel securing the steering column.



8) Pull out the steering shaft assembly from the hole on toe board.

#### CAUTION:

- Always remove the universal joint before removing the steering column installation bolt to avoid damage to the universal joint.
- Be sure to remove the universal joint before removing the parts, if the relative position between steering shaft and gearbox changes when removing steering shaft assembly or when lowering it and gearbox for servicing other parts.

Do not loosen the tilt lever when the steering column is not secured to the vehicle.

### B: INSTALLATION

1) Insert the end of the steering shaft into the toe board.

2) With the tilt lever secured, tighten the steering shaft mounting bolts under instrument panel.

#### Tightening torque:

**20 N·m (2.0 kgf·m, 14.8 ft·lb)**

3) Connect all the connectors under the instrument panel.

4) Connect the airbag system connector at the harness spool.

#### NOTE:

Make sure to apply double lock.

5) Install the instrument panel lower cover with tilt lever held in the lowered position.

6) Install the universal joint. <Ref. to PS-13, INSTALLATION, Universal Joint.>

#### CAUTION:

- Always install the universal joint after installing the steering column to avoid damage to the universal joint.
- Be sure to follow the tightening order and tightening torque of universal joint to avoid the steering effort from becoming heavy.

7) Align the center position of the roll connector. <Ref. to AB-24, ADJUSTMENT, Roll Connector.>

8) Install the steering wheel. <Ref. to PS-12, INSTALLATION, Steering Wheel.>

#### CAUTION:

Insert the roll connector guide pin into the guide hole on lower end of steering wheel surface to prevent damage.

### C: DISASSEMBLY

Remove the two screws securing the upper steering column covers, and the two screws securing the combination switch, and then remove related parts.

### D: ASSEMBLY

Insert the combination switch to the upper column shaft, and install the upper column cover. Then route the ignition key harness and combination switch harness between the column cover mounting bosses.

#### Tightening torque:

**1.2 N·m (0.12 kgf·m, 0.89 ft·lb)**

#### CAUTION:

Do not overtorque the screw.

### E: INSPECTION

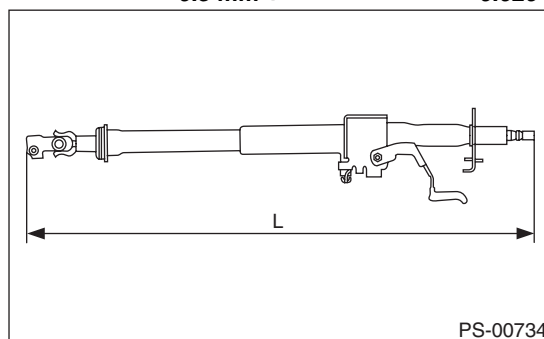
#### 1. BASIC INSPECTION

Measure the overall length of steering column. If not within specification, replace it.

#### Overall length L:

#### Specification

**917.5<sup>+1.3</sup> mm -0.3 mm (36.12<sup>+0.051</sup> in -0.020 in)**



#### 2. INSPECTION OF AIRBAG SYSTEM

#### WARNING:

Refer to "Airbag System" for airbag inspection procedure. <Ref. to AB-14, INSPECTION, Driver's Airbag Module.>

# Steering Gearbox

POWER ASSISTED SYSTEM (POWER STEERING)

## 5. Steering Gearbox

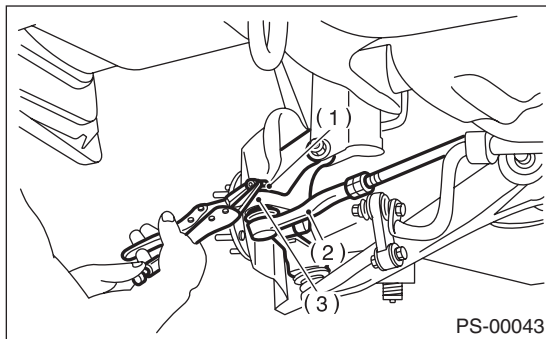
### A: REMOVAL

- 1) Set the vehicle on a lift.
- 2) Disconnect the ground cable from battery.
- 3) Lift up the vehicle, and remove the front wheels.
- 4) Remove the under cover. <Ref. to EI-18, REMOVAL, Front Under Cover.>
- 5) Remove the front exhaust pipe assembly. <Ref. to EX(H6DO)-5, REMOVAL, Front Exhaust Pipe.>

#### WARNING:

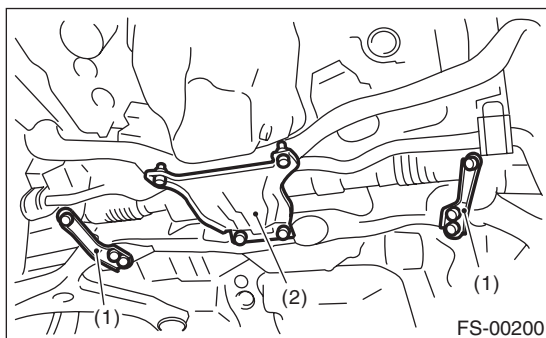
**Be careful not to burn yourself because the exhaust pipe is hot.**

- 6) After pulling off the cotter pin and removing the castle nut, use a puller to remove the tie-rod end from the knuckle arm.



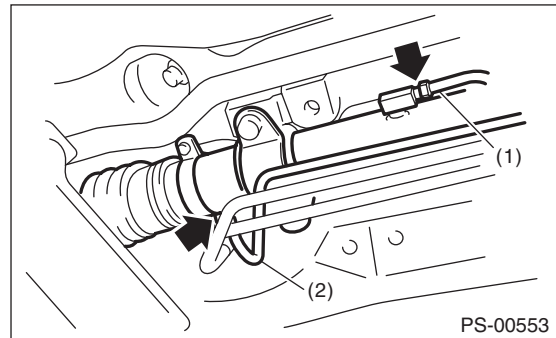
- (1) Castle nut
- (2) Tie-rod end
- (3) Knuckle arm

- 7) Remove the front crossmember support plate, jack-up plate and front stabilizer. <Ref. to FS-15, REMOVAL, Front Stabilizer.>



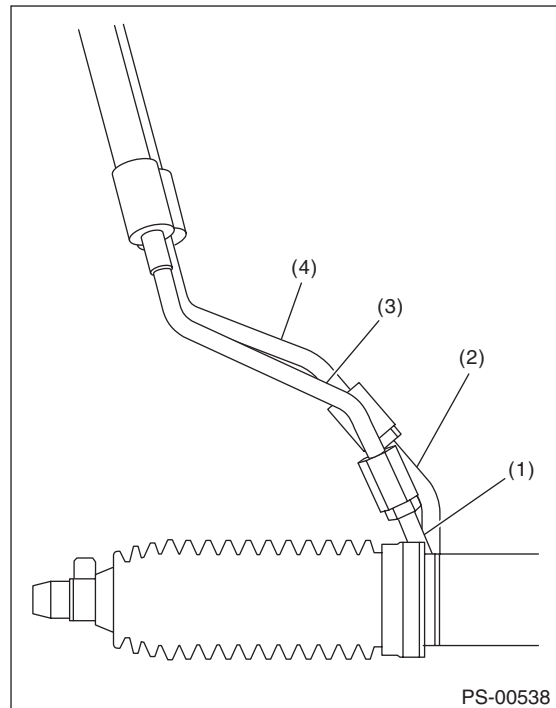
- (1) Crossmember support plate
- (2) Jack-up plate

- 8) Remove the one pipe joint at the center of the gearbox, and connect the vinyl hose to the pipe and the joint. Discharge the fluid by turning the steering wheel fully clockwise and counterclockwise. Discharge the fluid similarly from other pipes.



- (1) Pipe A
- (2) Pipe B

- 9) Remove the universal joint. <Ref. to PS-13, REMOVAL, Universal Joint.>
- 10) Disconnect the pipe C from pressure hose first, then disconnect pipe D from the return hose.

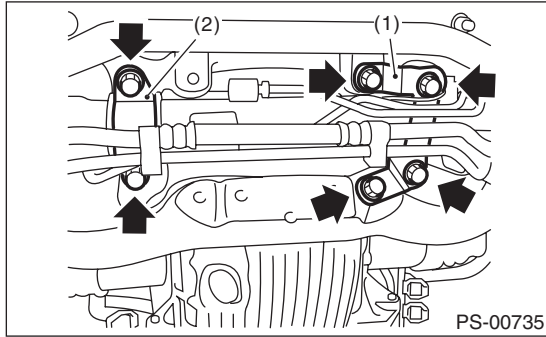


- (1) Pipe C
- (2) Pipe D
- (3) Pressure hose
- (4) Return hose

# Steering Gearbox

## POWER ASSISTED SYSTEM (POWER STEERING)

11) Remove the gear box bracket and clamp, and remove the gearbox.



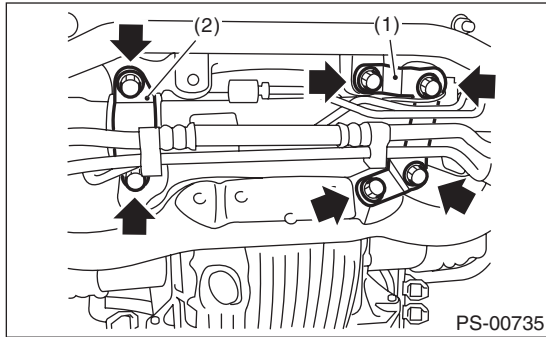
- (1) Bracket
- (2) Clamp

## B: INSTALLATION

1) Insert the gearbox into crossmember, being careful not to damage gearbox boot.  
2) Attach the gear box bracket and clamp.

**Tightening torque:**

**60 N·m (6.1 kgf·m, 44.3 ft·lb)**

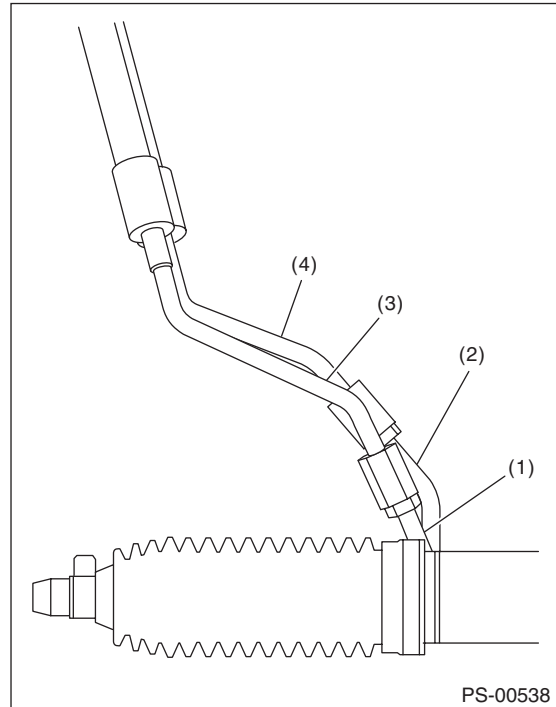


- (1) Bracket
- (2) Clamp

3) Connect the pipe D to return hose first, and the pipe C to pressure hose second.

**Tightening torque:**

**15 N·m (1.5 kgf·m, 11.1 ft·lb)**



- (1) Pipe C
- (2) Pipe D
- (3) Pressure hose
- (4) Return hose

4) Install the universal joint. <Ref. to PS-13, INSTALLATION, Universal Joint.>

5) Connect the tie-rod end and knuckle arm, and tighten with castle nut.

**Castle nut tightening torque:**

**27 N·m (2.8 kgf·m, 19.9 ft·lb)**

### CAUTION:

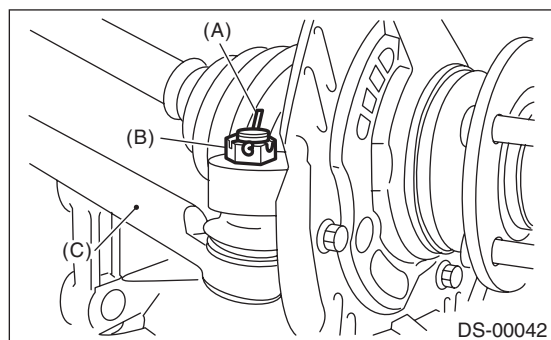
When connecting, do not hit the cap at the bottom of tie-rod end with hammer.



# Steering Gearbox

POWER ASSISTED SYSTEM (POWER STEERING)

6) After tightening the castle nut to the specified tightening torque, tighten it further within 60° until the cotter pin hole is aligned with slot in the nut. Fit the cotter pin into the nut, and then bend the pin to lock.



- (A) Cotter pin
- (B) Castle nut
- (C) Tie-rod end

7) Install the front stabilizer. <Ref. to FS-15, INSTALLATION, Front Stabilizer.>

8) Install the front crossmember support plate and jack-up plate.

9) Install the front exhaust pipe assembly. <Ref. to EX(H6DO)-5, INSTALLATION, Front Exhaust Pipe.>

10) Install the under cover. <Ref. to EI-18, INSTALLATION, Front Under Cover.>

11) Install the front wheels.

12) Tighten the wheel nuts to the specified torque.

### **Tightening torque:**

#### **Chromed wheel**

**150 N·m (15.3 kgf·m, 110.6 ft·lb)**

#### **Other than above**

**120 N·m (12.2 kgf·m, 88.5 ft·lb)**

13) Lower the vehicle.

14) Remove the steering wheel. <Ref. to PS-12, REMOVAL, Steering Wheel.>

15) Align the center position of the roll connector. <Ref. to AB-24, ADJUSTMENT, Roll Connector.>

16) Install the steering wheel. <Ref. to PS-12, INSTALLATION, Steering Wheel.>

17) Connect the ground cable to battery.

18) Pour fluid into the oil tank, and bleed air. <Ref. to PS-48, Power Steering Fluid.>

19) Check for fluid leaks.

20) Check the fluid level in oil tank.

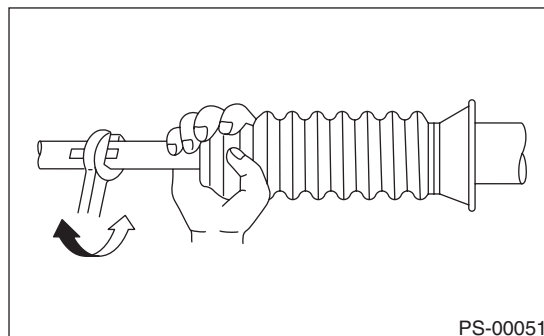
21) After adjusting toe-in and steering angle, tighten the lock nut on tie-rod end.

### **Tightening torque:**

**85 N·m (8.7 kgf·m, 62.7 ft·lb)**

### **NOTE:**

When adjusting toe-in, hold the boot as shown to prevent it from being rotated or twisted. If it becomes twisted, straighten it.



## **C: DISASSEMBLY**

### **1. RACK HOUSING ASSEMBLY**

1) Disconnect the four pipes from gearbox.

### **NOTE:**

Remove the pipes C and D, which are fixed to clamp plate, as a unit.

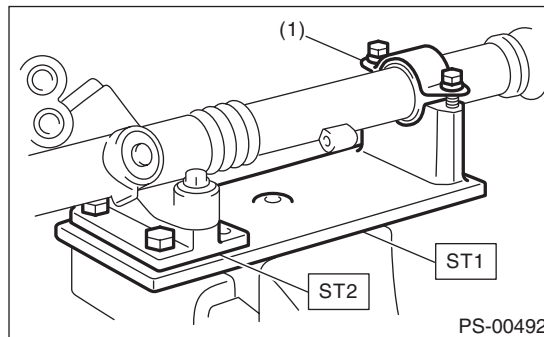
2) Secure the gearbox removed from vehicle in a vise using ST.

ST1 926200000 STAND

ST2 34199AG000 BOSS D

### **CAUTION:**

**Secure the gearbox in a vise using ST as shown in the figure. Do not secure the gearbox without this ST.**



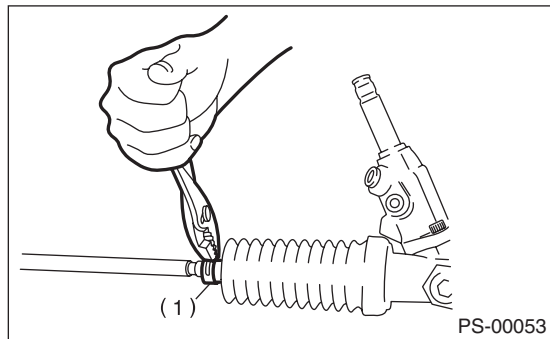
- (1) Clamp

3) Remove the tie-rod end and lock nut from gearbox.

# Steering Gearbox

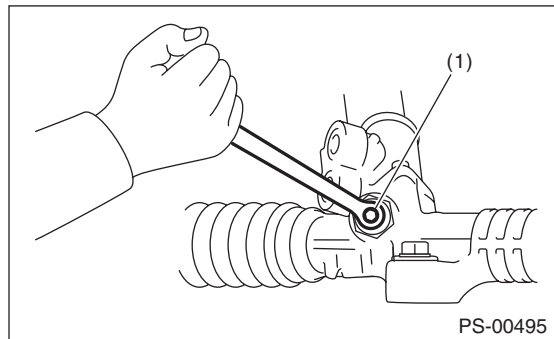
## POWER ASSISTED SYSTEM (POWER STEERING)

4) Remove the small clip from the boot using pliers, and then move the boot to tie-rod end side.



(1) Clip

7) Tighten the adjusting screw until it can no longer be tightened.

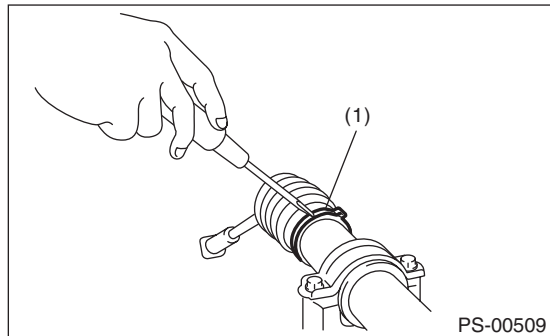


(1) Adjusting screw

5) Using a flat tip screwdriver, remove the band from boot.

### NOTE:

Replace the boot if there is damage, cracks or deterioration.

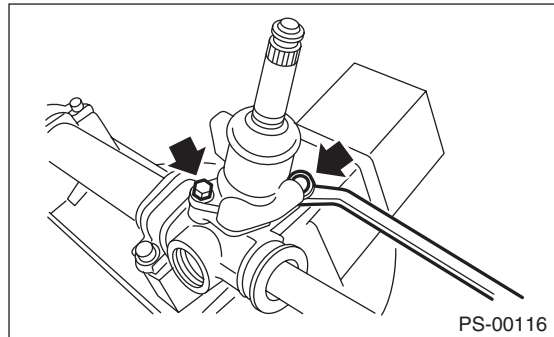


(1) Band

8) Remove the tie-rod.

9) Loosen the adjusting screw, and remove the spring and sleeve.

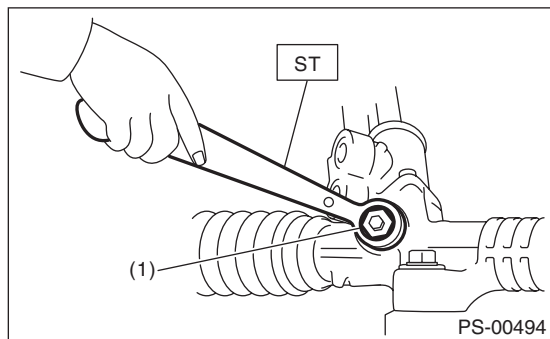
10) Remove the two bolts securing valve assembly.



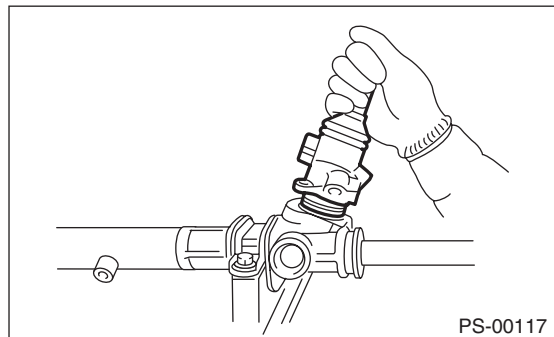
11) Carefully draw out the input shaft and remove the valve assembly.

6) Using the ST, loosen the lock nut.

ST 926230000 SPANNER



(1) Lock nut



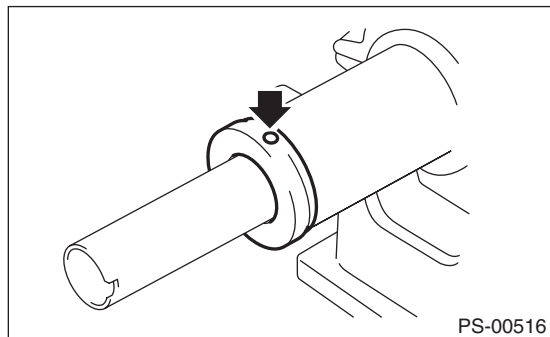
# Steering Gearbox

POWER ASSISTED SYSTEM (POWER STEERING)

12) Using a drill, release the crimping of holder.

### CAUTION:

Make a hole of 2 mm (0.08 in) depth using a drill with 3 mm (0.12 in) diameter.



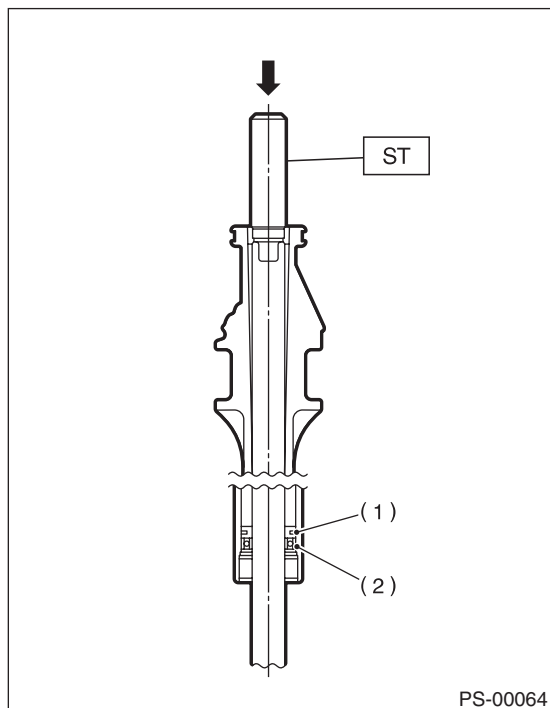
13) Remove the holder.

14) Attach the ST on the pinion housing side of rack, and press out the rack with the outer side oil seal.

ST 34199XA030 INSTALLER & REMOVER 44

### NOTE:

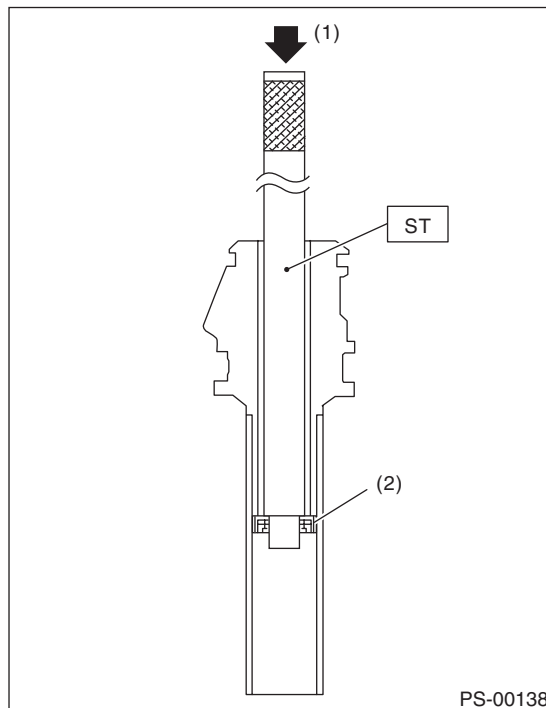
Block the pipe connection of steering body to prevent fluid from flowing out.



- (1) Rack piston
- (2) Outer side oil seal

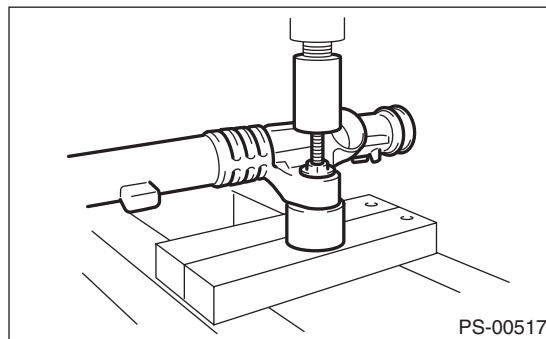
15) Insert the ST from pinion housing side and remove the oil seal using a press.

ST 34199XA060 OIL SEAL REMOVER



- (1) Press
- (2) Oil seal

16) Using a press, remove the bushing of gearbox installation portion.



# Steering Gearbox

## POWER ASSISTED SYSTEM (POWER STEERING)

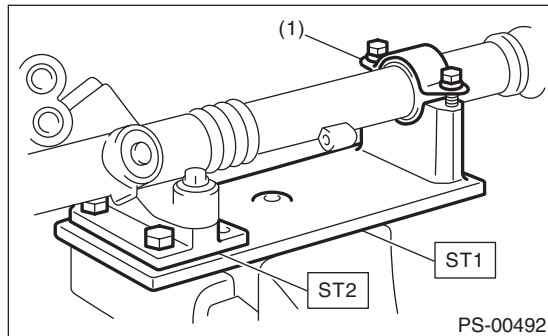
### 2. CONTROL VALVE

- 1) Disconnect the pipes A and B from gearbox.
- 2) Secure the gearbox removed from vehicle in a vise using ST.

ST1 92620000 STAND  
ST2 34199AG000 BOSS D

#### CAUTION:

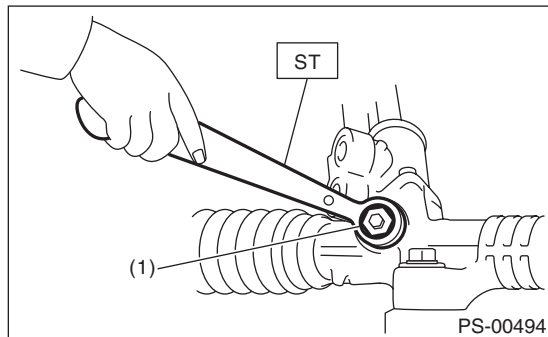
Secure the gearbox in a vise using ST as shown in the figure. Do not secure the gearbox without this ST.



(1) Clamp

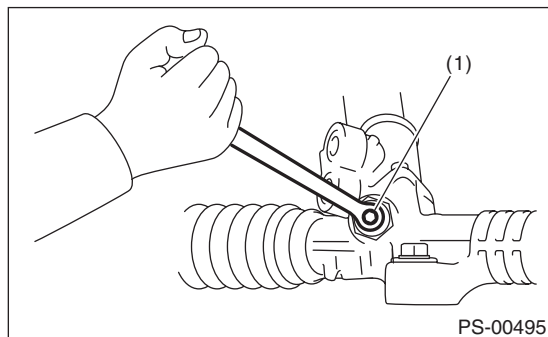
- 3) Using the ST, loosen the lock nut.

ST 926230000 SPANNER



(1) Lock nut

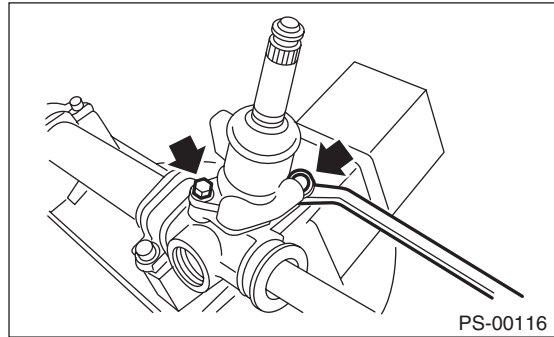
- 4) Tighten the adjusting screw until it can no longer be tightened.



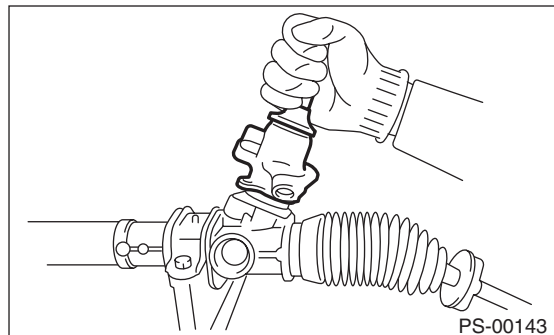
(1) Adjusting screw

- 5) Loosen the adjusting screw, and remove the spring and sleeve.

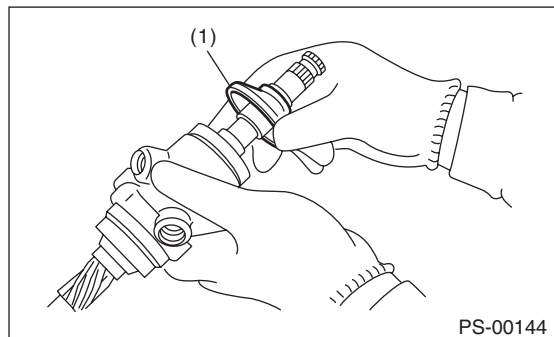
- 6) Remove the two bolts securing valve assembly.



- 7) Carefully draw out the input shaft and remove the valve assembly.

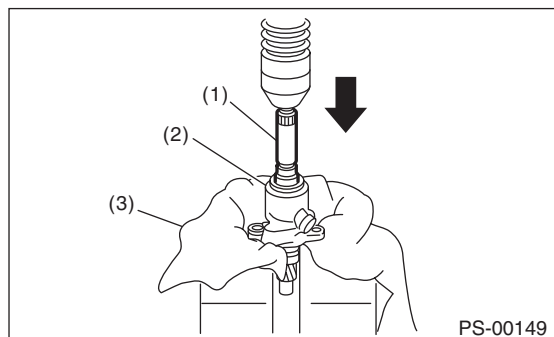


- 8) Put a vinyl tape around the spline portion, and slide the dust cover to remove.



(1) Dust cover

- 9) Using a press, remove the pinion and valve assembly from valve housing.



(1) Pinion and valve ASSY

(2) Valve housing

(3) Cloth

# Steering Gearbox

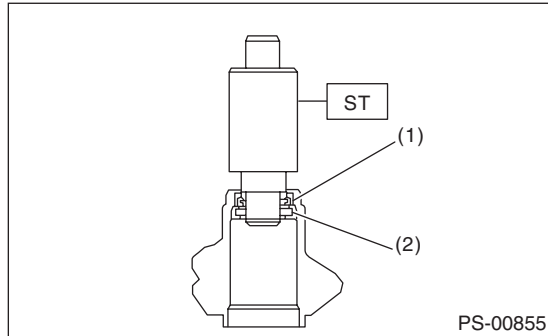
POWER ASSISTED SYSTEM (POWER STEERING)

10) Using the ST and a press, remove the bushing and oil seal from the valve housing.

ST 34199AG090 INSTALLER & REMOVER

### CAUTION:

- Do not apply a force to the end surface of valve housing.
- Do not reuse the oil seal after removal.

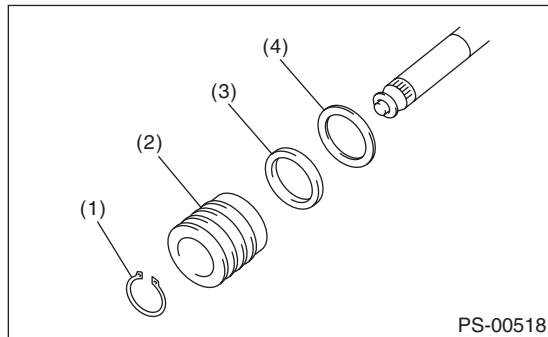


- (1) Oil seal
- (2) Bushing

11) Using a snap ring pliers, remove the snap ring, valve, oil seal and back-up washer.

### CAUTION:

Be careful not to scratch the pinion and valve assembly.

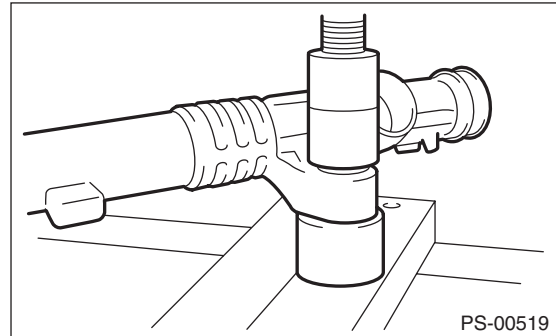


- (1) Snap ring
- (2) Valve
- (3) Oil seal
- (4) Back-up ring

## D: ASSEMBLY

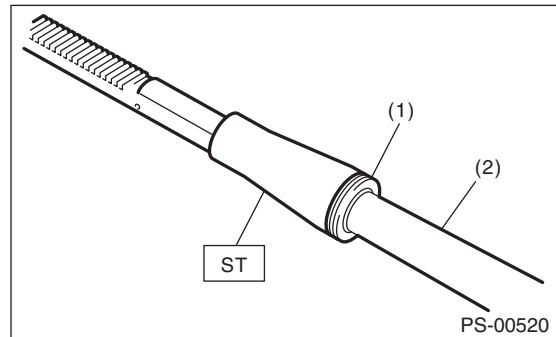
### 1. RACK HOUSING ASSEMBLY

1) Using a press, install the bushing to gearbox installation portion.



2) Insert the ST to rack.

ST 34199XA010 GUIDE 44



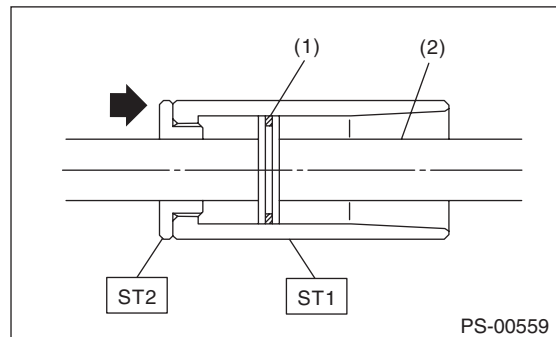
- (1) Seal ring
- (2) Rack

3) Install the seal ring to piston portion of rack.

4) Using the ST, form the seal ring properly.

ST1 34199XA020 FORMER PISTON 44

ST2 34199AG060 GUIDE G (26)



- (1) Seal ring
- (2) Rack

# Steering Gearbox

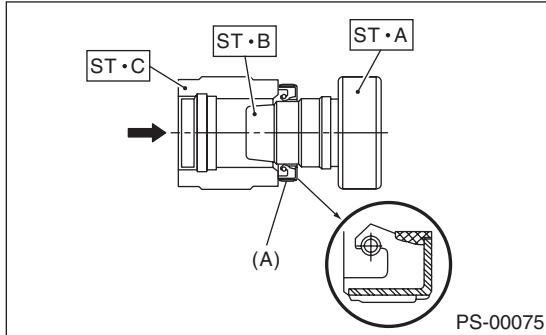
## POWER ASSISTED SYSTEM (POWER STEERING)

5) Using the ST B and ST C, attach the oil seal to ST A.

ST 34199FE040 INSTALLER A, B, C

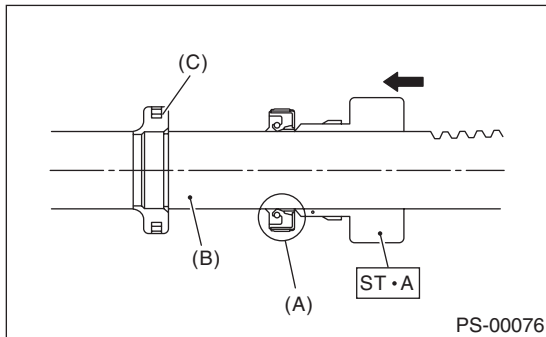
NOTE:

Face the oil seal in the direction as shown in the figure.



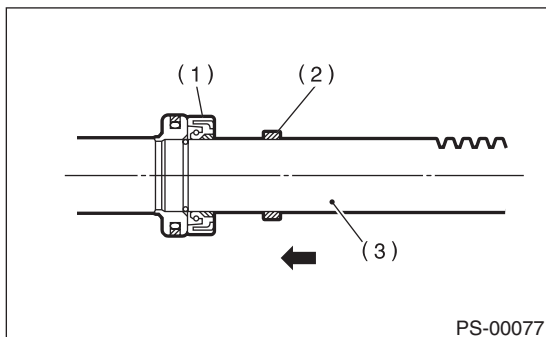
(A) Oil seal

6) Insert the ST A with oil seal assembled from the gear side of rack. Remove the oil seal from ST A near piston, and then remove the ST A from rack.



(A) Oil seal  
(B) Rack  
(C) Piston

7) Install the back-up washer from the gear side of rack.



(1) Oil seal  
(2) Back-up washer  
(3) Rack

8) Check the threaded end of holder and gearbox cylinder end for burrs, damage, etc. Correct if faulty.

9) Apply a coat of grease to the grooves in rack, sliding surface of sleeve and sealing surface of piston. Then insert the rack into steering body from cylinder side.

10) Attach the ST on gearbox cylinder.

ST 34199XA000 INSTALLER 44

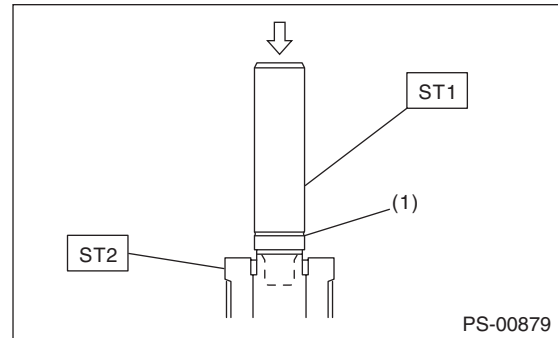
11) Set the ST to the end of rack.

ST 34199XA030 INSTALLER & REMOVER 44

12) Using a press, press-fit until the groove of ST1 is aligned to the end surface of ST2.

ST1 34199XA030 INSTALLER & REMOVER 44

ST2 34199XA000 INSTALLER 44



(1) Groove

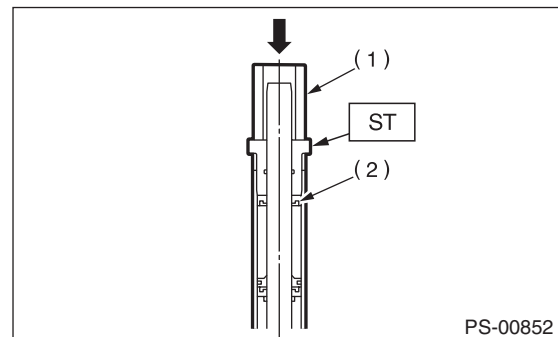
13) Remove the ST.

14) Insert the outer side oil seal into the rack using the same procedure as steps 5) and 6).

ST 34199FE040 INSTALLER A, B, C

15) Put the ST and pipe through the rack, and press-fit the outer side oil seal using a press.

ST 34199XA000 INSTALLER 44

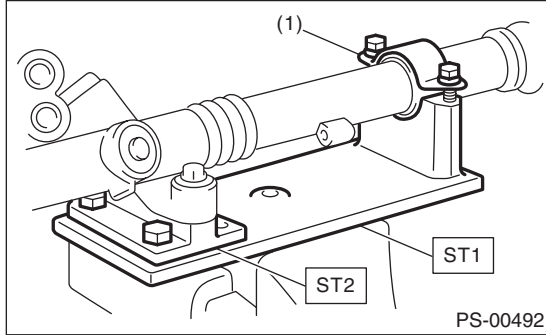


(1) Pipe  
(2) Outer side oil seal

# Steering Gearbox

## POWER ASSISTED SYSTEM (POWER STEERING)

- 16) Secure the gearbox in a vise using ST.  
ST1 92620000 STAND  
ST2 34199AG000 BOSS D



(1) Clamp

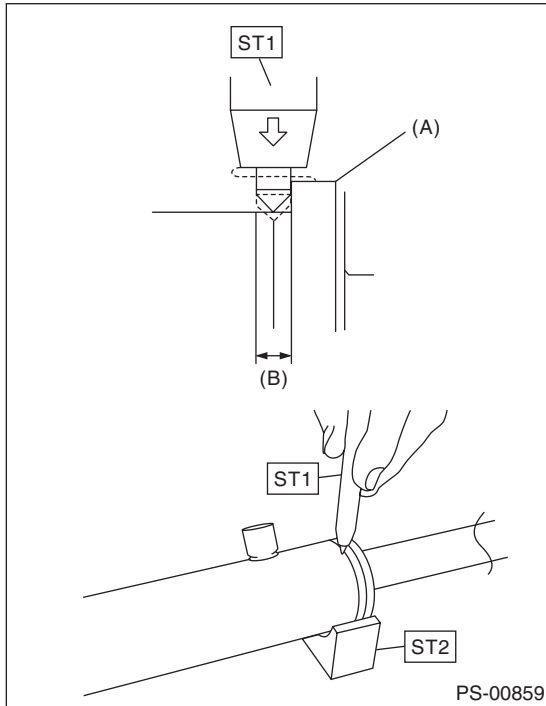
- 17) Tighten the holder.

### **Tightening torque:**

**85 N·m (8.7 kgf·m, 62.7 ft·lb)**

- 18) Using the ST, crimp so that the diameter of punch hole is 2 — 2.5 mm (0.08 — 0.10 in) and is aligned to the position of 2 mm (0.08 in) from gearbox cylinder end surface.

ST1 34099FA060 PUNCH HOLDER  
ST2 34199XA050 BASE

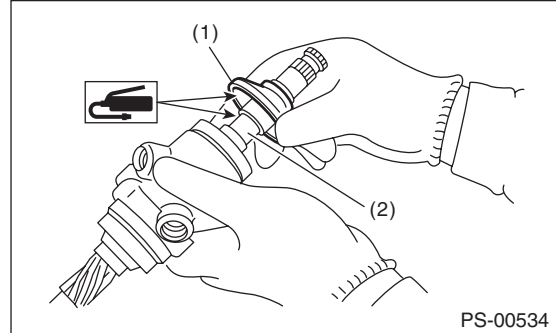


(A) Holder  
(B) 2 mm (0.08 in)

- 19) Put a vinyl tape around the spline portion and apply genuine grease to the dust cover and install to valve assembly.

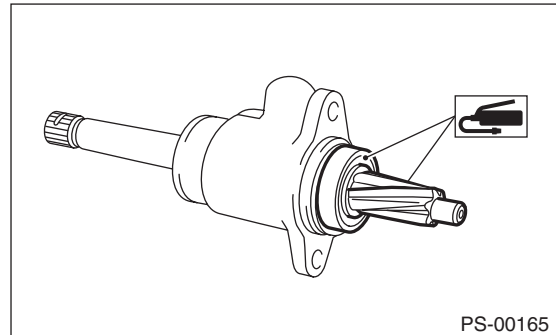
### **CAUTION:**

**Be sure to install the dust cover to groove of shaft.**

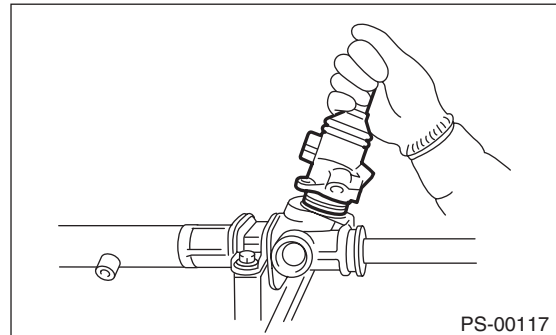


(1) Dust cover  
(2) Groove

- 20) Apply the genuine grease to the pinion gear and bearing of valve assembly.



- 21) Install a new gasket on valve assembly. Insert the valve assembly into place while facing the rack teeth toward pinion.



- 22) Tighten the bolts alternately to secure the valve assembly.

### **Tightening torque:**

**20 N·m (2.0 kgf·m, 14.8 ft·lb)**

### **CAUTION:**

**Be sure to alternately tighten the bolts.**

# Steering Gearbox

## POWER ASSISTED SYSTEM (POWER STEERING)

23) Temporarily tighten the tie-rod to the rack end, and then operate the rack from lock to lock for two or three times to make it fit in.

### CAUTION:

**Operating the rack from lock to lock without installing tie-rods may damage the oil seal. Always install the left and right tie-rods.**

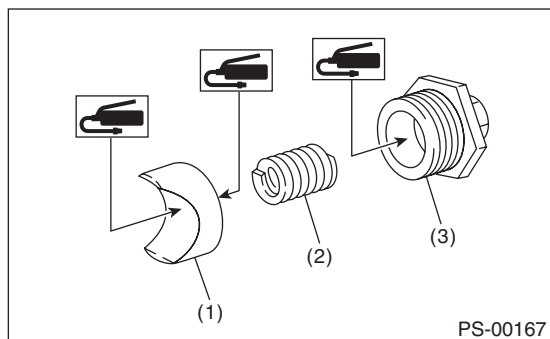
24) Apply liquid gasket to 1/3 or more of entire perimeter of adjusting screw thread.

### Liquid gasket:

**THREE BOND 1102 or 1215**

25) Apply a coat of grease to the sliding surface of sleeve and seating surface of spring, and then insert the sleeve into steering body.

Charge the adjusting screw with grease, and then insert the spring into adjusting screw. Then install on the steering body.



- (1) Sleeve
- (2) Spring
- (3) Adjusting screw

26) Tighten the adjusting screw to the specified torque.

### Tightening torque:

**5.9 N·m (0.6 kgf-m, 4.4 ft-lb)**

27) Tighten the adjusting screw to the specified torque, then loosen it 20°.

### CAUTION:

**Adjust the adjusting screw with the rack set in a straight-ahead position.**

28) Remove the tie-rod.

29) Adjust the turning resistance of gearbox so that it is within specification using adjusting screw. <Ref. to PS-33, TURNING RESISTANCE OF GEARBOX, INSPECTION, Steering Gearbox.>

30) Attach the lock nut into adjusting screw, and while holding the adjusting screw with wrench, tighten the lock nut using ST.

### Liquid gasket:

**THREE BOND 1102 or 1215**

ST 926230000 SPANNER

### Tightening torque (lock nut):

**25 N·m (2.5 kgf-m, 18.4 ft-lb)**

### NOTE:

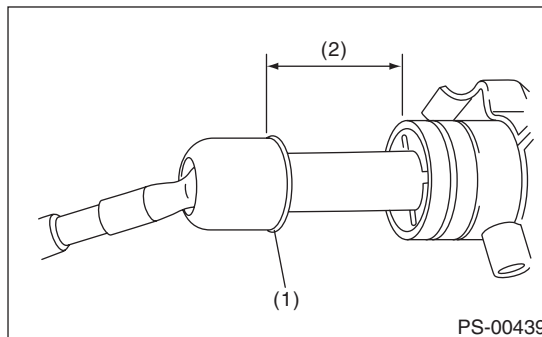
Hold the adjusting screw with a wrench to prevent it from turning while tightening lock nut.

31) Extend the rack approx. 40 mm (1.57 in) from steering body.

32) Install the tie-rod and new lock washer into rack.

### Tightening torque:

**128 N·m (13.1 kgf-m, 94.4 ft-lb)**

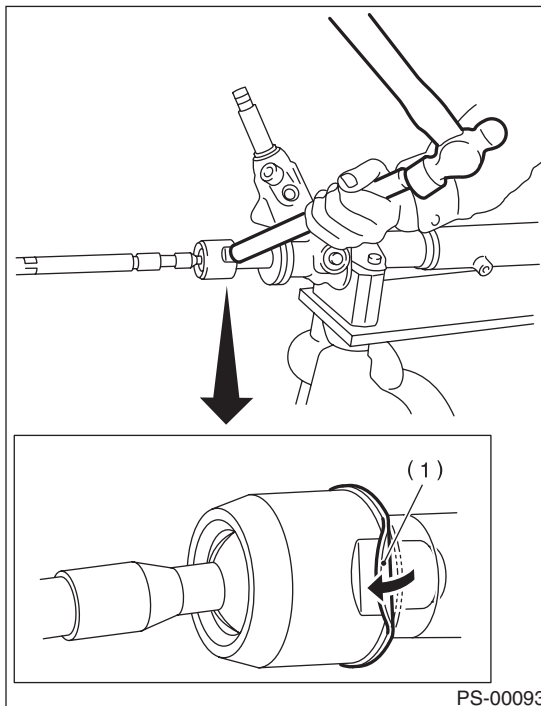


- (1) Lock washer
- (2) Approx. 40 mm (1.57 in)

33) Bend the lock washer and crimp it.

### CAUTION:

**Be careful not to scratch the rack when crimping lock washer.**



- (1) Lock washer



# Steering Gearbox

POWER ASSISTED SYSTEM (POWER STEERING)

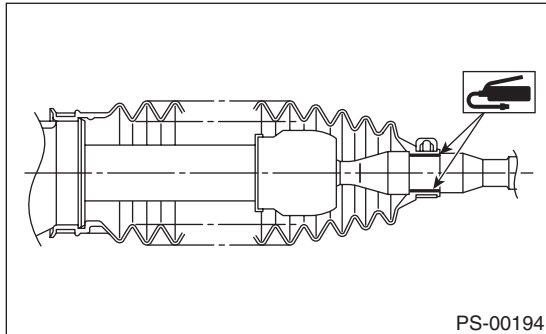
34) Apply a coat of grease to the tie-rod groove, and then install the boot to the housing.

### CAUTION:

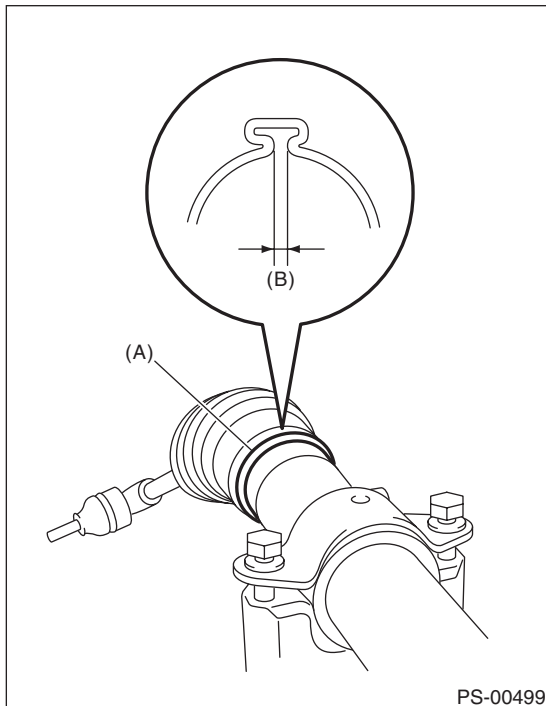
**Do not confuse the left and right boot when installing as the shape is different.**

### NOTE:

Make sure that the boot is installed without unusual inflation or deflation.



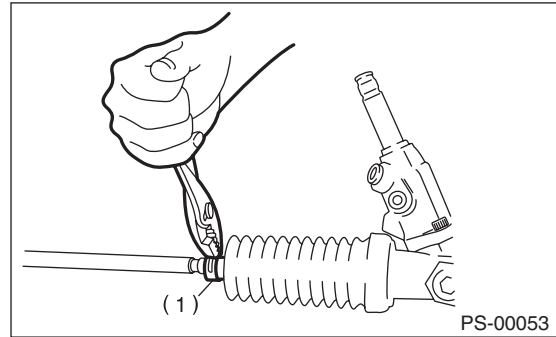
35) Install a new boot band. Using band clamp pliers, crimp it so that the clearance of crimping portion becomes 2 mm (0.079 in) or less.



(A) Boot band

(B) 2 mm (0.079 in) or less

36) Fix the boot end with small clip.



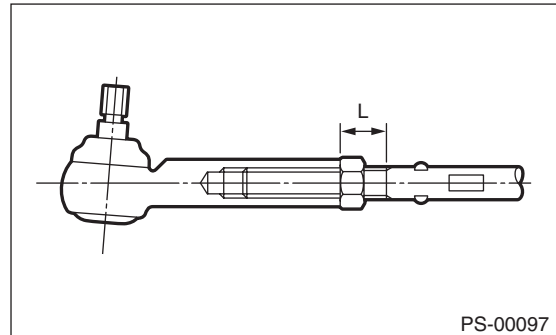
(1) Clip

37) After installing, check that the boot end is installed to the groove of the tie-rod.

38) If the tie-rod end has been removed, screw in lock nut and tie-rod end to the screwed portion of tie-rod, and tighten the lock nut temporarily in a position as shown in the figure.

**Installed tie-rod length L:**

**28 mm (1.1 in)**

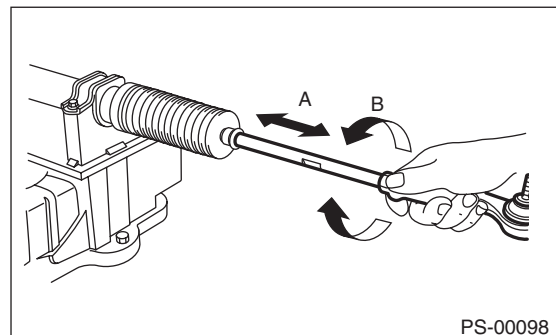


39) Inspect the gearbox as follows:

“A” Holding the tie-rod end, repeat lock to lock several times as quickly as possible.

“B” Holding the tie-rod end, turn it slowly at a radius several times as large as possible.

Finally, make sure that the boot is installed in the specified position without inflating.



40) Remove the gearbox from ST.

ST1 926200000 STAND

ST2 34199AG000 BOSS D

# Steering Gearbox

## POWER ASSISTED SYSTEM (POWER STEERING)

- 41) Install the four pipes on gearbox.  
(1) Connect the pipes A and B to the four pipe joints of gearbox.

### Tightening torque:

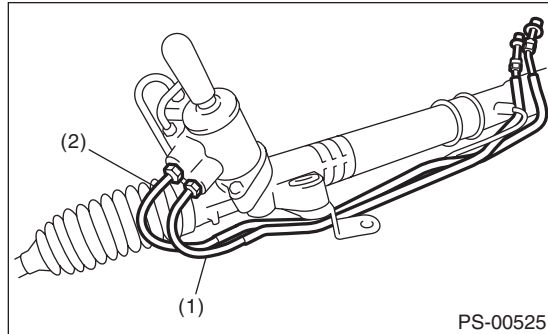
**Refer to the component parts. <Ref. to PS-4, POWER ASSISTED SYSTEM, COMPONENT, General Description.>**

- (2) Connect the pipes C and D to gearbox.

### Tightening torque:

**Pipe C: 37 N·m (3.8 kgf-m, 27.3 ft-lb)**

**Pipe D: 29 N·m (3.0 kgf-m, 21.4 ft-lb)**



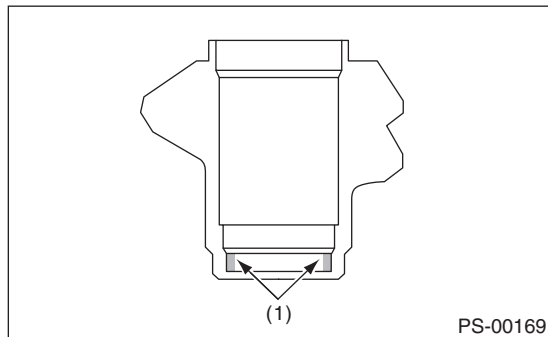
- (1) Pipe C  
(2) Pipe D

## 2. CONTROL VALVE ASSEMBLY

### 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 the inner wall of valve housing.

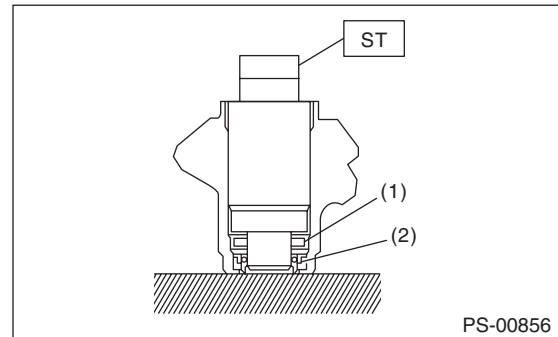


- (1) Apply fluid.

- 3) Apply grease to the oil seal.  
4) Verify the direction of oil seal.

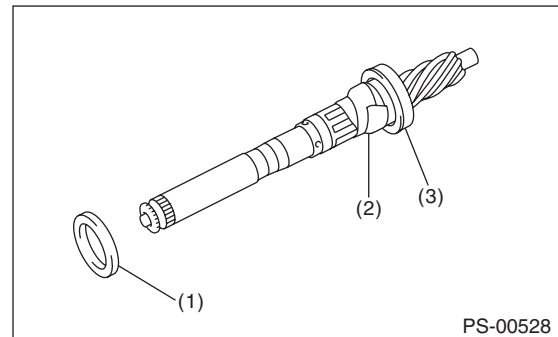
- 5) Using the ST and a press, install the oil seal and the bushing in valve housing.

ST 34199AG090 INSTALLER & REMOVER



- (1) Bushing  
(2) Oil seal

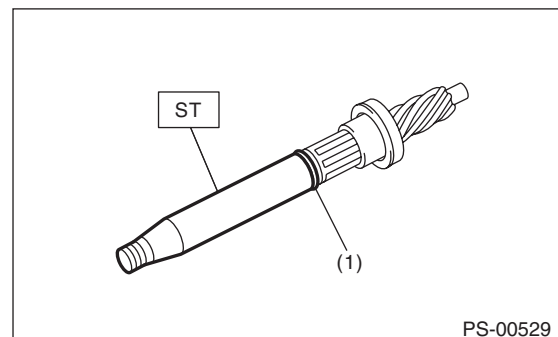
- 6) Apply vinyl tape to the groove of pinion.  
7) Install the back-up ring and oil seal to pinion, and then remove the vinyl tape.



- (1) Oil seal  
(2) Vinyl tape  
(3) Back-up ring

- 8) Attach the ST to pinion, and install the seal ring.

ST 34199AG020 GUIDE



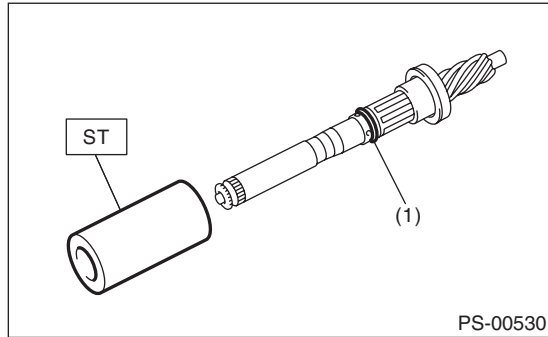
- (1) Seal ring

# Steering Gearbox

POWER ASSISTED SYSTEM (POWER STEERING)

9) Remove the ST GUIDE, and form the seal ring properly using ST FORMER.

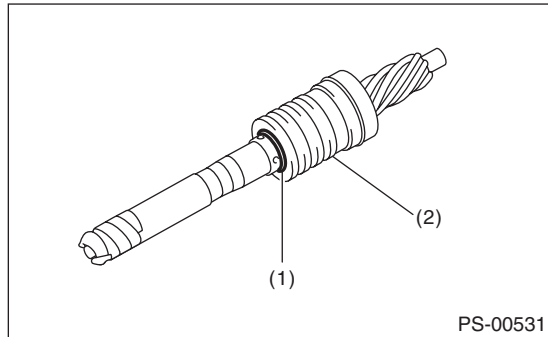
ST 34199AG070 FORMER



(1) Seal ring

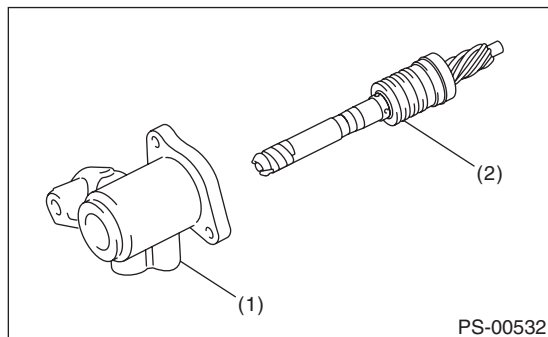
10) Put vinyl tape around pinion shaft spline to protect oil seal from damage.

11) Install the valve to pinion, and install the snap ring.



(1) Snap ring  
(2) Valve

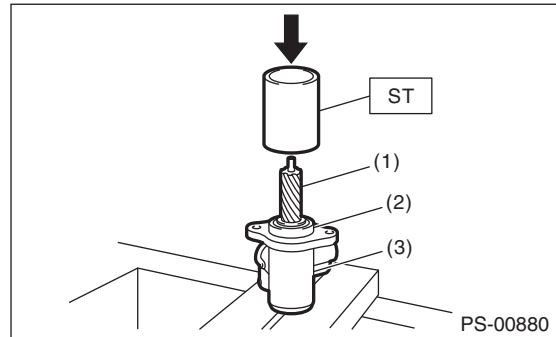
12) Attach the pinion & valve assembly into the valve housing.



(1) Valve housing  
(2) Pinion & valve ASSY

13) Using the ST and a press, push the outer race of bearing and press-fit the pinion and valve assembly into housing.

ST 34199XA020 FORMER PISTON 44



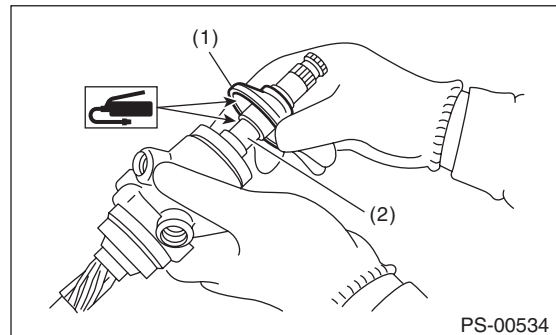
(1) Pinion & valve ASSY  
(2) Bearing  
(3) Housing

14) Apply the specified grease to dust cover.

15) Install the dust cover on valve assembly.

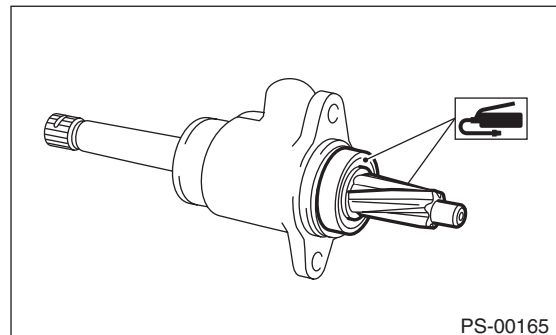
### CAUTION:

Be sure to install the dust cover to groove of shaft.



(1) Dust cover  
(2) Groove

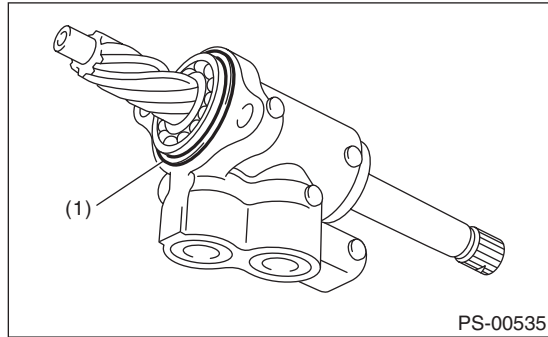
16) Apply the genuine grease to the pinion gear and bearing of valve assembly.



# Steering Gearbox

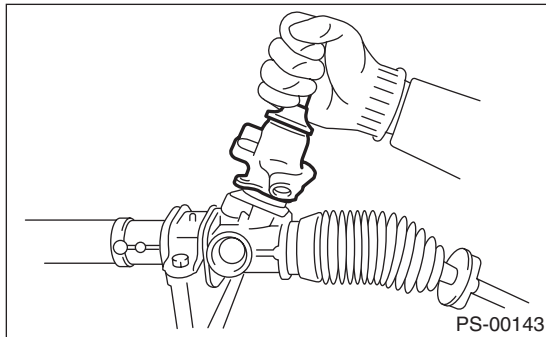
## POWER ASSISTED SYSTEM (POWER STEERING)

17) Install new O-ring to valve assembly.



(1) O-ring

18) Insert the valve assembly into place while facing the rack teeth toward pinion.



19) Tighten the bolts alternately to secure the valve assembly.

### **Tightening torque:**

**20 N-m (2.0 kgf-m, 14.8 ft-lb)**

### **CAUTION:**

**Be sure to alternately tighten the bolts.**

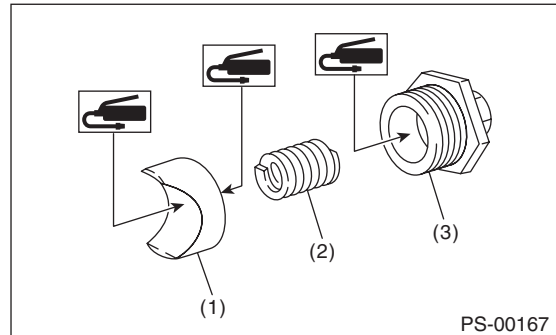
20) Apply liquid gasket to 1/3 or more of entire perimeter of adjusting screw thread.

### **Liquid gasket:**

**THREE BOND 1102 or 1215**

21) Apply a coat of grease to the sliding surface of sleeve and seating surface of spring, and then insert the sleeve into steering body.

Charge the adjusting screw with grease, and then insert the spring into adjusting screw. Then install on the steering body.



(1) Sleeve

(2) Spring

(3) Adjusting screw

22) Tighten the adjusting screw to the specified torque.

### **Tightening torque:**

**5.9 N-m (0.6 kgf-m, 4.4 ft-lb)**

23) Tighten the adjusting screw to the specified torque, then loosen it 20°.

24) Adjust the turning resistance of gearbox so that it is within specification using adjusting screw. <Ref. to PS-33, TURNING RESISTANCE OF GEARBOX, INSPECTION, Steering Gearbox.>

25) Attach the lock nut into adjusting screw, and while holding the adjusting screw with wrench, tighten the lock nut using ST.

### **Liquid gasket:**

**THREE BOND 1102 or 1215**

ST 926230000 SPANNER

### **Tightening torque (lock nut):**

**25 N-m (2.5 kgf-m, 18.4 ft-lb)**

### **NOTE:**

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

26) Remove the gearbox from ST.

ST1 926200000 STAND

ST2 34199AG000 BOSS D

# Steering Gearbox

POWER ASSISTED SYSTEM (POWER STEERING)

- 27) Install the four pipes on gearbox.  
 (1) Connect the pipes A and B to gearbox.

**Tightening torque:**

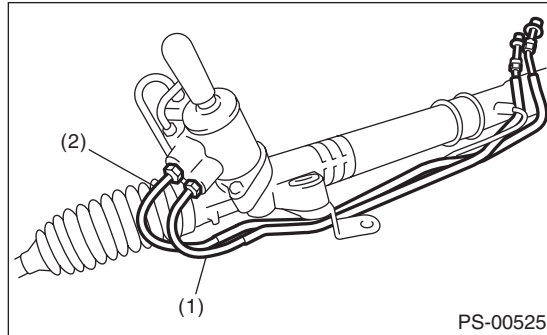
**Refer to the component parts. <Ref. to PS-4, POWER ASSISTED SYSTEM, COMPONENT, General Description.>**

- (2) Connect the pipes C and D to gearbox.

**Tightening torque:**

**Pipe C: 37 N·m (3.8 kgf-m, 27.3 ft-lb)**

**Pipe D: 29 N·m (3.0 kgf-m, 21.4 ft-lb)**



- (1) Pipe C  
 (2) Pipe D

## E: INSPECTION

### 1. BASIC INSPECTION

- 1) Clean all the disassembled parts, and check for wear, damage or any other faults, then repair or replace as necessary.  
 2) When disassembling, check the inside of gearbox for water. If any water is found, carefully check the 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) Bent input shaft (2) Damage on serration	If the bend or damage is excessive, replace the entire gearbox.
2	Dust seal	(1) Crack or damage (2) Wear	If the outer wall slips, the lip is worn out or damage is found, replace it with a new part.
3	Rack and pinion	Poor mating of rack with pinion	(1) Adjust the backlash properly. By measuring the turning torque of the gearbox and sliding resistance of rack, check if the rack & pinion engage uniformly and smoothly with each other. (Refer to "Service limit".) (2) Pull out the entire rack to allow viewing of the teeth, and check for damage. Even if abnormality is found in either (1) or (2), replace the entire gearbox.
4	Gearbox unit	(1) Bending of the rack shaft (2) Bending of the cylinder portion (3) Crack or damage on the aluminum portion	Replace the gearbox with a new part.
		(4) Wear or damage on rack bushing	If the free play of rack shaft in radial direction is out of the specified range, replace the gearbox with new part. (Refer to "Service limit".)
		(5) Wear on input shaft bearing	If the free play of input shaft in radial and axial direction is out of the specified range, replace the gearbox with a new part. (Refer to "Service limit".)

# Steering Gearbox

## POWER ASSISTED SYSTEM (POWER STEERING)

No.	Parts	Inspection	Corrective action
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 of dust seal	Replace.
8	Adjusting screw spring	Deterioration	Replace.
9	Boot clip	Deterioration	Replace.
10	Sleeve	Damage	Replace.
11	Pipe	(1) Damage to flared surface (2) Damage to flare nut (3) Damage to pipe	Replace.

### 2. LIMIT

Make a measurements as follows. If it exceeds the specified service limits, adjust or replace.

#### NOTE:

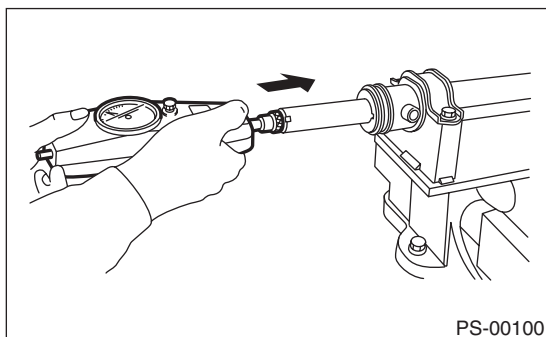
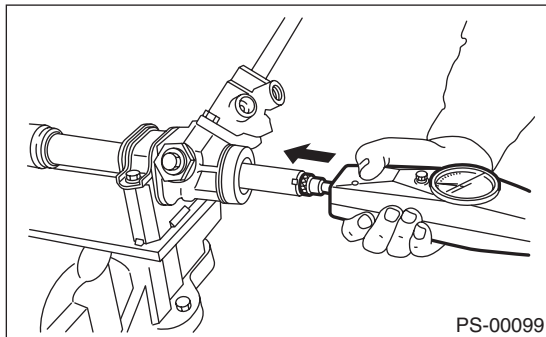
When making a measurement, vise the gearbox using ST. Never vise the gearbox by inserting aluminum plates etc. between vise and gearbox.

ST1 92620000 STAND  
ST2 34199AG000 BOSS D

#### Rack shaft sliding resistance:

##### Limit

**343 N (35 kgf, 77 lb) or less**



### 3. RACK SHAFT PLAY IN THE RADIAL DIRECTION

#### Right-turn steering:

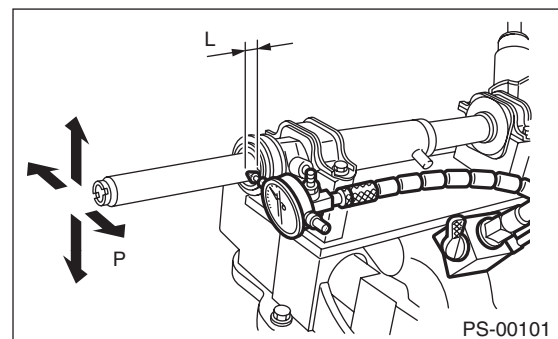
##### Limit

**0.4 mm (0.016 in) or less**

##### Condition

**L: 5 mm (0.20 in)**

**P: 98 N (10 kgf, 22 lb)**



#### Left-turn steering:

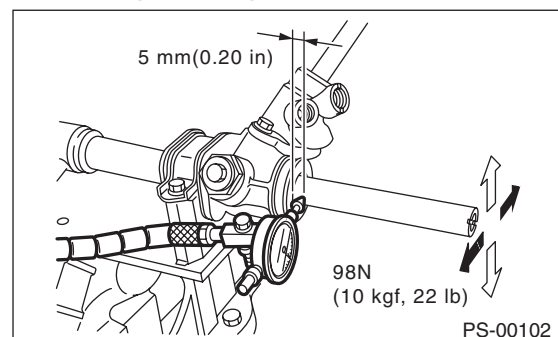
##### Limit

**Direction** ⇄

**0.6 mm (0.024 in) or less**

**Direction** ⇄

**0.4 mm (0.016 in) or less**



# Steering Gearbox

POWER ASSISTED SYSTEM (POWER STEERING)

## 4. INPUT SHAFT PLAY

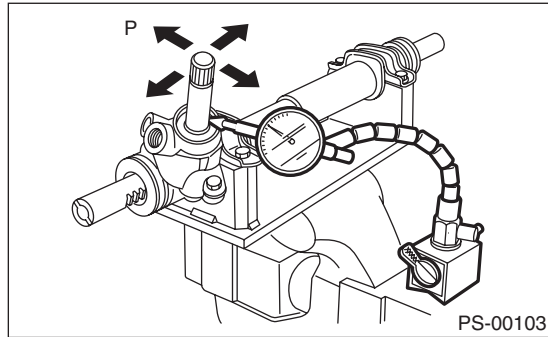
*In radial direction:*

**Limit**

**0.26 mm (0.0102 in) or less**

**Condition**

**P: 98 N (10 kgf, 22 lb)**



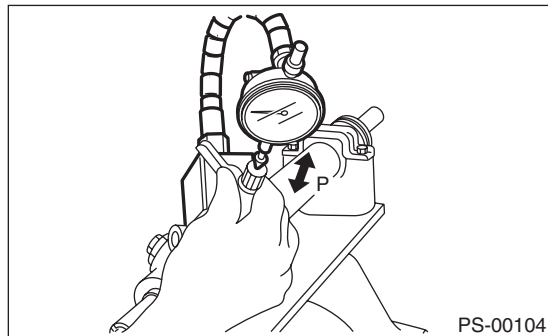
*In axial direction:*

**Service limit**

**Without play**

**Condition**

**P: 20 — 49 N (2 — 5 kgf, 4 — 11 lb)**



## 5. TURNING RESISTANCE OF GEARBOX

Using the ST, measure the gearbox turning resistance.

ST 34099PA100 SPANNER

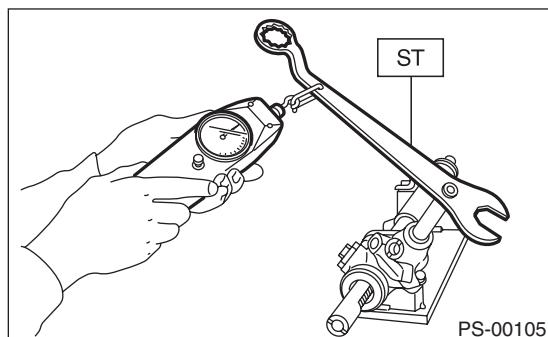
**Service limit:**

**Maximum allowable resistance:**

**10.5 N (1.1 kgf, 2.4 lb) or less**

**Difference between right and left turning resistance:**

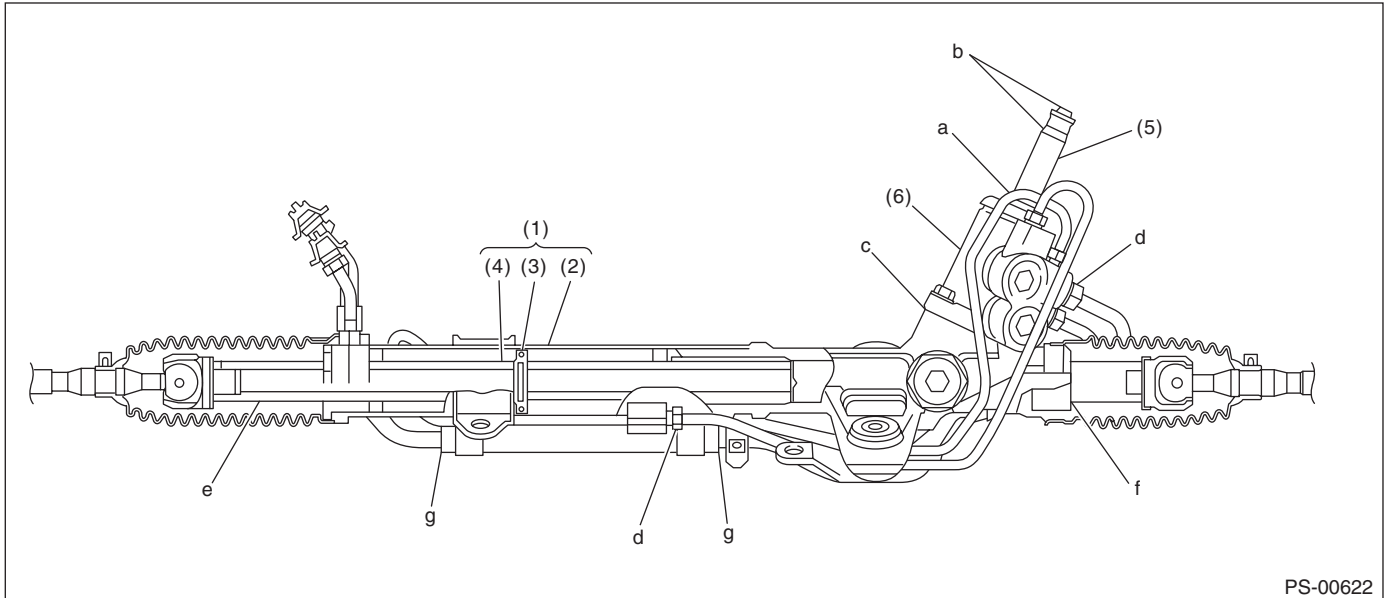
**20% or less**



# Steering Gearbox

## POWER ASSISTED SYSTEM (POWER STEERING)

### 6. OIL LEAKAGE



PS-00622

- (1) Power cylinder  
(2) Cylinder

- (3) Rack piston  
(4) Rack axle

- (5) Input shaft  
(6) Valve housing

1) Lift up the vehicle.

2) If a fluid leak is found, clean the fluid completely from the suspect area, and turn the steering wheel 30 to 40 times to the left and right from lock to lock, with the engine running, and check again for leaks immediately, and also after a few hours have passed.

3) Cause and solution for oil leakage from "a"  
The oil seal is damaged. Replace the valve assembly or oil seal with a new part.

4) Cause and solution for oil leakage from "b"  
The torsion bar O-ring is damaged. Replace the valve assembly with a new part.

5) Cause and solution for oil leakage from "c"  
The oil seal is damaged. Replace the valve assembly or oil seal with a new part.

6) Cause and solution for oil leakage from "d"  
The pipe is damaged. Replace the faulty pipe or O-ring.

7) Cause and solution for oil leakage from "g".  
The hose is damaged. Replace the hose with a new part.

8) If leak is other than a, b, c, d or g, or if oil is leaking from gearbox, move the right and left boots toward tie-rod end side, respectively, with the gearbox mounted to the vehicle, and remove fluid from surrounding portions. Then, turn the steering wheel from lock to lock about 30 to 40 times with the engine running, then re-inspect the leaking area immediately after and several hours after this operation.

(1) Leakage from "e"

The cylinder seal is damaged. Replace the rack bushing with a new part.

(2) Leakage from "f"

There are two possible causes. Perform the following step first. Remove the pipe assembly B from the valve housing, and close the circuit using ST.

ST 926420000 PLUG

Turn the steering wheel from lock to lock approx. 30 to 40 times with the engine running, then inspect the leaked portion immediately after and several hours after this operation.

- If leakage from "f" is noted again:

The oil seal of pinion and valve assembly is damaged. Replace the pinion & valve assembly with a new part. Or replace the oil seal and the parts that are damaged during disassembly with new parts.

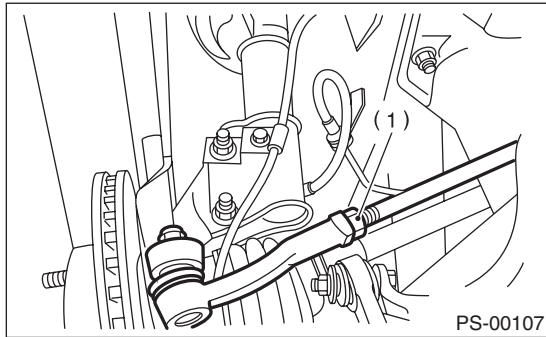
- If oil stops leaking from "f":

The oil seal of rack housing is damaged. Replace the oil seal and parts that are damaged during disassembly with new parts.



## F: ADJUSTMENT

- 1) Adjust the front toe.  
 <Ref. to FS-10, FRONT WHEEL TOE-IN, INSPECTION, Wheel Alignment.>



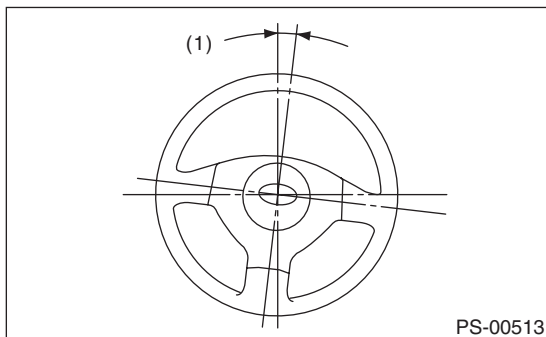
(1) Lock nut

- 2) Check the steering angle of the wheels.

### **Standard of steering angle:**

Inner wheel	$37.0^{\circ} \pm 1.5^{\circ}$
Outer wheel	$32.0^{\circ} \pm 1.5^{\circ}$

- 3) If the steering wheel spokes are not horizontal when wheels are set in the straight ahead position, or error is more than  $5^{\circ}$  on the periphery of the steering wheel, correctly re-install the steering wheel.



(1)  $5^{\circ}$  or less

- 4) If the 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 opposite direction from each other by the same angle.

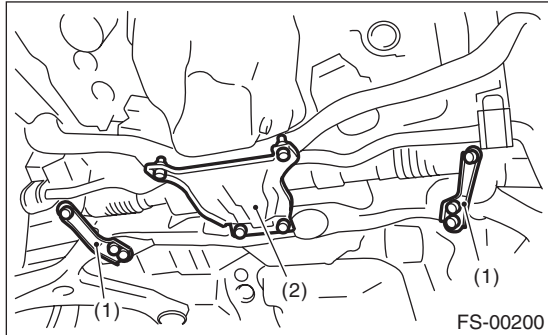
# Pipe Assembly

## POWER ASSISTED SYSTEM (POWER STEERING)

### 6. Pipe Assembly

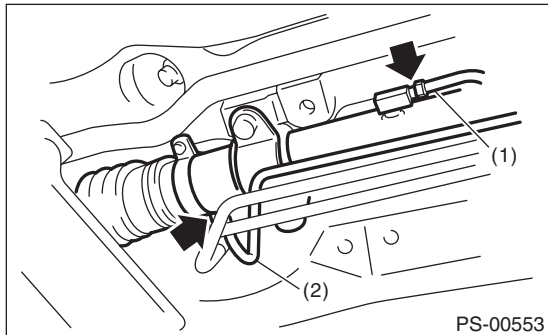
#### A: REMOVAL

- 1) Disconnect the ground cable from battery.
- 2) Lift up the vehicle, and then remove the front crossmember support plate and jack-up plate.



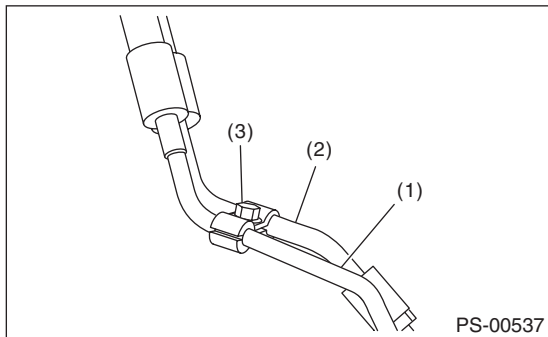
- (1) Front crossmember support plate
- (2) Jack-up plate

- 3) Remove the one pipe joint at the center of the gearbox, and connect the vinyl hose to the pipe and the joint. Discharge the fluid by turning the steering wheel fully clockwise and counterclockwise. Discharge the fluid similarly from other pipes.



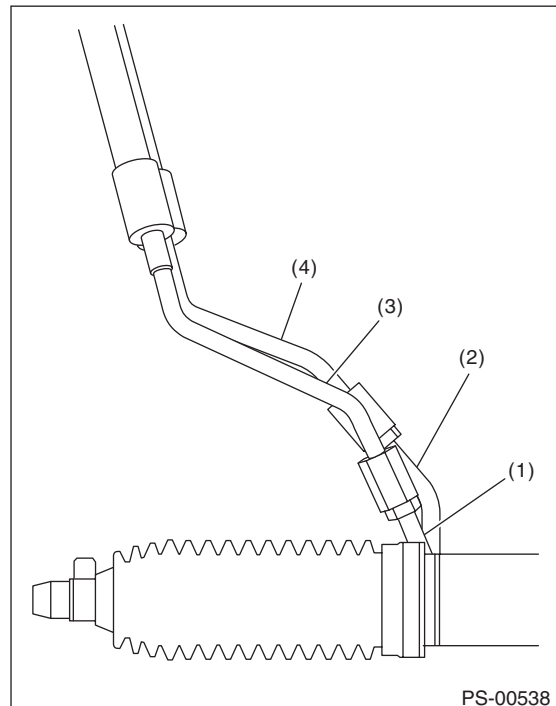
- (1) Pipe A
- (2) Pipe B

- 4) Remove the clamp E from return hose and pressure hose.



- (1) Return hose
- (2) Pressure hose
- (3) Clamp E

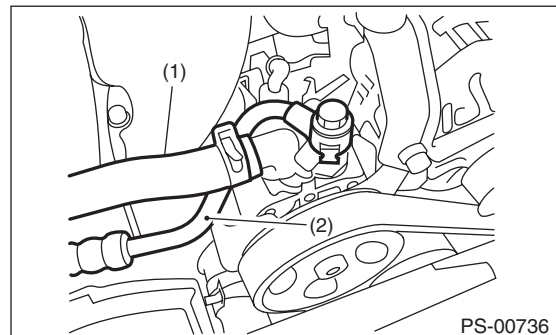
- 5) Disconnect the pipe D from return hose and pipe C from pressure hose.



- (1) Pipe C
- (2) Pipe D
- (3) Pressure hose
- (4) Return hose

- 6) Remove the air intake duct. <Ref. to IN(H6DO)-9, REMOVAL, Air Intake Duct.>

- 7) Disconnect the suction hose and pressure hose from oil pump.

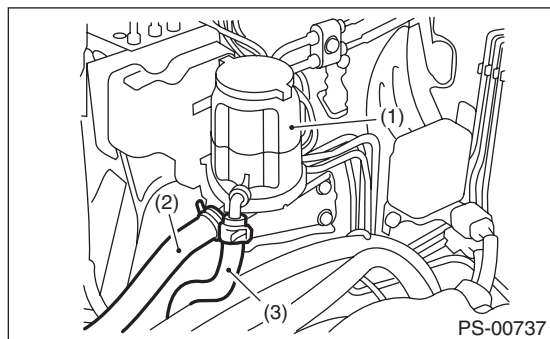


- (1) Suction hose
- (2) Pressure hose

# Pipe Assembly

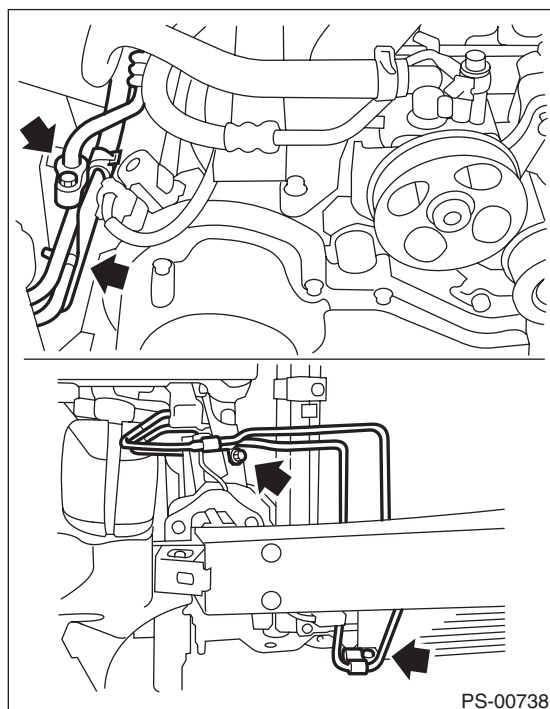
POWER ASSISTED SYSTEM (POWER STEERING)

8) Disconnect the suction hose and return hose from the reservoir tank.

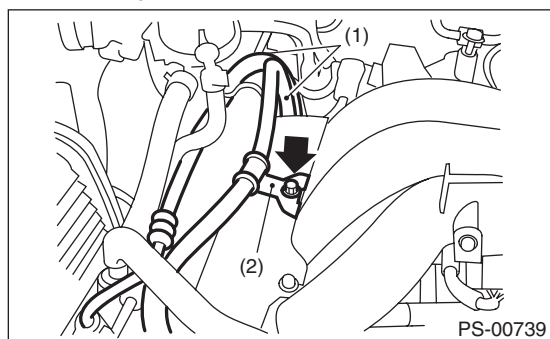


- (1) Reservoir tank
- (2) Suction hose
- (3) Return hose

9) Remove the oil cooler pipe.



10) Remove the hose bracket and take out the hose assembly from vehicle.



- (1) Hose ASSY
- (2) Hose bracket

## B: INSTALLATION

1) Install in the reverse order of removal.

### **Tightening torque:**

**<Ref. to PS-4, POWER ASSISTED SYSTEM, COMPONENT, General Description.>**

2) Fill with the specified fluid.

### **CAUTION:**

**Never start the engine before filling with fluid; otherwise the vane pump may become seized.**

3) Finally, check the clearance between pipes or hoses as shown in the figure indicated in "General Diagnostic Table". <Ref. to PS-52, INSPECTION OF CLEARANCE, INSPECTION, General Diagnostic Table.>

## Pipe Assembly

POWER ASSISTED SYSTEM (POWER STEERING)

### C: INSPECTION

Check all disassembled parts for wear, damage or other problems. Repair or replace the defective parts as necessary.

Part	Maintenance parts	Corrective action
Pipe	<ul style="list-style-type: none"> <li>• O-ring fitting surface damage</li> <li>• Nut damage</li> <li>• Pipe damage</li> </ul>	Replace with a new part.
Hose	<ul style="list-style-type: none"> <li>• Flare surface damage</li> <li>• Flare nut damage</li> <li>• Outer surface cracks</li> <li>• Outer surface wear</li> <li>• Clip damage</li> <li>• End coupling or adapter deformation</li> </ul>	Replace with a new part.

#### CAUTION:

**Although the 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. Wipe off hoses immediately if any of these come into contact with the hoses. 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 areas and a driving condition in which many steering operations are required in short time.**

**Continuous discharge of the relief valve for 5 seconds or more will reduce the service lives of hoses, oil pump, fluid, etc., due to over heating.**

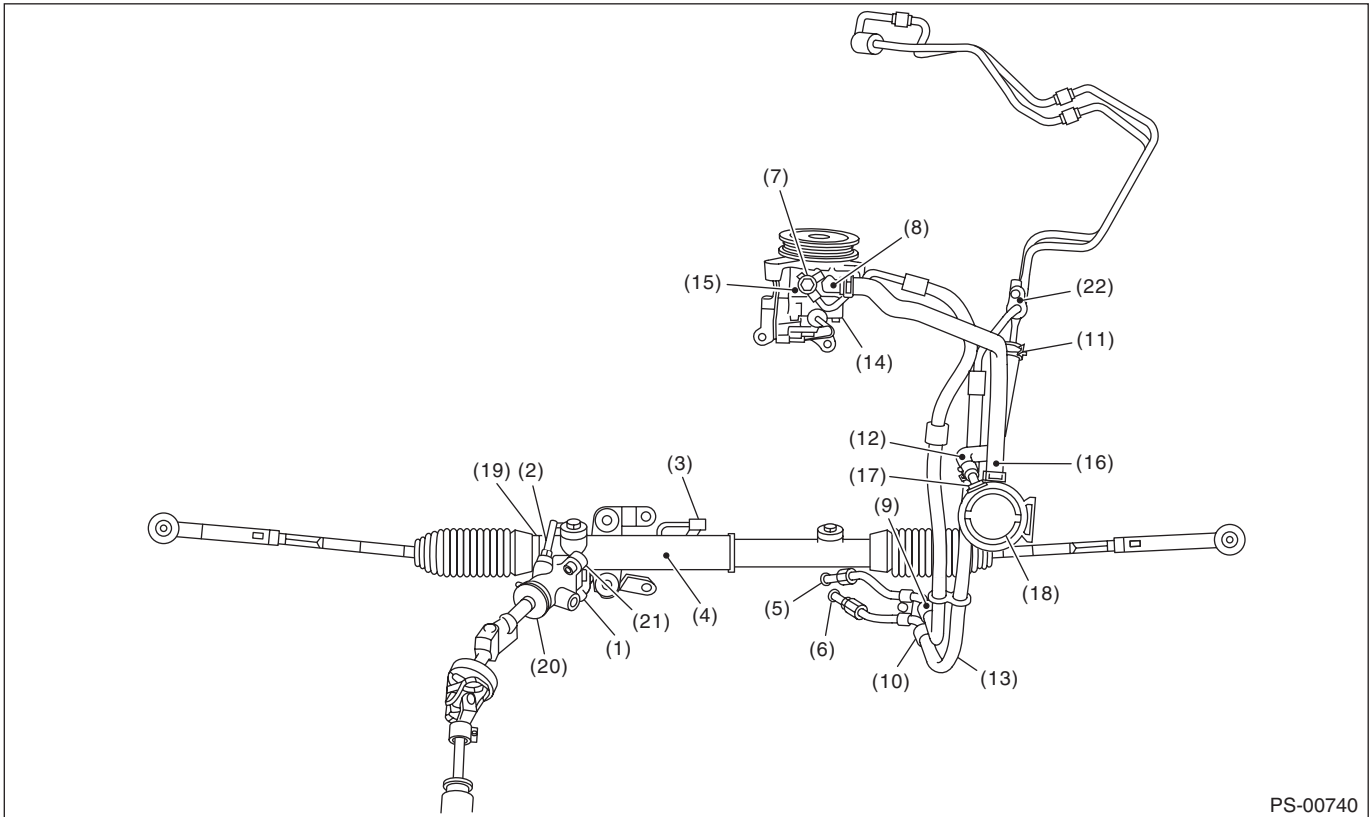
Trouble	Possible cause	Corrective action
Pressure hose burst	Excessive holding time of relief status	Instruct customers.
	Malfunction of the relief valve	Replace the oil pump.
	Poor cold characteristic of fluid	Replace fluid.
Disconnection of the return hose	Improper connection	Repair.
	Loosening of the clip	Replace the hose clip.
	Poor cold characteristic of fluid	Replace fluid.
Fluid slightly leaking out of hose	Wrong layout, tensioned	Replace the hose.
	Excessive play of engine due to deterioration of engine mounting rubber	Replace the parts if defective.
	Improper stop position of pitching stopper	Replace the parts if defective.
Crack on hose	Excessive holding time of relief status	Replace. Instruct customers.
	Power steering fluid, engine oil, electrolyte adhere on the hose surface	Replace. Be careful during service work.
	Too many uses in extremely cold weather	Replace. Instruct customers.

# Pipe Assembly

POWER ASSISTED SYSTEM (POWER STEERING)

**NOTE:**

There are conditions in which a fluid leak is diagnosed, but is not actually leaking. This is because the fluid spilt during the last maintenance was not completely wiped off. Be sure to wipe off spilt fluid thoroughly after maintenance.



Fluid leaking area	Possible cause	Corrective action
Leakage from the connections of pipes and hoses, numbered (1) through (8) in the figure	Insufficient tightening of flare nut, adhesion of dirt, damage to flare or flare nut or eye bolt	Loosen and retighten. Replace if ineffective.
	Improper installation of hose or clamp	Replace.
	Damaged O-ring or gasket	Replace the O-ring, gasket pipe or hose with new part, if still no improvement, replace the gearbox or oil pump as well.
Leakage from hose (9) through (13) in the figure	Crack or damage in hose	Replace with a new part.
	Crack or damage in hose hardware	Replace with a new part.
Leakage from surrounding of aluminum portion of oil pump, (14) and (15) in the figure	Damaged O-ring	Replace the oil pump.
	Damaged gasket	Replace the oil pump.
Leakage from oil tank, (16) and (17) in the figure	Crack in oil tank	Replace the oil tank.
Leakage from filler neck of (18)	Damaged cap gasket	Replace the cap.
	Crack in root of filler neck	Replace the oil tank.
	Fluid level too high	Adjust the fluid level.
Leakage from power cylinder of gear-box area (19) in the figure	Damaged oil seal	Replace the oil seal.
Leakage from (20), (21) in the figure and control valve of gearbox	Damaged gasket or oil seal	Replace the faulty parts.
	Damage in control valve	Replace the control valve.
(22) Leakage from the joints between cooler pipe and hose.	Insufficient tightening of connecting portion.	Loosen and retighten.

# Oil Pump

## POWER ASSISTED SYSTEM (POWER STEERING)

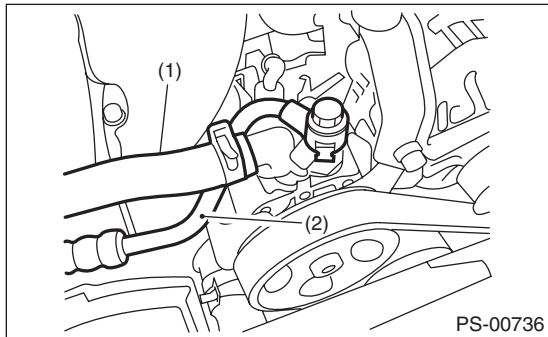
### 7. Oil Pump

#### A: REMOVAL

- 1) Disconnect the ground cable from battery.
- 2) Remove the air intake duct. <Ref. to IN(H6DO)-9, REMOVAL, Air Intake Duct.>
- 3) Remove the pulley belt cover.
- 4) Remove the V-belts.
- 5) Disconnect the connector from power steering pump switch.
- 6) Disconnect the pressure hose and suction hose from power steering pump.

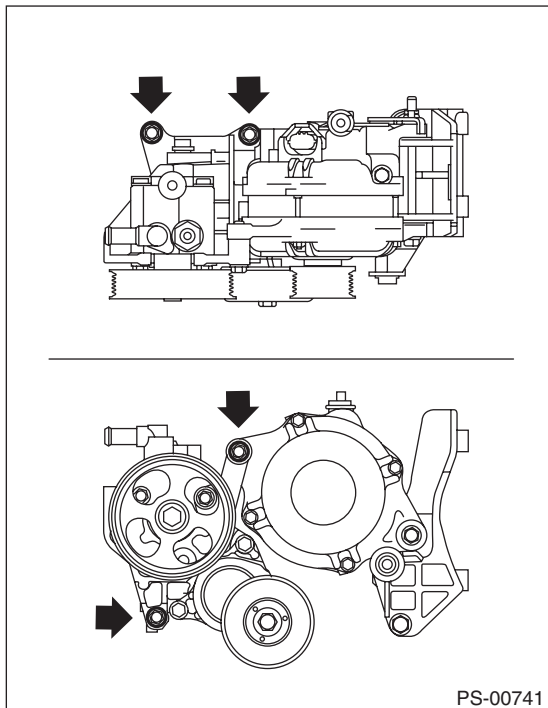
#### CAUTION:

- Do not spill power steering fluid.
- To prevent foreign matter from entering the hose and pipe, cover the open ends with clean cloth.



- (1) Suction hose
- (2) Pressure hose

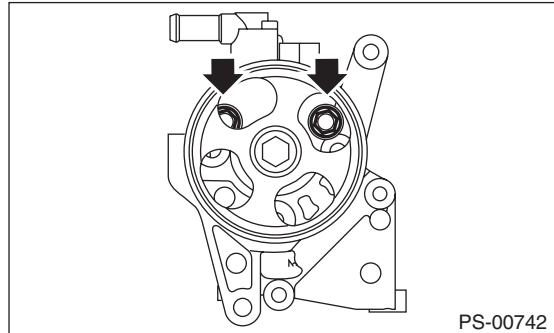
- 7) Remove the installation bolt of the power steering pump bracket.



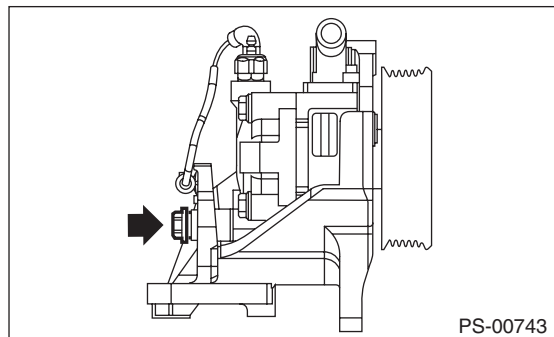
- 8) Place the oil pump bracket in a vise, and remove the two bolts from the front side of the oil pump.

#### CAUTION:

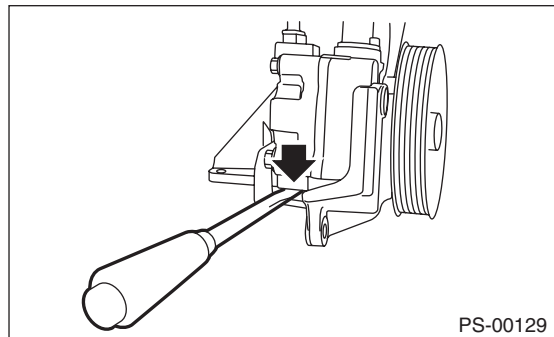
When securing the oil pump bracket in a vise, hold the oil pump bracket with the least possible force between two pieces of wood.



- 9) Remove the bolt from the rear side of oil pump.



- 10) Disassemble the oil pump and bracket by inserting a flat tip screwdriver as shown in the figure.



# Oil Pump

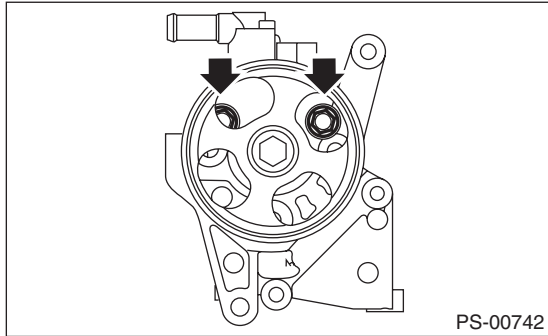
POWER ASSISTED SYSTEM (POWER STEERING)

## B: INSTALLATION

1) Install the oil pump to bracket.

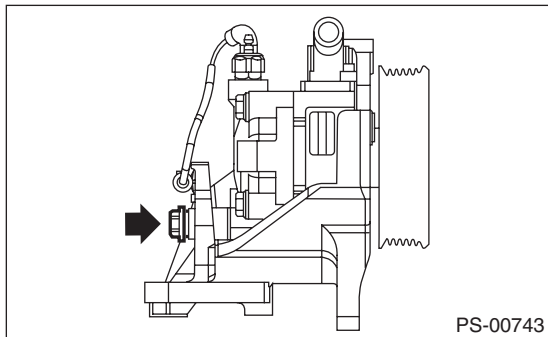
**Tightening torque:**

**15.7 N·m (1.6 kgf-m, 11.6 ft-lb)**



**Tightening torque:**

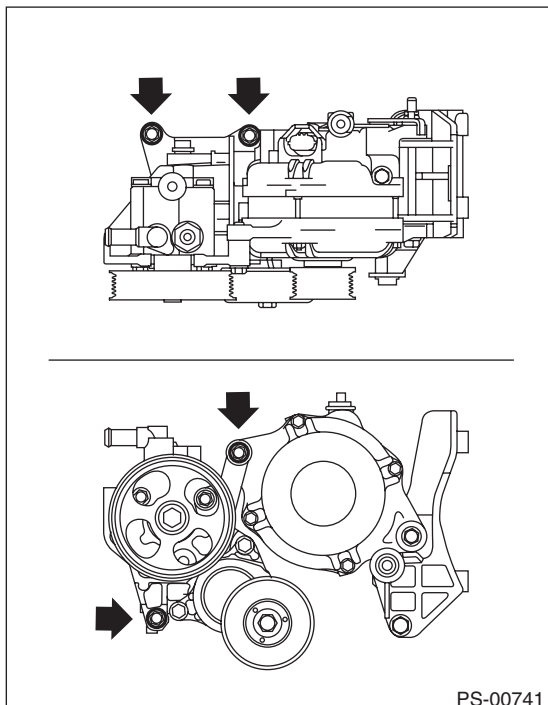
**36.8 N·m (3.8 kgf-m, 27.1 ft-lb)**



2) Install the power steering pump bracket.

**Tightening torque:**

**<Ref. to PS-6, OIL PUMP, COMPONENT, General Description.>**



3) Connect the pressure hose and suction hose.

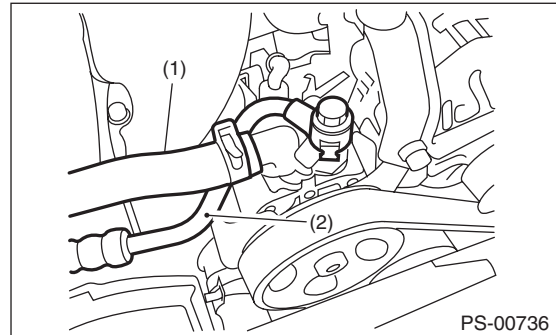
**Tightening torque:**

**Eye bolt**

**40 N·m (4.1 kgf-m, 29.5 ft-lb)**

**CAUTION:**

**Be careful when installing; If the hose is twisted it may come into contact with other parts.**



(1) Suction hose

(2) Pressure hose

4) Connect the connector to the power steering oil pressure switch.

5) After installing the oil pump, fill the oil pump with fluid while rotating the pulley by hand and bleed the air from the oil pump.

**CAUTION:**

**Always fill the oil pump with the fluid to prevent abnormal noise and seizure of the oil pump.**

6) Install the tensioner adjuster.

7) Install the V-belts.

8) Install the cover of the pulley belt.

9) Connect the ground cable to battery.

10) Pour the specified power steering fluid. <Ref. to PS-48, Power Steering Fluid.>

**CAUTION:**

**Never start the engine before filling with fluid; otherwise the vane pump may become seized.**

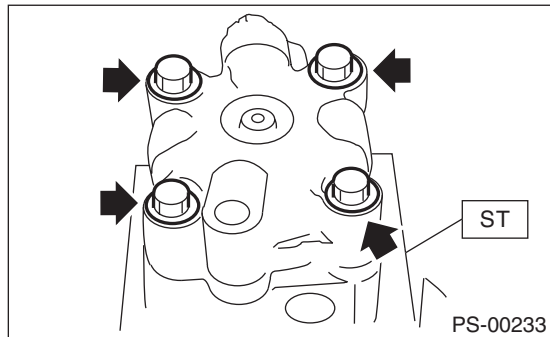
# Oil Pump

POWER ASSISTED SYSTEM (POWER STEERING)

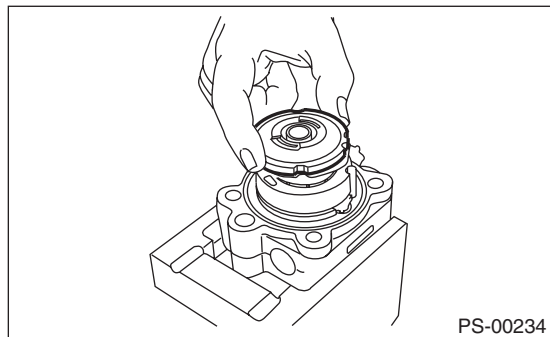
## C: DISASSEMBLY

1) Using the ST, place the oil pump in the vise, and remove the 4 bolts holding the rear cover.

ST 34199AE020 ATTACHMENT



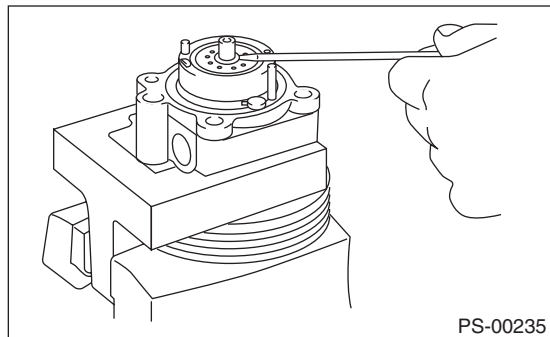
2) Remove the pressure plate.



3) Use a screwdriver to pry the retaining ring.

### CAUTION:

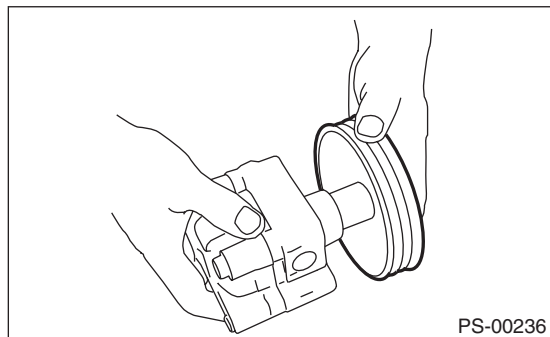
**Do not remove the cam rings and rotors.**



4) Install the pressure plate.

5) Temporarily tighten the rear cover to the front casing.

6) Remove the oil pump pulley.



7) Place the oil pump in the vice.

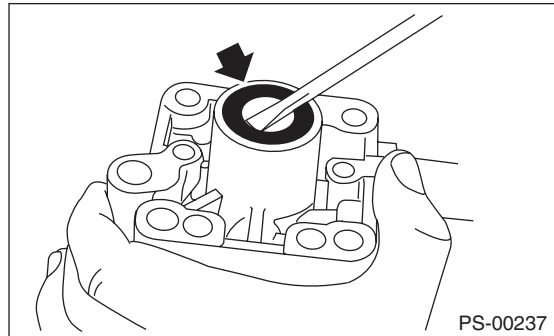
### CAUTION:

**Do not place the oil pump in the vise directly. Support the oil pump lightly using soft pads to protect it.**

8) Use a screwdriver to pry the oil seal out.

### CAUTION:

**Be careful not to scratch the inner surface of the casing.**



## D: ASSEMBLY

1) Caution during reassembly

(1) When removing O-rings, oil seals and snap rings, always replace with new parts.

(2) Thoroughly wash the parts and allow to dry. Make sure the parts do not come into contact with cleaning oil or dust.

(3) The reassembly must be performed in a clean place. Make sure lint or other foreign objects do not stick to parts.

(4) Cleaning oil tends to remain inside the front casing. Use compressed air to completely clean out any remaining cleaning oil.

(5) Make sure the parts are not rusted. Once the parts are washed and dried, use a specified hydraulic oil to prevent rust.

(6) Reassemble in the reverse order of removal.

2) At the bearing positions, apply grease to the oil seal and front casing inner surfaces.

### CAUTION:

**Make sure the inner surface of the front body is not damaged.**

3) Temporarily tighten the rear cover to the front body.

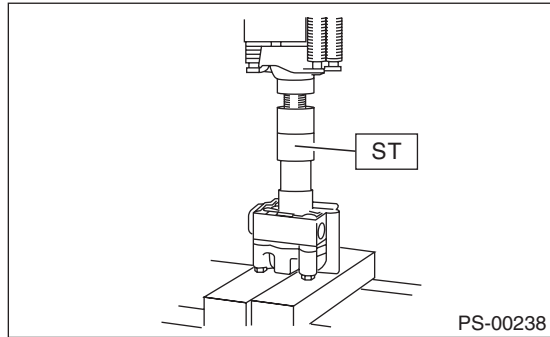


# Oil Pump

## POWER ASSISTED SYSTEM (POWER STEERING)

4) Attach ST to the front body. Using the press, install the oil seal.

ST 34199AE030 INSTALLER



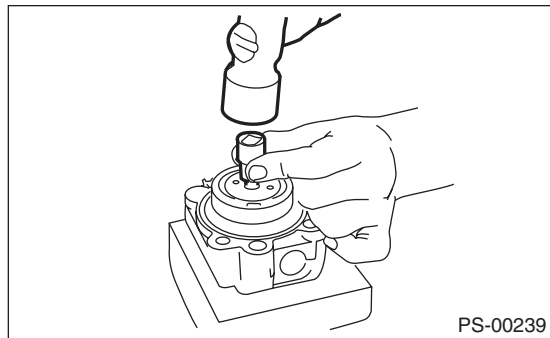
5) Install the pump pulley to front body.

6) Using the ST, place the oil pump in a vise.

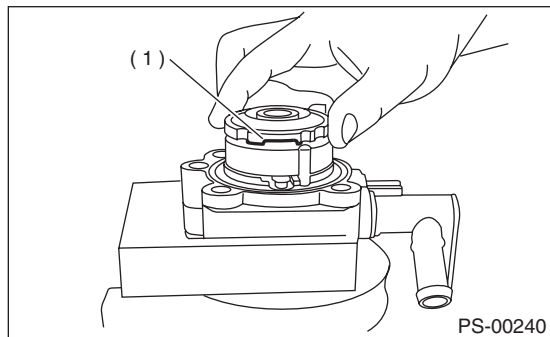
ST 34199AE020 ATTACHMENT

7) Remove the rear cover.

8) Using a 10 mm box wrench, tap the retaining ring into the shaft groove.



9) Install the pressure plate as shown in the figure.



(1) Groove

10) Apply the specified hydraulic oil to the O-rings, and attach to the front casing and pressure plate.

11) Install the seal ring to the pressure plate.

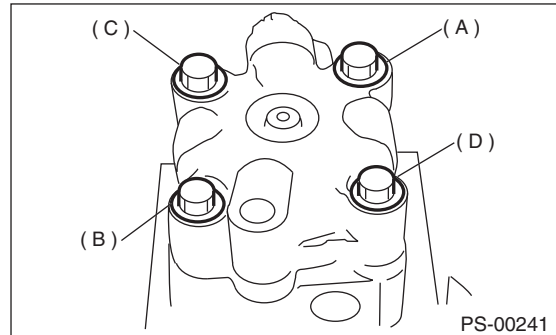
12) With knock pin positions aligned, install the rear cover.

**Tightening torque:**

**27.5 N·m (2.8 kgf-m, 20.3 ft-lb)**

**CAUTION:**

**Temporarily tighten the bolts in the order of (A), (B), (C), (D) as shown in the figure. Then, tighten in the same sequence.**



13) When reassembly is complete, turn the shaft by hand to make sure that rotation is smooth. If it is excessively tight or there is a clear problem, detach and check for foreign objects on the slide surface, or whether there is any problems in the attachment, and remove the cause of the problem.

# Oil Pump

POWER ASSISTED SYSTEM (POWER STEERING)

## E: INSPECTION

### 1. BASIC INSPECTION

Perform the following inspection procedures and replace faulty parts.

No.	Parts	Inspection	Corrective action
1	Oil pump (Exterior)	(1) Crack, damage or oil leakage	Replace the oil pump with a new part.
		(2) Play of pulley shaft	Measure the radial play and axial play. If any of these exceeds the service limit, replace the oil pump with a new part.
2	Pulley	(1) Damage	Replace with a new part.
		(2) Bend	Measure the V groove deflection. If it exceeds the service limit, replace the oil pump with a new part.
3	Oil pump (Interior)	(1) Faulty or seized of vane pump	Check the rotating resistance of pulley. If it exceeds the service limit, replace the oil pump with new part.
		(2) Bend in the shaft or damage to bearing	If the a string is wrapped on the pulley and rotated, and the oil pump emits a noise that is markedly different in tone and loudness from a sound of a new oil pump, replace the oil pump with a new part.
4	O-ring	Cracking or deterioration	Replace with a new part.
5	Bracket	Cracks	Replace with a new part.

### 2. SERVICE LIMIT

Make a measurements as follows. If it exceeds the service limit, replace with a new part.

#### CAUTION:

- When securing the oil pump on a vise, hold the oil pump with the least possible force between two pieces of wood.
- Do not set the outside of flow control valve or pulley on a vise; otherwise outside or pulley might be deformed. Select properly sized wood pieces.

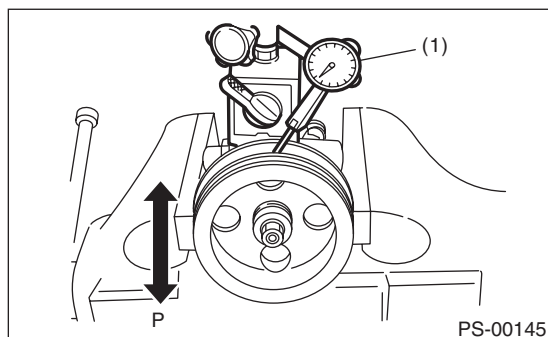
1) Play of the pulley shaft

#### Condition:

**P:** When applying the force of 9.8 N (1.0 kgf, 2.2 lb)

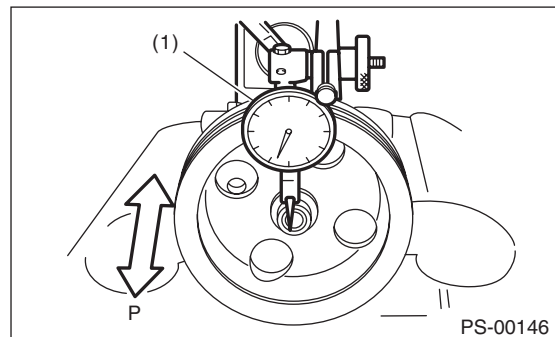
#### Service limit:

**Play in the radial direction (Direction ← →)**  
0.2 mm (0.008 in) or less



(1) Dial gauge

**Axial play (Direction ⇐ ⇨)**  
0.6 mm (0.024 in) or less



(1) Dial gauge

# Oil Pump

POWER ASSISTED SYSTEM (POWER STEERING)

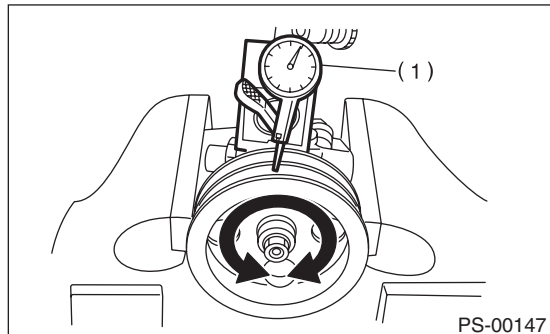
## 2) Deflection of the pulley groove

### 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 gauge

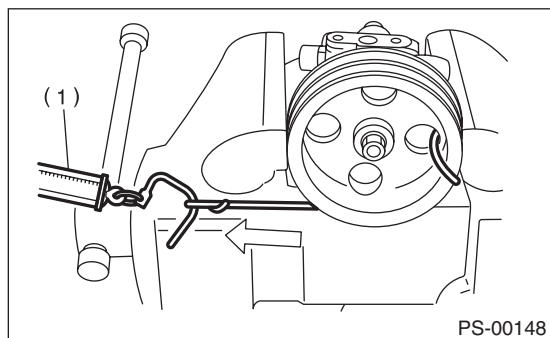
## 3) Rotating resistance of pulley

### 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 to make a judgment.



(1) Spring scale

## 3. HYDRAULIC PRESSURE

### NOTE:

- To measure hydraulic pressure correctly, be sure to complete all the items in "INSPECTION", prior to performing the measurement. <Ref. to PS-49, INSPECTION, General Diagnostic Table.>
- Do not leave the valve of pressure gauge closed or hold the steering wheel at lock for 5 seconds or more in any case, this can damage the oil pump.
- Before attaching a pressure gauge, place cloth at locations where fluid is expected to spill. Wipe off any spilled fluid completely after the measurement.

### 1) Regular pressure measurement

(1) Connect the ST1, ST2 and ST3.

ST1 925711000 PRESSURE GAUGE

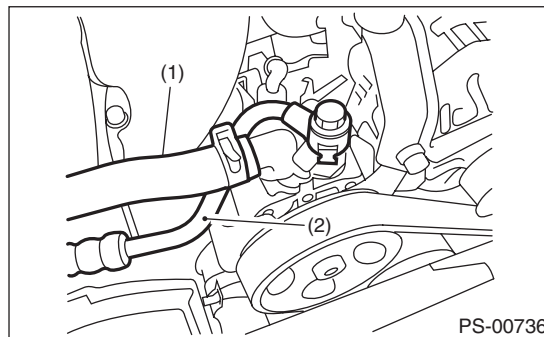
ST2 34099AC020 ADAPTER HOSE B

ST3 34099AC010 ADAPTER HOSE A

(2) Remove the air intake duct.

(3) Disconnect the pipe C from pump.

(4) Using the gasket (Part No. 34621AC021) and bolt (Part No. 34620AC010), install the ST2 to pump instead of pressure hose.



(1) Suction hose

(2) Pressure hose

(5) Attach the ST3 to the end of pressure hose which is removed from pump.

(6) Replenish power steering fluid up to the specified level.

(7) Open the valve, and start the engine.

# Oil Pump

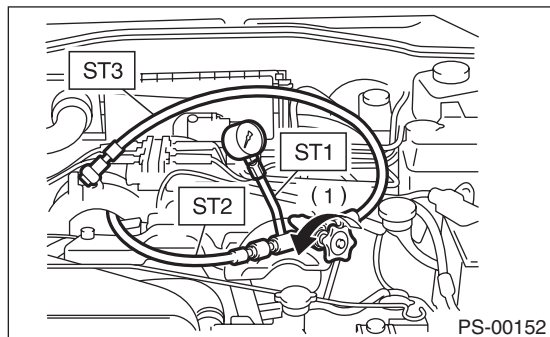
## POWER ASSISTED SYSTEM (POWER STEERING)

(8) Measure the regular pressure.

ST1 925711000 PRESSURE GAUGE

ST2 34099AC020 ADAPTER HOSE B

ST3 34099AC010 ADAPTER HOSE A



(1) Valve

### Service limit:

**981 kPa (10 kg/cm<sup>2</sup>, 142 psi) or less**

(9) If it is not within the specification, replace the problem part for the following problems. (Pipe or hose clogged, leaks from fluid line, and mixture of foreign matter in fluid line)

2) Measure the relief pressure.

(1) Using the STs, measure the relief pressure.

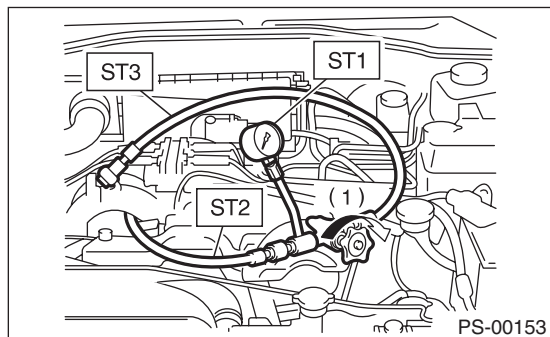
(2) Close the valve.

(3) Measure the relief pressure.

ST1 925711000 PRESSURE GAUGE

ST2 34099AC020 ADAPTER HOSE B

ST3 34099AC010 ADAPTER HOSE A



(1) Valve

### Service limit:

**8,800 — 9,400 kPa (90 — 96 kg/cm<sup>2</sup>, 1,276 — 1,363 psi)**

(4) If it is not within the specification, replace the oil pump.

3) Measure the working pressure.

(1) Using the ST, measure the working pressure.

(2) Open the valve.

(3) Measure the working pressure of control valve by turning steering wheel from stop to stop.

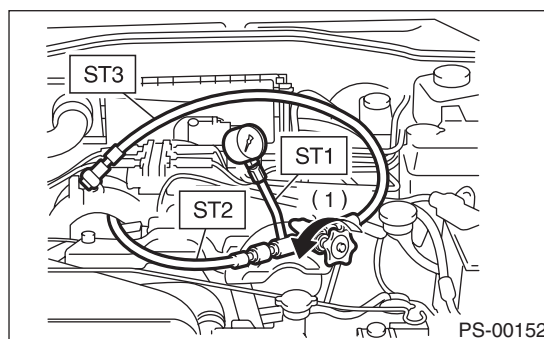
### NOTE:

Because of the power steering system setup, there are conditions where the pressure will not rise to the repair limit value even if the steering wheel is turned to the maximum steering angle. In this case, turn the steering wheel further than the maximum steering angle to measure the operational pressure.

ST1 925711000 PRESSURE GAUGE

ST2 34099AC020 ADAPTER HOSE B

ST3 34099AC010 ADAPTER HOSE A



(1) Valve

### Service limit:

**8,800 — 9,400 kPa (90 — 96 kg/cm<sup>2</sup>, 1,276 — 1,363 psi)**

(4) If it is out of specification, measure the steering effort. <Ref. to PS-51, MEASUREMENT OF STEERING EFFORT, INSPECTION, General Diagnostic Table.> If it is not within specification, replace the control valve itself or control valve and pinion as a single unit, using new parts.

## 8. Reservoir Tank

### A: REMOVAL

- 1) Drain fluid from the reservoir tank.
- 2) Disconnect the hose from reservoir tank.

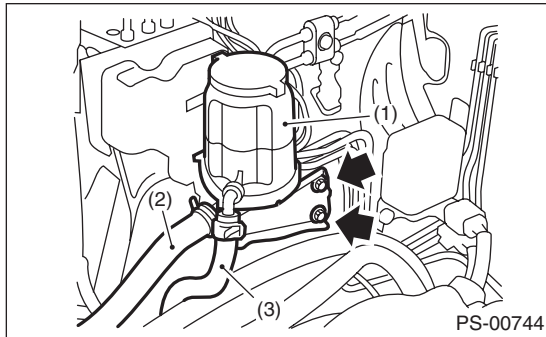
#### CAUTION:

To prevent foreign matter from entering the hose and pipe, cover the open ends of them with clean cloth.

- 3) Remove the bolt and remove the reservoir tank from the body.

#### CAUTION:

Do not separate the reserve tank and bracket.



- (1) Reservoir tank
- (2) Suction hose
- (3) Return hose

### B: INSTALLATION

- 1) Install in the reverse order of removal.
- 2) Replenish power steering fluid up to the specified level. <Ref. to PS-48, Power Steering Fluid.>

#### Tightening torque:

**33 N·m (3.4 kgf-m, 24.3 ft-lb)**

### C: INSPECTION

Check the reservoir tank for cracks, breakage or damage. If a failure is found, replace the reservoir tank.

# Power Steering Fluid

POWER ASSISTED SYSTEM (POWER STEERING)

## 9. Power Steering Fluid

### A: SPECIFICATION

Recommended power steering fluid
SUBARU ATF or ATF DEXRON III

### B: INSPECTION

1) Check the power steering fluid for deterioration or contamination. If the fluid is highly deteriorated or contaminated, drain it and refill with new fluid.

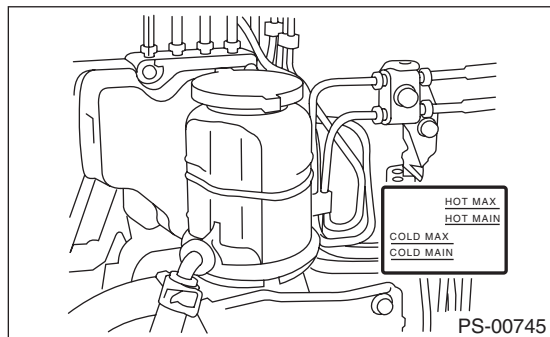
2) Check the joints and units for oil leakage. If any oil leaks are found, repair or replace the applicable part.

3) Inspect the fluid level of reservoir tank with vehicle on level surface and engine stopped.

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

(1) Check at power steering fluid temperature 20°C (68°F); read the fluid level on the "COLD" side.

(2) Check at power steering fluid temperature 80°C (176°F); read the fluid level on the "HOT" side.



### C: REPLACEMENT

1) Lift up the vehicle.  
2) Remove the crossmember support.  
3) Remove the pipe joint in the center of gearbox, and connect the vinyl hose to the pipe and joint. Wipe fluid off while turning the steering wheel.

4) Add the specified fluid to reservoir tank at "MAX" level.

5) Continue to turn the steering wheel slowly from lock to lock until the bubbles stop appearing on oil surface while keeping the fluid at the level in the Step 4).

6) If the steering wheel is turned in a low fluid level condition, air will be sucked into the pipe. If sucked, leave it about half an hour and then do the step 5) again.

7) Start the engine and let it idle.

8) Continue to turn the steering wheel slowly from lock to lock again until the bubbles stop appearing on oil surface while keeping the fluid at the level in Step 4).

Normally bubbles will stop appearing after turning the steering wheel from lock to lock three times.

9) In case bubbles do not stop appearing in the tank, leave it about half an hour and then do the step 4) all over again.

10) Lower the vehicle, and then idle the engine.

11) Continue to turn the steering wheel from lock to lock until the bubbles stop appearing and change of the fluid level is within 3 mm (0.12 in).

12) In case the following happens, leave it about half an hour and then do step 8) to 11) 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.

13) Check the fluid leakage after turning steering wheel from lock to lock with engine running.

# General Diagnostic Table

POWER ASSISTED SYSTEM (POWER STEERING)

## 10. General Diagnostic Table

### A: INSPECTION

Trouble	Possible cause	Corrective action
<ul style="list-style-type: none"> <li>Steering effort is heavy in all ranges.</li> <li>Steering effort is heavy at stand still.</li> <li>Steering wheel vibrates when turning.</li> </ul>	1. Pulley belt <ul style="list-style-type: none"> <li>Unequal length of pulley belts</li> <li>Contact with oil or grease</li> <li>Looseness or damage of the pulley belt</li> <li>Poor uniformity of the pulley belt cross section</li> <li>Pulley belt touches to pulley bottom</li> <li>Poor revolution of pulleys (except oil pump pulley)</li> <li>Poor revolution of oil pump pulley</li> </ul>	Adjust or replace the faulty parts.
	2. Tire and wheel <ul style="list-style-type: none"> <li>Improper tire out of specifications<sup>*1</sup></li> <li>Improper wheel out of specifications<sup>*1</sup></li> <li>Tires not properly inflated</li> </ul>	Replace or reinflate the tire and wheel. Instruct customers.
	3. Fluid <ul style="list-style-type: none"> <li>Low fluid level</li> <li>Air entry in fluid</li> <li>Dust entry in fluid</li> <li>Fluid deterioration</li> <li>Inadequate warm up of fluid<sup>*2</sup></li> </ul>	Refill the fluid, bleed air, replace or instruct customer.
	4. Idle speed <ul style="list-style-type: none"> <li>Lower idle speed</li> <li>Excessive drop of idle speed at start or when turning the steering wheel<sup>*3</sup></li> </ul>	Adjust the idle speed or instruct customer.
	5. Measure the hydraulic pressure. <Ref. to PS-45, HYDRAULIC PRES-SURE, INSPECTION, Oil Pump.>	Replace the faulty parts.
	6. Measure the steering wheel effort. <Ref. to PS-51, MEASUREMENT OF STEERING EFFORT, INSPECTION, General Diagnostic Table.>	Adjust the idle speed or replace the faulty parts.
	7. Fluid line <ul style="list-style-type: none"> <li>Folded hose</li> <li>Flattened pipe</li> </ul>	Replace the faulty parts.
<ul style="list-style-type: none"> <li>Vehicle leads to one side or the other.</li> <li>Returning force of steering wheel to center is poor.</li> <li>Steering wheel vibrates when turning.</li> </ul>	1. Tire and wheel <ul style="list-style-type: none"> <li>Flat tire</li> <li>Mixed use of different tires</li> <li>Mixed use of different wheels</li> <li>Abnormal wear of tire</li> <li>Unequal tread remaining</li> <li>Unequal pressure of tire</li> </ul>	Adjust, repair or replace the tire and wheel.
	2. Front alignment <ul style="list-style-type: none"> <li>Improper or unequal caster</li> <li>Improper or unequal toe-in</li> <li>Loose suspension connections</li> </ul>	Adjust or retighten.
	3. Others <ul style="list-style-type: none"> <li>Damaged joint assembly</li> <li>Unbalance of ground clearance</li> <li>Unbalance of load</li> </ul>	Replace or adjust the faulty parts, or instruct customer.
	4. Measure the steering wheel effort. <Ref. to PS-51, MEASUREMENT OF STEERING EFFORT, INSPECTION, General Diagnostic Table.>	Adjust or replace the faulty parts.

<sup>\*1</sup> If the tires or wheels are wider than standard, the load to the power steering system is increased. Accordingly, in a condition, for example before fluid warms-up, relief valve may work before reaching maximum turning angle. In this case, steering effort may be heavy. When the measured hydraulic pressure is normal, there is no abnormal thing.

<sup>\*2</sup> In cold weather, flow resistance will increase due to the cold hydraulic fluid, and steering effort will be heavier. After warming-up engine, turn the steering wheel from stop to stop several times to warm up fluid. If steering effort reduces normally, function is normal.

<sup>\*3</sup> In cold weather or with insufficient warm up of the engine, steering effort may be heavy due to excessive drop of idle rpm when turning the steering wheel. In this case, start the vehicle with increasing engine speed than usual. If steering effort reduces normally, function is normal.

# General Diagnostic Table

## POWER ASSISTED SYSTEM (POWER STEERING)

### 1. NOISE & VIBRATION

#### CAUTION:

**Do not keep the relief valve operated for five seconds or more at any time or inner parts of the oil pump may be damaged due to rapid increase of fluid temperature.**

#### NOTE:

- A screeching noise may be heard immediately after the engine start in extremely cold conditions. 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 characteristics in extremely cold condition.
- The oil pump normally makes a small whining noise due to its mechanism. Even if a noise is 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 driving.
- When turning the steering wheel with the brake applied when the vehicle is parked, a screeching noise may be generated by the brake disc and pads. This is not a fault in the steering system.
- There may be a small vibration around the steering devices when turning the steering wheel at standstill, even though the component parts are operating properly.

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.

These conditions do not indicate a problem in the system.

Confirm vibration for an AT model, by applying the parking brake on a concrete surface, shifting into the "D" range, and turning the steering wheel repeatedly from slow to rapid, step by step.

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. (Do not keep this condition for five seconds or more.)	Normal operation
	Relief valve emits operating sound when steering wheel is not turned. This means that the relief valve is defective.	Replace the oil pump.
Rattling noise (intermittent) While engine is running.	Interference with adjacent parts	Check the clearance. Correct if necessary. <Ref. to PS-38, INSPECTION, Pipe Assembly.>
	Loosened installation of oil pump, oil tank, pump bracket, gearbox or crossmember	Retighten.
	Loose oil pump pulley or other pulley(s)	Retighten.
	Looseness of linkage, play of steering, improper tightening (looseness) of suspension joint or steering column	Retighten or replace.
	Sound generates from the inside of gearbox or oil pump.	Replace faulty parts in the gearbox or oil pump.
Knocking When turning steering wheel in both directions with small angle repeatedly at engine ON or OFF.	Excessive backlash Loosened lock nut for adjusting backlash	Adjust and retighten.
	Insufficient tightening or play in the tie-rod or tie-rod end	Retighten or replace.
Grinding noise (continuous) While engine is running.	Air in vane pump	Inspect and retighten the fluid line connection. Refill the fluid and vent air.
	Vane pump seizing	Replace the oil pump.
	Oil pump pulley bearing seized	Replace the oil pump.
	Folded hose, flattened pipe	Replace.
Squeal, squeak (intermittent or continuous) While engine is running.	Improper adjustment of pulley belt Damaged or over tensioned pulley belt Unequal length of pulley belts	Adjust or replace. (Replace two belts as a set.)
	Runout or dirty V-groove surface of oil pump pulley	Clean or replace.



# General Diagnostic Table

## POWER ASSISTED SYSTEM (POWER STEERING)

Trouble	Possible cause	Corrective action
Sizzling noise (continuous) While engine is running.	Fluid aeration	Fix the faulty part causing aeration. Replace the fluid and vent air.
	Damaged pipe of gearbox	Replace the pipe.
	Faulty inside of hose or pipe Flattened hose or pipe	Repair or replace.
	Abnormal inside of oil tank	Replace.
	Removed oil tank cap	Install cap.
Whistle (continuous) While engine is running.	Faulty pipe of gearbox or faulty hose	Replace the faulty parts of the gearbox or the hose.
Whine or growl (intermittent or continuous) While engine is running with/ without steering turned.	Looseness of oil pump, oil pump bracket attachment	Retighten.
	Fault inside of oil pump or hose	Replace the oil pump or hose, if the noise can be heard when vehicle is running as well as being stopped.
	Torque converter growl, air conditioner compression growl	Remove the power steering pulley belt and check.
Grinding noise (continuous) While engine is running with the steering turned.	Fault inside of gearbox	Replace the faulty parts of gearbox.
	Faulty steering shaft bearing	Apply grease or replace.
	Occurs when turning the steering wheel with brakes (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.	Engine speed is too low.	Adjust, and notify customer.
	Air in vane pump	Repair faulty part Vent air.
	Damaged valve in oil pump or gearbox	Replace the faulty parts in gearbox and oil pump.
	Excessive play in steering, looseness of suspension parts	Retighten.

## 2. MEASUREMENT OF STEERING EFFORT

Step	Check	Yes	No
<b>1 CHECK STEERING EFFORT.</b> 1) Stop the vehicle on paved road. 2) Start the engine. 3) Run the engine at idle. 4) Install a spring scale on the steering wheel. 5) Pull the spring scale at a right angle to the steering wheel, and measure both right and left steering wheel efforts.  NOTE: When turning the steering more quickly than necessary from a direction to the other direction at an engine speed of 2,000 rpm or higher, steering effort may be heavy. This is caused by flow characteristic of the fluid in the oil pump and is not a defect.	Is the steering effort less than 29.4 N (3.0 kgf, 6.6 lb)?	Steering effort is normal.	Go to step 2.
<b>2 CHECK STEERING EFFORT.</b> 1) Stop the engine and lift up the vehicle. 2) Pull the spring scale at a right angle to the steering wheel, and measure both right and left steering wheel efforts.	Is the steering effort less than 15 N (1.5 kgf, 3.3 lb)?	Go to step 3.	Adjust the backlash.
<b>3 CHECK STEERING WHEEL EFFORT.</b> 1) Remove the universal joint. 2) Measure the steering wheel effort.	Is steering effort less than 2.26 N (0.23 kgf, 0.51 lb)?	Go to step 4.	Replace the steering column.

# General Diagnostic Table

## POWER ASSISTED SYSTEM (POWER STEERING)

Step	Check	Yes	No	
<b>4</b>	<b>CHECK STEERING WHEEL EFFORT.</b> Measure the steering wheel effort.	Is the difference of steering effort between right and left less than 20%?	Go to step 5.	Replace the steering column.
<b>5</b>	<b>CHECK UNIVERSAL JOINT.</b> Measure the swing torque of the joint (yoke of steering column side). <Ref. to PS-13, INSPECTION, Universal Joint.>	Is the swing torque of the universal joint less than 7.3 N (0.74 kgf, 1.64 lb)?	Go to step 6.	Replace the universal joint.
<b>6</b>	<b>CHECK UNIVERSAL JOINT.</b> Measure the swing torque of the joint (yoke of gearbox side). <Ref. to PS-13, INSPECTION, Universal Joint.>	Is the swing torque of the universal joint less than 3.8 N (0.39 kgf, 0.86 lb)?	Go to step 7.	Replace the universal joint.
<b>7</b>	<b>CHECK FRONT WHEEL.</b> Check the front wheels.	Does the front wheels have unsteady revolution or rattling, or does the brake drag?	Inspect, readjust and replace if necessary.	Go to step 8.
<b>8</b>	<b>CHECK TIE-ROD ENDS.</b> Remove the tie-rod ends from housing.	If the tie-rod ends have unsteady revolution or rattling?	Inspect and replace if necessary.	Go to step 9.
<b>9</b>	<b>CHECK GEARBOX.</b> Measure the rotating of gearbox. <Ref. to PS-33, TURNING RESISTANCE OF GEARBOX, INSPECTION, Steering Gearbox.>	Is the rotating resistance of steering gearbox less than 10.5 N (1.1 kgf, 2.4 lb)? Is the difference between right and left sides less than 20%?	Go to step 10.	Readjust the backlash, and if ineffective, replace the faulty parts.
<b>10</b>	<b>CHECK GEARBOX.</b> Measure the sliding of gearbox. <Ref. to PS-32, LIMIT, INSPECTION, Steering Gearbox.>	Is the sliding resistance of steering gearbox less than 343 N (35 kgf, 77 lb)? Is the difference of sliding resistance between right and left sides less than 20%?	Steering effort is normal.	Readjust the backlash, and if ineffective, replace the faulty parts.

### 3. INSPECTION OF CLEARANCE

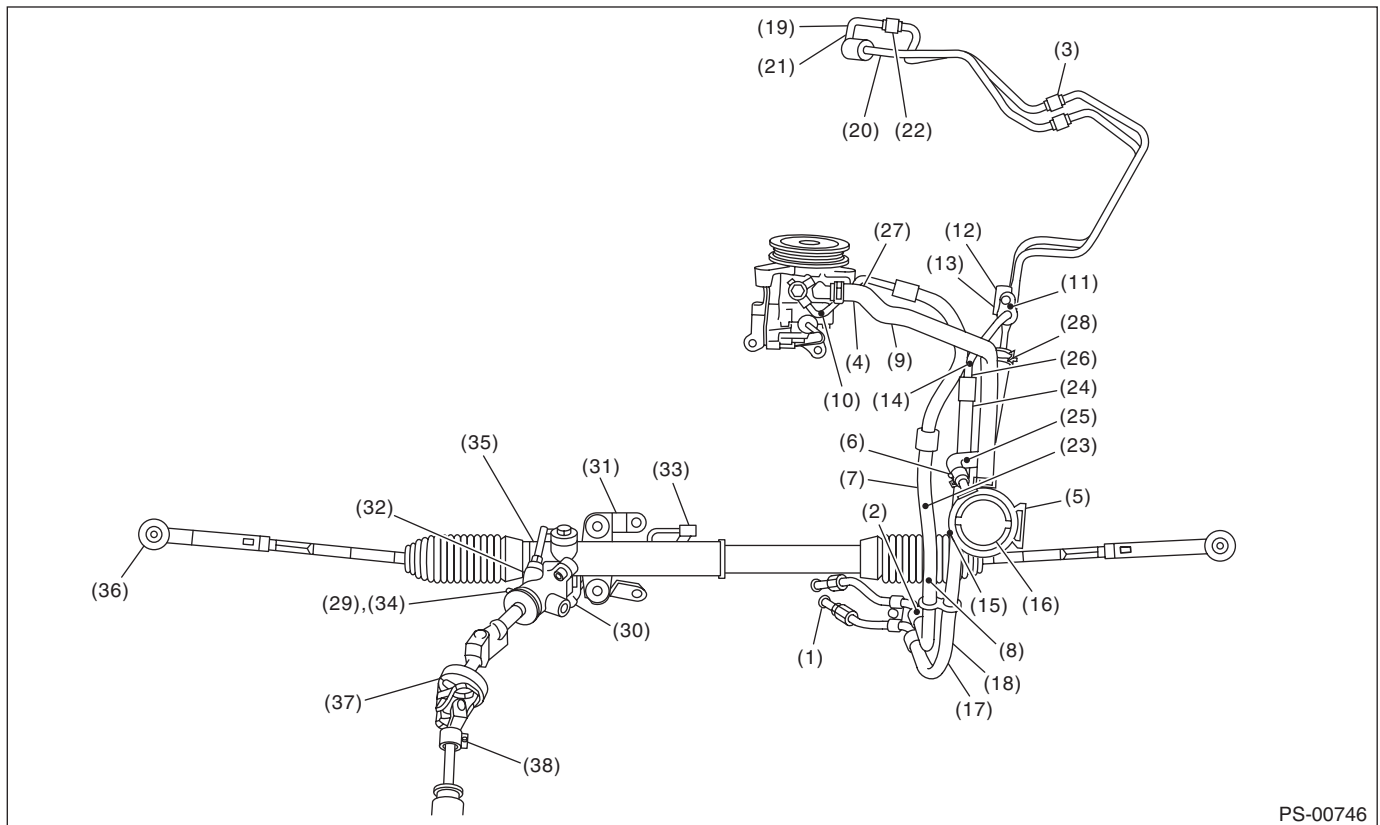
This table lists various clearances that must be correctly adjusted to ensure the normal vehicle driving without interfering noise, or any other faults.

Install locations	Minimum allowance mm (in)
(1) Crossmember-to-Hose assembly	10 (0.39)
(2) Front frame side-to-Hose assembly	15 (0.59)
(3) Airbag sensor to Cooler pipe assembly	10 (0.39)
(4) Engine cover-to-Suction hose	10 (0.39)
(5) VDCH/U to Reservoir tank bracket	10 (0.39)
(6) Air boots to Hose clip	15 (0.59)
(7) Air boot-to-Hose assembly	15 (0.59)
(8) Protector to Hose assembly	10 (0.39)
(9) Intake manifold to Suction hose	10 (0.39)
(10) Intake manifold to Hose assembly	10 (0.39)
(11) Air cleaner case to Cooler pipe joint block	5 (0.20)
(12) Chain cover to Cooler pipe joint block	20 (0.78)
(13) Oil pipe to Cooler pipe joint block	20 (0.78)
(14) Suction hose to Hose assembly	10 (0.39)
(15) Air boot to Reservoir tank	10 (0.39)
(16) Brake pipe to Reservoir tank	10 (0.39)
(17) Harness to Hose assembly	10 (0.39)
(18) Relay box to Hose assembly	15 (0.59)
(19) Bumper beam to Cooler pipe assembly	10 (0.39)
(20) Radiator bracket to Cooler pipe assembly	10 (0.39)
(21) ATF cooler to Cooler pipe assembly	10 (0.39)

# General Diagnostic Table

## POWER ASSISTED SYSTEM (POWER STEERING)

Install locations	Minimum allowance mm (in)
(22) Undercover to Cooler pipe assembly	10 (0.39)
(23) Protector to Hose assembly	10 (0.39)
(24) Protector to Hose assembly	15 (0.59)
(25) Return hose to Hose assembly	10 (0.39)
(26) Air cleaner case to Hose assembly	10 (0.39)
(27) Suction hose to Hose assembly	10 (0.39)
(28) Air cleaner case to Return hose	3 (0.12)
(29) Valve housing to DOJ	12 (0.47)
(30) Valve housing to Crossmember	1 (0.04)
(31) Mount to Crossmember	There must be no contact.
(32) Feed tube to Crossmember	3 (0.12)
(33) Elbow to Crossmember	3 (0.12)
(34) Cylinder pipe to Crossmember	3 (0.12)
(35) Feed tube to Exhaust pipe	18 (0.71)
(36) Tie-rod end to Brake dust cover	2.5 (0.10)
(37) Coupling rubber to AT level gauge	10 (0.39)
(38) Yoke to Brake booster	5 (0.20)



PS-00746

# General Diagnostic Table

POWER ASSISTED SYSTEM (POWER STEERING)

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**BODY 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.

<b>HVAC SYSTEM (HEATER, VENTILATOR AND A/C)</b>	<b>AC</b>
<b>HVAC SYSTEM (AUTO A/C) (DIAGNOSTICS)</b>	<b>AC(diag)</b>
<b>AIRBAG SYSTEM</b>	<b>AB</b>
<b>AIRBAG SYSTEM (DIAGNOSTICS)</b>	<b>AB(diag)</b>
<b>OCCUPANT DETECTION SYSTEM (DIAGNOSTICS)</b>	<b>OD(diag)</b>
<b>SEAT BELT SYSTEM</b>	<b>SB</b>
<b>LIGHTING SYSTEM</b>	<b>LI</b>
<b>WIPER AND WASHER SYSTEMS</b>	<b>WW</b>
<b>ENTERTAINMENT</b>	<b>ET</b>
<b>COMMUNICATION SYSTEM</b>	<b>COM</b>
<b>GLASS/WINDOWS/MIRRORS</b>	<b>GW</b>
<b>BODY STRUCTURE</b>	<b>BS</b>
<b>INSTRUMENTATION/DRIVER INFO</b>	<b>IDI</b>
<b>SEATS</b>	<b>SE</b>
<b>SECURITY AND LOCKS</b>	<b>SL</b>
<b>SUNROOF/T-TOP/CONVERTIBLE TOP (SUNROOF)</b>	<b>SR</b>
<b>EXTERIOR/INTERIOR TRIM</b>	<b>EI</b>



**BODY SECTION**

**EXTERIOR BODY PANELS**

**EB**

**CRUISE CONTROL SYSTEM**

**CC**

**CRUISE CONTROL SYSTEM  
(DIAGNOSTICS)**

**CC(diag)**

**IMMOBILIZER (DIAGNOSTICS)**

**IM(diag)**

**LAN SYSTEM (DIAGNOSTICS)**

**LAN(diag)**





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

# AC

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# General Description

HVAC SYSTEM (HEATER, VENTILATOR AND A/C)

## 1. General Description

### A: SPECIFICATION

#### 1. HEATER SYSTEM

Item		Specification	Condition
Heating capacity		5.2 kW (4,471 kcal/h, 17,743 BTU/h) or more	<ul style="list-style-type: none"> <li>• Mode selector switch: HEAT</li> <li>• Temperature control switch: FULL HOT</li> <li>• Temperature difference between hot water and inlet air: 65°C (149°F)</li> <li>• Hot water flow rate: 360 ℓ (95.1 US gal, 79.2 Imp gal)/h</li> </ul>
Air flow rate		340 m <sup>3</sup> (11,301 cu ft)/h	Heat mode (FRESH), FULL HOT at 12.5 V
Max air flow rate		550 m <sup>3</sup> (16,245 cu ft)/h	<ul style="list-style-type: none"> <li>• Temperature control switch: FULL COLD</li> <li>• Blower fan speed: 6th position</li> <li>• Mode selector lever: RECIRC</li> </ul>
Heater core size (height × length × width)		264 × 110 × 27 mm (10.4 × 4.33 × 1.06 in)	—
Blower motor	Type	Brush motor 260 W or less	12 V
	Fan type and size (diameter × width)	Sirocco fan type 165 × 70 mm (6.50 × 2.76 in)	—

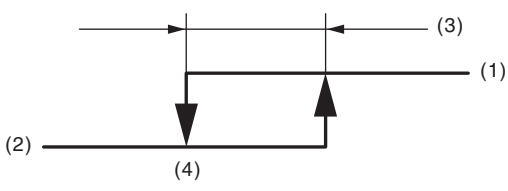
#### 2. A/C SYSTEM

- Single A/C model (front only)

Item		Specifications
Type of air conditioner		Reheat air-mix type
Cooling capacity		6.2 kW (5,331 kcal/h, 21,154 BTU/h)
Refrigerant		HFC-134a (CH <sub>2</sub> FCF <sub>3</sub> ) 20 — 22 oz (0.57 — 0.63 kg, 1.26 — 1.39 lb)
Compressor	Type	Inclined plate (SWASH PLATE), fixed capacity (10SR17), Temperature fuse
	Discharge	177 cc (10.80 cu in)/rev
	Max. permissible speed	6,000 rpm
Magnet clutch	Type	Dry, single-disc type
	Power consumption	35 W
	Type of belt	V-belt 6 PK
	Pulley dia. (effective dia.)	115 mm (4.53 in)
	Pulley ratio	1.24
Condenser	Type	Corrugated fin (Sub cool type)
	Core face area	0.29 m <sup>2</sup> (3.122 sq ft)
	Core thickness	16 mm (0.63 in)
	Radiation area	7.65 m <sup>2</sup> (82.35 sq ft)
Expansion valve	Type	Box time (external pressure equalizing type)
Evaporator	Type	Single tank
	Dimensions (W × H × T)	293.1 × 211 × 38 mm (11.54 × 8.31 × 1.50 in)
Blower fan	Fan type	Sirocco fan
	Outer diameter × width	165 × 70 mm (6.50 × 2.76 in)
	Power consumption	260 W

# General Description

HVAC SYSTEM (HEATER, VENTILATOR AND A/C)

Item		Specifications	
Condenser fan (Sub fan)	Motor type	Magnet	
	Power consumption	200 W	
	Fan outer diameter	320 mm (12.6 in)	
Radiator fan (Main fan)	Motor type	Magnet	
	Power consumption	200 W	
	Fan outer diameter	320 mm (12.6 in)	
Idle speed	MPFI model	No load: 700±100 rpm A/C ON: 805±100 rpm	
Triple switch (Pressure switch)	Low-pressure switch operating pressure	ON → OFF	196±20 kPa (2.00±0.20 kg/cm <sup>2</sup> , 28.4±2.9 psi)
		OFF → ON	225 <sup>+25</sup> <sub>-29</sub> kPa (2.29 <sup>+0.25</sup> <sub>-0.30</sub> kg/cm <sup>2</sup> , 32.6 <sup>+3.6</sup> <sub>-4.2</sub> psi)
	High-pressure switch operating pressure	ON → OFF	3,140 <sup>+50</sup> <sub>-200</sub> kPa (32.02 <sup>+0.51</sup> <sub>-2.04</sub> kg/cm <sup>2</sup> , 455.4 <sup>+7.25</sup> <sub>-29.0</sub> psi)
		OFF → ON	2,550±200 kPa (26.00±2.04 kg/cm <sup>2</sup> , 369.8±29.0 psi)
	Middle-pressure switch operating pressure	ON → OFF	1,370±120 kPa (13.97±1.22 kg/cm <sup>2</sup> , 198.65±17.35 psi)
		OFF → ON	1,770±80 kPa (18.05±0.82 kg/cm <sup>2</sup> , 256.81±11.60 psi)
Thermo-control amplifier working temperature (Evaporator outlet air)		 <p style="text-align: right;">AC-00601</p> <p>(1) ON (2) OFF (3) 1°C (33.8°F) (4) 1.5<sup>+8.0</sup>°C (34.7<sup>+46.4</sup>°F)</p>	

## General Description

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

- Dual A/C model (Front A/C and Rear cooler)

Item		Specifications	
Type of air conditioner	Front	Reheat air-mix type	
	Rear	Cooler	
Cooling capacity		7.2 kW (6,191 kcal/h, 24.56 BTU/h)	
Refrigerant		HFC-134a (CH <sub>2</sub> FCF <sub>3</sub> ) 30 — 32 oz (0.84 — 0.90 kg, 1.85 — 1.98 lb)	
Compressor	Type	Inclined plate (SWASH PLATE), fixed capacity (10SR17), Temperature fuse	
	Discharge	177 cc (10.80 cu in)/rev	
	Max. permissible speed	6,000 rpm	
Magnet clutch	Type	Dry, single-disc type	
	Power consumption	35 W	
	Type of belt	V-belt 6 PK	
	Pulley dia. (effective dia.)	115 mm (4.53 in)	
	Pulley ratio	1.24	
Condenser	Type	Corrugated fin (Sub cool type)	
	Core face area	0.29 m <sup>2</sup> (3.122 sq ft)	
	Core thickness	16 mm (0.63 in)	
	Radiation area	7.65 m <sup>2</sup> (82.35 sq ft)	
Expansion valve	Front	Type Box time (external pressure equalizing type)	
	Rear		
Evaporator	Front	Type	Single tank
		Dimensions (W × H × T)	293.1 × 211 × 38 mm (11.54 × 8.31 × 1.50 in)
	Rear	Type	Single tank
		Dimensions (W × H × T)	132.1 × 181 × 38 mm (5.2 × 7.13 × 1.50 in)
Blower fan	Front	Fan type	Sirocco fan
		Outer diameter × width	165 × 70 mm (6.49 × 2.76 in)
		Power consumption	260 W
	Rear	Fan type	Sirocco fan
		Outer diameter × width	150 × 70 mm (5.91 × 2.76 in)
		Power consumption	150 W or less
Condenser fan (Sub fan)	Motor type	Magnet	
	Power consumption	200 W	
	Fan outer diameter	320 mm (12.6 in)	
Radiator fan (Main fan)	Motor type	Magnet	
	Power consumption	200 W	
	Fan outer diameter	320 mm (12.6 in)	
Idle speed	MPFI model	No load: 700±100 rpm A/C ON: 805±100 rpm	

# General Description

HVAC SYSTEM (HEATER, VENTILATOR AND A/C)

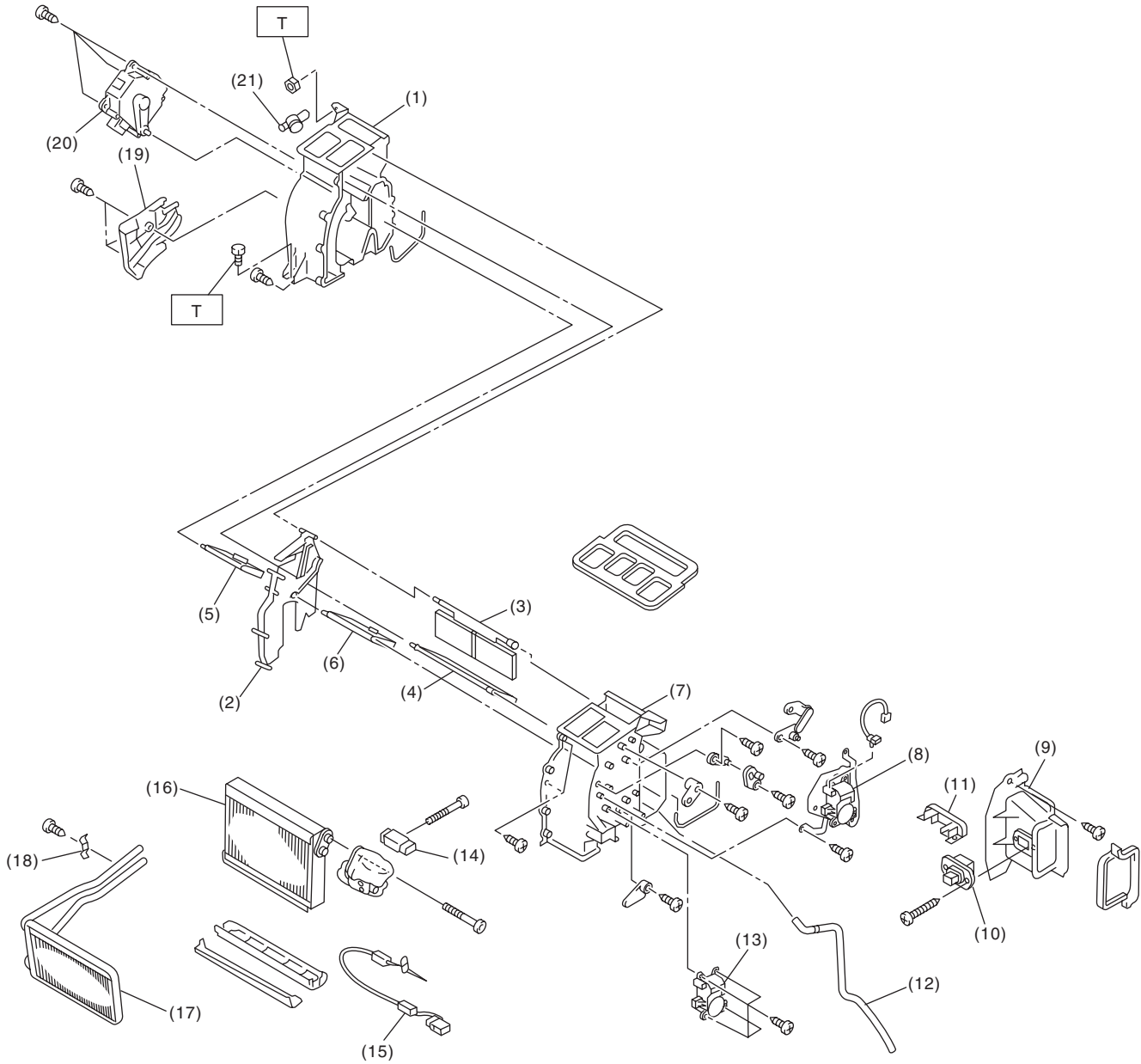
Item			Specifications
Triple switch (Pressure switch)	Low-pressure switch operating pressure	ON → OFF	196±20 kPa (2.00±0.20 kg/cm <sup>2</sup> , 28.4±2.9 psi)
		OFF → ON	225 <sup>+25</sup> <sub>-29</sub> kPa (2.29 <sup>+0.25</sup> <sub>-0.30</sub> kg/cm <sup>2</sup> , 32.6 <sup>+3.6</sup> <sub>-4.2</sub> psi)
	High-pressure switch operating pressure	ON → OFF	3,140 <sup>+50</sup> <sub>-200</sub> kPa (32.02 <sup>+0.51</sup> <sub>-2.04</sub> kg/cm <sup>2</sup> , 455.4 <sup>+7.25</sup> <sub>-29.0</sub> psi)
		OFF → ON	2,550±200 kPa (26.00±2.04 kg/cm <sup>2</sup> , 369.8±29.0 psi)
	Middle-pressure switch operating pressure	ON → OFF	1,370±120 kPa (13.97±1.22 kg/cm <sup>2</sup> , 198.65±17.35 psi)
		OFF → ON	1,770±80 kPa (18.05±0.82 kg/cm <sup>2</sup> , 256.81±11.60 psi)
Thermo-control amplifier working temperature (Evaporator outlet air)			<p style="text-align: right;">AC-00601</p> <p>(1) ON (2) OFF (3) 1°C (33.8°F) (4) 1.5<sup>+0.8</sup>°C (34.7<sup>+46.4</sup>°F)</p>

# General Description

HVAC SYSTEM (HEATER, VENTILATOR AND A/C)

## B: COMPONENT

### 1. HEATER COOLING UNIT



AC-01268

# General Description

HVAC SYSTEM (HEATER, VENTILATOR AND A/C)

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(1) Heater unit case LH	(9) Evaporator cover	(17) Heater Core
(2) Separator	(10) Power transistor	(18) Heater pipe clamp
(3) Mode door RR	(11) Pipe cover	(19) Heater core cover
(4) Mode door FR	(12) Drain hose	(20) Air mix door actuator LH
(5) Air mix door LH	(13) Air mix door actuator RH	(21) Aspirator
(6) Air mix door RH	(14) Expansion valve	
(7) Heater unit case RH	(15) Evaporator sensor	
(8) Mode door actuator	(16) Evaporator	

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**Tightening torque: N·m (kgf·m, ft·lb)**

**T: 7.5 (0.76, 5.5)**

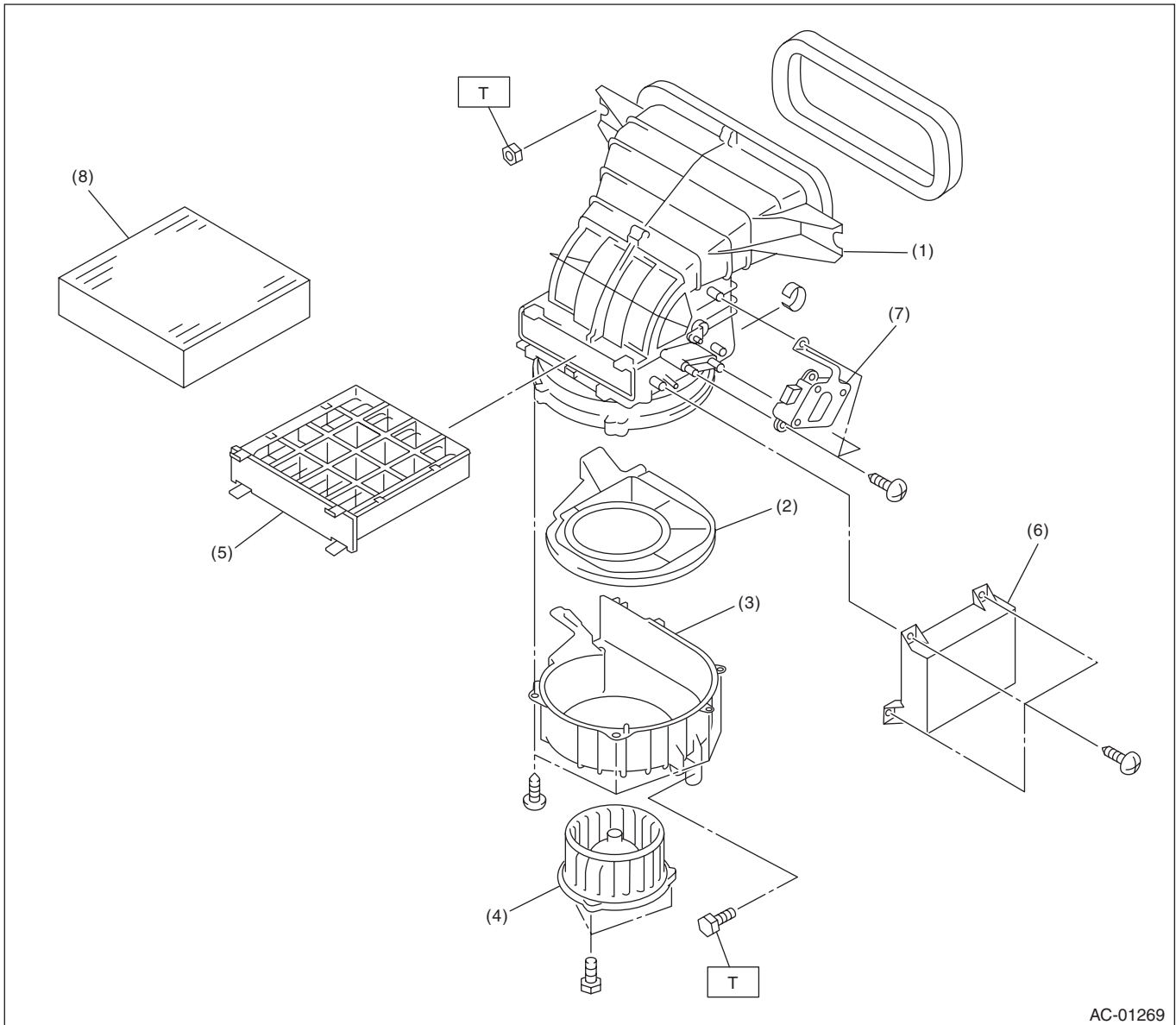
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# General Description

HVAC SYSTEM (HEATER, VENTILATOR AND A/C)

## 2. BLOWER MOTOR UNIT

Front



- |                  |                                   |
|------------------|-----------------------------------|
| (1) Upper case   | (5) Filter cover                  |
| (2) Blower plate | (6) Control unit (Auto A/C model) |
| (3) Lower case   | (7) Intake door actuator          |
| (4) Blower motor | (8) Filter                        |

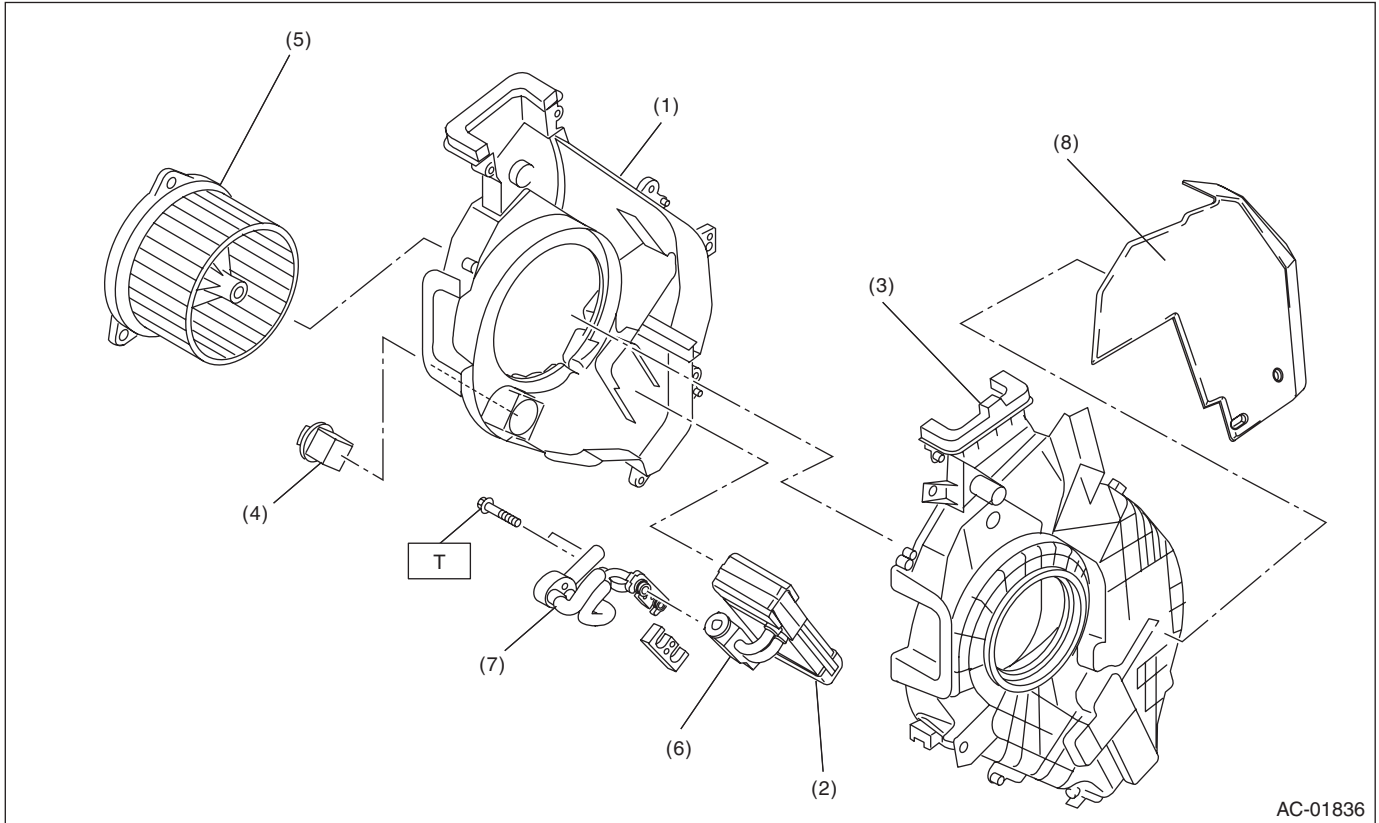
**Tightening torque: N·m (kgf·m, ft·lb)**  
**T: 7.5 (0.76, 5.5)**



# General Description

HVAC SYSTEM (HEATER, VENTILATOR AND A/C)

## Rear



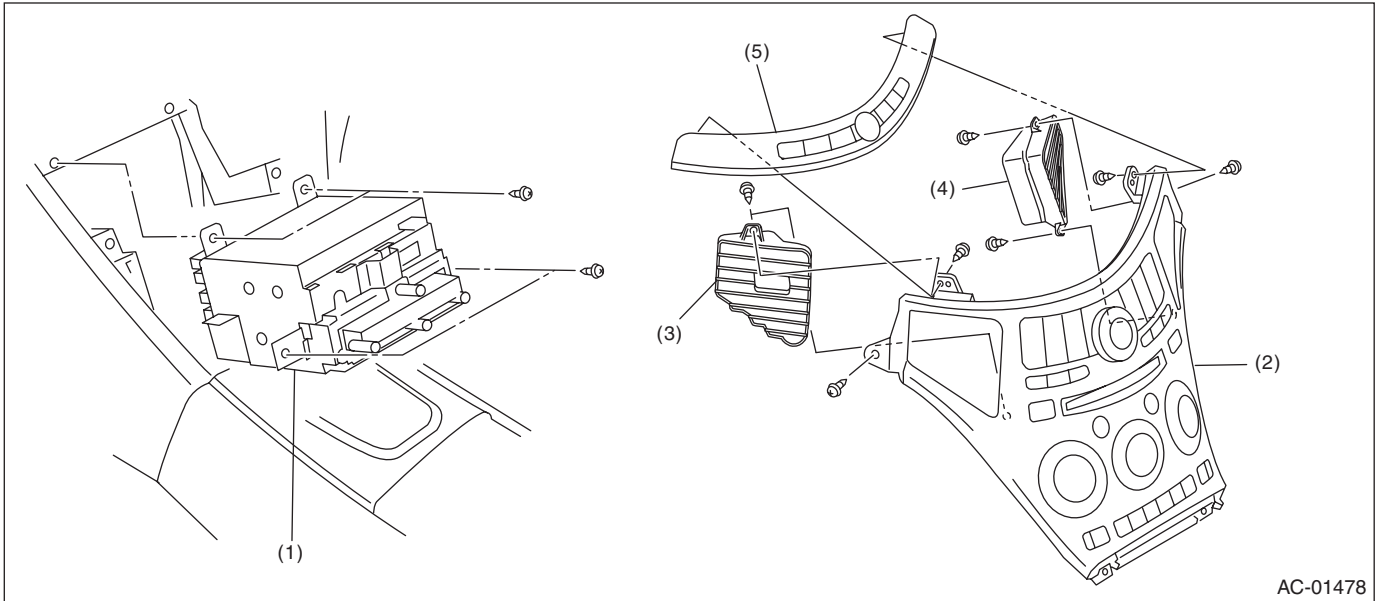
- |                     |                     |
|---------------------|---------------------|
| (1) Inner case      | (5) Blower motor    |
| (2) Evaporator      | (6) Expansion valve |
| (3) Outer case      | (7) Expansion tube  |
| (4) Blower resistor | (8) Cover           |

**Tightening torque: N·m (kgf·m, ft·lb)**  
**T: 7.5 (0.76, 5.5)**

# General Description

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

### 3. CONTROL PANEL



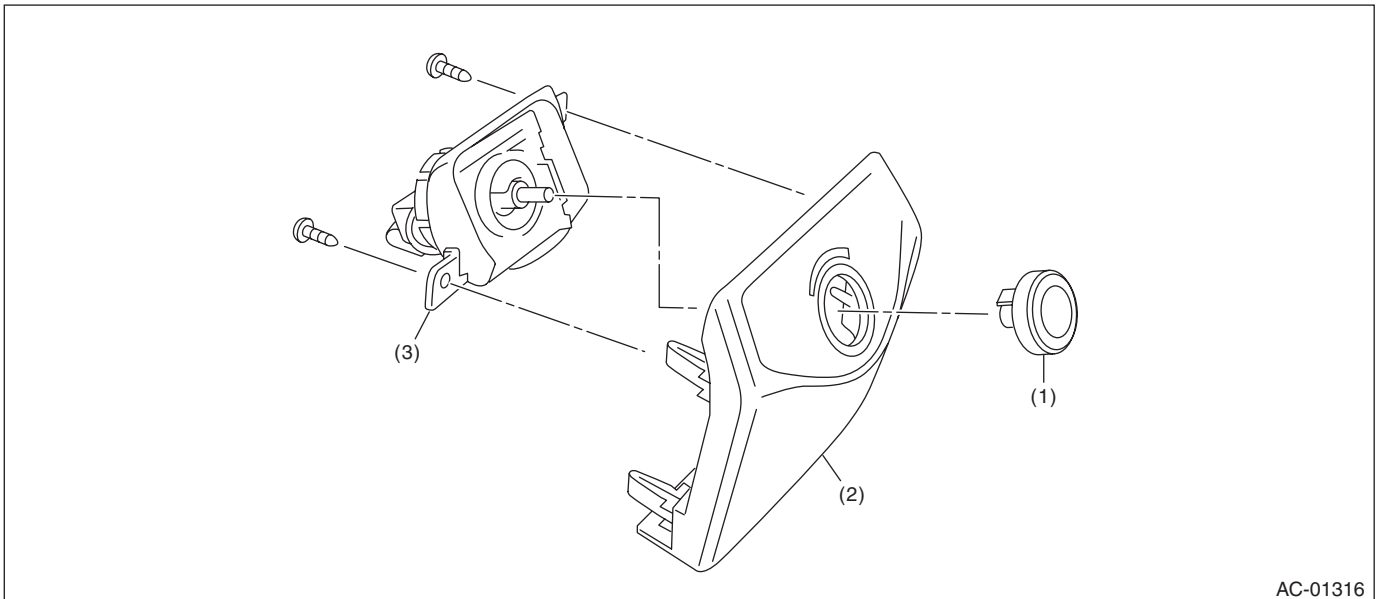
AC-01478

- (1) Audio ASSY
- (2) Control panel

- (3) Center duct RH
- (4) Center duct LH

- (5) Navigation, MFD control switch

### Rear cooler model



AC-01316

- (1) Dial

- (2) Control panel

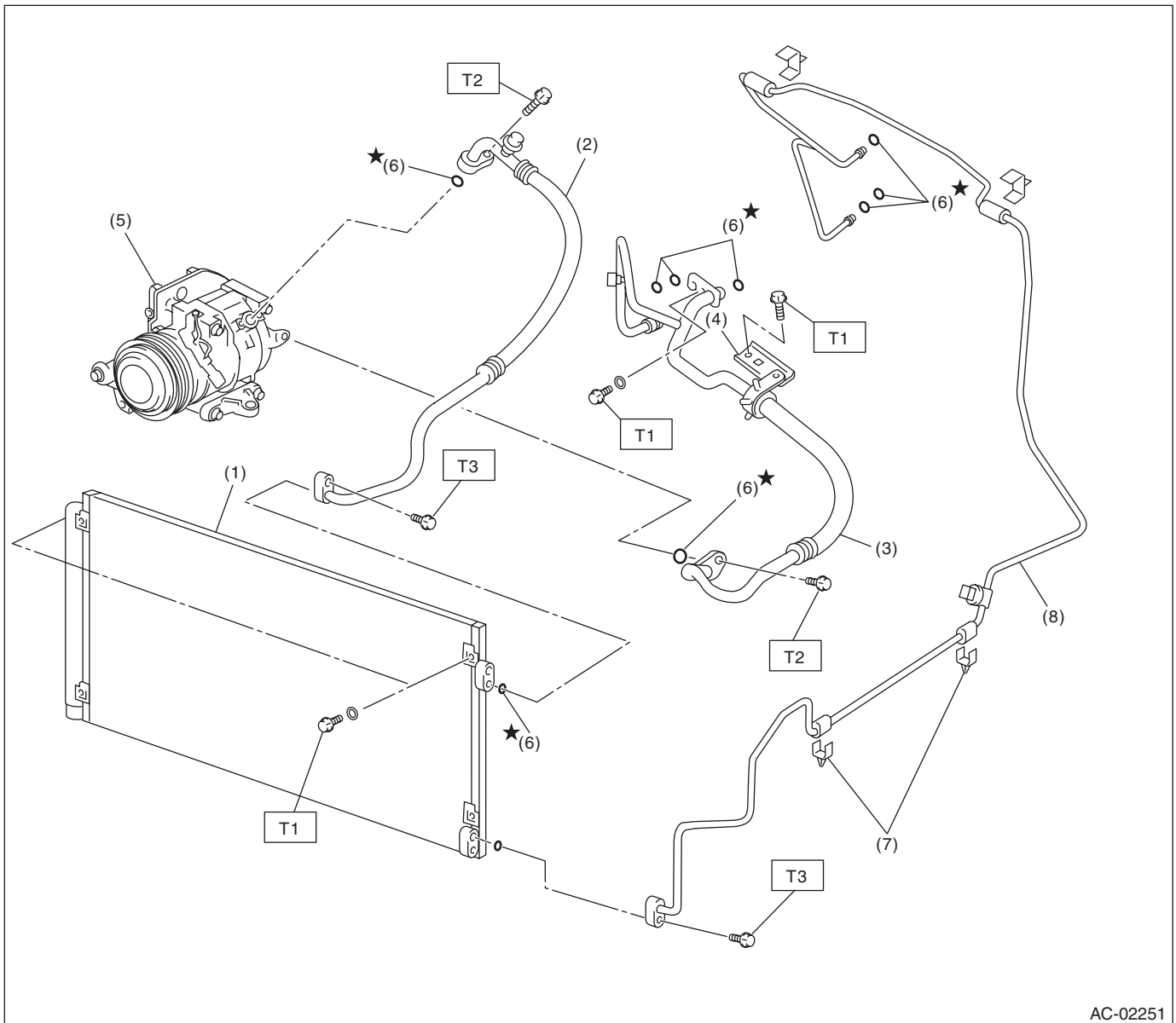
- (3) Blower switch

# General Description

HVAC SYSTEM (HEATER, VENTILATOR AND A/C)

## 4. AIR CONDITIONING UNIT

Front



AC-02251

- |                          |                |
|--------------------------|----------------|
| (1) Condenser            | (5) Compressor |
| (2) Hose (high-pressure) | (6) O-ring     |
| (3) Hose (low-pressure)  | (7) Clamp      |
| (4) Bracket              | (8) Pipe       |

**Tightening torque: N·m (kgf·m, ft·lb)**

**T1: 7.5 (0.76, 5.5)**

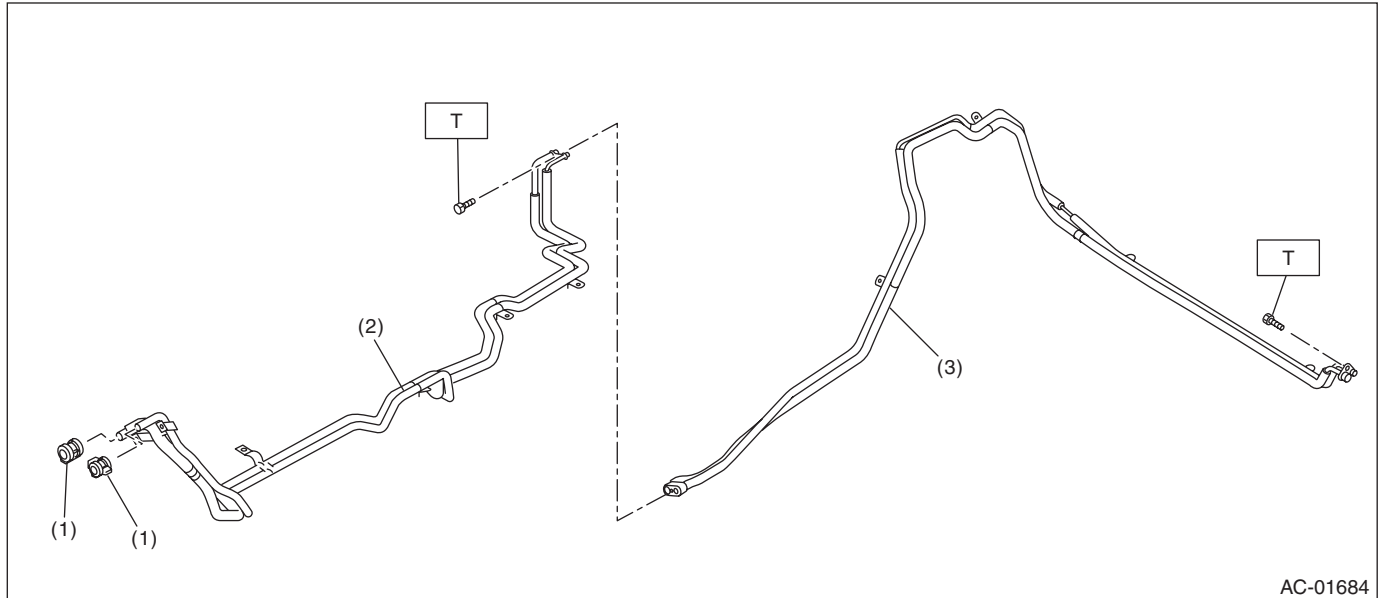
**T2: 10 (1.0, 7.4)**

**T3: 5 (0.5, 3.7)**

# General Description

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

### Rear



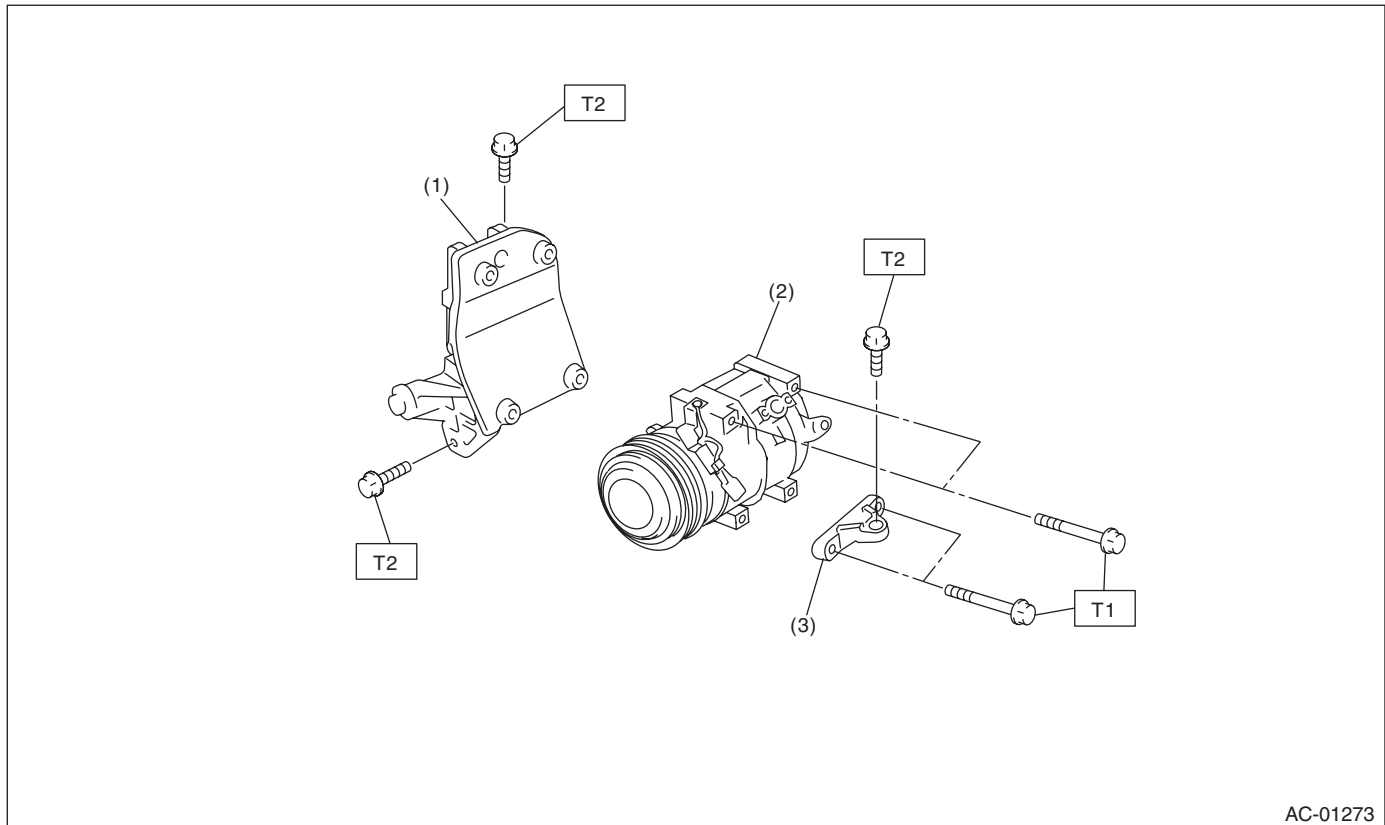
AC-01684

- (1) Quick connector
- (2) Front pipe
- (3) Rear pipe

**Tightening torque: N·m (kgf·m, ft·lb)**

**T: 7.5 (0.76, 5.5)**

### 5. COMPRESSOR



AC-01273

- (1) Compressor upper bracket
- (2) Compressor
- (3) Compressor lower bracket

**Tightening torque: N·m (kgf·m, ft·lb)**

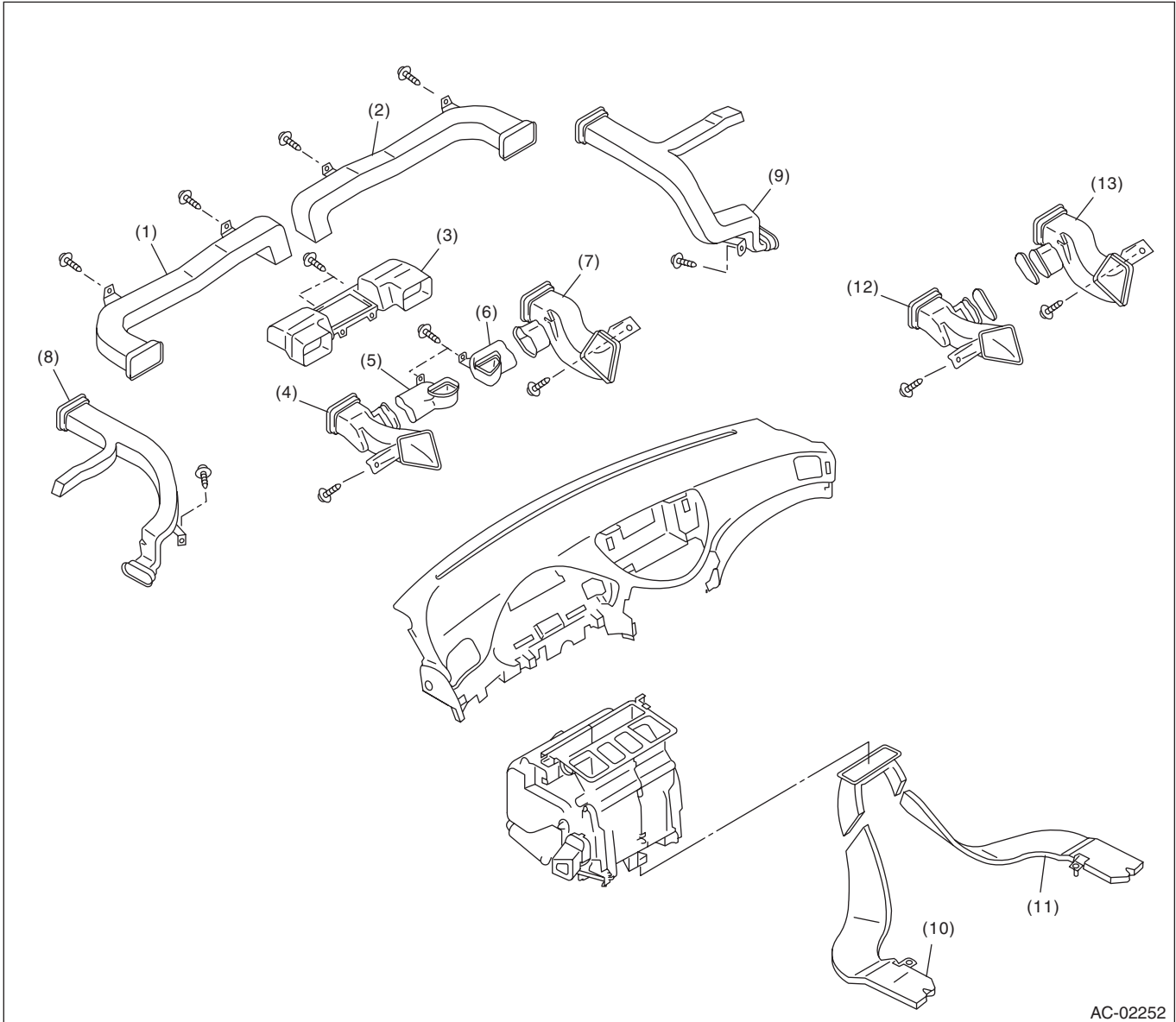
**T1: 26.5 (2.95, 21.3)**

**T2: 36 (3.7, 26.6)**

# General Description

HVAC SYSTEM (HEATER, VENTILATOR AND A/C)

## 6. HEATER DUCT



- |                              |                            |   |
|------------------------------|----------------------------|---|
| (1) Side ventilation duct LH | (6) Upper duct RH          | (10) Rear heater duct LH                      |
| (2) Side ventilation duct RH | (7) Center duct RH         | (11) Rear heater duct RH                      |
| (3) Center ventilation duct  | (8) Side defroster duct LH | (12) Center duct LH (for harman/kardon audio) |
| (4) Center duct LH           | (9) Side defroster duct RH | (13) Center duct RH (for harman/kardon audio) |
| (5) Upper duct LH            |                            |   |

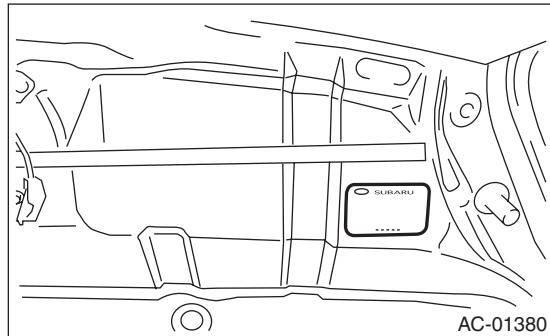
# General Description

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

### C: CAUTION

#### 1. HFC-134A A/C SYSTEM

- The cooling system components for the HFC-134a system such as the refrigerant and compressor oil are different from the conventional CFC-12 system components and they are incompatible with each other.
- Vehicles with the HFC-134a system can be identified by the label attached to the vehicle. Before maintenance, check which A/C system is installed to the vehicle.



#### 2. COMPRESSOR OIL

- HFC-134a compressor oil has no compatibility with that of CFC-12 system.
  - Use only DENSO OIL 8, the manufacturer-authorized compressor oil for the HFC-134a system.
  - Do not mix multiple compressor oils.
- If CFC-12 compressor oil is used in the 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 CFC-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 atmosphere using a plug or tape. In order to avoid moisture, store the oil in a container with its cap tightly closed.

#### 3. REFRIGERANT

- CFC-12 refrigerant cannot be used in a HFC-134a A/C system. HFC-134a refrigerant, also cannot be used in a CFC-12 A/C system.
- If an incorrect or no refrigerant is used, it will result in poor lubrication and the compressor itself may be damaged.

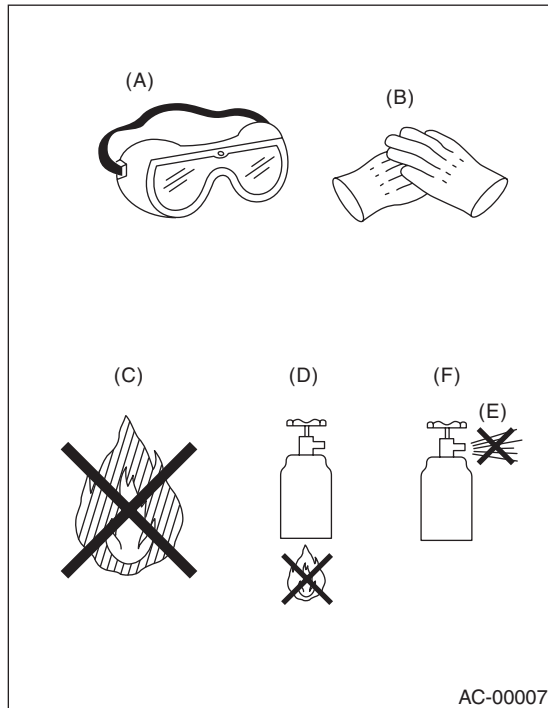
#### 4. HANDLING OF REFRIGERANT

- The refrigerant boils at approx.  $-30^{\circ}\text{C}$  ( $-22^{\circ}\text{F}$ ). When handling it, be sure to wear protective 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 warm water of  $40^{\circ}\text{C}$  ( $104^{\circ}\text{F}$ ) or less.
- Do not drop or subject a service can to impacts. (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. High-pressure gas can back-flow resulting in an explosion of the can.
- Provide good ventilation and do not work in a closed area.

# General Description

HVAC SYSTEM (HEATER, VENTILATOR AND A/C)

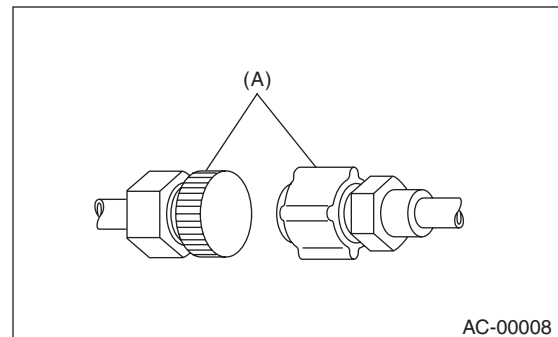
- In order to prevent global warming, avoid releasing HFC-134a into the atmosphere. Using a refrigerant recovery system, discharge and recycle the gas.



- (A) Goggles
- (B) Gloves
- (C) Avoid open flame
- (D) No direct heat on container
- (E) Do not discharge
- (F) Loosen

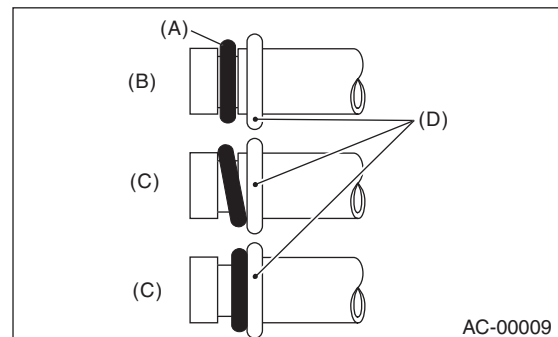
## 5. O-RING CONNECTIONS

- Always use a new O-ring.
- In order to keep the O-rings free of lint which will cause a refrigerant gas leak, perform work without using gloves or waste cloths.
- Apply compressor oil to O-rings to avoid sticking, before installation.
- Use a torque wrench to tighten the O-ring fittings. Over-tightening will result in damage of the O-ring and deformation of the pipe end.
- If the work is interrupted before completing pipe connections, recap the pipes, components and fittings with a plug or tape to prevent foreign matter from entering.



(A) Seal

- 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 straight against the groove of the pipe.



- (A) O-ring
- (B) OK
- (C) NG
- (D) Groove

## General Description

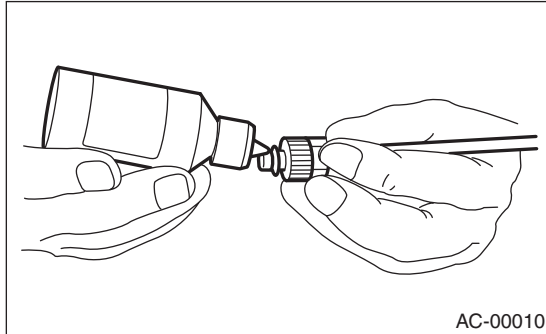
### HVAC SYSTEM (HEATER, VENTILATOR AND A/C)

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- Use compressor oil specified in the service manual to lubricate the O-rings.

Apply oil to the top and sides of O-rings before installation.

Apply compressor oil to grooves of the pipe.



- After tightening, use a clean cloth to remove excess compressor 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 tighten the connections further, but disconnect the connections, remove the O-rings, and check the O-rings, threads, and connections.



# General Description

HVAC SYSTEM (HEATER, VENTILATOR AND A/C)

## D: PREPARATION TOOL

### CAUTION:

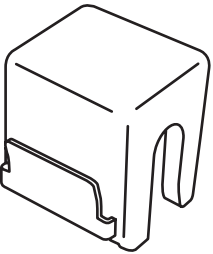
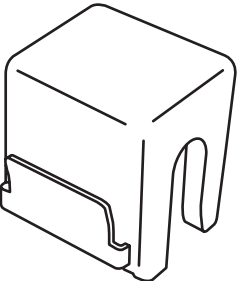
If HFC-134a and CFC-12 refrigerant or compressor oil is mixed, it will result in poor lubrication and the compressor itself may be damaged, be careful of the following:

- When working on vehicles with a HFC-134a system, only use HFC-134a specified tools and parts.
- Do not mix CFC-12 tools and parts.
- The gas leak detectors for the HFC-134a and CFC-12 systems must also not be interchanged.

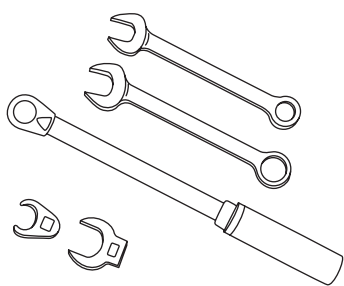
In order to prevent the mixing HFC-134a and CFC-12 parts and fluids, the type of tools, screw types, and replacement valves are different.

	HFC-134a	CFC-12
Tool & screw type	Millimeter size	Inch size
Valve type	Quick joint type	Screw-in type

## 1. SPECIAL TOOL

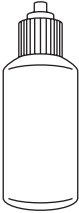
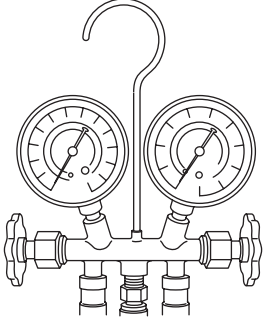
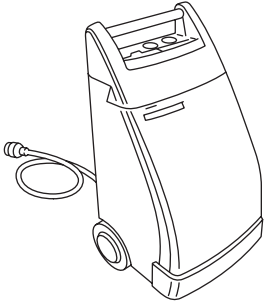
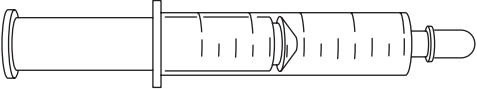
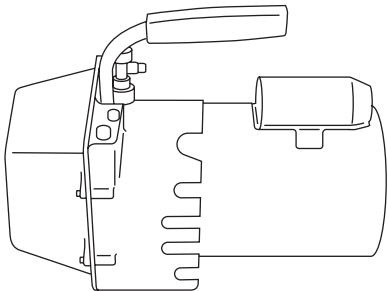
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>ST73499XA00A</p>	73499XA00A	S/T REMOVER PD	Used to disconnect the connector for a quick joint type air conditioner piping (high pressure side).
 <p>ST73499XA01A</p>	73499XA01A	S/T REMOVER PS	Used to disconnect the connector for a quick joint type air conditioner piping (high pressure side).

## 2. GENERAL TOOL

ILLUSTRATION	Name and Function
 <p>AC-00213</p>	<p>Wrench</p> <p>Various <b>WRENCHES</b> will be required to service any A/C system. 7 — 40 N·m (0.7 to 4.1 kg·m, 5 to 30 ft·lb) torque wrench and various crow-foot wrenches will be needed. Open end or flare nut wrenches will be needed to affix the pipe and hose fittings.</p>

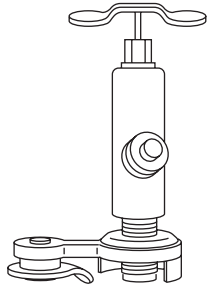
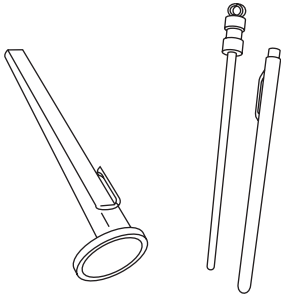
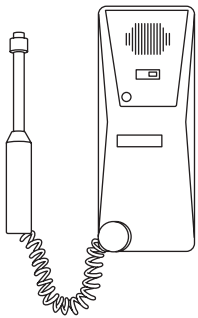
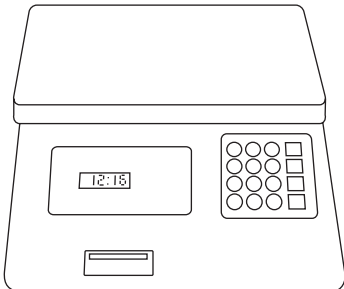
## General Description

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

ILLUSTRATION	Name and Function
 <p style="text-align: right;">AC-00012</p>	<p>Applicator bottle</p> <p>A small <b>APPLICATOR BOTTLE</b> is recommended to apply compressor oil to the various parts. It can be available at a hardware or drug store.</p>
 <p style="text-align: right;">AC-00013</p>	<p>Manifold gauge set</p> <p>A <b>MANIFOLD GAUGE SET</b> (with hoses) is available at either a refrigerant supplier or an automotive equipment supplier.</p>
 <p style="text-align: right;">AC-00014</p>	<p>Refrigerant recovery system</p> <p>A <b>REFRIGERANT RECOVERY SYSTEM</b> is used for the recovery and recycling of A/C system refrigerant after contaminants and moisture have been removed from the refrigerant.</p>
 <p style="text-align: right;">AC-00015</p>	<p>Syringe</p> <p>A graduated plastic <b>SYRINGE</b> will be needed to add oil into the system again. A syringe can be available at a pharmacy or drug store.</p>
 <p style="text-align: right;">AC-00016</p>	<p>Vacuum pump</p> <p>A <b>VACUUM PUMP</b> is necessary (for a good working condition), and may be available at either a refrigerant supplier or an automotive equipment supplier.</p>

# General Description

HVAC SYSTEM (HEATER, VENTILATOR AND A/C)

ILLUSTRATION	Name and Function
 <p>AC-00017</p>	<p>Can tap</p> <p>A <b>CAN TAP</b> for the 397 g (14 oz.) can is available at an automotive equipment supplier.</p>
 <p>AC-00018</p>	<p>Thermometer</p> <p>A pocket <b>THERMOMETER</b> is available either at a industrial hardware store or a refrigerant supplier.</p>
 <p>AC-00019</p>	<p>Electronic leak detector</p> <p>An <b>ELECTRONIC LEAK DETECTOR</b> can be available at either a specialty tool supplier or an A/C equipment supplier.</p>
 <p>AC-00020</p>	<p>Weight scale</p> <p>A <b>WEIGHT SCALE</b> 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.</p>

# Refrigerant Pressure with Manifold Gauge Set

HVAC SYSTEM (HEATER, VENTILATOR AND A/C)

---

## 2. Refrigerant Pressure with Manifold Gauge Set

### A: PROCEDURE

- 1) Place the vehicle in the shade and windless condition.
- 2) Connect the manifold gauge set.
- 3) Open all windows and close all doors.
- 4) Increase the engine to 1,500 rpm.
- 5) Turn on the A/C switch.
- 6) Turn the temperature control switch to MAX COOL.
- 7) Put in RECIRC position.
- 8) Turn the blower control switch to HI.
- 9) Read the gauge.

#### Standard:

**Low pressure: 127 — 196 kPa (1.3 — 2.0 kg/cm<sup>2</sup>, 18 — 28 psi)**

**High pressure: 1,471 — 1,667 kPa (15 — 17 kg/cm<sup>2</sup>, 213 — 242 psi)**

**Ambient temperature: 30 — 35°C (86 — 95°F)**

### B: INSPECTION

Symptoms	Probable cause	Repair order
High-pressure side is unusually high.	<ul style="list-style-type: none"><li>• Defective condenser fan motor</li><li>• Clogged condenser fin</li><li>• Too much refrigerant</li><li>• Air inside the system</li><li>• Defective receiver dryer (condenser)</li></ul>	<ul style="list-style-type: none"><li>• Replace the fan motor.</li><li>• Clean the condenser fin.</li><li>• Discharge refrigerant.</li><li>• Replace the condenser.</li><li>• After evacuating again, charge an appropriate amount of refrigerant.</li></ul>
High-pressure side is unusually low.	<ul style="list-style-type: none"><li>• Defective compressor</li><li>• Not enough refrigerant</li><li>• Clogged expansion valve</li><li>• Expansion valve frozen temporarily by moisture.</li></ul>	<ul style="list-style-type: none"><li>• Replace the compressor.</li><li>• Check for leaks.</li><li>• Replace the expansion valve.</li><li>• Fully evacuate the expansion valve.</li></ul>
Low-pressure side is unusually high.	<ul style="list-style-type: none"><li>• Defective compressor</li><li>• Defective expansion valve</li><li>• Too much refrigerant</li></ul>	<ul style="list-style-type: none"><li>• Replace the compressor.</li><li>• Replace the expansion valve.</li><li>• Discharge refrigerant.</li></ul>
Low-pressure side is unusually low.	<ul style="list-style-type: none"><li>• Not enough refrigerant</li><li>• Clogged expansion valve</li><li>• Expansion valve frozen temporarily by moisture.</li><li>• Saturated receiver dryer (condenser)</li></ul>	<ul style="list-style-type: none"><li>• Check for leaks.</li><li>• Replace the expansion valve.</li><li>• Replace the condenser.</li></ul>

# Refrigerant Recovery Procedure

HVAC SYSTEM (HEATER, VENTILATOR AND A/C)

## 3. Refrigerant Recovery Procedure

### A: PROCEDURE

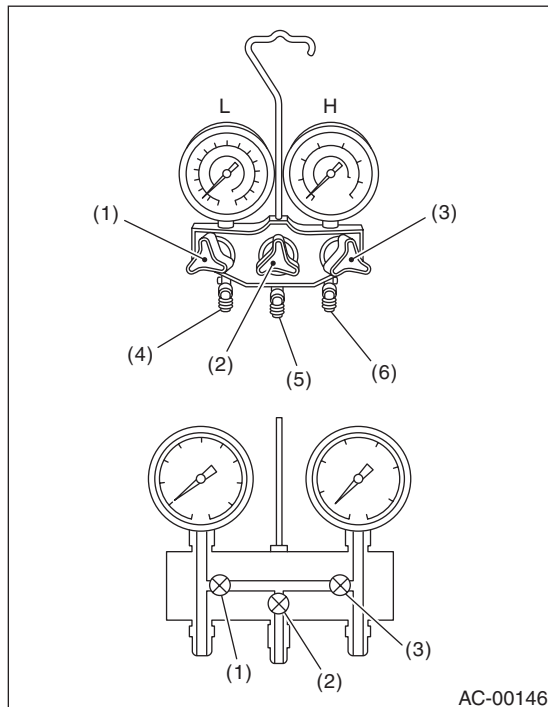
#### CAUTION:

- During operation, be sure to wear protective goggles and protective gloves.
- Connect the refrigerant recovery system with the manifold gauge set set to discharge the refrigerant from the A/C system and recycle the gas.
- When recycling the discharged refrigerant, keep service cans on hand. Because the recovery rate with the recovery system is approx. 90%, service cans are necessary to charge the refrigerant.
- Follow the detailed operation procedure described in the operation manual attached to the refrigerant recovery system.

1) Perform the compressor oil return operation.  
<Ref. to AC-26, PROCEDURE, Compressor Oil.>

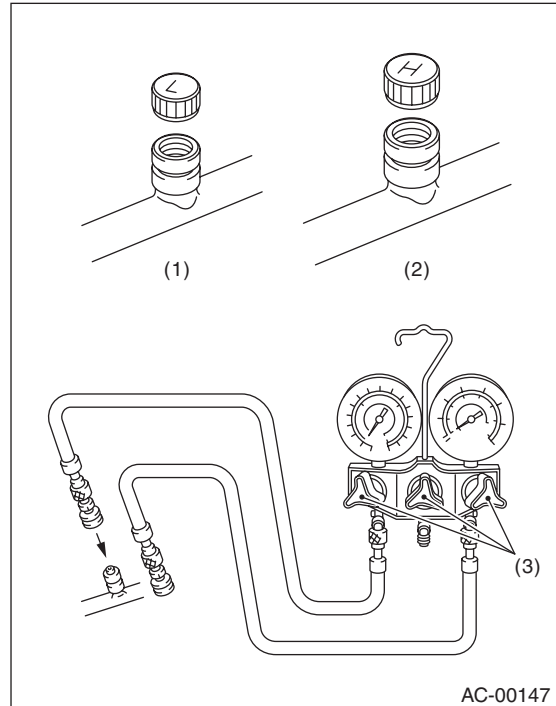
2) Stop the engine.

3) Make sure the valves on low-/high-pressure sides of manifold gauge set are fully closed.



- L: Low pressure gauge
- H: High pressure gauge
- (1) Low pressure valve
- (2) Vacuum pump valve
- (3) High pressure valve
- (4) For low pressure
- (5) For vacuum pump
- (6) For high pressure

4) Install the low-/high-pressure hoses to the service ports on the low-/high-pressure sides of the vehicle respectively.



- (1) Low-pressure side service port
- (2) High-pressure side service port
- (3) Close

5) Connect the center hose to the refrigerant recovery system.

6) Follow the operation manual to activate the refrigerant recovery system.

# Refrigerant Charging Procedure

HVAC SYSTEM (HEATER, VENTILATOR AND A/C)

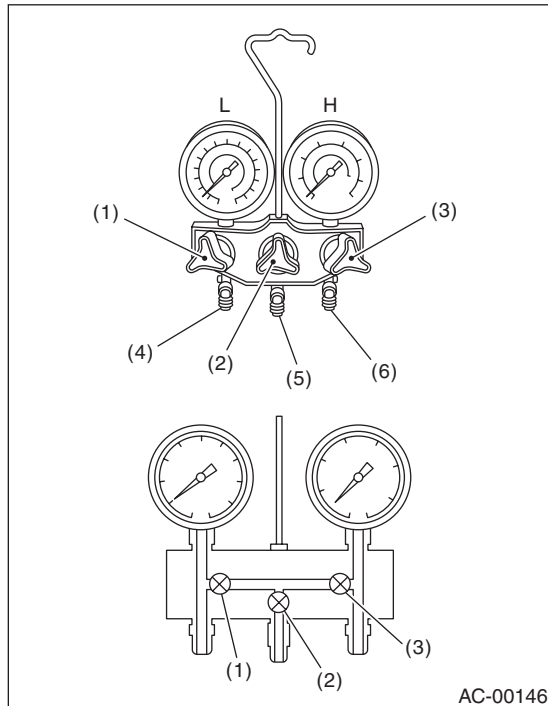
## 4. Refrigerant Charging Procedure

### A: PROCEDURE

#### CAUTION:

- While working, be sure to wear protective goggles and protective gloves.
- Air in the cycle can cause insufficient air conditioning, and water in the cycle can cause clogging in the cycle (icing) and rust. To remove this air and water content, use a vacuum pump to perform evacuation before filling with refrigerant. By making the inside of the cycle a vacuum, the water content will evaporate even at normal temperatures, and can be removed.

1) Close all valves of the manifold gauge.

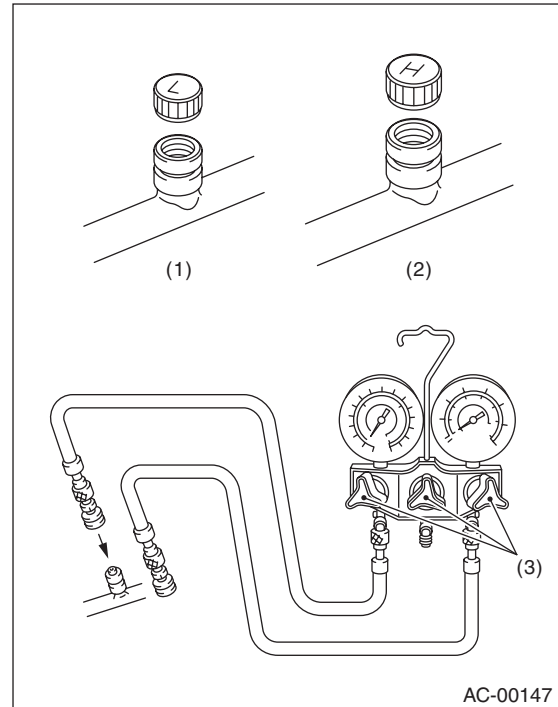


- L: Low pressure gauge
- H: High pressure gauge
- (1) Low pressure valve
- (2) Vacuum pump valve
- (3) High pressure valve
- (4) For low pressure
- (5) For vacuum pump
- (6) For high pressure

2) Attach the low pressure side and high pressure side hoses to the vehicle service port.

#### CAUTION:

Confirm that the connections are secure.



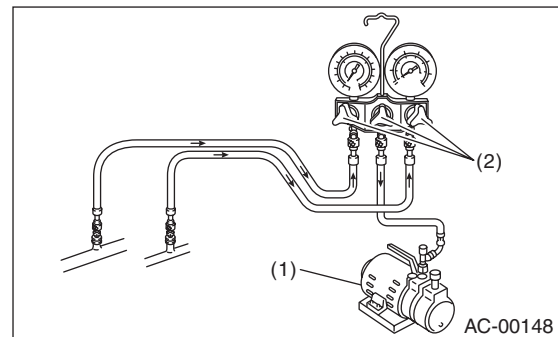
- (1) Low-pressure side service port
- (2) High-pressure side service port
- (3) Close

3) Connect the center manifold hose of the manifold gauge to the vacuum pump.

4) Operate the vacuum pump and open the low pressure and high pressure side valves. Next, open the center manifold hose valve, and begin evacuation.

#### CAUTION:

Make sure to perform evacuation using a vacuum pump.



- (1) Vacuum pump
- (2) Open

# Refrigerant Charging Procedure

HVAC SYSTEM (HEATER, VENTILATOR AND A/C)

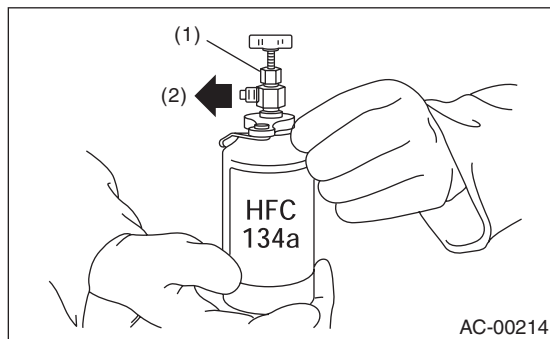
5) Perform evacuation for 5 minutes or more, and when the low pressure gauge needle reaches  $-100.0$  kPa ( $-750$  mmHg,  $-29.5$  inHg) or higher, close the center manifold hose valve, and stop the vacuum pump.

6) Leave alone for 5 to 10 minutes after closing the low pressure side and high pressure side valves, and check whether there is any change in the low pressure gauge needle indication. If the needle position changes, this indicates a leak. Check the pipe and hose connections, and repair the location with the problem. In this case, repeat again from step 1).

7) If there is no leakage, continue evacuation for additional 20 to 30 minutes.

8) Close all valves and stop the vacuum pump.

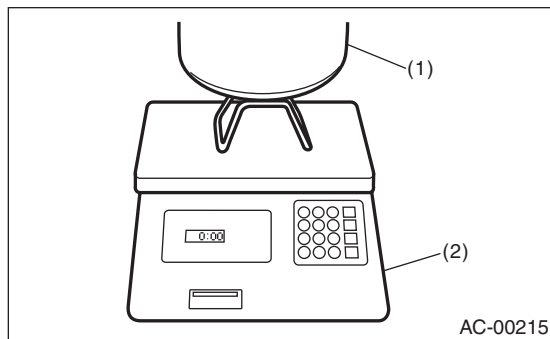
9) Follow the can tap operation manual, install to the refrigerant can.



- (1) Tap valve
- (2) To the center manifold hose

10) Disconnect the center manifold hose from the vacuum pump, and connect the hose to the tap valve.

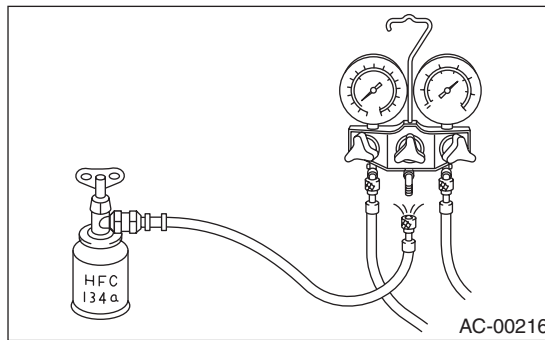
11) When a 13.6 kg (30 lb) refrigerant container is used, measure the amount of refrigerant with a refrigerant charging scale, and connect with the center manifold hose.



- (1) Refrigerant container (HFC-134a)
- (2) Weight scale

12) Open the valve on the HFC-134a source.

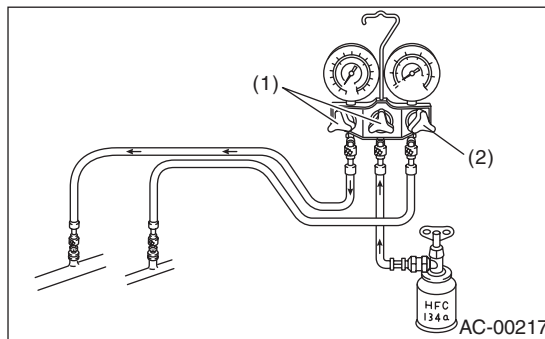
13) Loosen the center manifold hose connection on the manifold gauge for a few seconds (if there is a purge valve on the manifold gauge, push this instead) to allow the air in the center manifold hose to be bled by the refrigerant pressure.



14) Open the high pressure side and low pressure side valves of the manifold gauge to fill with refrigerant.

### CAUTION:

**When filling with the engine running, do not open the high pressure side valve. Always fill from the low pressure side.**



- (1) Open (low pressure)
- (2) Open (high pressure)

15) When the gauge needle reaches approximately 200 kPa (1,500 mmHg, 59.1 inHg), close all valves.

16) Using a leak tester, check for refrigerant leaks in the system.

17) After checking that there are no refrigerant leaks, fill with refrigerant up to the specified amount.

18) If the HFC-134a supply container becomes empty, close all valves, and close the can tap valve to replace the empty container. After replacing with a new HFC-134a supply container, perform air purge, and resume the filling operation.

19) If the refrigerant filling efficiency drops, close all valves.

20) Check that both the low pressure and high pressure valves are closed. Start the engine with the A/C switch OFF.

## Refrigerant Charging Procedure

HVAC SYSTEM (HEATER, VENTILATOR AND A/C)

---

21) To prevent damage to the compressor, push the A/C switch ON-OFF quickly a few times.

22) Set up the vehicle to the following status:

**CAUTION:**

**When filling with the engine running, do not open the high pressure side valve.**

**Always fill from the low pressure side valve.**

- 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"
- Window open

23) Open the low pressure side valve and fill with refrigerant up to the specified amount.

24) After filling with refrigerant, close all valves and disconnect the hose from the service port.

25) Attach the cap to the service port.



# Refrigerant Leak Check

HVAC SYSTEM (HEATER, VENTILATOR AND A/C)

## 5. Refrigerant Leak Check

### A: INSPECTION

1) At engine speed below 1500 rpm, 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<sup>2</sup>, 100 psi). Then stop the engine to start the leak test.

2) Starting from the connection between high-pressure pipe and evaporator, check the system for leaks along the high-pressure side through the compressor. The following items must be checked thoroughly.

3) Check the joint and seam between pressure switch (triple pressure switch) and high-pressure pipe.

4) Check the connections between condenser and pipes, 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 compressor and hoses.

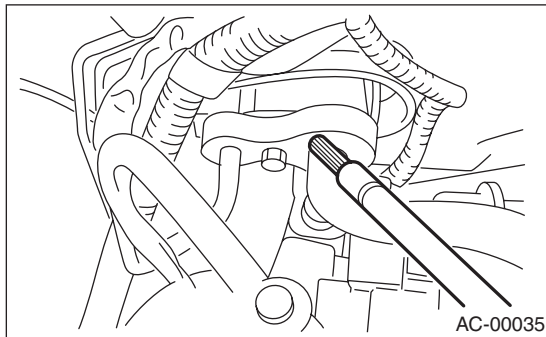
6) Check the machined area of the compressor and other joints on the compressor.

7) Check the compressor shaft seal at the area near the center of compressor clutch pulley.

Some shaft seals will show a slight amount of leakage, about 3 g (0.1 oz) per year. This is not a problem.

8) Starting from the connection between low-pressure pipe and evaporator, check the system for leakage along the low-pressure side through the compressor. The following items must be checked thoroughly.

- Connection between 2 parts
- Connection between pipe and plate
- Connection between pipes

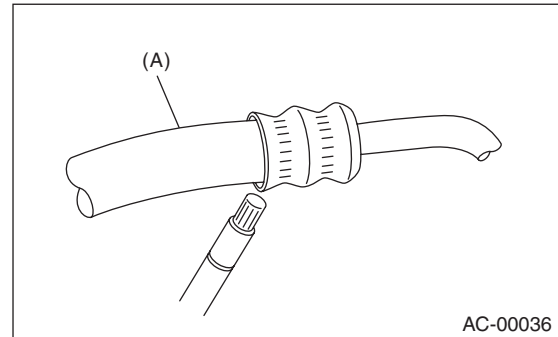


9) Visually check the rubber area of the flexible hose for cracks.

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 pipes at approx. 25 mm (0.98 in) per second.

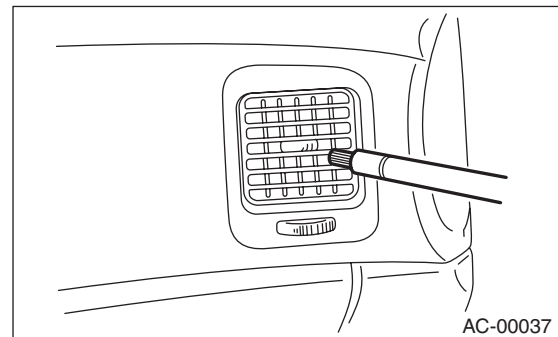


(A) Flexible hose

10) Disconnect the drain hose from the heater case, and check the hose end for at least 10 seconds.

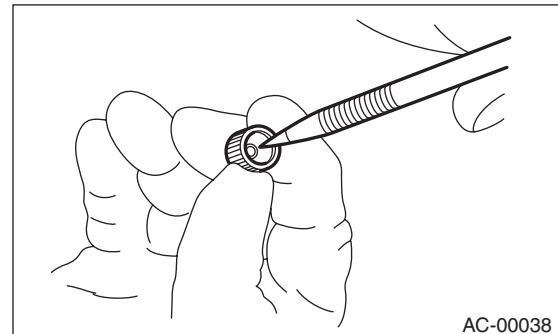
After the test is finished, reconnect the drain hose.

11) Turn the ignition key to the ON position, and run the blower at high speed for approx. 1 minute. Stop the blower to check the ventilation grille on the instrument panel. While moving the tester closer to the grille, run the blower for 1 or 2 seconds, then stop it. Check the grille at that position for at least 10 seconds.



12) Check the valve in the service port.

13) Visually check the rubber seal in the service port cap.



# Compressor Oil

HVAC SYSTEM (HEATER, VENTILATOR AND A/C)

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## 6. Compressor Oil

### A: PROCEDURE

NOTE:

Before making repairs, perform the oil return operation to return the compressor oil in circulation with the refrigerant to the compressor.

- 1) Increase the engine to 1,500 rpm.
- 2) Turn on the A/C switch.
- 3) Turn the temperature control switch to MAX COOL.
- 4) Put in RECIRC position.
- 5) Turn the blower control switch to HI. (For models with rear coolers, also turn the rear cooler fan switch to HI)
- 6) Leave in this condition for 10 minutes.

### B: REPLACEMENT

NOTE:

- If a component has been replaced, add an appropriate amount of compressor oil (same as the amount of remaining oil in removed component).
- 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.

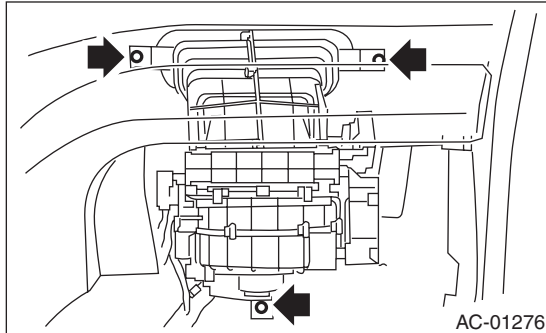
# Blower Motor Unit Assembly

HVAC SYSTEM (HEATER, VENTILATOR AND A/C)

## 7. Blower Motor Unit Assembly

### A: REMOVAL

- 1) Disconnect the ground cable from the battery.
- 2) Remove the glove box. <Ref. to EI-38, REMOVAL, Glove Box.>
- 3) Disconnect the connectors of the A/C control module, intake door actuator, blower motor, power transistor and blower resistor.
- 4) Lift the floor mat.
- 5) Loosen the bolt and nut to remove blower motor unit assembly.



### B: INSTALLATION

Install in the reverse order of removal.

#### **Tightening torque:**

**Refer to “COMPONENT” of “General Description”.** <Ref. to AC-6, HEATER COOLING UNIT, COMPONENT, General Description.>  
<Ref. to AC-8, BLOWER MOTOR UNIT, COMPONENT, General Description.>

# Blower Motor

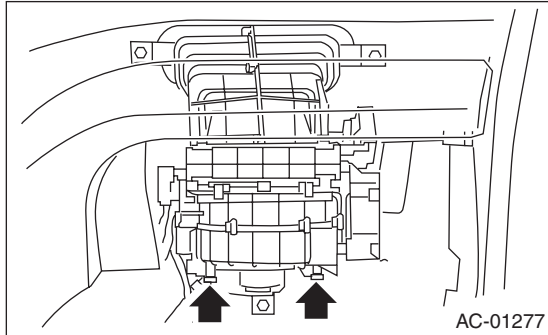
HVAC SYSTEM (HEATER, VENTILATOR AND A/C)

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## 8. Blower Motor

### A: REMOVAL

- 1) Disconnect the ground cable from the battery.
- 2) Remove the glove box lower cover. <Ref. to EI-38, REMOVAL, Glove Box.>
- 3) Disconnect the connector of the blower motor.
- 4) Loosen the screw to remove the blower motor.

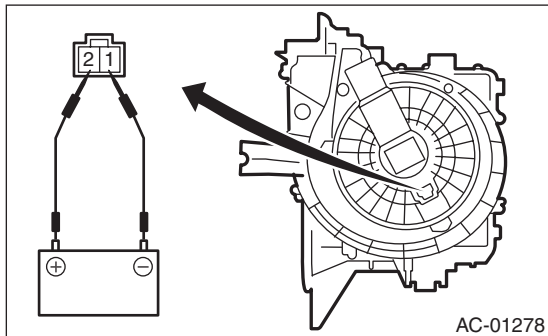


### B: INSTALLATION

Install in the reverse order of removal.

### C: INSPECTION

Connect the battery positive (+) terminal to terminal No. 2 of blower motor connector, and negative (-) terminal to terminal No. 1. Check the blower motor for smooth rotation.



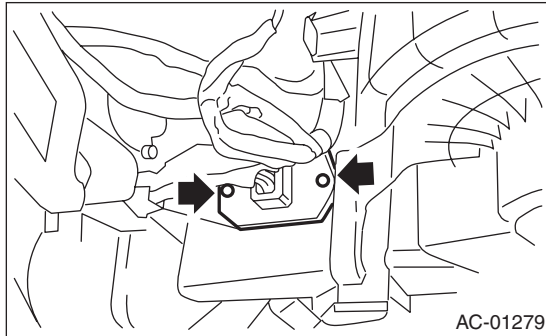
## Power Transistor (Auto A/C Model)

HVAC SYSTEM (HEATER, VENTILATOR AND A/C)

### 9. Power Transistor (Auto A/C Model)

#### A: REMOVAL

- 1) Remove the glove box lower cover on the passenger's side. <Ref. to EI-38, REMOVAL, Glove Box.>
- 2) Disconnect the power transistor connector.
- 3) Remove the two screws and remove the power transistor.



#### B: INSTALLATION

Install in the reverse order of removal.

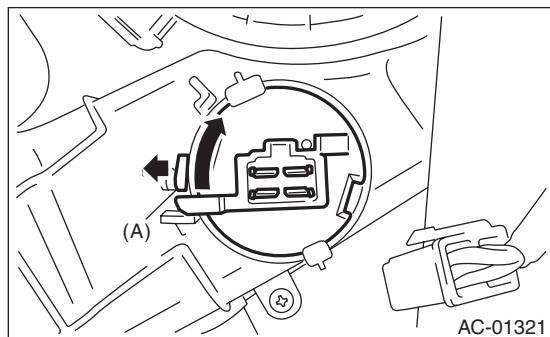
## Blower Resistor (Dual A/C Model)

HVAC SYSTEM (HEATER, VENTILATOR AND A/C)

### 10. Blower Resistor (Dual A/C Model)

#### A: REMOVAL

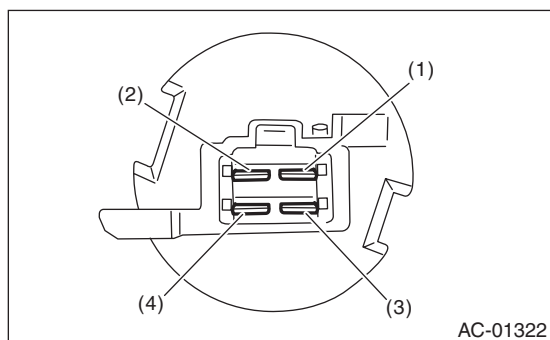
- 1) Remove the left rear quarter trim. <Ref. to EI-46, REMOVAL, Rear Quarter Trim.>
- 2) Disconnect the blower resistor connector.
- 3) Remove the lock (A) and rotate it to the right to remove the blower resistor.



#### B: INSTALLATION

Install in the reverse order of removal.

#### C: INSPECTION



Measure the blower resistor resistance.

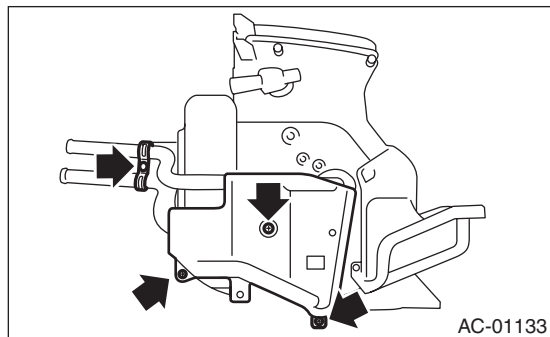
Terminal No.	Standard
1 and 3	Approximately 0.42 $\Omega$
1 and 2	Approximately 1.42 $\Omega$
4 and 1	Approximately 3.4 $\Omega$

If NG, replace the blower resistor.

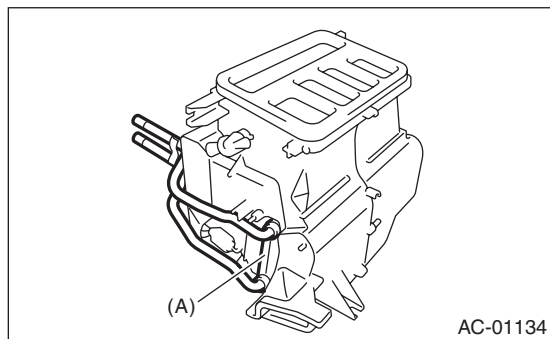
## 11.Heater Core

### A: REMOVAL

- 1) Disconnect the ground cable from the battery.
- 2) Draw out the refrigerant with the refrigerant recovery unit. <Ref. to AC-21, PROCEDURE, Refrigerant Recovery Procedure.>
- 3) Remove the heater and cooling unit. <Ref. to AC-36, REMOVAL, Heater and Cooling Unit.>
- 4) Remove the screws and remove the heater core cover and pipe clamp.



- 5) Remove the heater core (A).



### B: INSTALLATION

Install in the reverse order of removal.

# Control Panel

HVAC SYSTEM (HEATER, VENTILATOR AND A/C)

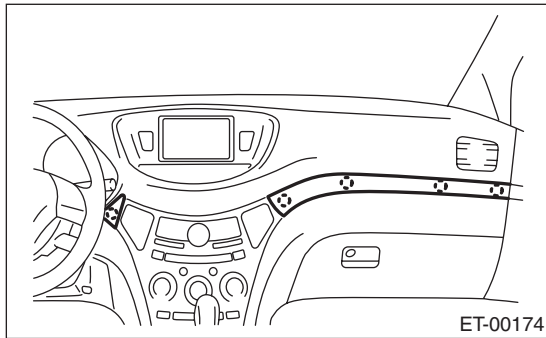
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## 12. Control Panel

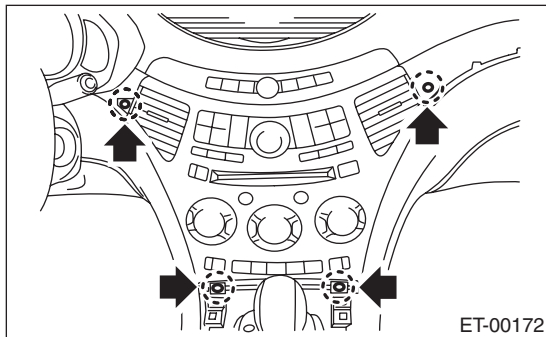
### A: REMOVAL

#### 1. FRONT

- 1) Disconnect the ground cable from the battery.
- 2) Remove the front console panel. <Ref. to ET-13, REMOVAL, Audio.>
- 3) Remove the instrument panel ornament and the driver's side and passenger's side inner panels.



- 4) Remove the screws, and pull out the control panel.



- 5) Disconnect the harness connectors and remove the front control panel.

#### 2. REAR

- 1) Disconnect the ground cable from the battery.
- 2) Pull out the storage box from underneath the rear control panel.
- 3) Push out the panel from the back side.
- 4) Detach the connectors and remove the rear control panel.

### B: INSTALLATION

Install in the reverse order of removal.



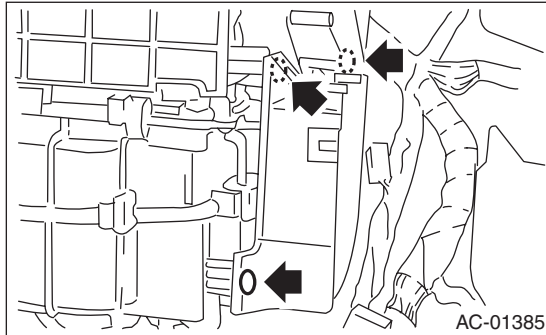
## Control Unit (Auto A/C Model)

HVAC SYSTEM (HEATER, VENTILATOR AND A/C)

### 13. Control Unit (Auto A/C Model)

#### A: REMOVAL

- 1) Disconnect the ground cable from the battery.
- 2) Remove the glove box. <Ref. to EI-38, REMOVAL, Glove Box.>
- 3) Remove the screw, disconnect the connector and remove the control unit.



#### B: INSTALLATION

Install in the reverse order of removal.

# Compressor

HVAC SYSTEM (HEATER, VENTILATOR AND A/C)

## 14. Compressor

### A: INSPECTION

#### 1. MAGNETIC CLUTCH CLEARANCE

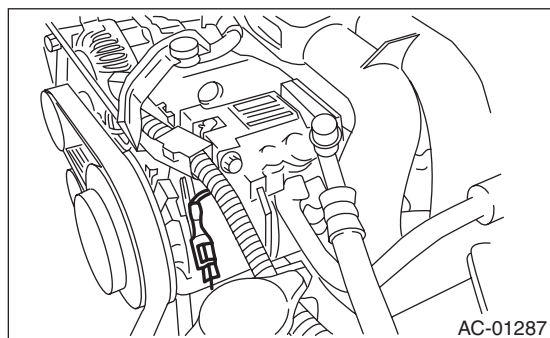
Check the clearance of the entire circumference around the drive plate and pulley.

#### Standard:

$0.45 \pm 0.15 \text{ mm}$  ( $0.0177 \pm 0.0059 \text{ in}$ )

#### 2. MAGNETIC CLUTCH OPERATION

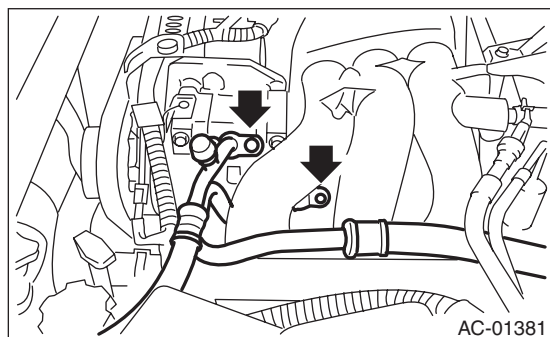
- 1) Disconnect the compressor connector.
- 2) Connect the battery positive (+) terminal to the compressor connector terminal, and the negative (-) terminal to the compressor body.



- 3) Check the magnet clutch engagement.  
If there is a problem, replace the compressor.

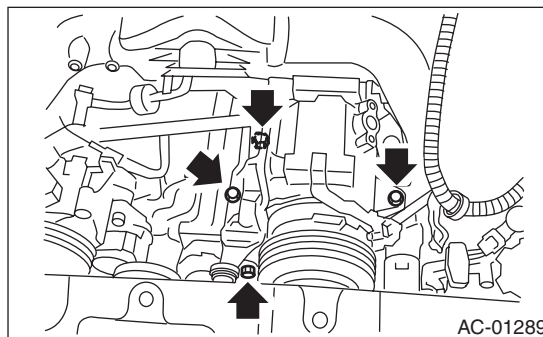
### B: REMOVAL

- 1) Perform the compressor oil return operation. <Ref. to AC-26, PROCEDURE, Compressor Oil.>
- 2) Turn the A/C switch to OFF and stop the engine.
- 3) Using the refrigerant recovery system, discharge refrigerant. <Ref. to AC-21, PROCEDURE, Refrigerant Recovery Procedure.>
- 4) Disconnect the ground cable from the battery.
- 5) Remove the V-belts. <Ref. to ME(H6DO)-45, REMOVAL, V-belt.>
- 6) Remove the generator. <Ref. to SC(H6DO)-13, REMOVAL, Generator.>
- 7) Remove the bolt and remove the low-pressure hose and high-pressure hose.

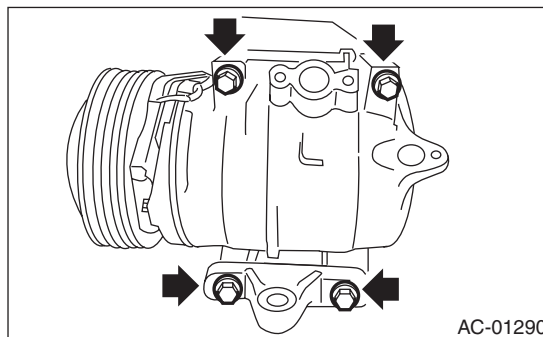


- 8) Disconnect the compressor harness from the body harness.

- 9) Remove the bolts and remove the compressor bracket.



- 10) Remove the bolts, then remove the bracket from the compressor.



### C: INSTALLATION

- 1) Install in the reverse order of removal.
- 2) Replace the O-rings on low/high pressure hoses with new parts, then apply compressor oil.
- 3) After replacing the compressor, adjust the amount of compressor oil. <Ref. to AC-26, PROCEDURE, Compressor Oil.>
- 4) Charge refrigerant. <Ref. to AC-22, PROCEDURE, Refrigerant Charging Procedure.>

#### Tightening torque:

Refer to "COMPONENT" of "General Description". <Ref. to AC-11, AIR CONDITIONING UNIT, COMPONENT, General Description.>  
<Ref. to AC-12, COMPRESSOR, COMPONENT, General Description.>

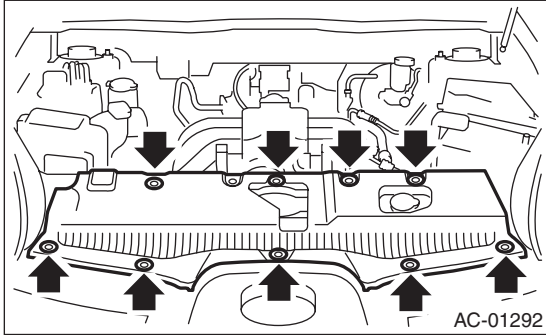
# Condenser

HVAC SYSTEM (HEATER, VENTILATOR AND A/C)

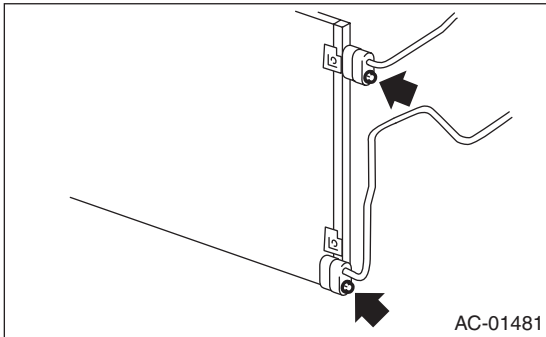
## 15. Condenser

### A: REMOVAL

- 1) Using the refrigerant recovery system, discharge refrigerant. <Ref. to AC-21, PROCEDURE, Refrigerant Recovery Procedure.>
- 2) Disconnect the ground cable from battery.
- 3) Remove the bumper upper cover.



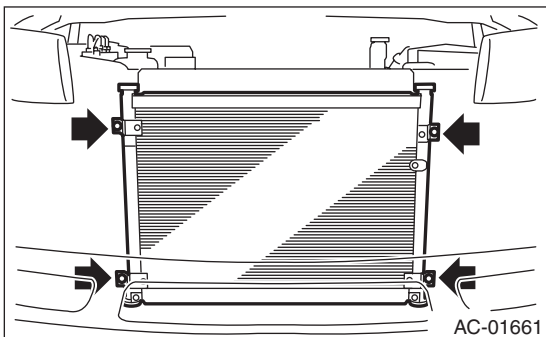
- 4) Remove the front bumper. <Ref. to EI-22, REMOVAL, Front Bumper.>
- 5) Disconnect the pressure hose and pipe from the condenser.



- 6) Remove the 4 bolts, lift the condenser and pull out from the space between the radiator and bumper.

### CAUTION:

- Be careful not to damage the condenser fins. If a damaged fin is found, repair it using a thin screwdriver.
- If the condenser is replaced, add an appropriate amount of compressor oil to the compressor. <Ref. to AC-26, REPLACEMENT, Compressor Oil.>



### B: INSTALLATION

- 1) Install in the reverse order of removal.

### CAUTION:

Replace the O-rings on hoses or pipes with new parts, and then apply compressor oil.

- 2) Charge refrigerant. <Ref. to AC-22, PROCEDURE, Refrigerant Charging Procedure.>

### Tightening torque:

Refer to "COMPONENT" of "General Description". <Ref. to AC-11, AIR CONDITIONING UNIT, COMPONENT, General Description.>

### C: INSPECTION

- 1) Check to see that the condenser fins are not clogged with debris or insects. Blow with compressed air or flush fins with water as needed.
- 2) Inspect for oil leakage from the condenser. If a failure is found, replace the condenser with a new part.

# Heater and Cooling Unit

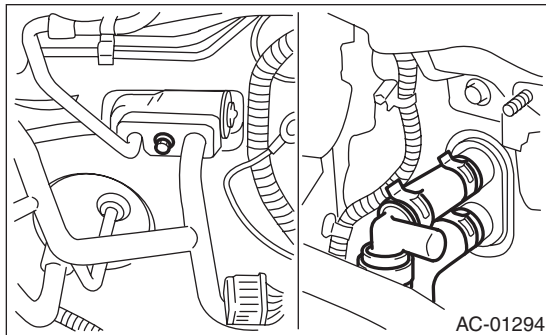
HVAC SYSTEM (HEATER, VENTILATOR AND A/C)

## 16. Heater and Cooling Unit

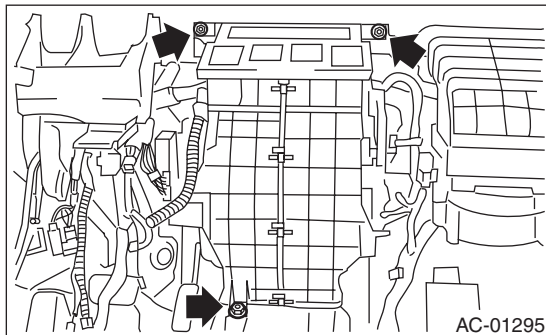
### A: REMOVAL

#### 1. FRONT

- 1) Disconnect the ground cable from the battery.
- 2) Using the refrigerant recovery system, discharge refrigerant. <Ref. to AC-21, PROCEDURE, Refrigerant Recovery Procedure.>
- 3) Drain engine coolant from the radiator.
- 4) Remove the bolts securing expansion valve and pipe in engine compartment. Release the heater hose clamps in engine compartment to remove the hoses.



- 5) Remove the instrument panel. <Ref. to EI-41, REMOVAL, Instrument Panel Assembly.>
- 6) Remove the support beam.
- 7) Remove the blower motor unit assembly. <Ref. to AC-27, REMOVAL, Blower Motor Unit Assembly.>
- 8) Disconnect the actuator connector.
- 9) Remove the bolt and nuts and remove the heater and cooling unit.



#### 2. REAR

- 1) Disconnect the ground cable from battery.
- 2) Using the refrigerant recovery system, discharge refrigerant. <Ref. to AC-21, PROCEDURE, Refrigerant Recovery Procedure.>
- 3) Remove the left rear quarter trim. <Ref. to EI-46, REMOVAL, Rear Quarter Trim.>
- 4) Remove the bolts, then disconnect the rear pipe.
- 5) Disconnect the harness connector.
- 6) Remove the nuts, then remove the cooler unit.

### B: INSTALLATION

- 1) Install in the reverse order of removal.
- 2) Charge refrigerant. <Ref. to AC-22, PROCEDURE, Refrigerant Charging Procedure.>

#### Tightening torque:

**Refer to "COMPONENT" of "General Description". <Ref. to AC-6, HEATER COOLING UNIT, COMPONENT, General Description.>**

# Evaporator

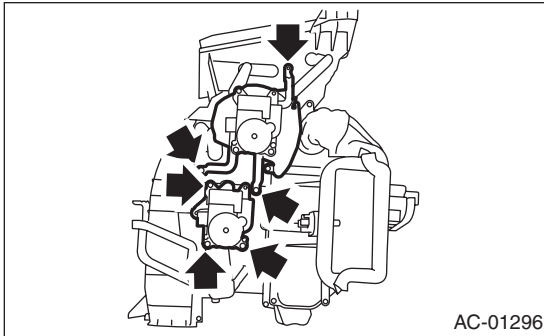
HVAC SYSTEM (HEATER, VENTILATOR AND A/C)

## 17. Evaporator

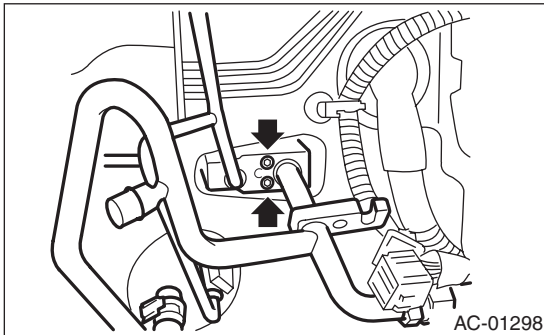
### A: REMOVAL

#### 1. FRONT

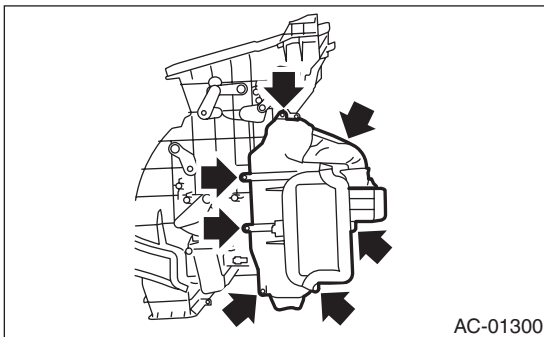
- 1) Using the refrigerant recovery system, discharge refrigerant. <Ref. to AC-21, PROCEDURE, Refrigerant Recovery Procedure.>
- 2) Disconnect the ground cable from battery.
- 3) Remove the blower motor unit assembly. <Ref. to AC-27, REMOVAL, Blower Motor Unit Assembly.>
- 4) Disconnect the connector, remove the screw and then remove the air-mix door actuator and mode door actuator.



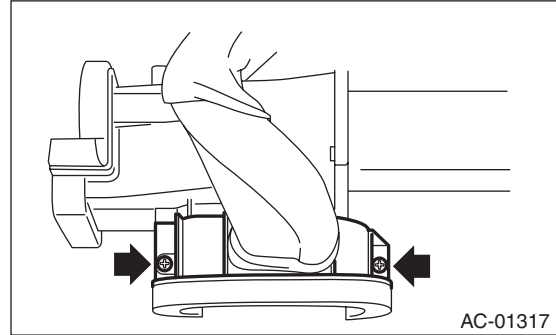
- 5) Remove the bolts holding the expansion valve, and remove the expansion valve.



- 6) Remove the screws and pull out the evaporator.



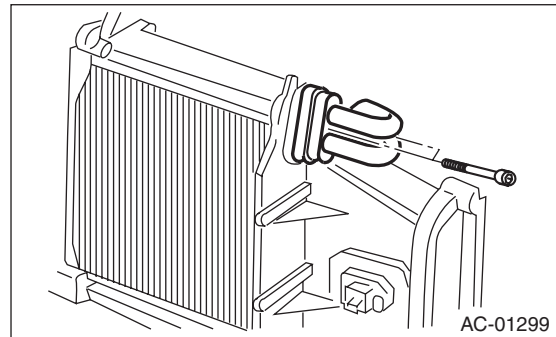
- 7) Remove the pipe cover from the evaporator.



- 8) Remove the bolt which holds the pipe to evaporator, and remove the evaporator.

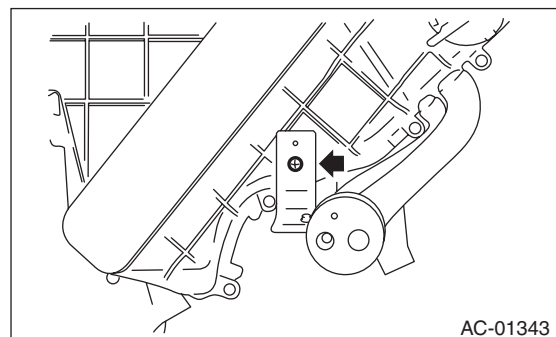
#### CAUTION:

When replacing the evaporator, add an appropriate amount of compressor oil to the evaporator. <Ref. to AC-26, REPLACEMENT, Compressor Oil.>



#### 2. REAR

- 1) Using the refrigerant recovery system, discharge refrigerant. <Ref. to AC-21, PROCEDURE, Refrigerant Recovery Procedure.>
- 2) Disconnect the ground cable from battery.
- 3) Remove the rear cooler unit. <Ref. to AC-36, REAR, REMOVAL, Heater and Cooling Unit.>
- 4) Remove the pipe bracket bolts and remove the bracket.

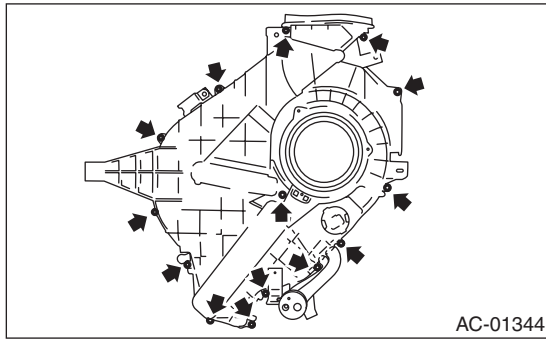


# Evaporator

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

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5) Remove the screws, and then remove the cooler unit.



6) Remove from the cooler unit and disconnect the pipe from the evaporator.

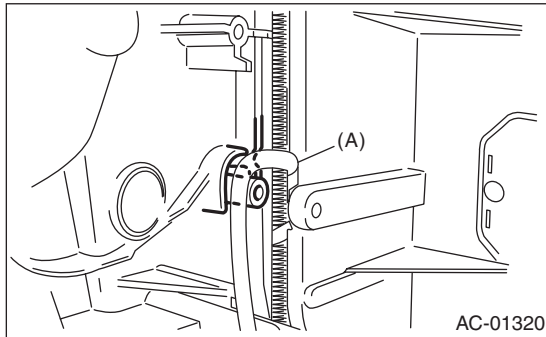
### CAUTION:

When replacing the evaporator, add an appropriate amount of compressor oil to the evaporator. <Ref. to AC-26, REPLACEMENT, Compressor Oil.>

## B: INSTALLATION

### CAUTION:

Route the cord (A) of the evaporator through the location shown on the illustration.



(A) Code

Install in the reverse order of removal.

## 18.Hose and Pipe

### A: REMOVAL

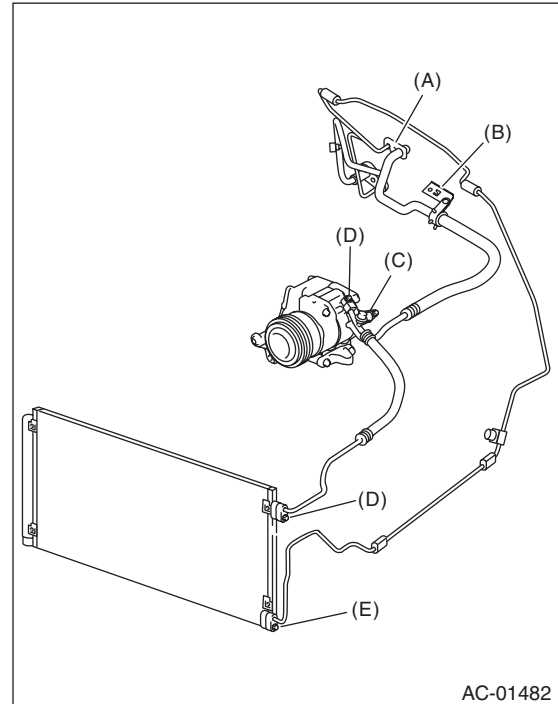
#### CAUTION:

- When disconnecting/connecting hoses, do not apply an excessive force to them. After installing, check that no torsion or excessive tension applied to the hoses.
- Seal the disconnected hose with a plug or vinyl tape to prevent foreign matter from entering.

#### 1. FRONT

- 1) Disconnect the ground cable from battery.
- 2) Using the refrigerant recovery system, discharge refrigerant. <Ref. to AC-21, PROCEDURE, Refrigerant Recovery Procedure.>
- 3) Remove the evaporator unit mounting bolt (A) and low-pressure hose bracket bolt (B).
- 4) Remove the low-pressure hose attaching bolts (C).
- 5) Disconnect the low-pressure hose from evaporator unit.
- 6) Disconnect the low-pressure hose from compressor.
- 7) Remove the low-pressure hose from vehicle.
- 8) Remove the high-pressure hose attaching bolt (D).
- 9) Disconnect the high-pressure hose from compressor.
- 10) Disconnect the high-pressure hose from condenser.
- 11) Remove the high-pressure hose from vehicle.
- 12) Remove the high-pressure pipe attaching bolt (E).

- 13) Remove the high-pressure tube from vehicle.



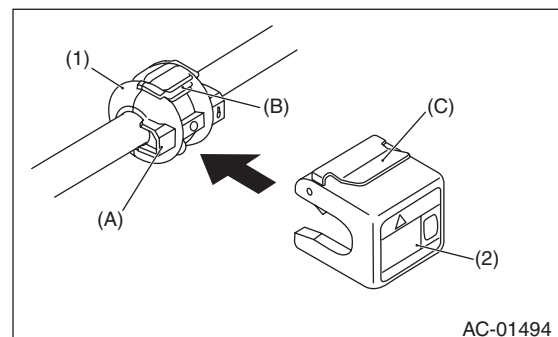
#### 2. REAR

- 1) Disconnect the ground cable from battery.
  - 2) Using the refrigerant recovery system, discharge refrigerant. <Ref. to AC-21, PROCEDURE, Refrigerant Recovery Procedure.>
  - 3) Remove the sheet and floor mat. <Ref. to EI-48, REMOVAL, Floor Mat.>
  - 4) Remove the ECM bracket. <Ref. to FU(H6DO)-52, REMOVAL, Engine Control Module (ECM).>
  - 5) Remove the quick connectors (A and B).
- ST REMOVER PS 73499XA01A  
ST REMOVER PD 73499XA00A

#### NOTE:

Description for handling the special tool

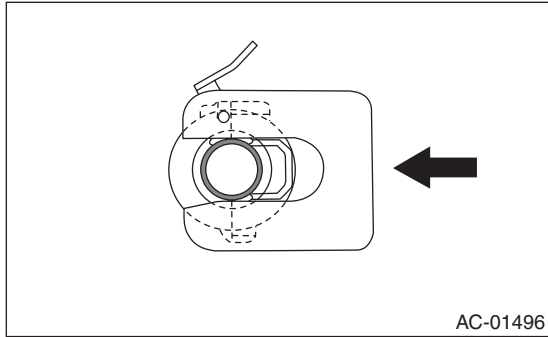
1. Face collar side (A) of the quick connector (1) to the remover (2), and set lock part (B) on the stopper side (C) of the remover.



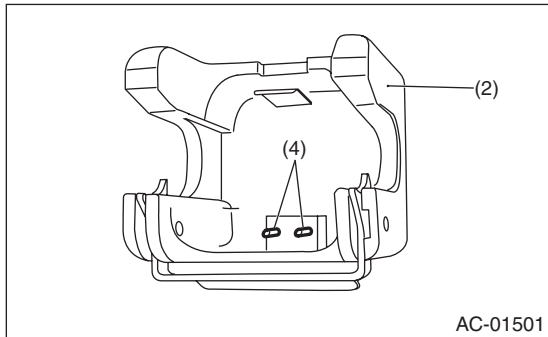
# Hose and Pipe

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

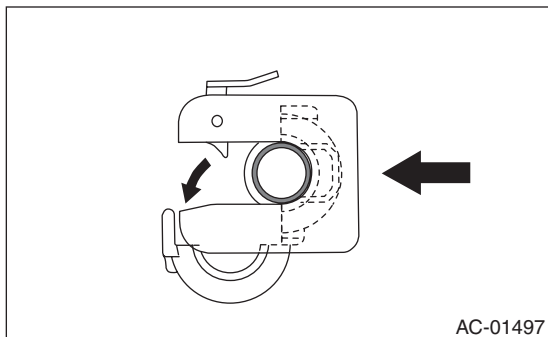
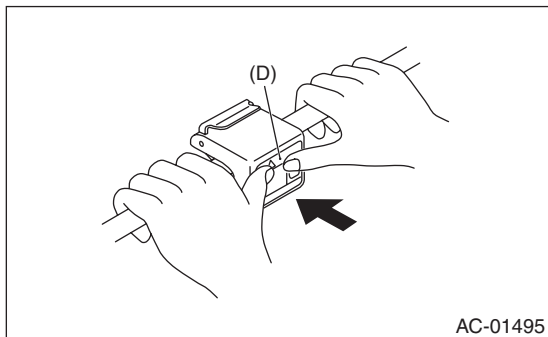
2. Insert the remover.



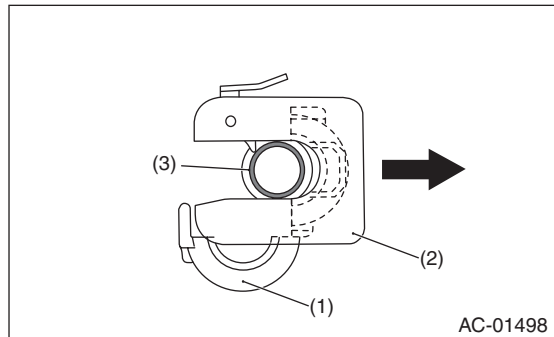
Do not bend the needle (4) in the remover.



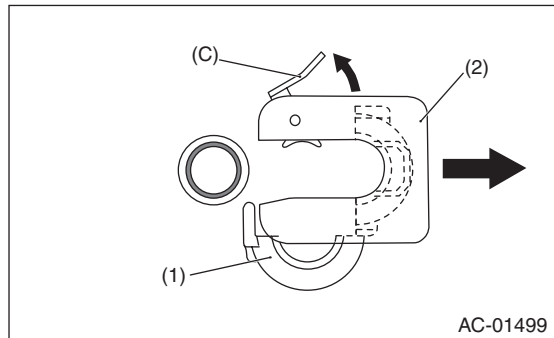
3. With the pipe secured, press the label part (D) of the remover with a thumb. Connector is unlocked and the quick connector opens.



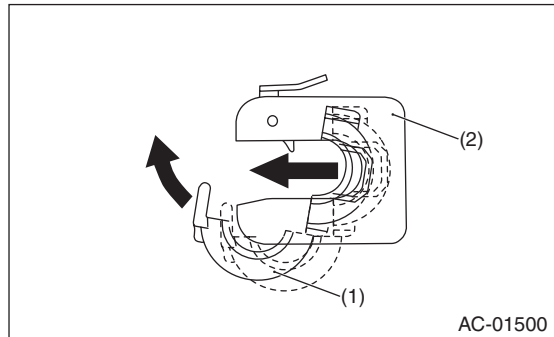
4. Pull the remover (2) and separate the pipe (3) from the quick connector (1).



5. Pull up the stopper (C) and remove the remover (2) and quick connector (1) from the pipe.



6. Disconnect the quick connector (1) from the remover (2).



6) Remove the pipe bracket.

7) Remove the front pipe and rear pipe connecting bolts (C).

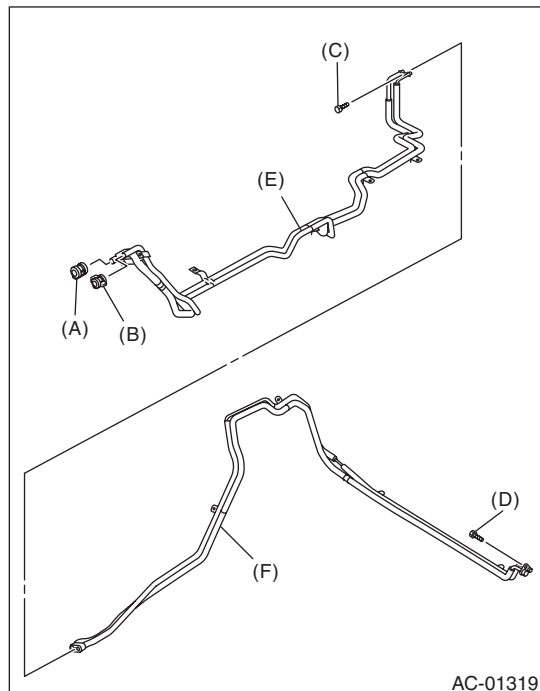
8) Remove the connecting bolts (D) of the rear cooler unit.



# Hose and Pipe

HVAC SYSTEM (HEATER, VENTILATOR AND A/C)

9) Remove the front pipe (E) and rear pipe (F).



## B: INSTALLATION

### CAUTION:

- When disconnecting or connecting the hoses, do not apply excessive force. After installing, check that no torsion or excessive tension applied to the hoses.
- Seal the disconnected hose with a plug or vinyl tape to prevent foreign matter from entering.

1) Install in the reverse order of removal.

2) Charge refrigerant. <Ref. to AC-22, PROCEDURE, Refrigerant Charging Procedure.>

### Tightening torque:

Refer to “COMPONENT” of “General Description”. <Ref. to AC-11, AIR CONDITIONING UNIT, COMPONENT, General Description.>

## C: INSPECTION

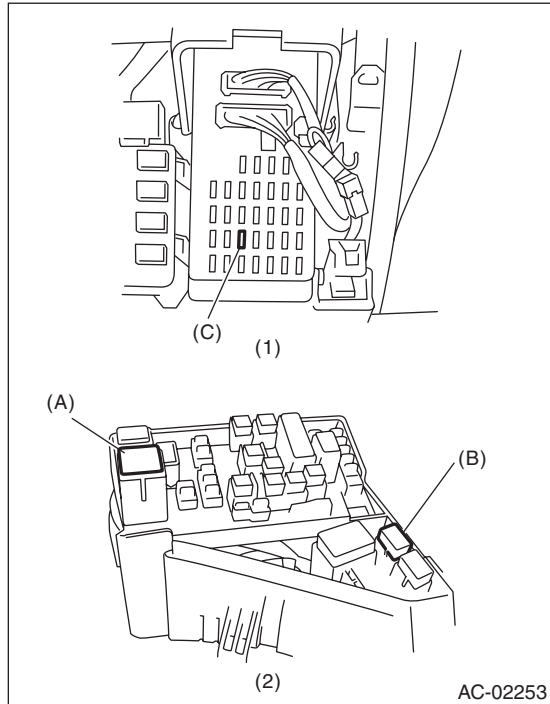
Check the hoses for cracks, damage and expansion. If any fault is found, replace with new parts.

# Relay and Fuse

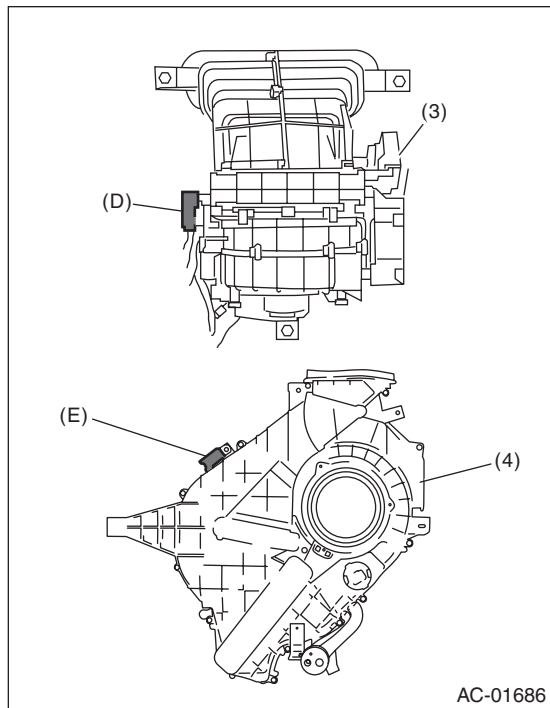
HVAC SYSTEM (HEATER, VENTILATOR AND A/C)

## 19. Relay and Fuse

### A: LOCATION



- (1) Joint box
- (2) Main fuse box

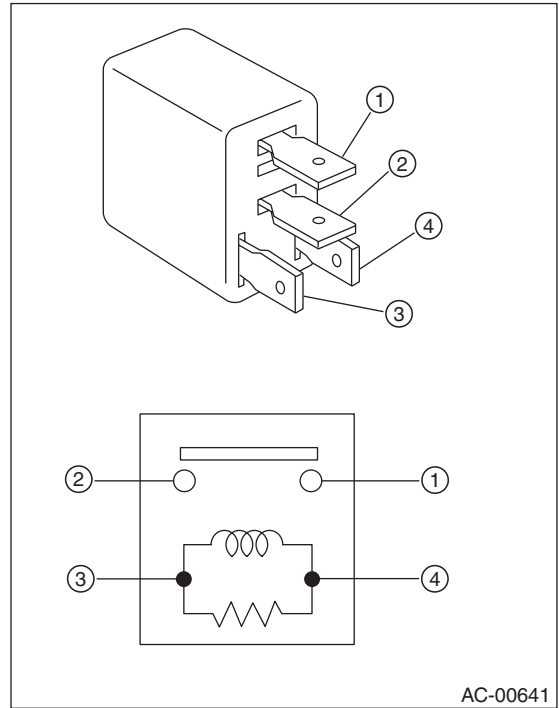


- (3) Blower motor unit
- (4) Rear cooler unit

Main fan relay 1	(A)
A/C relay	(B)
A/C fuse	(C)
Front blower relay	(D)
Rear blower relay	(E)

### B: INSPECTION

- A/C relay

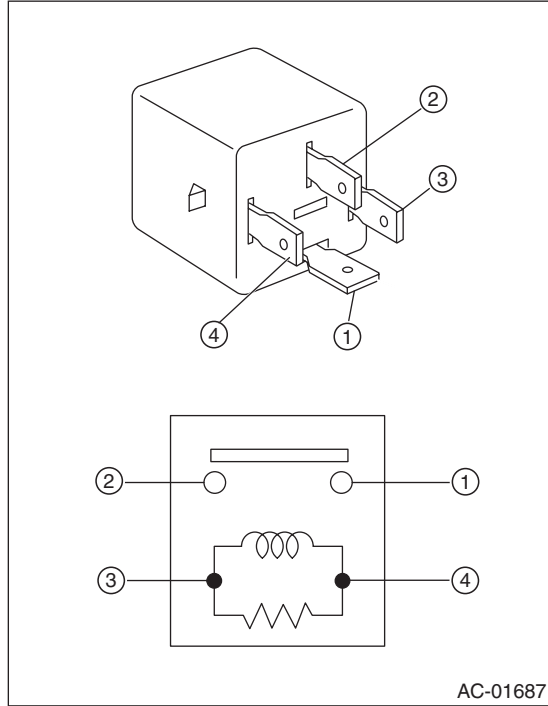


- (3) — (4): Continuity exists
- (1) — (2): Continuity does not exist

# Relay and Fuse

HVAC SYSTEM (HEATER, VENTILATOR AND A/C)

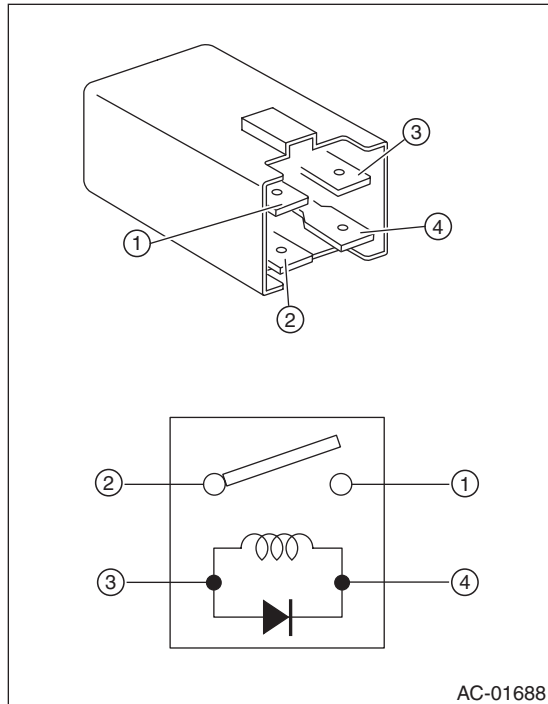
- Main fan relay 1, Front blower relay



While applying battery voltage to the terminal between (3) and (4), check continuity between (1) and (2).  
If no continuity exists, replace the relay with a new part.

- (3) — (4): Continuity exists
- (1) — (2): Continuity does not exist

- Rear blower relay



- (3) — (4): Continuity exists
- (1) — (2): Continuity does not exist

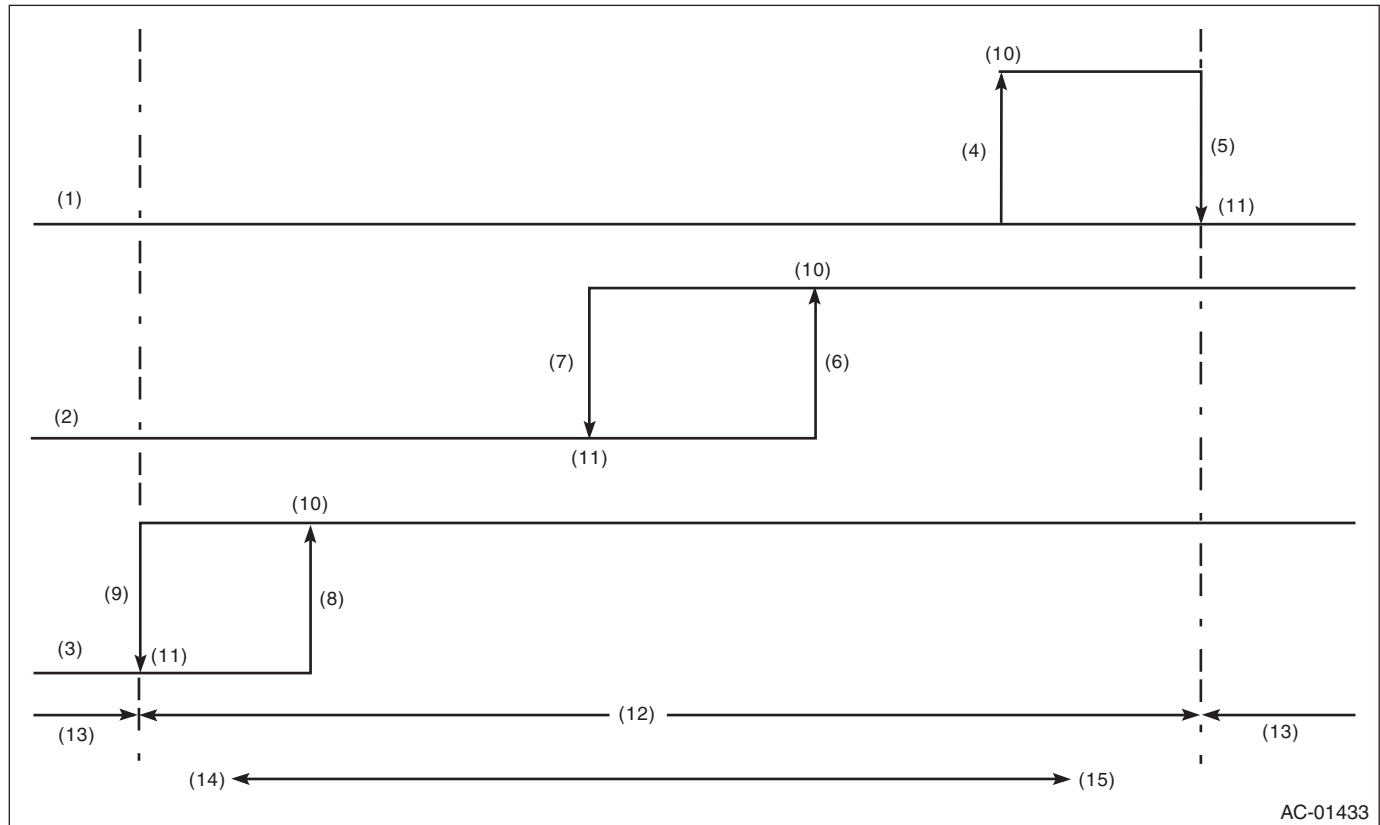
# Pressure Switch (Triple Pressure Switch)

HVAC SYSTEM (HEATER, VENTILATOR AND A/C)

## 20. Pressure Switch (Triple Pressure Switch)

### A: INSPECTION

- 1) Connect the manifold gauge to the service valve on the high-pressure side.
- 2) Start the air conditioner, and check the operating pressure of switch by turning the compressor (magnet clutch) to ON/OFF. Operation of each switch is as follows.



AC-01433

(1) High pressure switch	(6) 1,770±80 kPa (18±1 kg/cm <sup>2</sup> , 256±14 psi)	(11) OFF
(2) Middle pressure switch	(7) 1,370±120 kPa (14±1 kg/cm <sup>2</sup> , 199±14 psi)	(12) Operative range of compressor
(3) Low pressure switch	(8) 225 <sup>+25</sup> <sub>-29</sub> kPa (2.29 <sup>+0.25</sup> <sub>-0.30</sub> kg/cm <sup>2</sup> , 32.6 <sup>+3.6</sup> <sub>-4.2</sub> psi)	(13) Range that compressor does not operate
(4) 2,550±200 kPa (26.00±2.04 kg/cm <sup>2</sup> , 369.8±29.0 psi)	(9) 196±20 kPa (2.00±0.20 kg/cm <sup>2</sup> , 28.4±2.9 psi)	(14) Low pressure
(5) 3,140 <sup>+50</sup> <sub>-200</sub> kPa (32.02 <sup>+0.51</sup> <sub>-2.04</sub> kg/cm <sup>2</sup> , 455.4 <sup>+7.25</sup> <sub>-29.0</sub> psi)	(10) ON	(15) High pressure

#### NOTE:

- High pressure switch turns the compressor (magnet clutch) to OFF when the refrigerant pressure becomes extremely high to prevent the evaporator, air conditioner piping and expansion valve from getting damaged or frozen.
- Middle pressure switch effectively controls the radiator fan output by judging high load/low load in normal pressure range.
- If the refrigerant pressure is abnormally low, the low pressure switch determines that there is insufficient refrigerant, and turns the compressor (magnet clutch) OFF since there is a possibility that the compressor will seize if it is continued to run.

# Actuator

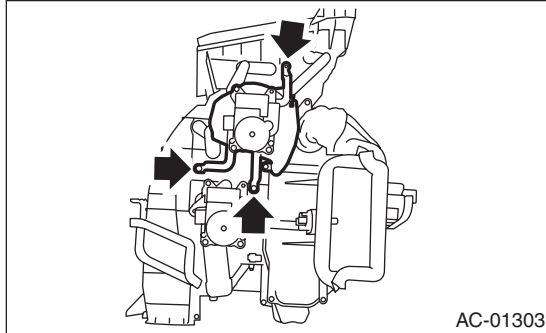
HVAC SYSTEM (HEATER, VENTILATOR AND A/C)

## 21. Actuator

### A: REMOVAL

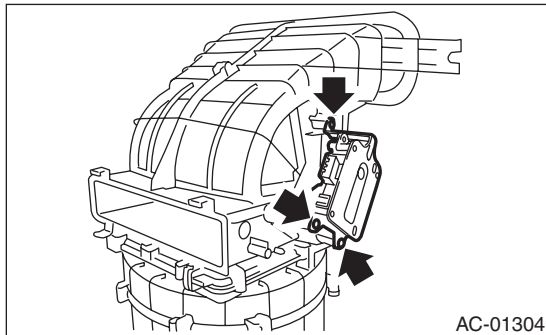
#### 1. MODE DOOR ACTUATOR

Disconnect the connector, remove the screw, and then remove the mode door actuator from the heater and cooling unit.



#### 2. INTAKE DOOR ACTUATOR

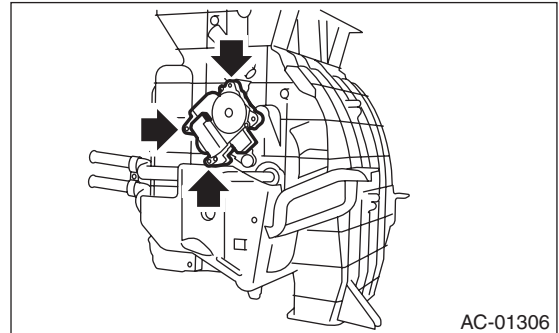
Disconnect the connector, remove the screw, and then remove the intake door actuator from the blower motor unit.



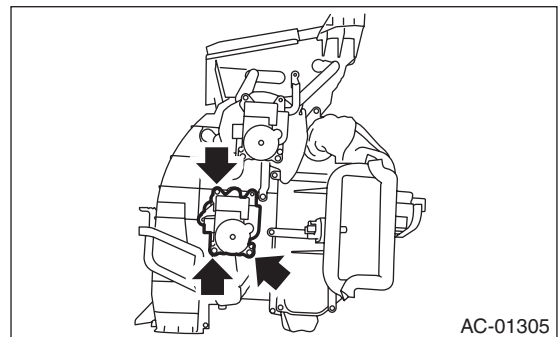
#### 3. AIR MIX DOOR ACTUATOR (AUTO A/C MODEL)

Disconnect the connector, remove the screw, and then remove the air mix door actuator from the heater and cooling unit.

- Driver's side



- Passenger's side



### B: INSTALLATION

Install in the reverse order of removal.

## Ambient Sensor (Auto A/C Model)

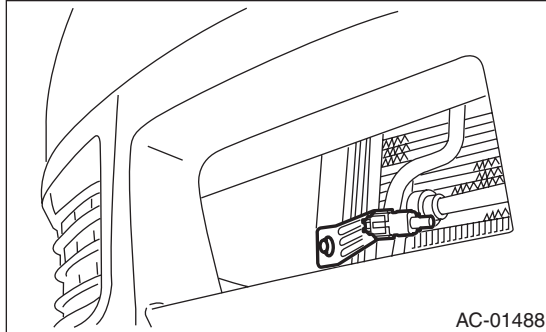
HVAC SYSTEM (HEATER, VENTILATOR AND A/C)

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### 22. Ambient Sensor (Auto A/C Model)

#### A: REMOVAL

- 1) Disconnect the ground cable from the battery.
- 2) Disconnect the ambient sensor connector.
- 3) Remove the ambient sensor from the radiator lower panel.



#### B: INSTALLATION

Install in the reverse order of removal.

#### C: INSPECTION

<Ref. to AC(diag)-29, AMBIENT SENSOR, Diagnostic Procedure for Sensors.>

## Sunload Sensor (Auto A/C Model)

HVAC SYSTEM (HEATER, VENTILATOR AND A/C)

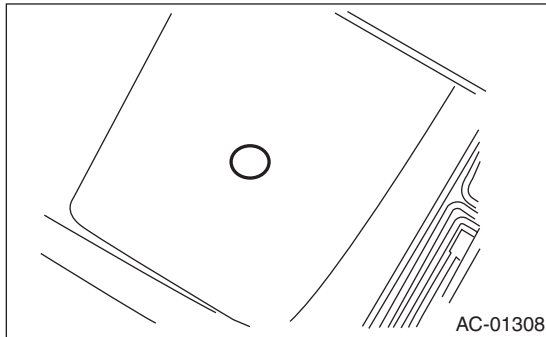
### 23. Sunload Sensor (Auto A/C Model)

#### A: REMOVAL

- 1) Disconnect the ground cable from battery.
- 2) Disconnect the connector and remove the sunload sensor.

#### CAUTION:

Be careful not to damage the interior trims when removing the sensor.



#### B: INSTALLATION

Install in the reverse order of removal.

#### C: INSPECTION

<Ref. to AC(diag)-35, SUNLOAD SENSOR, Diagnostic Procedure for Sensors.>

## In-Vehicle Sensor (Auto A/C Model)

HVAC SYSTEM (HEATER, VENTILATOR AND A/C)

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### 24. In-Vehicle Sensor (Auto A/C Model)

#### A: REMOVAL

- 1) Disconnect the ground cable from the battery.
- 2) Remove the instrument panel lower panel on driver's side. <Ref. to EI-37, REMOVAL, Instrument Panel Lower Cover.>
- 3) Disconnect the connector and aspirator hose, remove the catch hook and remove the interior temperature sensor from the knee guard plate.

#### CAUTION:

**Be careful not to damage the sensors and interior trim when removing.**

#### B: INSTALLATION

Install in the reverse order of removal.

#### C: INSPECTION

<Ref. to AC(diag)-31, IN-VEHICLE SENSOR, Diagnostic Procedure for Sensors.>



# Air Vent Grille

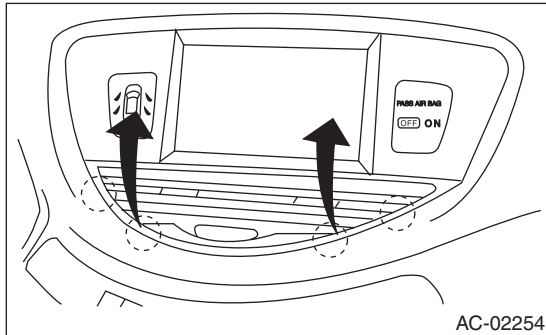
HVAC SYSTEM (HEATER, VENTILATOR AND A/C)

## 25. Air Vent Grille

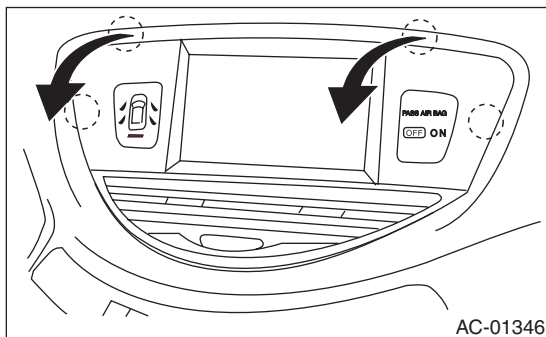
### A: REMOVAL

#### 1. UPPER GRILLE

- 1) Disconnect the ground cable from battery.
- 2) Lift the upper grille (speaker grille for harman/kardon audio spec), and remove the catch on the hazard switch side.



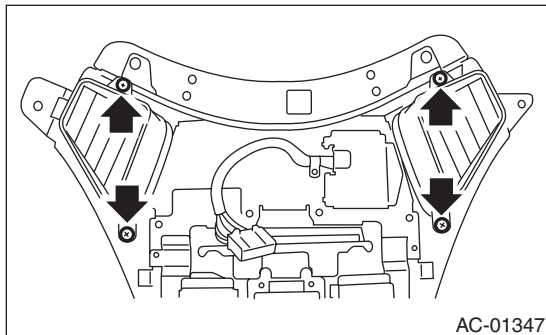
- 3) Hold the side of the monitor and remove the catch on the upper, right and left sides.



- 4) Detach the connectors and remove the panel.

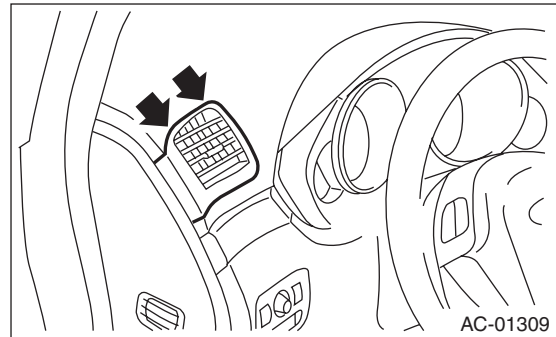
#### 2. CENTER GRILLE

- 1) Disconnect the ground cable from battery.
- 2) Remove the front control panel. <Ref. to AC-32, FRONT, REMOVAL, Control Panel.>
- 3) Remove the screw, and remove the center grille.



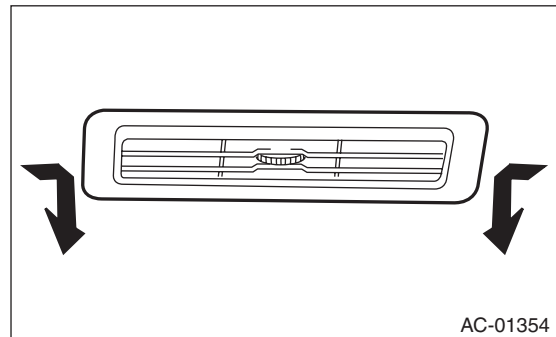
#### 3. SIDE GRILLE

Remove the catch in 2 locations to remove the side air vent grille.



#### 4. ROOF GRILLE

Remove the catch, and remove the roof air vent grille.



### B: INSTALLATION

Install in the reverse order of removal.

### C: INSPECTION

- 1) Check that the direction and amount of air can be adjusted smoothly.
- 2) Check that the adjustment can be maintained in each position.

# Heater Duct

HVAC SYSTEM (HEATER, VENTILATOR AND A/C)

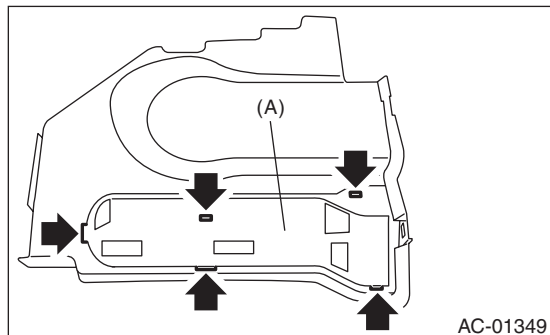
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## 26.Heater Duct

### A: REMOVAL

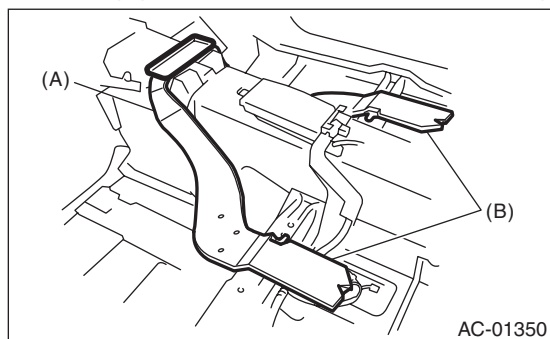
#### 1. FRONT HEATER DUCT

- 1) Remove the instrument panel lower cover. <Ref. to EI-37, REMOVAL, Instrument Panel Lower Cover.>
- 2) Remove the catch and detach the front heater duct (A).



#### 2. REAR HEATER DUCT

- 1) Remove the heater cooling unit. <Ref. to AC-36, REMOVAL, Heater and Cooling Unit.>
- 2) Remove the front seats. <Ref. to SE-7, REMOVAL, Front Seat.>
- 3) Remove the front side sill cover.
- 4) Pull off the floor mat to remove the rear center heater duct (A) and rear heater duct LH, RH (B).



### B: INSTALLATION

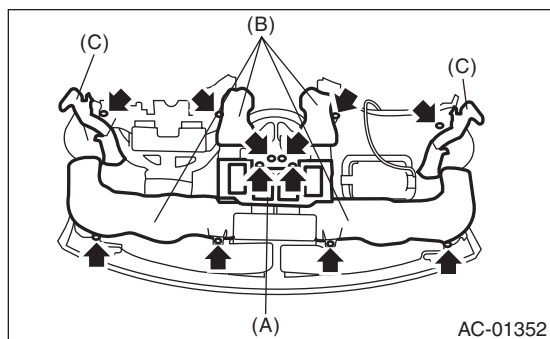
Install in the reverse order of removal.

## 27.Heater Vent Duct

### A: REMOVAL

#### 1. INSTRUMENT

- 1) Remove the instrument panel. <Ref. to EI-37, REMOVAL, Instrument Panel Lower Cover.>
- 2) Remove the screws and detach the center vent duct (A).
- 3) Remove the screws and detach the side vent duct (B).
- 4) Remove the screws and detach the side defroster duct (C).



#### 2. ROOF DUCT

Remove the roof trim. <Ref. to EI-51, REMOVAL, Roof Trim.>

#### NOTE:

The roof duct is one piece with the roof trim. If it requires replacement, replace the roof trim.

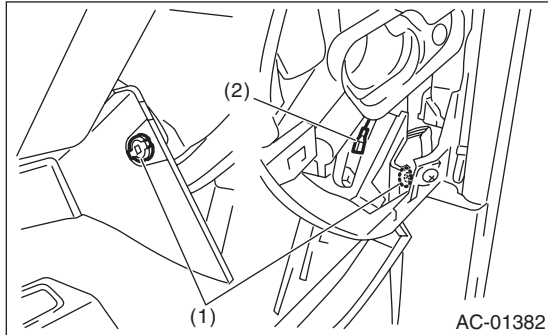
### B: INSTALLATION

Install in the reverse order of removal.

### 28.A/C Filter

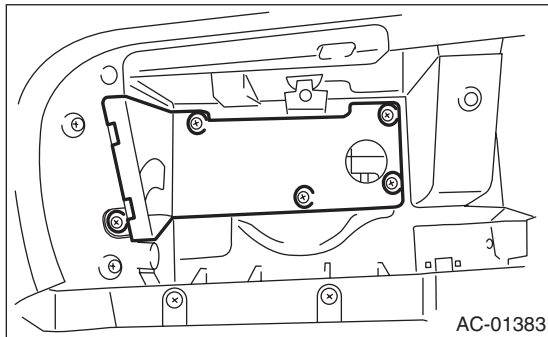
#### A: REPLACEMENT

- 1) Remove the instrument panel lower cover. <Ref. to EI-38, REMOVAL, Glove Box.>
- 2) Remove the 2 clips and the damper (string).

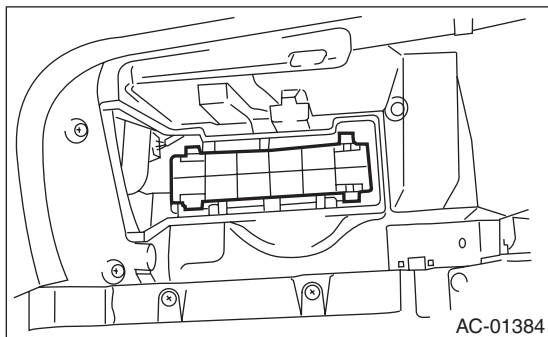


- (1) Clip
- (2) Damper (String)

- 3) Remove the glove box.
- 4) Remove the service hole cover.



- 5) Remove the A/C filter.



- 6) Install in the reverse order of removal.

# General Diagnostic Table

HVAC SYSTEM (HEATER, VENTILATOR AND A/C)

## 29. General Diagnostic Table

### A: INSPECTION

Symptom		Repair order
Blower motor	Does not operate.	Fuse
		Blower motor relay
		Blower motor
		Blower motor resistor
		Blower switch
		Wiring harness
	Strange noise	Blower motor
		Air conditioner filter
Compressor	Does not operate.	Refrigerant
		Fuse
		Air conditioning relay
		Magnet clutch
		Compressor
		Pressure switch
		A/C switch
		Blower switch
		Wiring harness
	Strange noise	V-belt
		Magnet clutch
		Compressor
		Belt tensioner
Cold air is not emitted.	Refrigerant	
	V-belt	
	Magnet clutch	
	Compressor	
	Pressure switch	
	Expansion valve	
	A/C switch	
	Blower switch	
	Wiring harness	
	Heater duct	
	Heater vent duct	
	Temperature control door actuator	
	Warm air is not emitted.	Engine coolant
Blower switch		
Heater core		
Temperature control door actuator		
Temperature of air from vents does not change.	Engine coolant	
	Air mix door actuator (Auto A/C)	
	Wiring harness (Auto A/C)	
Unable to switch blow vents.	Mode door actuator	
	Air flow switch	
	Wiring harness	
Unable to switch suction vents.	Air inlet select switch	
	Intake door actuator	
	Wiring harness	

# General Diagnostic Table

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

Symptom	Repair order
Air is not emitted from the rear A/C.	Rear cooler blower
	Rear cooler blower resistor
	Rear A/C switch
	Wiring harness
Cold air is not emitted from the rear A/C.	A/C switch
	Compressor
	Rear A/C switch
	Rear cooler expansion valve

# HVAC SYSTEM (AUTO A/C) (DIAGNOSTICS)

# *AC(diag)*

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3. Electrical Component Location .....	6
4. Auto A/C Control Module I/O Signal .....	8
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# Basic Diagnostic Procedure

HVAC SYSTEM (AUTO A/C) (DIAGNOSTICS)

## 1. Basic Diagnostic Procedure

### A: PROCEDURE

Step	Check	Yes	No
<b>1</b> <b>START INSPECTIONS.</b> 1) Perform the pre-inspection. <Ref. to AC(diag)-3, INSPECTION, General Description.> 2) Perform the self-diagnosis. <Ref. to AC(diag)-10, OPERATION, Diagnostic Chart for Self-Diagnosis.>	Does the self-diagnosis operate?	Go to step 2.	<Ref. to AC(diag)-14, A/C OR SELF-DIAGNOSIS SYSTEMS DO NOT OPERATE, Diagnostics for A/C System Malfunction.>
<b>2</b> <b>IDENTIFY MALFUNCTION PART.</b> Identify the malfunction part with self-diagnosis.	Can the malfunction part be confirmed?	Repair the malfunctioning part in accordance with each diagnostic chart.	Go to step 3.
<b>3</b> <b>CHECK COMPARTMENT TEMPERATURE.</b> 1) Turn the A/C switch to ON. 2) Turn the temperature control dial at maximum cool position. 3) Check the compartment temperature change.	Does the compartment temperature change?	Go to step 4.	<Ref. to AC(diag)-18, COMPARTMENT TEMPERATURE DOES NOT CHANGE, OR A/C SYSTEM DOES NOT RESPOND PROMPTLY, Diagnostics for A/C System Malfunction.>
<b>4</b> <b>CHECK A/C SYSTEM RESPONSE.</b> Change the temperature setting, and check the response of A/C system.	Does the A/C system respond quickly?	A/C system is normal.	<Ref. to AC(diag)-18, COMPARTMENT TEMPERATURE DOES NOT CHANGE, OR A/C SYSTEM DOES NOT RESPOND PROMPTLY, Diagnostics for A/C System Malfunction.>



# General Description

HVAC SYSTEM (AUTO A/C) (DIAGNOSTICS)

## 2. General Description

### A: CAUTION

1) Never connect the battery in reverse polarity. Doing so may immediately damage the auto A/C control module.

2) Do not disconnect the battery terminals while the engine is running.

A large counter electromotive force will be generated in the generator, and this voltage may damage electronic parts such as auto A/C control module etc.

3) Before disconnecting the connectors of sensors and the auto A/C control module, be sure to turn off the ignition switch.

Auto A/C control module may be damaged.

4) Every A/C-related part is a precision part. Do not drop them.

5) Airbag system wiring harness is routed near the A/C control panel and junction box.

### CAUTION:

- Do not use electrical test equipment on the airbag system circuits.
- Be careful not to damage the airbag system wiring harness when servicing the A/C control panel and junction box.

### B: INSPECTION

Before performing the diagnosis, check the following items which might affect A/C system problems.

#### 1. BATTERY

1) Measure the battery voltage and specific gravity of electrolyte.

**Standard voltage: 12 V**

**Specific gravity: Above 1.260**

2) Check the condition of the fuses for A/C system power supply and other fuses.

3) Check the condition of harness and harness connector connections.

#### 2. ASPIRATOR HOSE

1) Turn the ignition switch to ON, and press the A/C switch.

2) Turn the temperature control dial to maximum hot position.

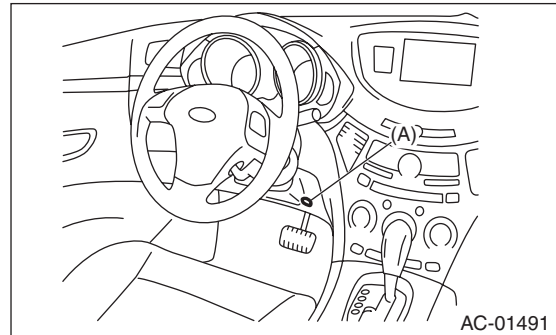
3) Turn the air flow control dial to "DEF" position.

4) Turn the fan speed control dial to MAX (6 speed) position.

5) Put a strip of paper close to the front side of in-vehicle sensor suction port (A) located in the driver's side console side panel, and check that air is being sucked into the port by seeing the paper moving towards the port.

### NOTE:

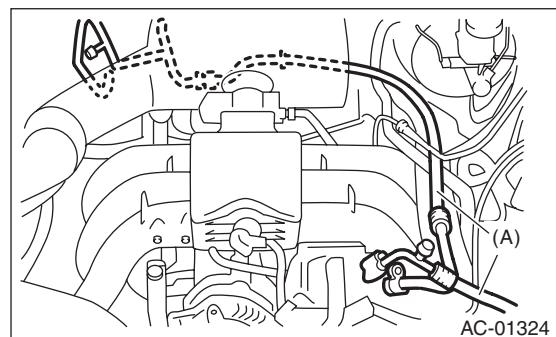
Be careful not to let the paper get sucked into the port.



6) If the paper does not move at all, remove the instrument lower cover <Ref. to EI-37, REMOVAL, Instrument Panel Lower Cover.> and check for improper connection of the aspirator hose, in-vehicle sensor and heater unit, and repair them if necessary.

#### 3. A/C LINE

Check the connection for A/C line (A) and lower side high-pressure pipe.



## General Description

### HVAC SYSTEM (AUTO A/C) (DIAGNOSTICS)

#### 4. CONTROL SWITCHES

Start the engine and warm up completely.

##### 1) Inspection using switches

No.	Point to check	Switch operation	Judgment standard
1	OFF switch	Press the OFF switch.	Setting temperature display goes out. <ul style="list-style-type: none"> <li>• Blower fan: OFF</li> <li>• Inlet opening: FRESH</li> <li>• Compressor: OFF</li> </ul>
2	AUTO switch, driver's side temperature control dial, and passenger's side temperature control dial	1) Press the AUTO switch. 2) Turn the temperature control dial to the left fully, and set to 18°C (65°F) (maximum cool position).	AUTO display illuminates. <ul style="list-style-type: none"> <li>• Outlet air temperature: COOL</li> <li>• Blower fan: HI (AUTO)</li> <li>• Outlet opening: FACE</li> <li>• Inlet opening: AUTO</li> <li>• Compressor: AUTO</li> </ul>
		3) Turn the temperature control dial to the right slowly, and change the setting from 18°C (65°F) (maximum cool position) to 32°C (85°F).	<ul style="list-style-type: none"> <li>• Outlet air temperature: COOL → HOT</li> <li>• Blower fan: AUTO</li> <li>• Outlet opening: FACE → B/L → FOOTHEAT</li> <li>• Inlet opening: AUTO</li> <li>• Compressor: AUTO</li> </ul>
		4) Turn the temperature control dial to the right fully, and set to 32°C (85°F) (maximum hot position).	<ul style="list-style-type: none"> <li>• Outlet air temperature: HOT</li> <li>• Blower fan: HI (AUTO)</li> <li>• Outlet opening: HEAT</li> <li>• Inlet opening: FRESH (AUTO)</li> <li>• Compressor: AUTO</li> </ul>
3	Defroster switch	Press the defroster switch.	Defroster switch indicator illuminates. <ul style="list-style-type: none"> <li>• Outlet air temperature: AUTO</li> <li>• Blower fan: AUTO</li> <li>• Outlet opening: DEF</li> <li>• Inlet opening: FRESH</li> <li>• Compressor: ON</li> </ul>
4	FRESH/RECIRC switch	Press the FRESH/RECIRC switch.	Inlet opening switches RECIRC → FRESH or FRESH → RECIRC each time pressing the switch.
5	MODE switch	Press the MODE switch.	Outlet opening switches between FACE → B/L → HEAT → D/H each time the switch is pressed.
6	FAN switch	Turn the FAN switch.	Every time the switch is turned, the blower fan switches in the order of OFF → LO → M1 → M2 → M3 → M4 → HI, and switches in reverse order when turned in the opposite direction.

##### 2) Inspection of compressor operation

No.	Point to check	Switch operation	Judgment standard
1	Compressor	1) Turn the A/C switch to ON. 2) Set the FAN switch between LO and HI.	Compressor: ON

##### 3) Inspection of illumination control

No.	Point to check	Switch operation	Judgment standard
1	Illumination	Turn the lighting switch to ON.	Illumination comes on.

##### 4) Inspection of the rear cooler switch

No.	Point to check	Switch operation	Judgment standard
1	FAN switch	Turn the FAN switch.	Every time the switch is turned, the blower fan switches in the order of OFF → LO → ML → MH → HI, and switches in reverse order when turned in the opposite direction.

## General Description

HVAC SYSTEM (AUTO A/C) (DIAGNOSTICS)

### 5) Inspection of rear cooler

No.	Point to check	Switch operation	Judgment standard
1	Roof grille	Turn the FAN switch.	Front A/C ON (compressor operates): COOL Front A/C OFF (compressor does not operate): Blower ON

### 6) Inspection of illumination control

No.	Point to check	Switch operation	Judgment standard
1	Illumination	Turn the lighting switch to ON.	Illumination comes on.

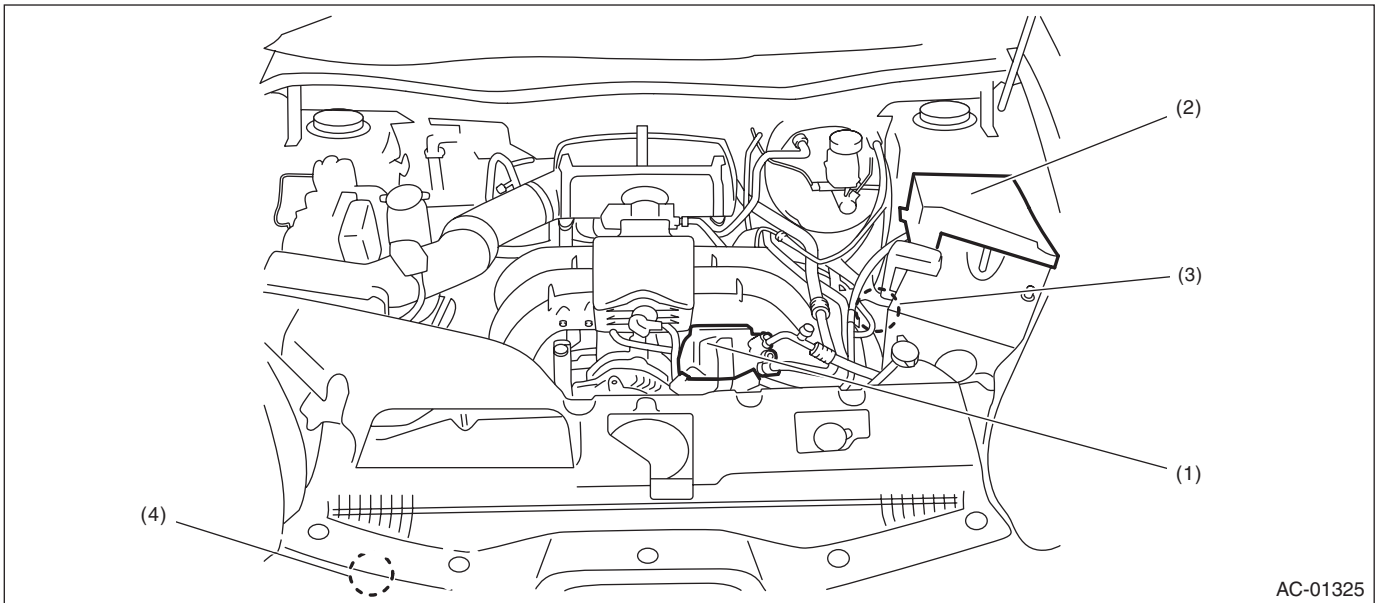
# Electrical Component Location

HVAC SYSTEM (AUTO A/C) (DIAGNOSTICS)

## 3. Electrical Component Location

### A: LOCATION

#### 1. ENGINE COMPARTMENT

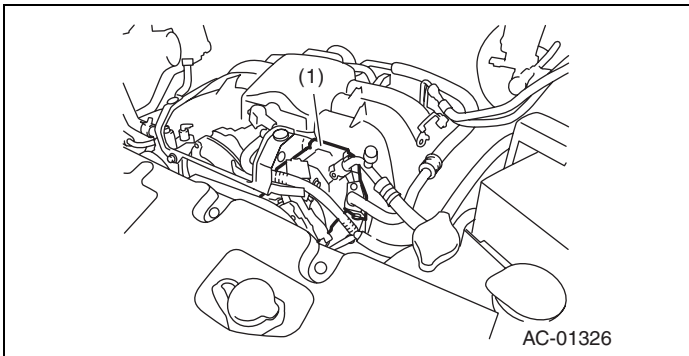


AC-01325

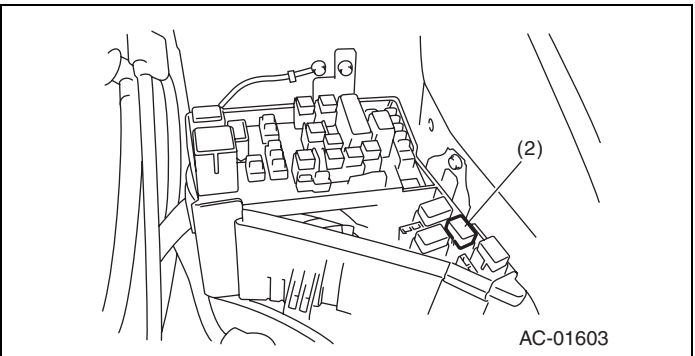
- (1) A/C compressor
- (2) A/C relay

- (3) Pressure switch

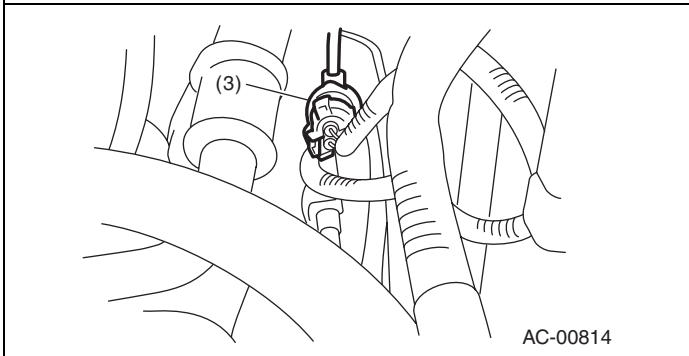
- (4) Ambient sensor



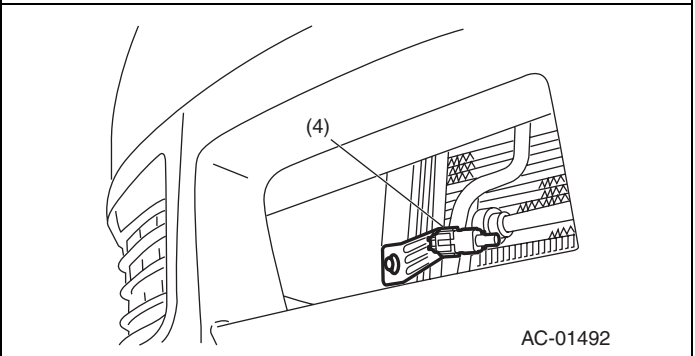
AC-01326



AC-01603



AC-00814

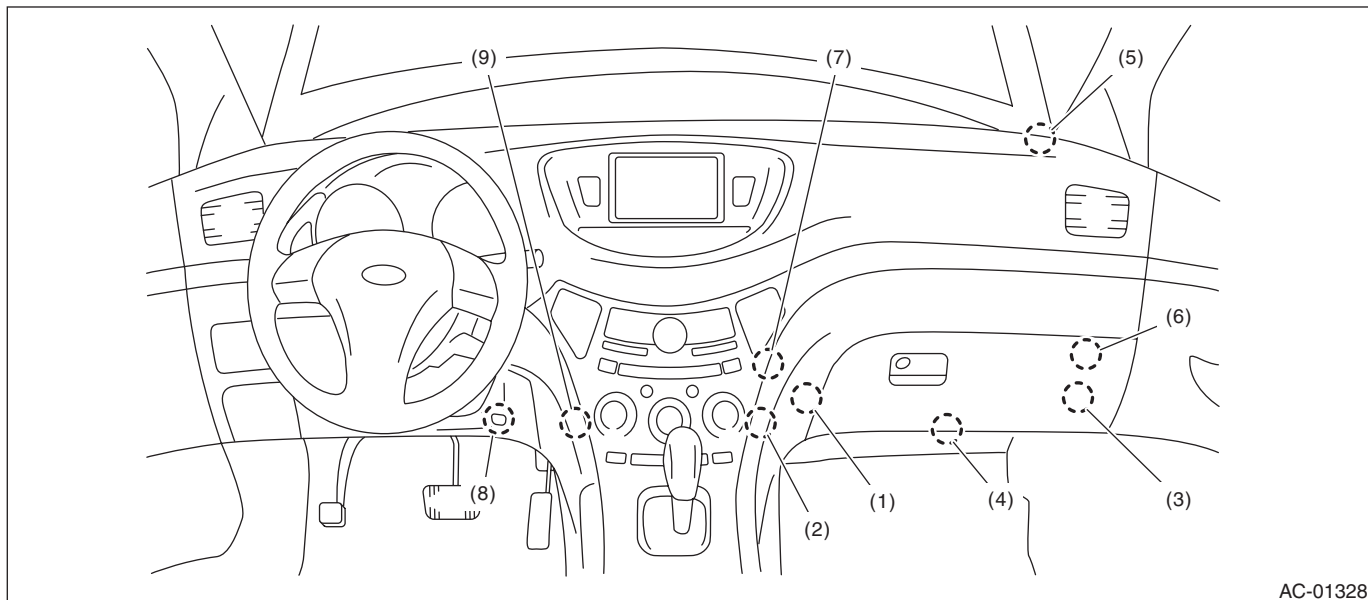


AC-01492

# Electrical Component Location

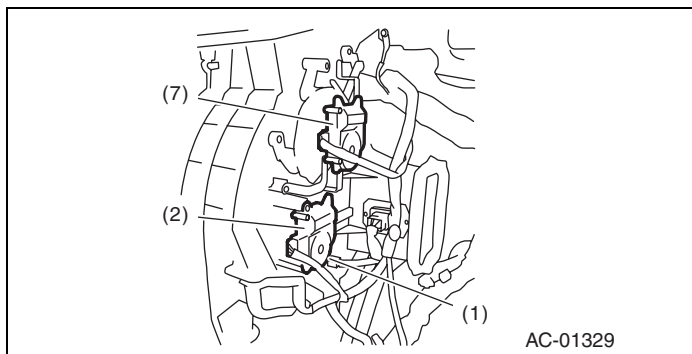
HVAC SYSTEM (AUTO A/C) (DIAGNOSTICS)

## 2. PASSENGER COMPARTMENT

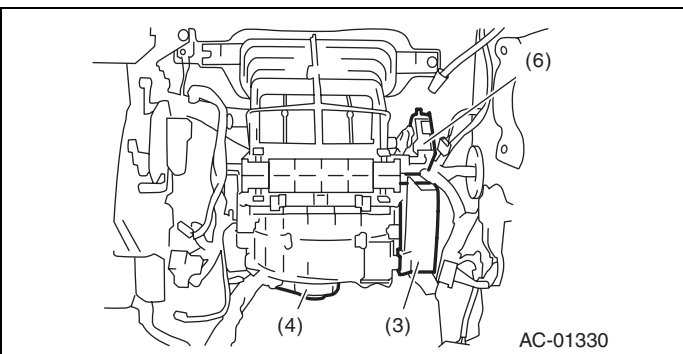


AC-01328

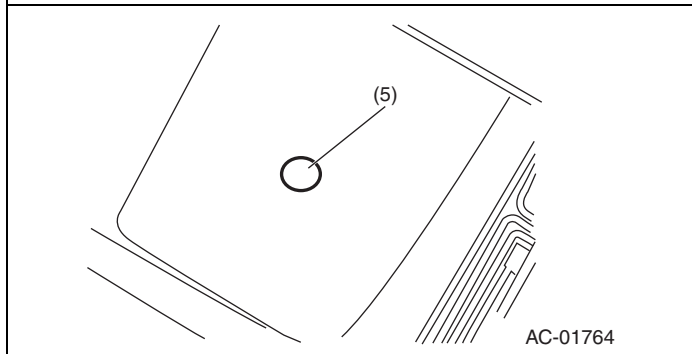
- |  |                          |   |
|--|--------------------------|---|
| (1) Evaporator sensor                      | (4) Blower motor         | (7) Mode door actuator                  |
| (2) Passenger's side air mix door actuator | (5) Sunload sensor       | (8) In-vehicle sensor                   |
| (3) Auto A/C control module                | (6) Intake door actuator | (9) Driver's side air mix door actuator |



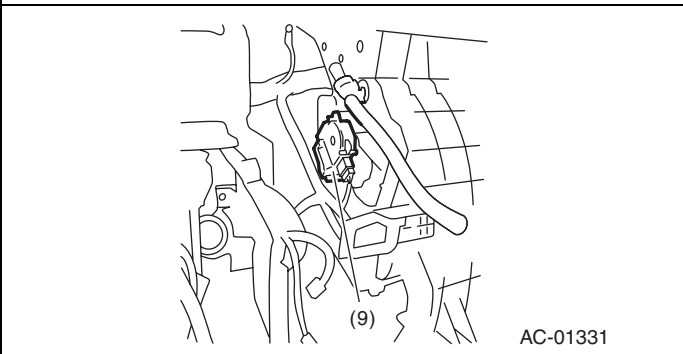
AC-01329



AC-01330



AC-01764



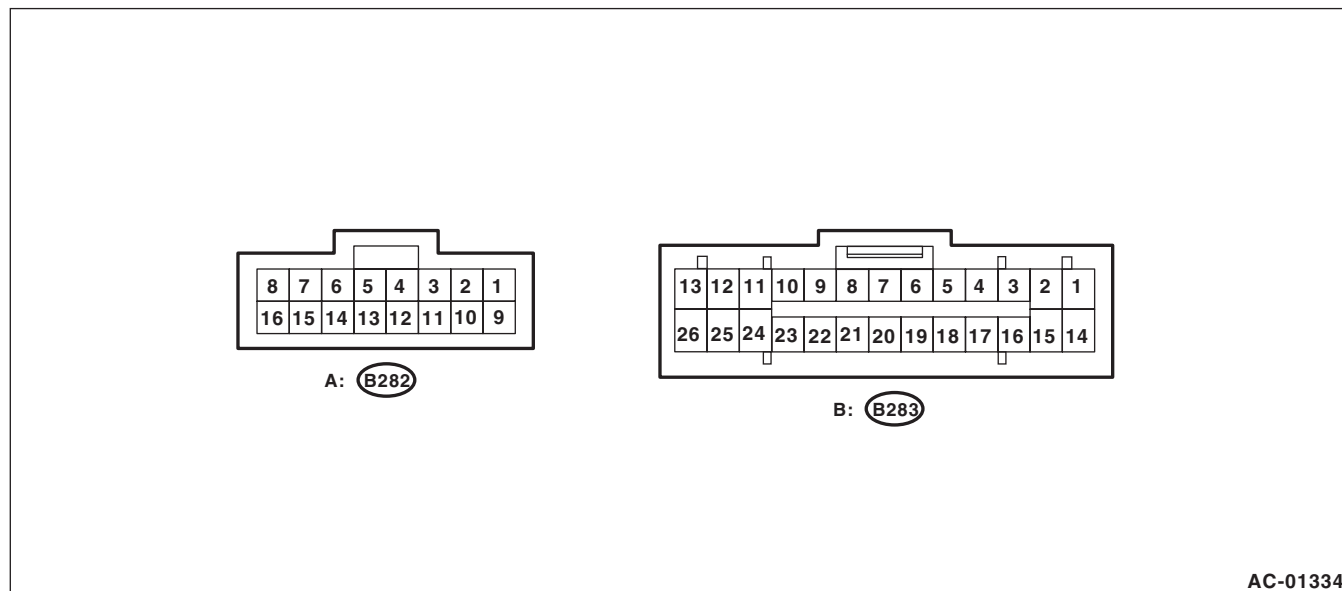
AC-01331

# Auto A/C Control Module I/O Signal

HVAC SYSTEM (AUTO A/C) (DIAGNOSTICS)

## 4. Auto A/C Control Module I/O Signal

### A: ELECTRICAL SPECIFICATION



Terminal No.	Description	Measuring condition	Standard
A1	Battery power supply	Ignition switch: OFF	Battery voltage
A2	ACC power supply	Ignition switch: ACC	Battery voltage
A3	Mode door actuator position signal	Mode door: FACE position	4 V
		Mode door: DEF position	1 V
A4	Passenger's side air mix door actuator position signal	Air mix door: Maximum cool position	4 V
		Air mix door: Maximum hot position	1 V
A5	In-vehicle sensor	Ignition switch: ON	5 V or less
A6	Sunload sensor	Ignition switch: ON, With Sunload (No sunload: 0.8 V)	3 V
A7	Driver's seat heater temperature sensor	Ignition switch: ON	5 V or less
A8	Sensor power supply	Ignition switch: ON	5 V
A9	Ignition power supply	Ignition switch: ON	Battery voltage
A10	A/C cut-off signal	Ignition switch: ON	Battery voltage
		When pressure SW is operating	0 V
A12	Driver's side air mix door actuator position signal	Air mix door: Maximum cool position	4 V
		Air mix door: Maximum hot position	1 V
A13	Evaporator sensor	Ignition switch: ON	5 V or less
A14	Passenger's seat heater temperature sensor	Ignition switch: ON	5 V or less
A15	Sensor ground	Continuity to chassis ground	0 Ω
A16	Ground	Continuity to chassis ground	0 Ω
B1	CAN communication (HI side)	Ignition switch: ON	Pulse signal *1
B2	Blower motor voltage feedback signal	Blower level: Manual Lo	7.6 V
		Blower level: Manual M3	3.7 V
		Blower level: Manual Hi	1 V or less
B3	Blower motor power MOS gate control signal	Ignition switch : ON, Blower switch : ON	1 V — battery voltage
B6	Magnet clutch signal	Temperature setting: Maximum COOL, MODE: Manual DEF, A/C: ON	Battery voltage

# Auto A/C Control Module I/O Signal

HVAC SYSTEM (AUTO A/C) (DIAGNOSTICS)

Terminal No.	Description	Measuring condition	Standard
B7	Mode door actuator power supply (FACE)	When switching mode door from DEF → FACE	Battery voltage — 2.5 V or more*2
		When switching mode door from FACE → DEF	1 V or less*2
B8	Passenger's side air mix door actuator power supply (COOL side)	When switching air mix door from HOT → COOL	Battery voltage — 2.5 V or more*2
		When switching air mix door from COOL → HOT	1 V or less*2
B9	Driver's side air mix door actuator power supply (COOL side)	When switching air mix door from HOT → COOL	Battery voltage — 2.5 V or more*2
		When switching air mix door from COOL → HOT	1 V or less*2
B10	Inlet opening motor (FRESH side)	FRESH	1 V or less
		RECIRC	Battery voltage
B11	Driver's seat heater	Driver's seat heater: ON (3 levels)	1 V or less*3
B13	Passenger's seat heater	Passenger's seat heater: ON (3 levels)	1 V or less*3
B14	CAN communication (Lo side)	Ignition switch: ON	Pulse signal*1
B16	Blower motor relay	Blower motor: When stopped	Battery voltage
		Blower motor: During operation	1 V or less
B18	Panel communication (transmitter side)	Ignition switch: ON	Pulse signal*1
B19	Panel communication (receiver side)	Ignition switch: ON	Pulse signal*1
B20	Mode door (DEF) side	Mode: DEF → FACE	1 V or less
		Mode: FACE → DEF	Battery voltage — 2.5 V or more
B21	Passenger's side air mix door	Air mix: Maximum HOT → maximum COOL	1 V or less
		Air mix: Maximum COOL → maximum HOT	Battery voltage — 2.5 V or more
B22	Driver's side air mix door	Air mix: Maximum HOT → maximum COOL	1 V or less
		Air mix: Maximum COOL → maximum HOT	Battery voltage — 2.5 V or more
B23	Inlet opening motor (RECIRC side)	RECIRC	1 V or less
		FRESH	Battery voltage
B24	Driver's seat heater ground	Continuity to chassis ground	0 Ω
B26	Passenger's seat heater ground	Continuity to chassis ground	0 Ω

\*1: Battery voltage cannot be measured because of digital signal.

\*2: The mode door and air mix door values show the values immediately after switching operation of FACE ↔ DEF and immediately after switching operation of max cooling ↔ max heating (value during damper door movement).

\*3: The seat heater value shows the value immediately after operation. (If the target value is reached, an ON/OFF operation will occur, so the measurement should be taken just after seat heater ON.)

## B: WIRING DIAGRAM

### 1. AIR CONDITIONER AUTO A/C MODEL

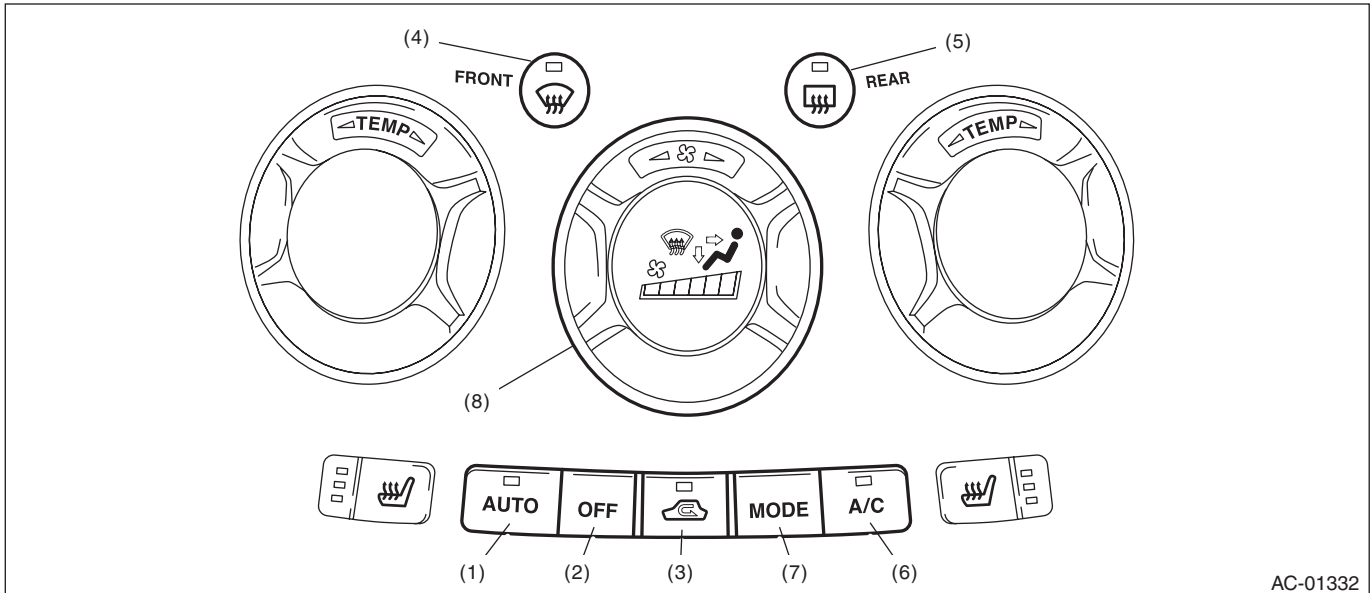
<Ref. to WI-63, WIRING DIAGRAM, Air Conditioning System.>

# Diagnostic Chart for Self-Diagnosis

HVAC SYSTEM (AUTO A/C) (DIAGNOSTICS)

## 5. Diagnostic Chart for Self-Diagnosis

### A: OPERATION



AC-01332

- |                         |                                 |                             |
|-------------------------|---------------------------------|-----------------------------|
| (1) AUTO switch         | (4) Defroster switch            | (7) Air flow control switch |
| (2) OFF switch          | (5) Rear window defogger switch | (8) FAN switch              |
| (3) FRESH/RECIRC switch | (6) A/C switch                  |                             |

#### NOTE:

For A/C system self-diagnosis, there is one that checks the control panel, and the other that checks the whole control system (sensor, actuator, blower motor, etc.). Perform the self-diagnosis for control panel first, and then perform the self-diagnosis for control system.

### 1. A/C CONTROL PANEL SELF-DIAGNOSIS

Step	Check	Yes	No
<b>1 SET SELF-DIAGNOSIS MODE BY OPERATING A/C CONTROL PANEL.</b> 1) Turn the ignition switch to ON with the AUTO switch and MODE switch pressed. 2) The communication status with the air conditioning ECM will be displayed in the left TEMP display area.	Does the self-diagnosis function operate?	Go to step 2.	<Ref. to AC(diag)-14, A/C OR SELF-DIAGNOSIS SYSTEMS DO NOT OPERATE, Diagnostics for A/C System Malfunction.>
<b>2 CHECK DISPLAY AND INDICATOR.</b> Check if all the screen display and indicators come on and then go off.  NOTE: "11" — "14" is displayed on the screen when malfunction occurs.	Do all the screen display and indicators come on then go off?	Go to step 3.	Replace the A/C control panel.
<b>3 CHECK SWITCH AND TEMPERATURE CONTROL DIAL INPUT.</b> According to the switch check table, press each switch or turn the temperature control dial, and check the relative screen display and indicators illuminate. <Ref. to AC(diag)-11, SWITCH CHECK TABLE, OPERATION, Diagnostic Chart for Self-Diagnosis.>	Does the screen display related to each switch and dial input illuminate?	Go to step 4.	Replace the A/C control panel.

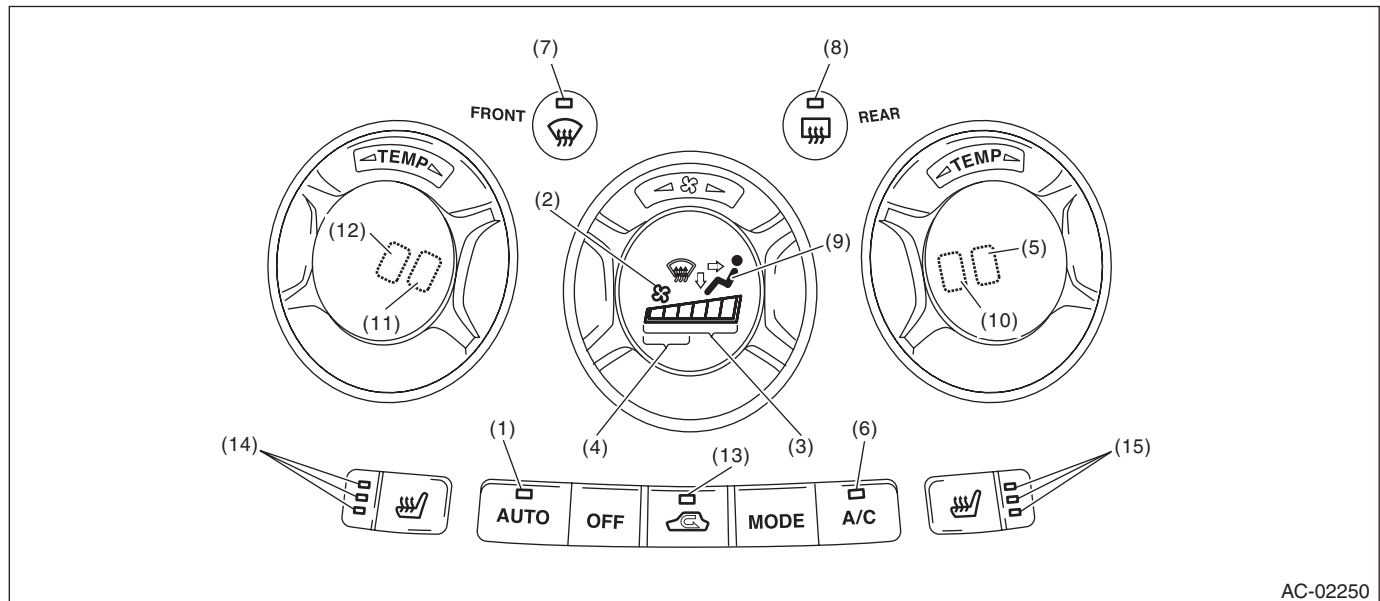


# Diagnostic Chart for Self-Diagnosis

HVAC SYSTEM (AUTO A/C) (DIAGNOSTICS)

Step	Check	Yes	No
<b>4 CHECK A/C CONTROL PANEL COMMUNICATION.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the auto A/C control module harness connector. 3) Using a suitable lead wire, short the terminal No. 18 and No. 19 of auto A/C control module harness connector (B283). 4) Turn the ignition switch from OFF to ACC, and wait for 2 seconds. 5) Turn the ignition switch to ON with the AUTO switch and A/C switch pressed. 6) Press any switch on the control panel. 7) When no malfunction occurs in the control panel communication, "CL" (no open circuit) is displayed in the left side TEMP display area; and when a malfunction occurs, "OP" (open circuit) is displayed.	Is "CL" displayed on the screen?	A/C control panel is normal. Turn the ignition switch to OFF, and connect the auto A/C control module harness connector.	Replace the A/C control panel.

## 2. SWITCH CHECK TABLE



AC-02250

Switch	Display screen	Switch	Display screen
A/C switch	(6)	FAN switch	Right rotation (3) Left rotation (4)
AUTO switch	(1)	Driver's side temperature control dial	Right rotation (11) Left rotation (12)
Air flow control switch	(9)	Passenger's side temperature control dial	Right rotation (5) Left rotation (10)
FRESH/RECIRC	(13)	OFF switch	(2)
Defroster switch	(7)	Driver's seat heater switch	(14)
Rear defogger switch	(8)	Passenger's seat heater switch	(15)

# Diagnostic Chart for Self-Diagnosis

HVAC SYSTEM (AUTO A/C) (DIAGNOSTICS)

## 3. A/C CONTROL SYSTEM SELF-DIAGNOSIS

Step	Check	Yes	No
<p><b>1 SET SELF-DIAGNOSIS MODE BY OPERATING A/C CONTROL PANEL.</b></p> <p>1) Start the engine with the AUTO switch and FRESH/RECIRC switch pressed.</p> <p>NOTE: Self-diagnosis can also be performed with ignition switch ON, but start the engine because observing the magnet clutch operation is difficult.</p> <p>2) All the indicators blink four times.</p>	Does the self-diagnosis function operate?	Go to step 2.	<Ref. to AC(diag)-14, A/C OR SELF-DIAGNOSIS SYSTEMS DO NOT OPERATE, Diagnostics for A/C System Malfunction.>
<p><b>2 CHECK EACH SENSOR AND POTENTIOMETER.</b></p> <p>1) After the indicators stop blinking, automatically change to the Inspection Mode of sensor and potentiometer.</p> <p>NOTE: Display items can be changed each time the A/C switch is pressed. (Step Operation)</p> <p>2) When malfunction occurs in each sensor and potentiometer, codes are displayed on the screen. When no malfunction occurs in each sensor and potentiometer, code "20" is displayed on the screen.</p> <p>3) Identify defective sensors according to the sensor check table. &lt;Ref. to AC(diag)-13, SENSOR CHECK TABLE, OPERATION, Diagnostic Chart for Self-Diagnosis.&gt;</p>	Are codes other than "20" displayed on the passenger's side display?	Repair the defective sensor. <Ref. to AC(diag)-29, Diagnostic Procedure for Sensors.>	Go to step 3.
<p><b>3 CHECK EACH ACTUATOR, BLOWER FAN AND MAGNET CLUTCH.</b></p> <p>1) After completing each sensor and potentiometer inspection, change to the Inspection Mode of actuator, blower fan and magnet clutch by pressing the defroster switch.</p> <p>2) Each mode will change and operate automatically every four seconds.</p> <p>NOTE: Operation mode items can be changed each time the A/C switch is pressed. (Step Operation)</p> <p>3) Check the operation of actuator, blower fan and magnet clutch in each mode according to the operating mode table. &lt;Ref. to AC(diag)-13, OPERATING MODE TABLE, OPERATION, Diagnostic Chart for Self-Diagnosis.&gt;</p>	Do the actuator, blower fan and magnet clutch operate as described in the operating mode table?	A/C control system is normal. Press the OFF switch and complete the self-diagnosis function.	Repair defective parts in accordance with each diagnostic chart. <Ref. to AC(diag)-14, Diagnostics for A/C System Malfunction.> or <Ref. to AC(diag)-22, Diagnostic Procedure for Actuators.>

# Diagnostic Chart for Self-Diagnosis

HVAC SYSTEM (AUTO A/C) (DIAGNOSTICS)

## 4. SENSOR CHECK TABLE

NOTE:

When the sunload sensor check is performed indoors or in the shade, it could be diagnosed as having an open circuit. Always check the sunload sensor with the sun shining on it.

Display screen (Malfunction at present)*1	Sensor	Trouble contents
21/AUTO Blink	In-vehicle sensor	Open
-21/AUTO Blink		Short
22/AUTO Blink	Ambient sensor	Sensor trouble or communication failure
23/AUTO Blink	Evaporator sensor	Open
-23/AUTO Blink		Short
24/AUTO Blink	Engine coolant temperature sensor	Sensor trouble or communication failure
25 Blink	Sunload sensor	Open*2
-25/AUTO Blink		Short
26/AUTO Blink	Driver's side air mix door actuator potentiometer	COOL
27/AUTO Blink		HOT
-26/AUTO Blink	Passenger's side air mix door actuator potentiometer	COOL
-27/AUTO Blink		HOT
28/AUTO Blink	Mode door actuator potentiometer	FACE
29/AUTO Blink		DEF
41/AUTO Blink	Seat heater thermistor (Driver's side)	Open
-41/AUTO Blink		Short
42/AUTO Blink	Seat heater thermistor (Passenger's side)	Open
-42/AUTO Blink		Short
20 Blink	When all conditions are normal	

\*1: "AUTO" display does not blink when past malfunction occurred. Past malfunction means that abnormal signals were continuously input for a certain time in the past.

\*2: Present malfunction only is displayed for sunload sensor open circuit.

## 5. OPERATING MODE TABLE

Display screen	FRESH/RECIRC door	Mode door	Air mix door*	Blower fan	A/C compressor (Magnet clutch)
31	FRESH	FACE	Maximum cool	LO	OFF
32	RECIRC	FACE	Maximum cool	LO	ON
33	RECIRC	FACE	Maximum cool	M1	ON
34	FRESH	B/L	50%	M1	ON
35	FRESH	HEAT	50%	M1	ON
36	FRESH	HEAT	Maximum hot	M3	ON
37	FRESH	D/H	Maximum hot	M3	ON
38	FRESH	DEF	Maximum hot	HI	ON

\*Same opening angle for both driver's and passenger's side

# Diagnostics for A/C System Malfunction

HVAC SYSTEM (AUTO A/C) (DIAGNOSTICS)

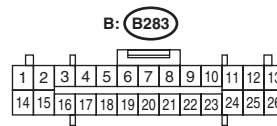
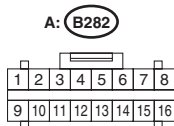
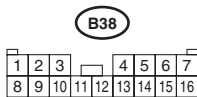
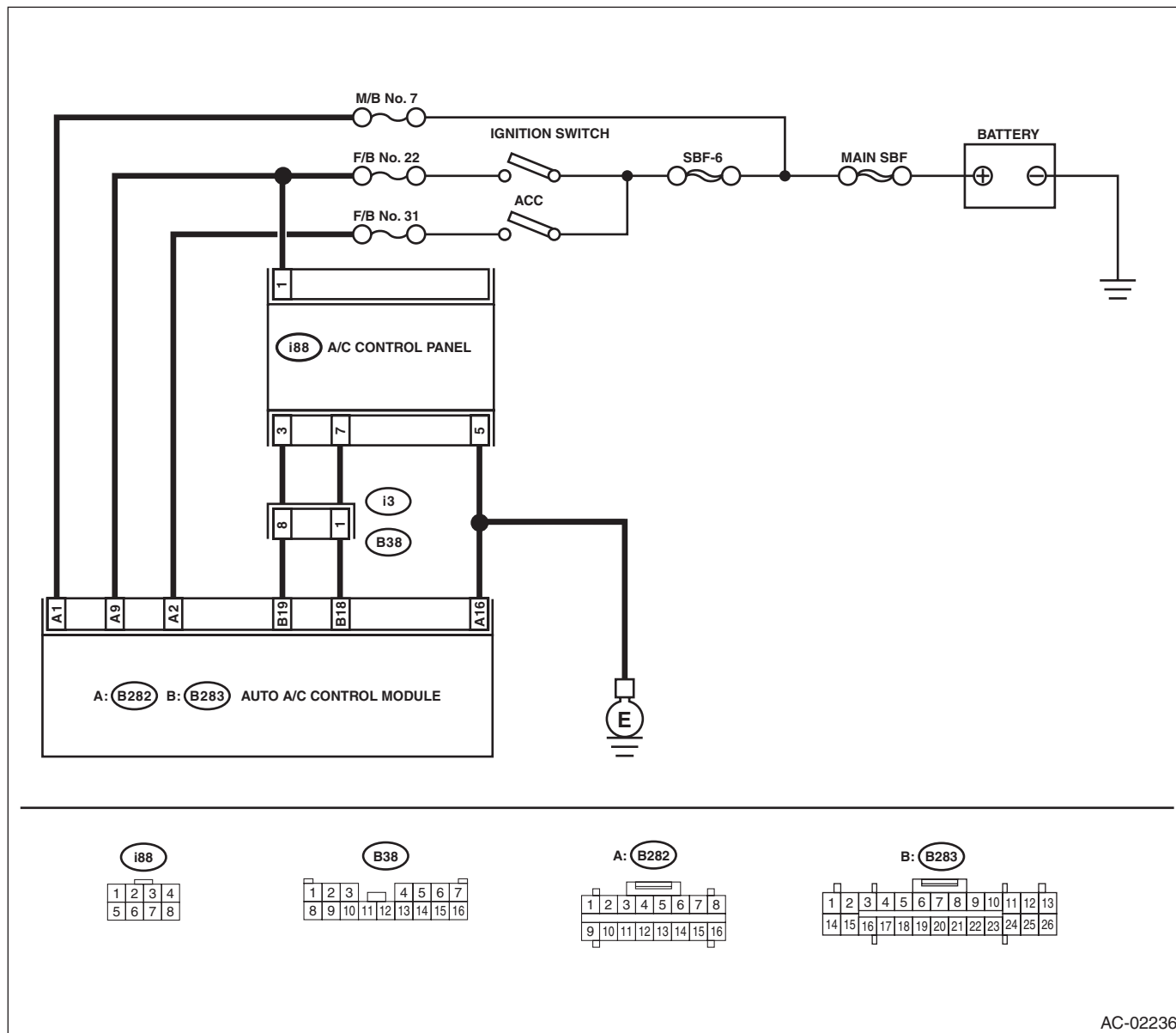
## 6. Diagnostics for A/C System Malfunction

### A: A/C OR SELF-DIAGNOSIS SYSTEMS DO NOT OPERATE

#### TROUBLE SYMPTOM:

- Set temperature is not indicated on the display, switch LEDs are faulty and switches do not operate.
- Self-diagnosis system does not operate.

#### WIRING DIAGRAM:



AC-02236

Step	Check	Yes	No
1	<b>CHECK FUSE.</b> 1) Turn the ignition switch to OFF. 2) Remove the fuse No. 7 from main fuse box. 3) Check the condition of fuse.	Replace the fuse.	Go to step 2.
2	<b>CHECK FUSE.</b> 1) Turn the ignition switch to OFF. 2) Remove the fuse No. 22 and No. 31 from fuse & relay box. 3) Check the condition of fuse.	Replace the fuse.	Go to step 3.

# Diagnostics for A/C System Malfunction

HVAC SYSTEM (AUTO A/C) (DIAGNOSTICS)

Step	Check	Yes	No
<b>3 CHECK A/C CONTROL PANEL POWER CIRCUIT.</b> Measure the voltage between A/C control panel harness connector terminal and chassis ground after turning the ignition switch to ON. <i>Connector &amp; terminal</i> <i>(i88) No. 1 (+) — Chassis ground (-):</i>	Is the voltage 10 V or more?	Go to step 4.	Check for open or short circuit in the harness between A/C control panel and fuse.
<b>4 CHECK A/C CONTROL PANEL GROUND POWER CIRCUIT.</b> Measure the resistance of harness between A/C control panel and chassis ground after turning the ignition switch to OFF. <i>Connector &amp; terminal</i> <i>(i88) No. 5 — Chassis ground:</i>	Is the resistance less than 10 $\Omega$ ?	Go to step 5.	Repair the harness for ground line.
<b>5 CHECK AUTO A/C CONTROL MODULE POWER CIRCUIT.</b> Measure the voltage between auto A/C control module connector terminal and chassis ground after turning the ignition switch to OFF. <i>Connector &amp; terminal</i> <i>(B282) No. 1 (+) — Chassis ground (-):</i>	Is the voltage 10 V or more?	Go to step 6.	Check open or short circuit of harness between auto A/C control module and fuse.
<b>6 CHECK AUTO A/C CONTROL MODULE POWER CIRCUIT.</b> Measure the voltage between auto A/C control module connector terminal and chassis ground after turning the ignition switch to ACC. <i>Connector &amp; terminal</i> <i>(B282) No. 2 (+) — Chassis ground (-):</i>	Is the voltage 10 V or more?	Go to step 7.	Check open or short circuit of harness between auto A/C control module and fuse.
<b>7 CHECK AUTO A/C CONTROL MODULE POWER CIRCUIT.</b> Measure the voltage between auto A/C control module connector terminal and chassis ground after turning the ignition switch to the ON position. <i>Connector &amp; terminal</i> <i>(B282) No. 9 (+) — Chassis ground (-):</i>	Is the voltage 10 V or more?	Go to step 8.	Check open or short circuit of harness between auto A/C control module and fuse.
<b>8 CHECK AUTO A/C CONTROL MODULE GROUND CIRCUIT.</b> Measure the resistance of harness between auto A/C control module and chassis ground. <i>Connector &amp; terminal</i> <i>(B282) No. 16 — Chassis ground:</i>	Is the resistance less than 5 $\Omega$ ?	Go to step 9.	Repair the harness for ground line.
<b>9 CHECK COMMUNICATION CIRCUIT.</b> Measure the resistance of harness between A/C control panel and auto A/C control module. <i>Connector &amp; terminal</i> <i>(i88) No. 3 — (B283) No. 19:</i> <i>(i88) No. 7 — (B283) No. 18:</i>	Is the resistance less than 1 $\Omega$ ?	Go to step 10.	Repair the harness.
<b>10 CHECK FOR POOR CONTACT.</b> Check poor contact of auto A/C control module connector.	Is there poor contact of connector?	Repair the connector.	Replace the auto A/C control module. <Ref. to AC-33, REMOVAL, Control Unit (Auto A/C Model).>

# Diagnostics for A/C System Malfunction

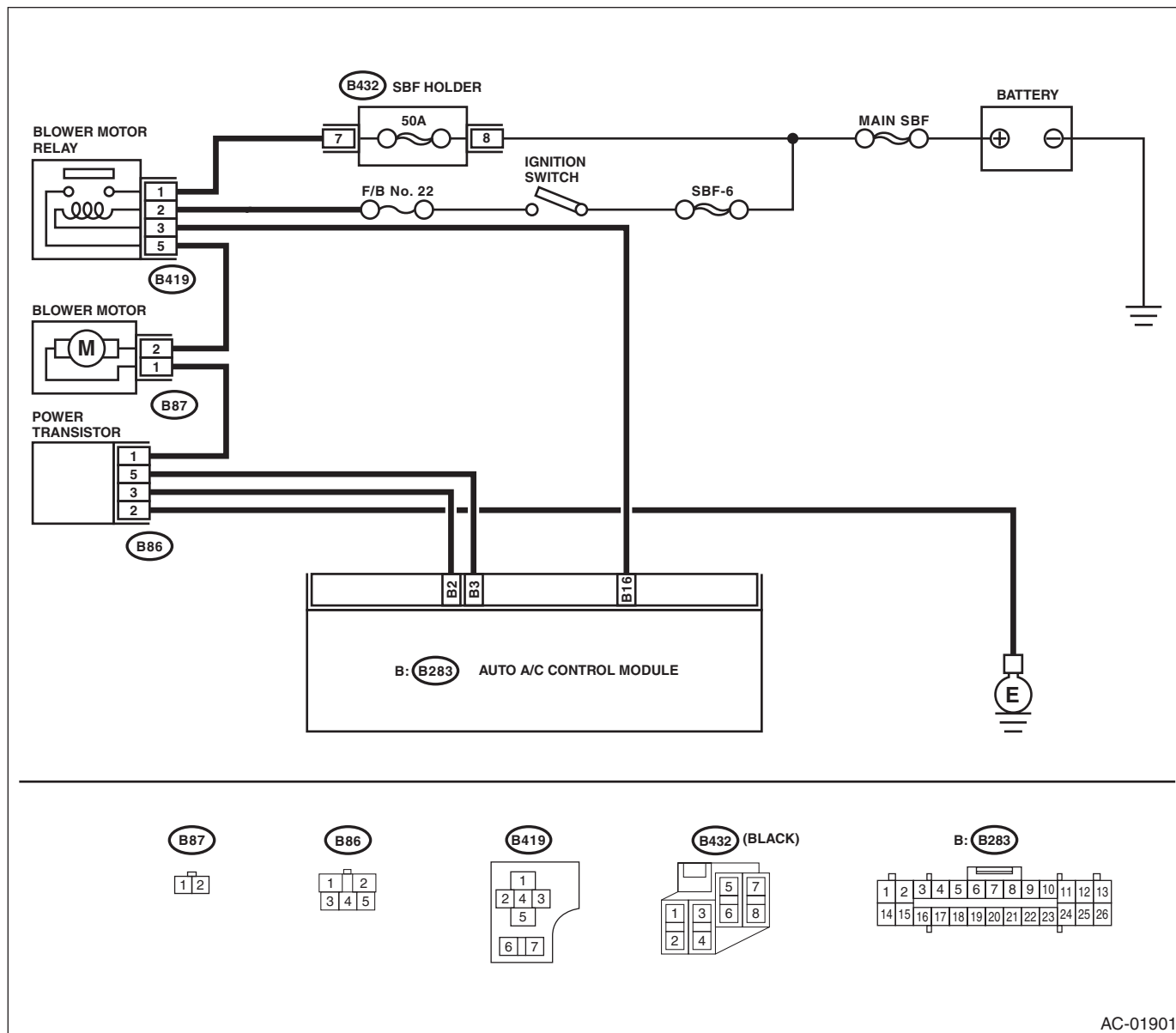
HVAC SYSTEM (AUTO A/C) (DIAGNOSTICS)

## B: BLOWER MOTOR DOES NOT ROTATE

### TROUBLE SYMPTOM:

- Blower motor does not rotate.
- Blower motor does not rotate in "HI".

### WIRING DIAGRAM:



AC-01901

Step	Check	Yes	No
1	<b>CHECK FUSE.</b> 1) Remove the fuse No. 22 from fuse & relay box. 2) Check the condition of fuse.	Replace the fuse.	Go to step 2.
2	<b>CHECK POWER SUPPLY FOR BLOWER MOTOR.</b> 1) Turn the ignition switch to ON. 2) Turn the blower switch to ON. 3) Measure the voltage between blower motor and chassis ground. <b>Connector &amp; terminal</b> (B87) No. 1 (+) — Chassis ground (-): (B87) No. 2 (+) — Chassis ground (-):	Go to step 3.	Repair the open circuit of blower motor power supply line harness.

# Diagnostics for A/C System Malfunction

HVAC SYSTEM (AUTO A/C) (DIAGNOSTICS)

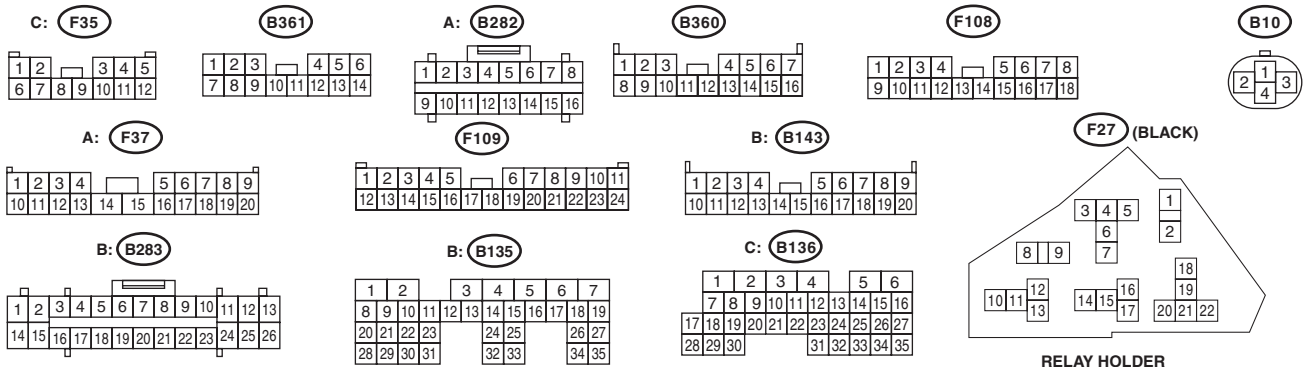
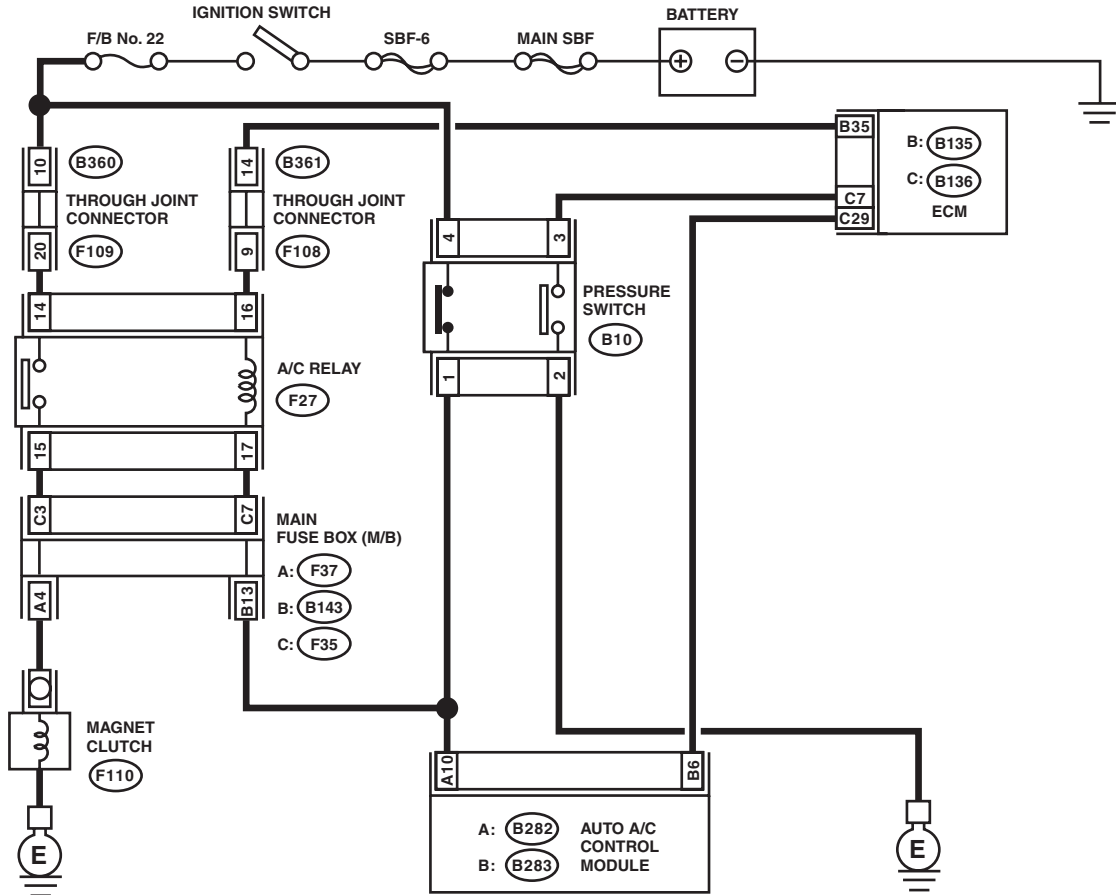
Step	Check	Yes	No
<b>3</b> <b>CHECK BLOWER MOTOR RELAY.</b> 1) Turn the ignition switch to OFF. 2) Remove the blower motor relay. 3) Connect the battery positive (+) terminal to terminal No. 2 of blower motor relay, and negative (-) terminal to terminal No. 3. 4) Measure the resistance between terminals No. 1 and No. 5. <b>Terminals</b> <b>(B419) No. 1 — (B419) No. 5:</b>	Is the resistance less than 1 $\Omega$ ?	Go to step 4.	Replace the blower motor relay.
<b>4</b> <b>CHECK BLOWER MOTOR.</b> 1) Disconnect the connector from blower motor. 2) Connect the battery positive (+) terminal to terminal No. 2 of blower motor connector, and negative (-) terminal to terminal No. 1. 3) Make sure the blower motor runs.	Does the blower motor run?	Go to step 5.	Replace the blower motor. <Ref. to AC-28, REMOVAL, Blower Motor.>
<b>5</b> <b>CHECK FOR POOR CONTACT.</b> Check poor contact of auto A/C control module connector.	Is there poor contact of connector?	Repair the connector.	Replace the auto A/C control module. <Ref. to AC-33, REMOVAL, Control Unit (Auto A/C Model).>

# Diagnostics for A/C System Malfunction

HVAC SYSTEM (AUTO A/C) (DIAGNOSTICS)

## C: COMPARTMENT TEMPERATURE DOES NOT CHANGE, OR A/C SYSTEM DOES NOT RESPOND PROMPTLY

WIRING DIAGRAM:



AC-02237



# Diagnostics for A/C System Malfunction

HVAC SYSTEM (AUTO A/C) (DIAGNOSTICS)

Step	Check	Yes	No
<b>1 CHECK FUSE.</b> 1) Turn the ignition switch to OFF. 2) Remove the fuse No. 22 from fuse & relay box. 3) Check the condition of fuse.	Is the fuse blown out?	Replace the fuse.	Go to step 2.
<b>2 CHECK SIGNAL TO A/C RELAY AND AUTO A/C CONTROL MODULE.</b> 1) Disconnect the A/C relay and auto A/C control module harness connector. 2) Turn the ignition switch to ON. 3) Measure the voltage between A/C relay connector terminal and chassis ground. 4) Measure the voltage between auto A/C control module harness connector terminal and chassis ground. <b>Connector &amp; terminal</b> <b>(F27) No. 17 (+) — Chassis ground (-):</b> <b>(B282) No. 10 (+) — Chassis ground (-):</b>	Is the voltage 10 V or more?	Go to step 5.	Go to step 3.
<b>3 CHECK POWER SUPPLY FOR PRESSURE SWITCH.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the pressure switch harness connector. 3) Turn the ignition switch to ON. 4) Measure the voltage between pressure switch harness connector terminal and chassis ground. <b>Connector &amp; terminal</b> <b>(B10) No. 4 (+) — Chassis ground (-):</b>	Is the voltage 10 V or more?	Go to step 4.	Check for open or short circuit in the harness between fuse and pressure switch.
<b>4 CHECK HARNESS BETWEEN PRESSURE SWITCH AND A/C RELAY, AUTO A/C CONTROL MODULE.</b> 1) Turn the ignition switch to OFF. 2) Measure the resistance of harness between pressure switch connector and A/C relay connector. 3) Measure the resistance of harness between pressure switch connector and auto A/C control module connector. <b>Connector &amp; terminal</b> <b>(B10) No. 1 — (F27) No. 17:</b> <b>(B10) No. 1 — (B282) No. 10:</b>	Is the resistance less than 1 $\Omega$ ?	Check the pressure switch. <Ref. to AC-44, INSPECTION, Pressure Switch (Triple Pressure Switch).>	Repair the harness.
<b>5 CHECK POWER SUPPLY FOR A/C RELAY.</b> Measure the voltage between A/C relay connector terminal and chassis ground. <b>Connector &amp; terminal</b> <b>(F27) No. 14 (+) — Chassis ground (-):</b>	Is the voltage 10 V or more?	Go to step 6.	Check open or short circuit of harness between fuse and A/C relay.
<b>6 CHECK A/C RELAY.</b> Check the A/C relay. <Ref. to AC-42, INSPECTION, Relay and Fuse.>	Is there a malfunction in the A/C relay?	Replace the A/C relay.	Go to step 7.

# Diagnostics for A/C System Malfunction

## HVAC SYSTEM (AUTO A/C) (DIAGNOSTICS)

Step	Check	Yes	No
<b>7 CHECK A/C ON SIGNAL.</b> 1) Turn the ignition switch to OFF. 2) Connect the A/C relay and all disconnected connectors. 3) Start the engine and turn the AUTO switch to ON. 4) Turn the temperature control dial at maximum cool position. 5) Measure the voltage between auto A/C control module harness connector terminal and chassis ground. <b>Connector &amp; terminal</b> <b>(B283) No. 6 (+) — Chassis ground (-):</b>	Is the voltage 10 V or more?	Go to step 9.	Go to step 8.
<b>8 CHECK HARNESS BETWEEN AUTO A/C CONTROL MODULE AND ECM.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the harness connector of auto A/C control module and ECM. 3) Measure the resistance of harness between auto A/C control module connector and ECM connector. <b>Connector &amp; terminal</b> <b>(B283) No. 6 — (B136) No. 29:</b>	Is the resistance less than 1 $\Omega$ ?	Replace the auto A/C control module. <Ref. to AC-33, REMOVAL, Control Unit (Auto A/C Model).>	Repair the harness.
<b>9 CHECK MAGNET CLUTCH ON SIGNAL.</b> 1) Stop the engine, and turn the AUTO switch to OFF. 2) Turn the ignition switch to ON. 3) Measure the voltage between ECM connector terminal and chassis ground. <b>Connector &amp; terminal</b> <b>(B135) No. 35 (+) — Chassis ground (-):</b>	Is the voltage 10 V or more?	Go to step 10.	Check for open or short circuit in the harness between A/C relay and ECM.
<b>10 CHECK MAGNET CLUTCH ON SIGNAL.</b> 1) Start the engine and turn the AUTO switch to ON. 2) Turn the temperature control dial at maximum cool position. 3) Measure the voltage between ECM connector terminal and chassis ground. <b>Connector &amp; terminal</b> <b>(B135) No. 35 (+) — Chassis ground (-):</b>	Is the voltage 0 V?	Go to step 11.	Replace the ECM. <Ref. to FU(H6DO)-52, REMOVAL, Engine Control Module (ECM).>
<b>11 CHECK POWER SUPPLY FOR MAGNET CLUTCH.</b> 1) Stop the engine, and turn the AUTO switch to OFF. 2) Disconnect the harness connector of magnet clutch. 3) Start the engine and turn the AUTO switch to ON. 4) Turn the temperature control dial at maximum cool position. 5) Measure the voltage between magnet clutch harness connector terminal and chassis ground. <b>Connector &amp; terminal</b> <b>(F110) No. 1 (+) — Chassis ground (-):</b>	Is the voltage 10 V or more?	Go to step 12.	Check for open or short circuit in the harness between A/C relay and magnet clutch.

# Diagnostics for A/C System Malfunction

HVAC SYSTEM (AUTO A/C) (DIAGNOSTICS)

Step	Check	Yes	No
<b>12</b> <b>CHECK MAGNET CLUTCH.</b> 1) Stop the engine, and turn the AUTO switch to OFF. 2) Disconnect the harness connector of magnet clutch. 3) Connect the battery positive (+) terminal to terminal No. 1 of the magnet clutch, and negative (-) terminal to the compressor body.	Does the magnet clutch operate?	The magnet clutch is functioning properly.	Replace the compressor. <Ref. to AC-34, REMOVAL, Compressor.>

# Diagnostic Procedure for Actuators

HVAC SYSTEM (AUTO A/C) (DIAGNOSTICS)

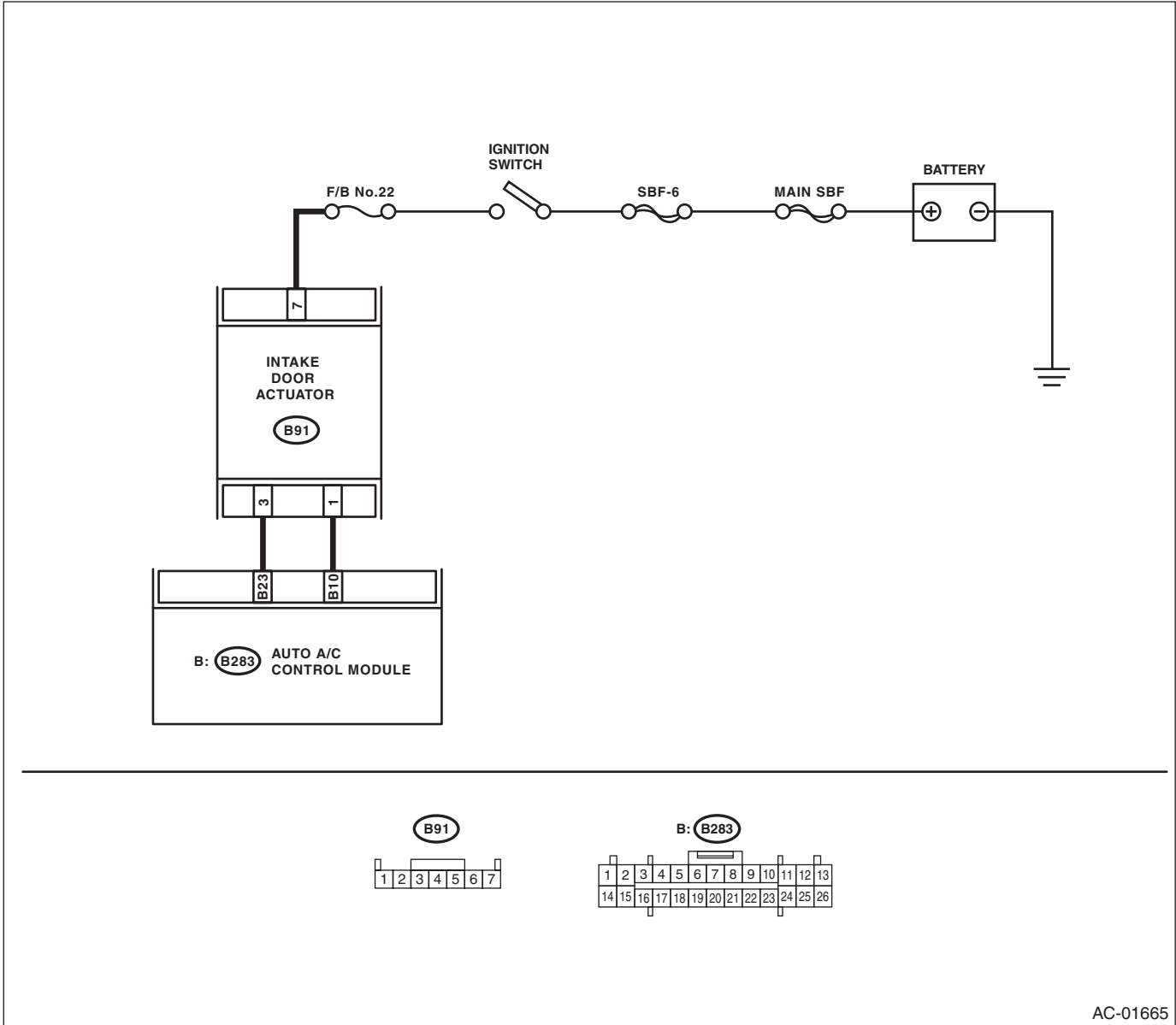
## 7. Diagnostic Procedure for Actuators

### A: INTAKE DOOR ACTUATOR

**TROUBLE SYMPTOM:**

FRESH/RECIRC mode is not changed.

**WIRING DIAGRAM:**



Step	Check	Yes	No
<b>1 CHECK POWER SUPPLY FOR INTAKE DOOR ACTUATOR.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the intake door actuator connector. 3) Turn the ignition switch to ON. 4) Measure the voltage between intake door actuator connector and chassis ground. <b>Connector &amp; terminal</b> <b>(B91) No. 7 (+) — Chassis ground (-):</b>	Is the voltage 8 V (at normal temperature)?	Go to step 2.	Check for open or short circuit in the harness between intake door actuator and fuse.

# Diagnostic Procedure for Actuators

HVAC SYSTEM (AUTO A/C) (DIAGNOSTICS)

Step	Check	Yes	No
<p><b>2</b></p> <p><b>CHECK HARNESS BETWEEN AUTO A/C CONTROL MODULE AND INTAKE DOOR ACTUATOR.</b></p> <p>1) Turn the ignition switch to OFF.</p> <p>2) Disconnect the auto A/C control module connector.</p> <p>3) Measure the resistance between intake door actuator connector and auto A/C control module connector.</p> <p><b>Connector &amp; terminal</b>  <b>(B283) No. 10 — (B91) No. 1:</b>  <b>(B283) No. 23 — (B91) No. 3:</b></p>	<p>Is the resistance 1 <math>\Omega</math> or less?</p>	<p>Go to step 3.</p>	<p>Repair the harness between auto A/C control module and intake door actuator.</p>
<p><b>3</b></p> <p><b>CHECK OPERATION OF INTAKE DOOR ACTUATOR.</b></p> <p>1) Connect the intake door actuator connector.</p> <p>2) Ground the auto A/C control module connector with a suitable wire.</p> <p>3) Turn the ignition switch to ON, and check the operation of intake door actuator.</p> <p><b>Connector &amp; terminal</b>  <b>(B283) No. 10 — Chassis ground:</b></p>	<p>Does the actuator move to the FRESH side?</p>	<p>Go to step 4.</p>	<p>Replace the intake door actuator.                      &lt;Ref. to AC-45, INTAKE DOOR ACTUATOR, REMOVAL, Actuator.&gt;</p>
<p><b>4</b></p> <p><b>CHECK OPERATION OF INTAKE DOOR ACTUATOR.</b></p> <p>1) Turn the ignition switch to OFF.</p> <p>2) Ground the auto A/C control module connector with a suitable wire.</p> <p>3) Turn the ignition switch to ON, and check the operation of intake door actuator.</p> <p><b>Connector &amp; terminal</b>  <b>(B283) No. 23 — Chassis ground:</b></p>	<p>Does the actuator move to the RECIRC side?</p>	<p>Replace the auto A/C control module. &lt;Ref. to AC-33, REMOVAL, Control Unit (Auto A/C Model).&gt;</p>	<p>Replace the intake door actuator.                      &lt;Ref. to AC-45, INTAKE DOOR ACTUATOR, REMOVAL, Actuator.&gt;</p>

# Diagnostic Procedure for Actuators

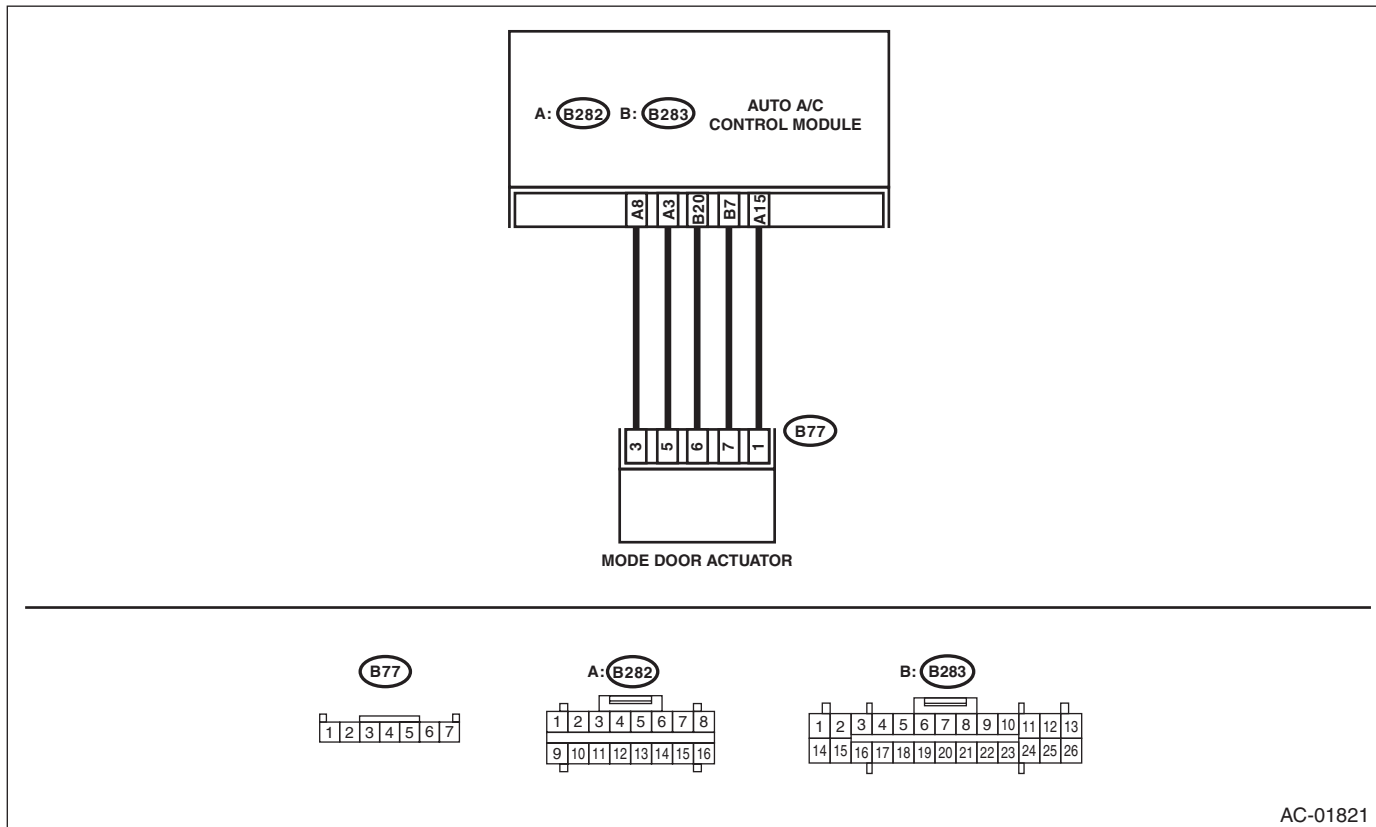
HVAC SYSTEM (AUTO A/C) (DIAGNOSTICS)

## B: MODE DOOR ACTUATOR

### TROUBLE SYMPTOM:

Air flow outlet is not changed.

### WIRING DIAGRAM:



Step	Check	Yes	No
<b>1 CHECK POWER SUPPLY FOR MODE DOOR ACTUATOR POSITION SENSOR.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the mode door actuator connector. 3) Turn the ignition switch and AUTO switch to ON. 4) Measure the voltage between auto A/C control module connector terminals. <i>Connector &amp; terminal</i> <i>(B282) No. 8 (+) — (B282) No. 15 (-):</i>	Is the voltage approx. 5 V?	Go to step 2.	Replace the auto A/C control module. <Ref. to AC-33, REMOVAL, Control Unit (Auto A/C Model).>
<b>2 CHECK POWER SUPPLY FOR MODE DOOR ACTUATOR.</b> Measure the voltage between auto A/C control module connector and chassis ground after turning the air flow control switch to FACE position. <i>Connector &amp; terminal</i> <i>(B283) No. 7 (+) — Chassis ground (-):</i>	Is the voltage 8 V (at normal temperature)?	Go to step 3.	Replace the auto A/C control module. <Ref. to AC-33, REMOVAL, Control Unit (Auto A/C Model).>

# Diagnostic Procedure for Actuators

HVAC SYSTEM (AUTO A/C) (DIAGNOSTICS)

Step	Check	Yes	No
<p><b>3 CHECK POWER SUPPLY FOR MODE DOOR ACTUATOR.</b> Measure the voltage between auto A/C control module connector and chassis ground after turning the air flow control switch to DEF position.</p> <p><b>Connector &amp; terminal</b> <b>(B283) No. 20 (+) — Chassis ground (-):</b></p>	Is the voltage 8 V (at normal temperature)?	Go to step 4.	Replace the auto A/C control module.
<p><b>4 CHECK HARNESS BETWEEN AUTO A/C CONTROL MODULE AND MODE DOOR ACTUATOR.</b> 1) Turn the A/C and ignition switch to OFF. 2) Disconnect the auto A/C control module connector. 3) Measure the resistance between auto A/C control module and mode door actuator connector.</p> <p><b>Connector &amp; terminal</b> <b>(B77) No. 1 — (B282) No. 15:</b> <b>(B77) No. 3 — (B282) No. 8:</b> <b>(B77) No. 5 — (B282) No. 3:</b> <b>(B77) No. 6 — (B283) No. 20:</b> <b>(B77) No. 7 — (B283) No. 7:</b></p>	Is the resistance less than 1 $\Omega$ ?	Go to step 5.	Repair the harness between auto A/C control module and mode door actuator.
<p><b>5 CHECK MODE DOOR ACTUATOR POSITION SWITCH SIGNAL.</b> 1) Connect the connector of auto A/C control module and mode door actuator. 2) Turn the ignition switch and AUTO switch to ON. 3) Check the voltage between auto A/C control module connector terminals while changing the mode between DEF and FACE.</p> <p><b>Connector &amp; terminal</b> <b>(B282) No. 3 (+) — (B282) No. 15 (-):</b></p>	Does the voltage change between 1 V (DEF) and 4 V (FACE)?	Go to step 6.	Replace the mode door actuator. <Ref. to AC-45, MODE DOOR ACTUATOR, REMOVAL, Actuator.>
<p><b>6 CHECK FOR POOR CONTACT.</b> Check poor contact of auto A/C control module and connector.</p>	Is there poor contact of connector?	Repair the connector.	Replace the auto A/C control module. <Ref. to AC-33, REMOVAL, Control Unit (Auto A/C Model).>

# Diagnostic Procedure for Actuators

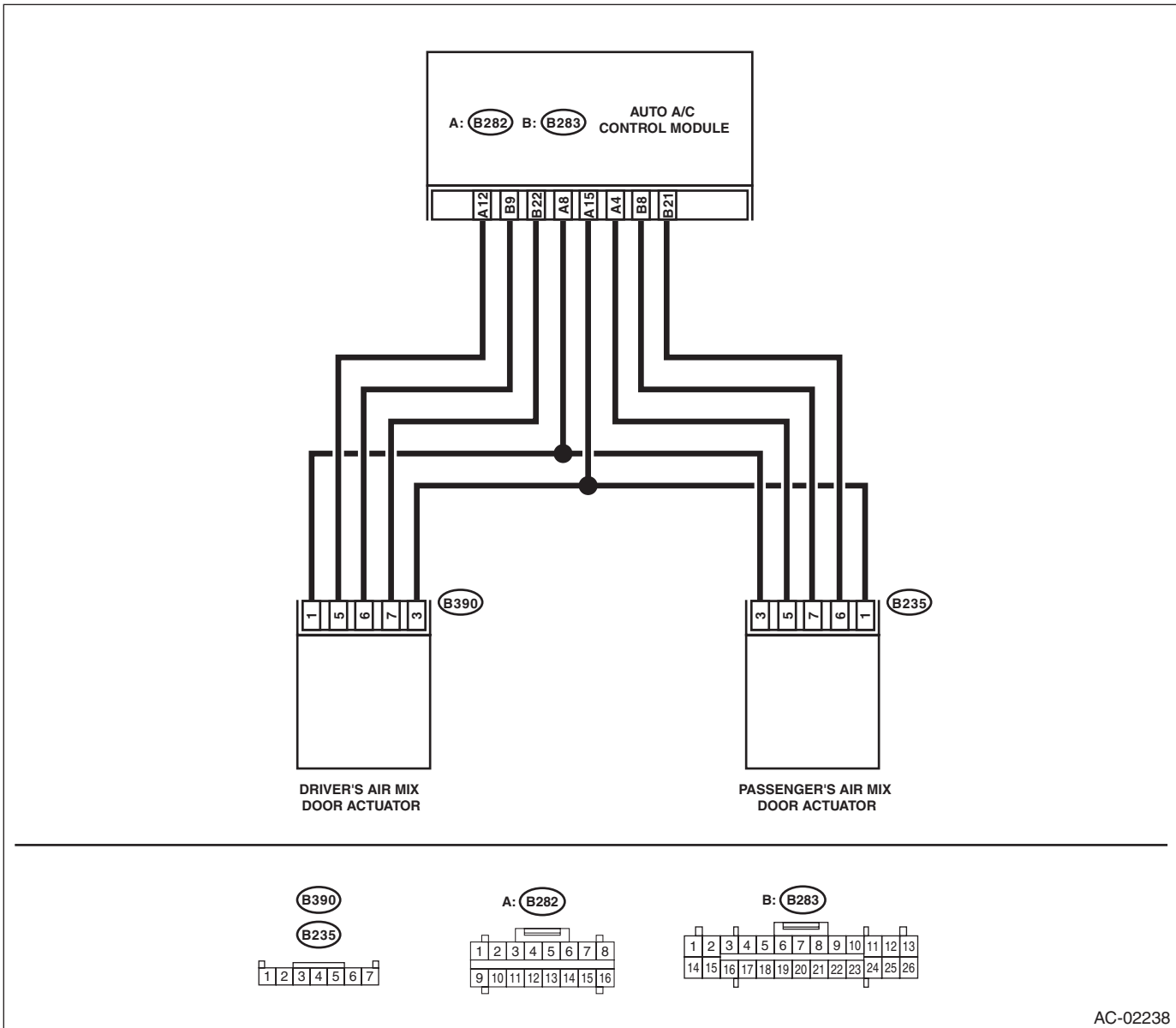
HVAC SYSTEM (AUTO A/C) (DIAGNOSTICS)

## C: AIR MIX DOOR ACTUATOR

### TROUBLE SYMPTOM:

Outlet air temperature does not change.

### WIRING DIAGRAM:



AC-02238

Step	Check	Yes	No
<b>1 CHECK POWER SUPPLY FOR AIR MIX DOOR ACTUATOR POSITION SWITCH.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the air mix door actuator connector. 3) Turn the ignition switch and AUTO switch to ON. 4) Measure the voltage between auto A/C control module connector terminals. <b>Connector &amp; terminal</b> <b>(B282) No. 8 (+) — (B282) No. 15 (-):</b>	Is the voltage approx. 5 V?	Go to step 2.	Replace the auto A/C control module. <Ref. to AC-33, REMOVAL, Control Unit (Auto A/C Model).>



# Diagnostic Procedure for Actuators

HVAC SYSTEM (AUTO A/C) (DIAGNOSTICS)

Step	Check	Yes	No
<p><b>2</b></p> <p><b>CHECK POWER SUPPLY FOR AIR MIX DOOR ACTUATOR.</b>                      Measure the voltage between auto A/C control module connector and chassis ground after turning the temperature control dial to maximum COOL position.</p> <p><b>Connector &amp; terminal</b>  <b>Driver's side</b>                      (B283) No. 22 (+) — Chassis ground (-):  <b>Passenger's side</b>                      (B283) No. 21 (+) — Chassis ground (-):</p>	Is the voltage 8 V (at normal temperature)?	Go to step 3.	Replace the auto A/C control module. <Ref. to AC-33, REMOVAL, Control Unit (Auto A/C Model).>
<p><b>3</b></p> <p><b>CHECK POWER SUPPLY FOR AIR MIX DOOR ACTUATOR.</b>                      Measure the voltage between auto A/C control module connector and chassis ground after turning the temperature control dial to maximum HOT position.</p> <p><b>Connector &amp; terminal</b>  <b>Driver's side</b>                      (B283) No. 9 (+) — Chassis ground (-):  <b>Passenger's side</b>                      (B282) No. 4 (+) — Chassis ground (-):</p>	Is the voltage 8 V (at normal temperature)?	Go to step 4.	Replace the auto A/C control module. <Ref. to AC-33, REMOVAL, Control Unit (Auto A/C Model).>
<p><b>4</b></p> <p><b>CHECK HARNESS BETWEEN AUTO A/C CONTROL MODULE AND AIR MIX DOOR ACTUATOR.</b>                      1) Turn the A/C and ignition switch to OFF.                      2) Disconnect the auto A/C control module connector.                      3) Measure the resistance between auto A/C control module and air mix door actuator connector.</p> <p><b>Connector &amp; terminal</b>  <b>Driver's side</b>                      (B390) No. 1 — (B282) No. 8:                      (B390) No. 3 — (B282) No. 15:                      (B390) No. 5 — (B282) No. 12:                      (B390) No. 6 — (B283) No. 9:                      (B390) No. 7 — (B283) No. 22:  <b>Passenger's side</b>                      (B235) No. 1 — (B282) No. 15:                      (B235) No. 3 — (B282) No. 8:                      (B235) No. 5 — (B282) No. 4:                      (B235) No. 7 — (B283) No. 8:                      (B235) No. 6 — (B283) No. 21:</p>	Is the resistance less than 1 Ω?	Go to step 5.	Repair the harness between auto A/C control module and air mix door actuator.
<p><b>5</b></p> <p><b>CHECK AIR MIX DOOR ACTUATOR POSITION SWITCH SIGNAL.</b>                      1) Connect the connector of auto A/C control module and air mix door actuator.                      2) Turn the ignition switch and AUTO switch to ON.                      3) Check the voltage between auto A/C control module connector terminals while changing the setting temperature between maximum COOL and maximum HOT.</p> <p><b>Connector &amp; terminal</b>  <b>Driver's side</b>                      (B282) No. 12 (+) — (B282) No. 15 (-):  <b>Passenger's side</b>                      (B282) No. 4 (+) — (B282) No. 15 (-):</p>	Does the voltage change between 1 V (Max. HOT) and 4 V (Max. COOL)?	Go to step 6.	Replace the air mix door actuator. <Ref. to AC-45, AIR MIX DOOR ACTUATOR (AUTO A/C MODEL), REMOVAL, Actuator.>

# Diagnostic Procedure for Actuators

## HVAC SYSTEM (AUTO A/C) (DIAGNOSTICS)

	Step	Check	Yes	No
6	<b>CHECK FOR POOR CONTACT.</b> Check poor contact of auto A/C control module and connector.	Is there poor contact of connector?	Repair the connector.	Replace the auto A/C control module. <Ref. to AC-33, REMOVAL, Control Unit (Auto A/C Model).>

# Diagnostic Procedure for Sensors

HVAC SYSTEM (AUTO A/C) (DIAGNOSTICS)

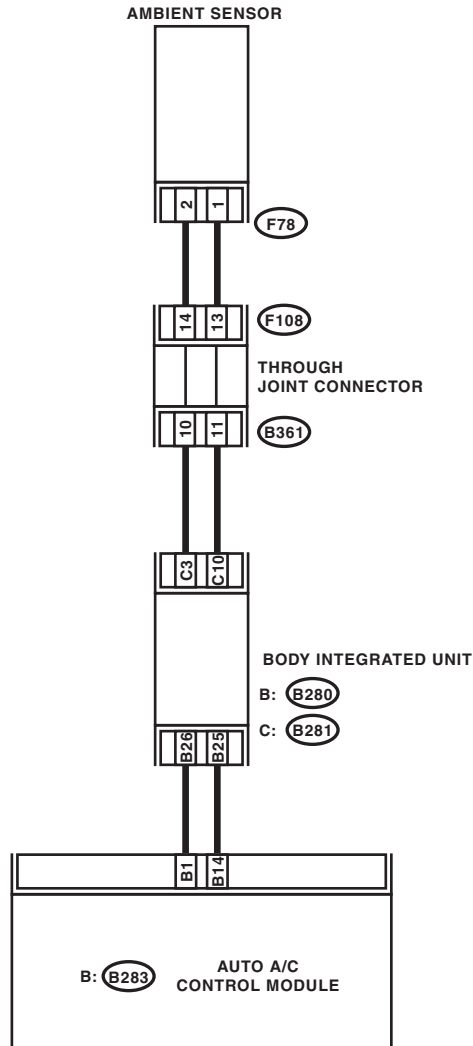
## 8. Diagnostic Procedure for Sensors

### A: AMBIENT SENSOR

#### TROUBLE SYMPTOM:

Fan speed is not switched when the fan speed control dial is in AUTO position.

#### WIRING DIAGRAM:



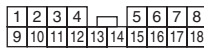
F78



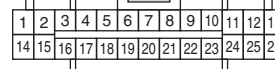
B361



F108



B: B283



B: B280



C: B281



AC-01341

## Diagnostic Procedure for Sensors

### HVAC SYSTEM (AUTO A/C) (DIAGNOSTICS)

Step	Check	Yes	No
<b>1 CHECK AMBIENT SENSOR.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ambient sensor. 3) Measure the resistance between connector terminals of ambient sensor. <i>Terminals</i> <i>No. 1 — No. 2:</i>	Is the resistance approximately 1.7 k $\Omega$ at 25°C (77°F)?	Go to step 2.	Replace the ambient sensor.
<b>2 CHECK INPUT SIGNAL FOR AMBIENT SENSOR.</b> 1) Turn the ignition to ON. 2) Measure the voltage between connector (F78) terminals. <i>Connector &amp; terminal</i> <i>(F78) No. 2 (+) — No. 1 (-):</i>	Is the voltage approx. 5 V?	Go to step 6.	Go to step 3.
<b>3 CHECK OUTPUT SIGNAL OF BODY INTEGRATED UNIT.</b> 1) Turn the ignition switch to OFF. 2) Draw out the body integrated unit. 3) Disconnect the connector from ambient sensor. 4) Turn the ignition switch to ON. 5) Measure the voltage between connector terminals of body integrated unit. <i>Connector &amp; terminal</i> <i>(B281) No. 3 (+) — No. 10 (-):</i>	Is the voltage approx. 5 V?	Go to step 4.	Go to step 6.
<b>4 CHECK HARNESS CONNECTOR BETWEEN BODY INTEGRATED UNIT AND AMBIENT SENSOR.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connector from body integrated unit. 3) Measure the resistance of harness between body integrated unit and ambient sensor. <i>Connector &amp; terminal</i> <i>(F78) No. 1 — (B281) No. 10:</i>	Is the resistance 1 $\Omega$ or less?	Go to step 5.	Repair the open circuit of harness between body integrated unit and ambient sensor.
<b>5 CHECK HARNESS CONNECTOR BETWEEN BODY INTEGRATED UNIT AND AMBIENT SENSOR.</b> Measure the resistance of harness between body integrated unit and ambient sensor. <i>Connector &amp; terminal</i> <i>(F78) No. 2 — (B281) No. 3:</i>	Is the resistance 1 $\Omega$ or less?	Go to step 6.	Repair the open circuit of harness between body integrated unit and ambient sensor.
<b>6 CHECK COMMUNICATION FAILURE DISPLAY.</b> 1) Connect the connectors of body integrated unit and ambient sensor as originally connected. 2) Check if “Er xx” is displayed on the Odo/Trip meter in combination meter after turning the ignition switch to ON.	Is “Er xx” displayed?	Check the communication circuit. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>	Go to step 7.
<b>7 CHECK POOR CONTACT.</b> Check poor contact of auto A/C control module connector.	Is there poor contact in connector?	Repair the connector.	Replace the auto A/C control module. <Ref. to AC-33, REMOVAL, Control Unit (Auto A/C Model).>

# Diagnostic Procedure for Sensors

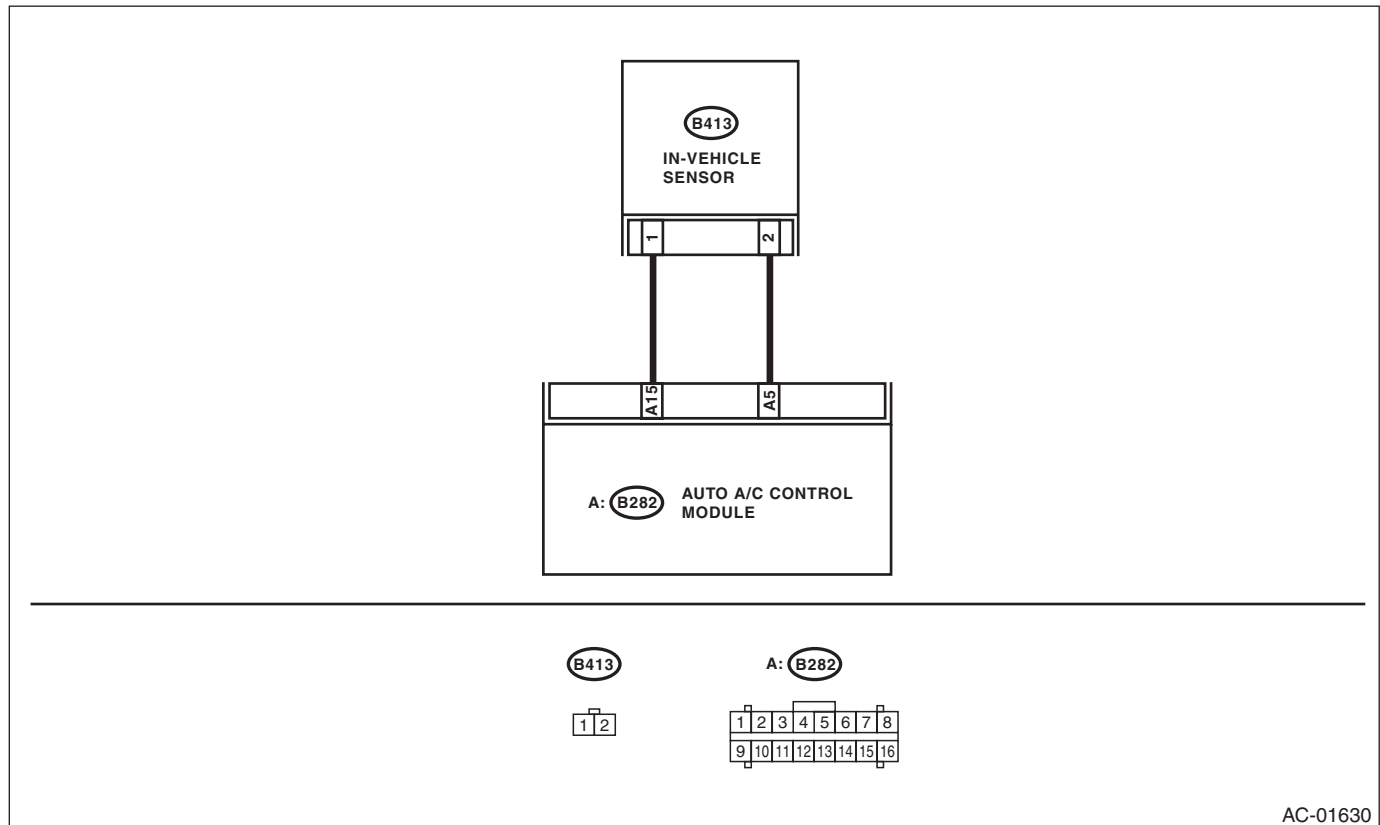
HVAC SYSTEM (AUTO A/C) (DIAGNOSTICS)

## B: IN-VEHICLE SENSOR

### TROUBLE SYMPTOM:

Blower fan speed, outlet port and inlet port do not change after turning the AUTO switch to ON.

### WIRING DIAGRAM:



AC-01630

Step	Check	Yes	No
<b>1 CHECK IN-VEHICLE SENSOR.</b> 1) Turn the ignition switch to OFF. 2) Remove the driver's side lower cover. 3) Disconnect the connector from in-vehicle sensor. 4) Measure the resistance between connector terminals of in-vehicle sensor. <b>Terminals</b> <b>No. 1 — No. 2:</b>	Is the resistance approximately 1.7 k $\Omega$ at 20°C (68°F)?	Go to step 2.	Replace the in-vehicle sensor.
<b>2 CHECK INPUT SIGNAL FOR IN-VEHICLE SENSOR.</b> 1) Turn the ignition switch to ON. 2) Measure the voltage between in-vehicle sensor harness connector terminal and chassis ground. <b>Connector &amp; terminal</b> <b>(B413) No. 2 (+) — Chassis ground (-):</b>	Is the voltage approx. 5 V?	Go to step 6.	Go to step 3.
<b>3 CHECK AUTO A/C CONTROL MODULE OUTPUT SIGNAL.</b> 1) Turn the ignition switch to OFF. 2) Remove the auto A/C control module. 3) Turn the ignition switch to ON. 4) Measure the voltage between connector terminals of auto A/C control module. <b>Connector &amp; terminal</b> <b>(B282) No. 5 (+) — (B282) No. 15 (-):</b>	Is the voltage approx. 5 V?	Go to step 4.	Go to step 6.

## Diagnostic Procedure for Sensors

### HVAC SYSTEM (AUTO A/C) (DIAGNOSTICS)

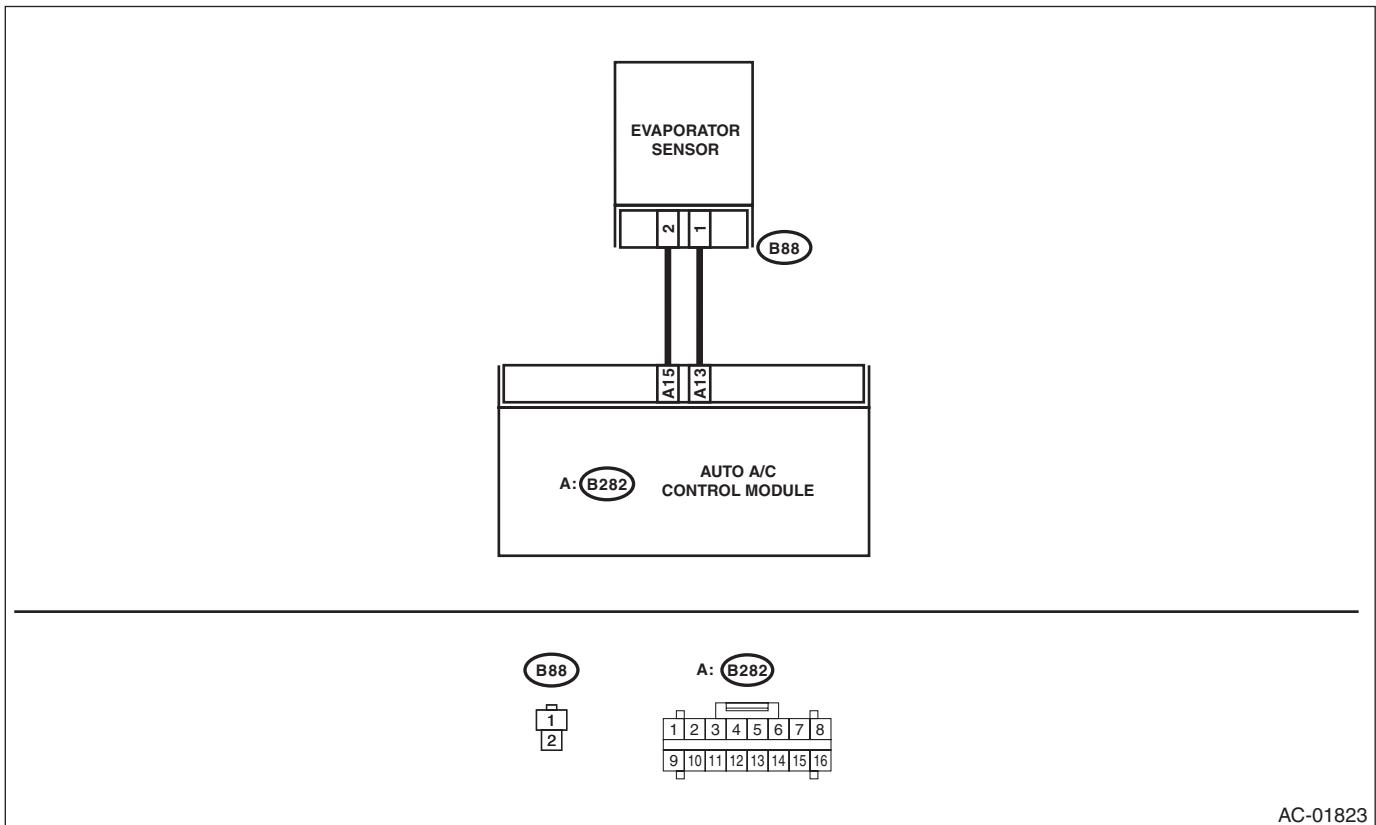
Step	Check	Yes	No
<b>4</b> <b>CHECK HARNESS BETWEEN AUTO A/C CONTROL MODULE AND IN-VEHICLE SENSOR.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connector from the auto A/C control module. 3) Measure the resistance of harness between auto A/C control module and in-vehicle sensor. <i><b>Connector &amp; terminal</b></i> <i><b>(B413) No. 2 — (B282) No. 5:</b></i>	Is the resistance less than 1 $\Omega$ ?	Go to step 5.	Repair the harness between auto A/C control module and in-vehicle sensor.
<b>5</b> <b>CHECK HARNESS BETWEEN AUTO A/C CONTROL MODULE AND IN-VEHICLE SENSOR.</b> Measure the resistance of harness between auto A/C control module and in-vehicle sensor. <i><b>Connector &amp; terminal</b></i> <i><b>(B413) No. 1 — (B282) No. 15:</b></i>	Is the resistance less than 1 $\Omega$ ?	Go to step 6.	Repair the harness between auto A/C control module and in-vehicle sensor.
<b>6</b> <b>CHECK FOR POOR CONTACT.</b> Check poor contact of auto A/C control module connector.	Is there poor contact of connector?	Repair the connector.	Replace the auto A/C control module. <Ref. to AC-33, REMOVAL, Control Unit (Auto A/C Model).>

# Diagnostic Procedure for Sensors

HVAC SYSTEM (AUTO A/C) (DIAGNOSTICS)

## C: EVAPORATOR SENSOR

### WIRING DIAGRAM:



AC-01823

Step	Check	Yes	No
<b>1 CHECK EVAPORATOR SENSOR.</b> 1) Turn the ignition switch to OFF. 2) Remove the glove box. 3) Disconnect the connector from evaporator sensor. 4) Measure the resistance between connector terminals of the evaporator sensor. <b>Terminals</b> <b>No. 1 — No. 2:</b>	Is the resistance approximately 1.9 k $\Omega$ at 20°C (68°F)?	Go to step 2.	Replace the evaporator sensor. <Ref. to AC-37, REMOVAL, Evaporator.>
<b>2 CHECK INPUT SIGNAL FOR EVAPORATOR SENSOR.</b> 1) Turn the ignition switch to ON. 2) Measure the voltage between connector (B88) terminal and chassis ground. <b>Connector &amp; terminal</b> <b>(B88) No. 1 (+) — Chassis ground (-):</b>	Is the voltage approx. 5 V?	Go to step 6.	Go to step 3.
<b>3 CHECK AUTO A/C CONTROL MODULE OUTPUT SIGNAL.</b> 1) Turn the ignition switch to OFF. 2) Remove the auto A/C control module. 3) Turn the ignition switch to ON. 4) Measure the voltage between connector terminals of auto A/C control module. <b>Connector &amp; terminal</b> <b>(B282) No. 13 (+) — No. 15 (-):</b>	Is the voltage approx. 5 V?	Go to step 4.	Go to step 6.

## Diagnostic Procedure for Sensors

### HVAC SYSTEM (AUTO A/C) (DIAGNOSTICS)

Step	Check	Yes	No
<b>4</b> <b>CHECK HARNESS CONNECTOR BETWEEN AUTO A/C CONTROL MODULE AND EVAPORATOR SENSOR.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connector from the auto A/C control module. 3) Measure the resistance of harness between auto A/C control module and evaporator sensor. <i><b>Connector &amp; terminal</b></i> <i><b>(B88) No. 2 — (B282) No. 15:</b></i>	Is the resistance less than 1 $\Omega$ ?	Go to step 5.	Repair the open circuit of harness between auto A/C control module and evaporator sensor.
<b>5</b> <b>CHECK HARNESS CONNECTOR BETWEEN AUTO A/C CONTROL MODULE AND EVAPORATOR SENSOR.</b> Measure the resistance of harness between auto A/C control module and evaporator sensor. <i><b>Connector &amp; terminal</b></i> <i><b>(B88) No. 1 — (B282) No. 13:</b></i>	Is the resistance less than 1 $\Omega$ ?	Go to step 6.	Repair the open circuit of harness between auto A/C control module and evaporator sensor.
<b>6</b> <b>CHECK FOR POOR CONTACT.</b> Check poor contact of auto A/C control module connector.	Is there poor contact of connector?	Repair the connector.	Replace the auto A/C control module. <Ref. to AC-33, REMOVAL, Control Unit (Auto A/C Model).>



# Diagnostic Procedure for Sensors

HVAC SYSTEM (AUTO A/C) (DIAGNOSTICS)

## D: SUNLOAD SENSOR

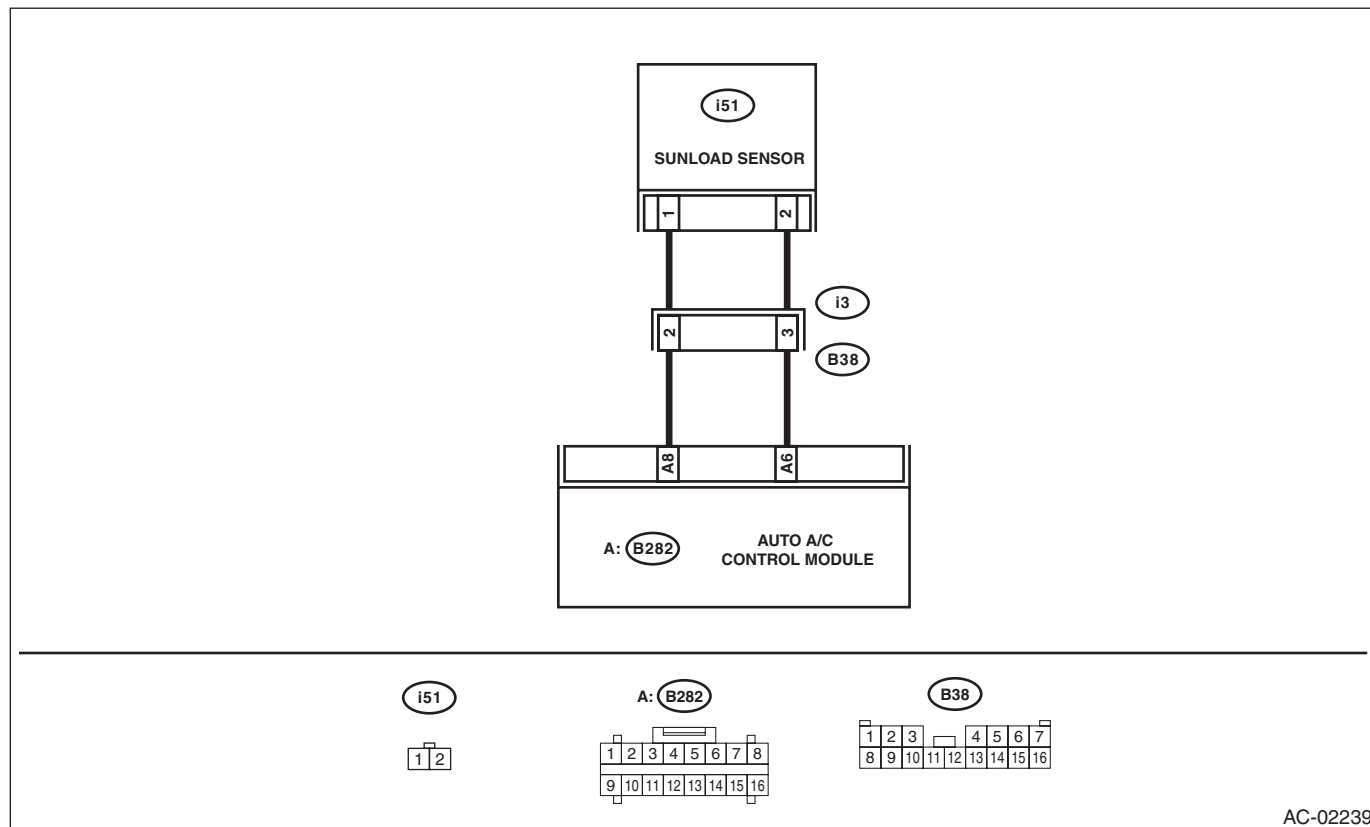
### TROUBLE SYMPTOM:

- Sensor identifies that sunlight is at maximum. Then, A/C system is controlled to COOL side.
- Sensor identifies that sunlight is at minimum. Then, A/C system is controlled to HOT side.

### NOTE:

When the sunload sensor check is performed indoors or in the shade, it could be diagnosed as having an open circuit. Always check the sunload sensor with the sun shining on it.

### WIRING DIAGRAM:



AC-02239

Step	Check	Yes	No
<b>1 CHECK POWER SUPPLY VOLTAGE FOR SUNLOAD SENSOR.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connector from sunload sensor. 3) Turn the ignition switch to ON. 4) Measure the power supply voltage for sunload sensor. <i>Connector &amp; terminal (i51) No. 1 (+) — No. 2 (-):</i>	Is the voltage approx. 5 V?	Go to step 4.	Go to step 2.
<b>2 CHECK HARNESS CONNECTOR BETWEEN AUTO A/C CONTROL MODULE AND SUNLOAD SENSOR.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connector from the auto A/C control module. 3) Measure the resistance of the harness between the auto A/C control module and sunload sensor. <i>Connector &amp; terminal (i51) No. 2 — (B282) No. 6:</i>	Is the resistance less than 1 $\Omega$ ?	Go to step 3.	Repair the harness between auto A/C control module and sunload sensor.

## Diagnostic Procedure for Sensors

### HVAC SYSTEM (AUTO A/C) (DIAGNOSTICS)

Step	Check	Yes	No
<b>3</b> <b>CHECK HARNESS CONNECTOR BETWEEN AUTO A/C CONTROL MODULE AND SUNLOAD SENSOR.</b> Measure the resistance of the harness between the auto A/C control module and sunload sensor. <i>Connector &amp; terminal</i> <i>(i51) No. 1 — (B282) No. 8:</i>	Is the resistance less than 1 $\Omega$ ?	Go to step 4.	Repair the harness between auto A/C control module and sunload sensor.
<b>4</b> <b>CHECK INPUT VOLTAGE FOR AUTO A/C CONTROL MODULE.</b> 1) Connect the connectors of sunload sensor and auto A/C control module. 2) Turn the ignition switch to ON. 3) Measure the voltage between connector terminals of auto A/C control module. <i>Connector &amp; terminal</i> <i>(B282) No. 8 (+) — (B282) No. 6 (-):</i>	Is the voltage approx. 3.0 V?	Go to step 5.	Replace the sunload sensor. <Ref. to AC-47, REMOVAL, Sunload Sensor (Auto A/C Model).>
<b>5</b> <b>CHECK FOR POOR CONTACT.</b> Check poor contact of auto A/C control module connector.	Is there poor contact of connector?	Repair the connector.	Replace the auto A/C control module. <Ref. to AC-33, REMOVAL, Control Unit (Auto A/C Model).>

# Diagnostics with Phenomenon

HVAC SYSTEM (AUTO A/C) (DIAGNOSTICS)

## 9. Diagnostics with Phenomenon

### A: INSPECTION

Symptoms	Problem parts
A/C system fails to operate.	<ul style="list-style-type: none"> <li>• Fuse (F/B No. 7, 22, 31).</li> <li>• Connector (Poor contact)</li> <li>• Ground</li> <li>• Auto A/C control module</li> <li>• Blower fan motor</li> <li>• Blower fan relay</li> <li>• A/C relay</li> <li>• Compressor (Magnet clutch)</li> <li>• Evaporator sensor</li> </ul>
Fuse is blown out.	<ul style="list-style-type: none"> <li>• Fuse (F/B No. 7, 22, 31).</li> <li>• Connector (Poor contact)</li> </ul>
Illumination cannot dim.	<ul style="list-style-type: none"> <li>• Fuse (F/B No. 7, 22, 31).</li> <li>• Connector (Poor contact)</li> <li>• Illumination control switch</li> <li>• Auto A/C control module</li> <li>• Body integrated unit</li> </ul>
Blower fan does not rotate or fan speed cannot be controlled.	<ul style="list-style-type: none"> <li>• Fuse (F/B No. 22, 27, 28)</li> <li>• Connector (Poor contact)</li> <li>• Ground</li> <li>• Auto A/C control module</li> <li>• Blower fan motor</li> <li>• Blower fan relay</li> <li>• Power transistor or blower resistor</li> </ul>
Unable to switch suction vents.	<ul style="list-style-type: none"> <li>• Connector (Poor contact)</li> <li>• Auto A/C control module</li> <li>• Intake door actuator</li> </ul>
Unable to switch vents.	<ul style="list-style-type: none"> <li>• Connector (Poor contact)</li> <li>• Auto A/C control module</li> <li>• Mode door actuator</li> </ul>
Compartment temperature does not rise. (Warm air does not come out.)	<ul style="list-style-type: none"> <li>• Connector (Poor contact)</li> <li>• Auto A/C control module</li> <li>• Air mix door actuator</li> <li>• In-vehicle sensor, ambient sensor, evaporator sensor and sunload sensor</li> <li>• In-vehicle sensor aspirator hose</li> <li>• Aspirator body</li> </ul>
Compartment temperature does not lower. (Cold air does not come out.)	<ul style="list-style-type: none"> <li>• Connector (Poor contact)</li> <li>• Auto A/C control module</li> <li>• Air mix door actuator</li> <li>• A/C relay</li> <li>• Compressor (Magnet clutch)</li> <li>• Radiator fan motor</li> <li>• Radiator fan relay</li> <li>• In-vehicle sensor, ambient sensor, evaporator sensor and sunload sensor</li> <li>• In-vehicle sensor aspirator hose</li> <li>• Aspirator body</li> <li>• Pressure switch</li> </ul>
Compartment temperature is higher or lower than setting temperature.	<ul style="list-style-type: none"> <li>• Auto A/C control module</li> <li>• Air mix door actuator</li> <li>• In-vehicle sensor, ambient sensor, evaporator sensor and sunload sensor</li> <li>• In-vehicle sensor aspirator hose</li> <li>• Aspirator body</li> </ul>

## Diagnostics with Phenomenon

### HVAC SYSTEM (AUTO A/C) (DIAGNOSTICS)

Symptoms	Problem parts
Compartment temperature does not quickly respond to setting temperature.	<ul style="list-style-type: none"><li>• Air mix door actuator</li><li>• In-vehicle sensor, ambient sensor, evaporator sensor and sunload sensor</li><li>• In-vehicle sensor aspirator hose</li><li>• Aspirator body</li></ul>
Radiator fan does not rotate during A/C operation.	<ul style="list-style-type: none"><li>• Radiator fan motor</li><li>• Radiator fan relay</li><li>• ECM</li><li>• A/C switch</li><li>• Auto A/C control module</li></ul>
Seat heater does not run.	<ul style="list-style-type: none"><li>• Seat thermistor</li><li>• Seat heater relay</li><li>• Seat heater</li><li>• Auto A/C control module</li><li>• Front control panel</li></ul>

# AIRBAG SYSTEM

# AB

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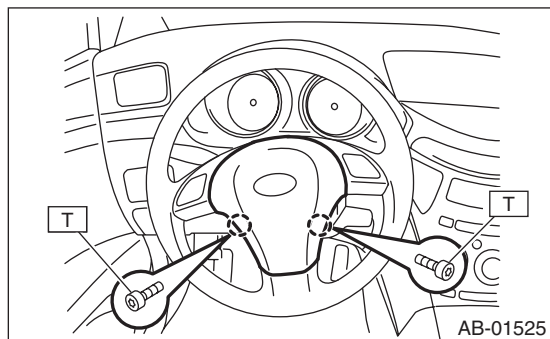
# General Description

## AIRBAG SYSTEM

### 1. General Description

#### A: COMPONENT

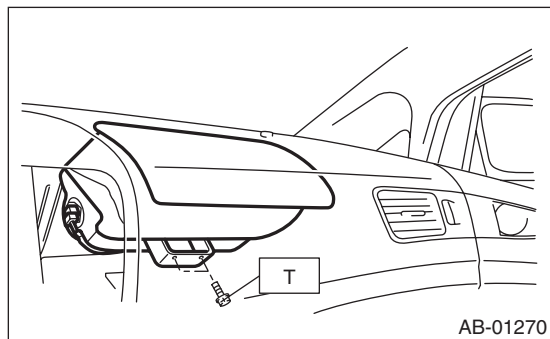
##### 1. DRIVER'S AIRBAG MODULE



**Tightening torque:**

**10 N·m (1.0 kgf·m, 7.2 ft·lb)**

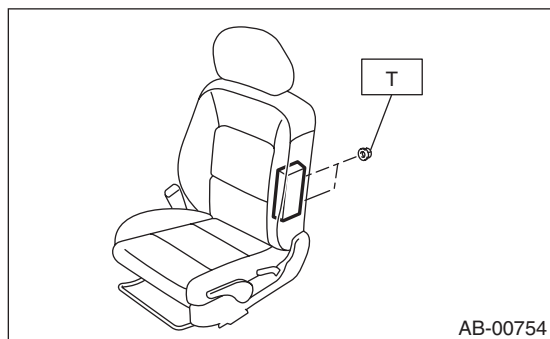
##### 2. PASSENGER'S AIRBAG MODULE



**Tightening torque:**

**7.4 N·m (0.75 kgf·m, 5.5 ft·lb)**

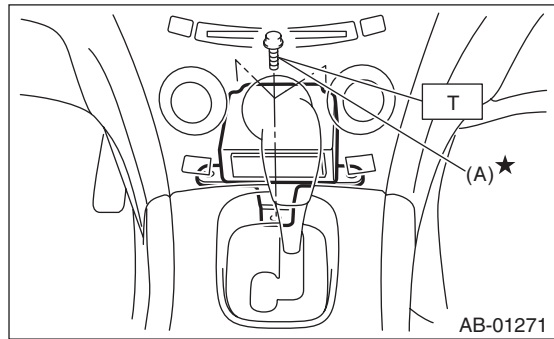
##### 3. SIDE AIRBAG MODULE



**Tightening torque:**

**6 N·m (0.61 kgf·m, 4.4 ft·lb)**

##### 4. AIRBAG CONTROL MODULE



(A) Bolt

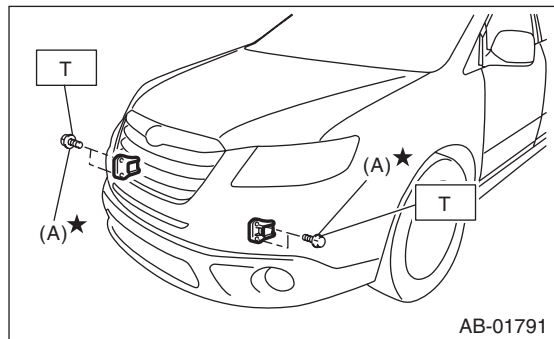
**CAUTION:**

**Do not reuse mounting bolts and nuts.**

**Tightening torque:**

**25 N·m (2.5 kgf·m, 18.1 ft·lb)**

##### 5. FRONT SUB SENSOR



(A) Bolt

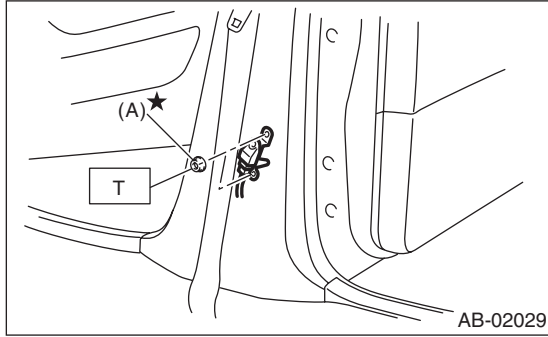
**CAUTION:**

**Do not reuse mounting bolts and nuts.**

**Tightening torque:**

**13 N·m (1.32 kgf·m, 9.6 ft·lb)**

## 6. SIDE AIRBAG SENSOR

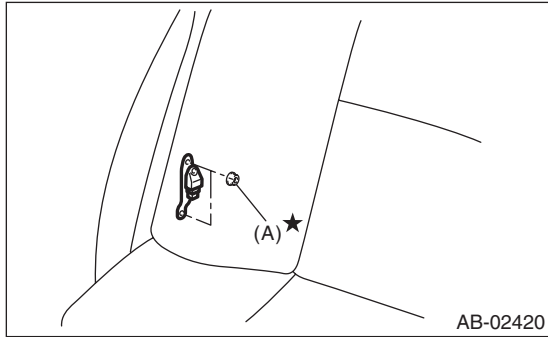


(A) Bolt

**CAUTION:**  
Do not reuse mounting bolts and nuts.

**Tightening torque:**  
7.5 N·m (0.76 kgf·m, 5.5 ft·lb)

## 7. CURTAIN AIRBAG SENSOR

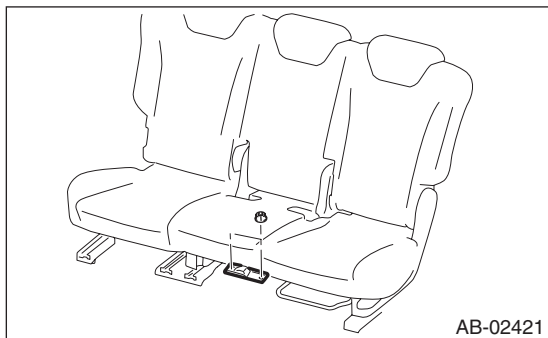


(A) Nut

**CAUTION:**  
Do not reuse mounting bolts and nuts.

**Tightening torque:**  
7.5 N·m (0.76 kgf·m, 5.5 ft·lb)

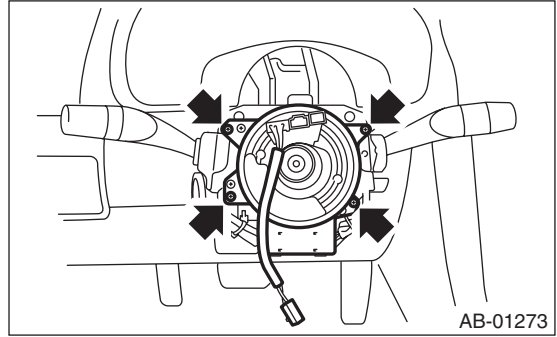
## 8. SATELLITE SAFING SENSOR



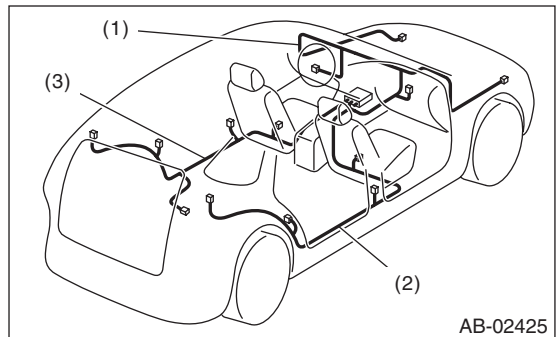
**CAUTION:**  
Do not reuse mounting bolts and nuts.

**Tightening torque:**  
7.5 N·m (0.76 kgf·m, 5.5 ft·lb)

## 9. STEERING ROLL CONNECTOR

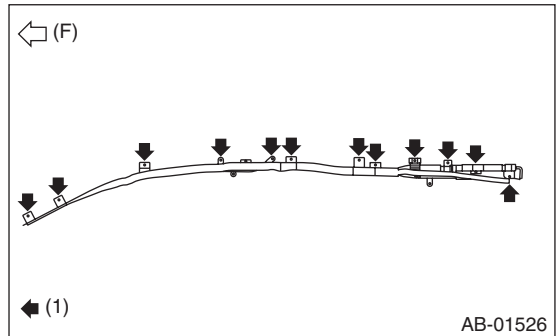


## 10. AIRBAG HARNESS



- (1) Airbag main harness
- (2) Airbag rear harness RH
- (3) Airbag rear harness LH

## 11. CURTAIN AIRBAG MODULE



(F) Front side of vehicle

(1) Bolt

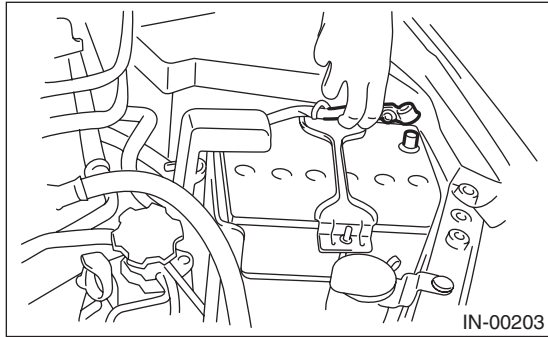
**Tightening torque:**  
7.5 N·m (0.76 kgf·m, 5.5 ft·lb)

# General Description

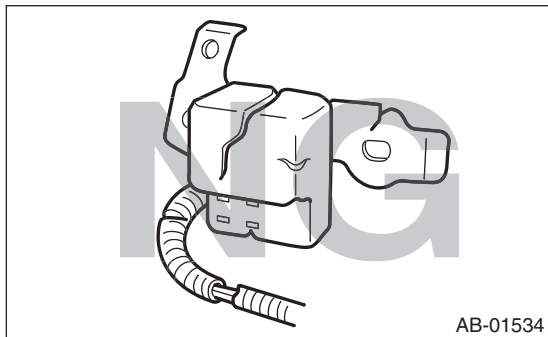
## AIRBAG SYSTEM

### B: CAUTION

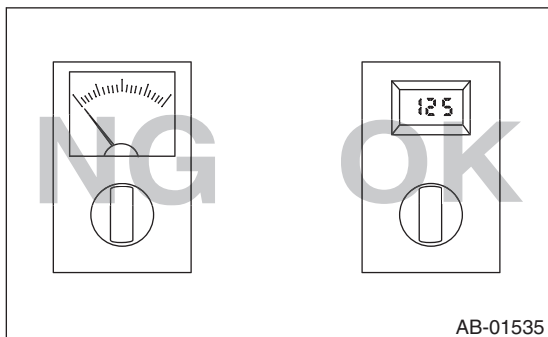
- When servicing a vehicle, be sure to turn the ignition switch to OFF, disconnect the ground cable from battery, and wait for 60 seconds or more before starting work.
- The airbag system is fitted with a backup power supply. After disconnecting the battery ground cable, the airbag may deploy if you do not wait for 60 seconds or more before starting airbag system servicing.



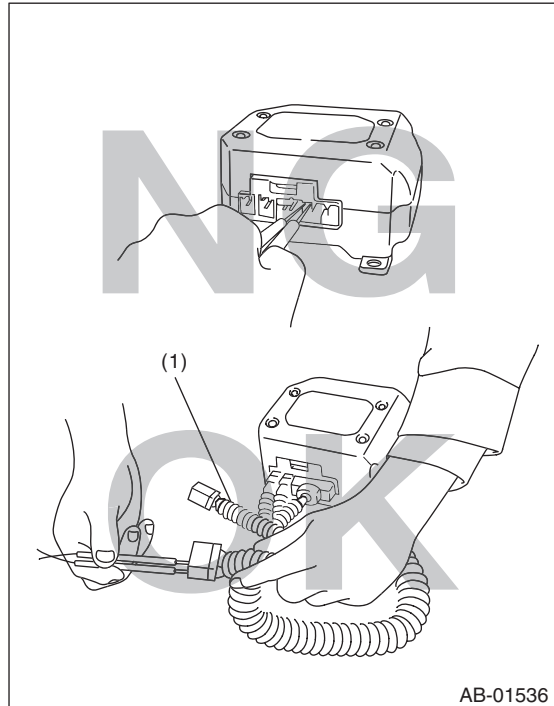
- If the airbag warning light illuminates, repair the vehicle immediately. Otherwise, the airbag or pretensioner may inflate incorrectly, or not inflate in collision.
- If sensors, sensor cover, airbag module, airbag control module, pretensioner or harness is deformed or damaged, replace with new parts.



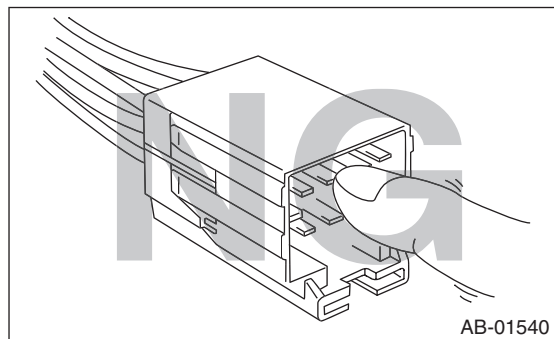
- When checking the airbag system, be sure to use a digital circuit tester. Use of an analog circuit tester may cause the airbag to activate erroneously due to a minimal current inside tester.



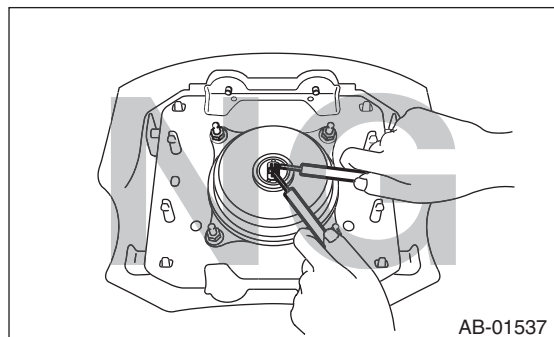
- When checking, use a test harness (1). Damage to connector terminal cause malfunction. Do not directly apply the tester probe to connector terminal of airbag.



- Do not allow water or oil to come in contact with the connector terminals. Also, do not touch the connector terminals.

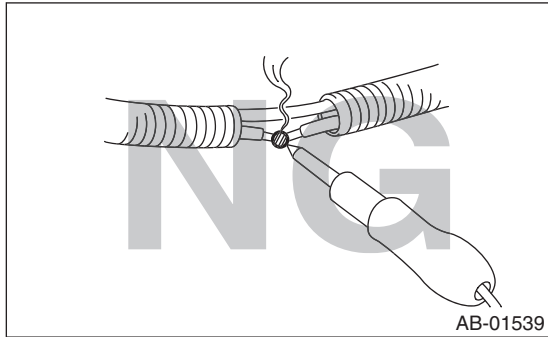


- Do not check continuity of the airbag modules for driver's side, passenger's side and curtain, or the pretensioner.

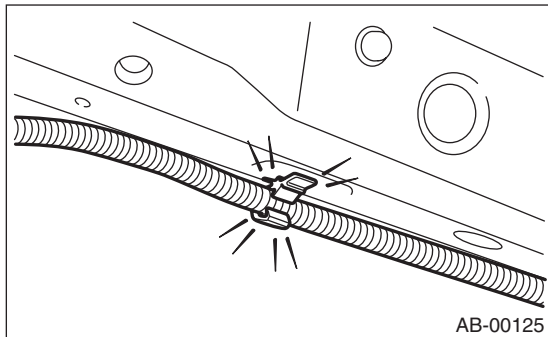




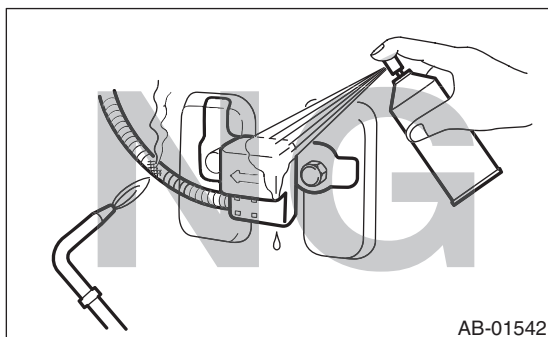
- If damage, open circuit or rust is found on airbag system wiring harness, do not use a soldering equipment to repair. Replace the faulty harness with a new genuine part.



- Install the wiring harness securely with the specified clips to avoid interference or tangled with other parts.

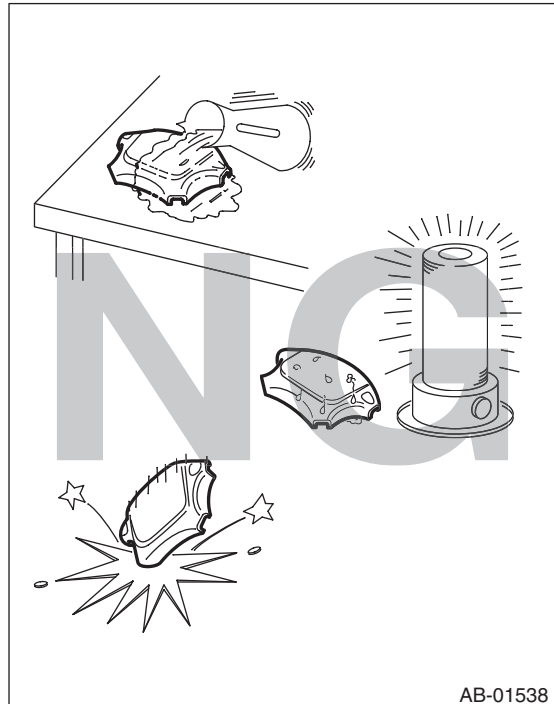


- When painting or performing sheet metal work on the front part of the vehicle, including the front wheel apron, front fender and front side frame, remove the front sub sensors and wiring harness of airbag system.
- When painting or performing sheet metal work on the side of the vehicle and around the rear floor pan, including the side sill, center pillar and front and rear doors, remove the side airbag sensors and wiring harness of the airbag system.

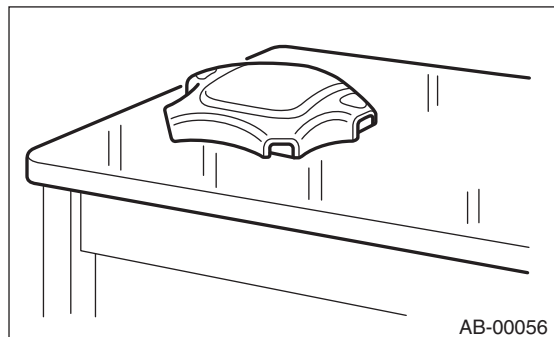


- Do not use the airbag or pretensioner parts from other vehicles. Always replace the defective parts with new parts.
- Never reuse a deployed airbag module and pretensioner.
- Do not discard undeployed airbag or pretensioner.

- When airbag control module, front sub sensor, side airbag sensor, curtain airbag sensor and satellite safing sensor are removed, do not reuse the bolts and nuts of them. Always use new bolts and nuts for them.
- Do not drop each airbag module, airbag control module and each sensor, or store these parts under high temperature of 85°C (185°F) or more, or let water, oil or grease get on them; the internal parts may be damaged or the reliability may be greatly lowered.



- After removal of each parts for airbag system, keep them with the pad facing upward on a dry, clean and flat surface without heat, light sources, moisture and dust.

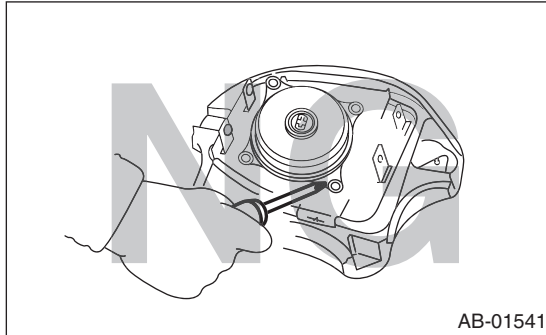


## General Description

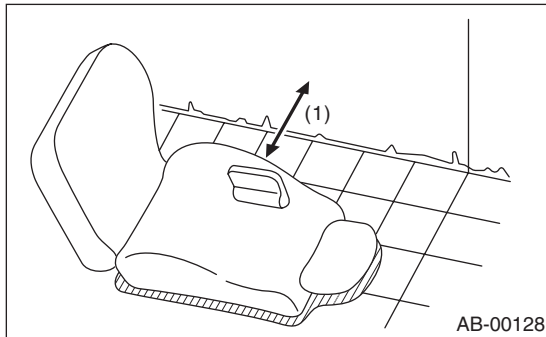
### AIRBAG SYSTEM

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- Do not disassemble driver's airbag module, passenger's airbag module, side or curtain airbag modules, or pretensioner.

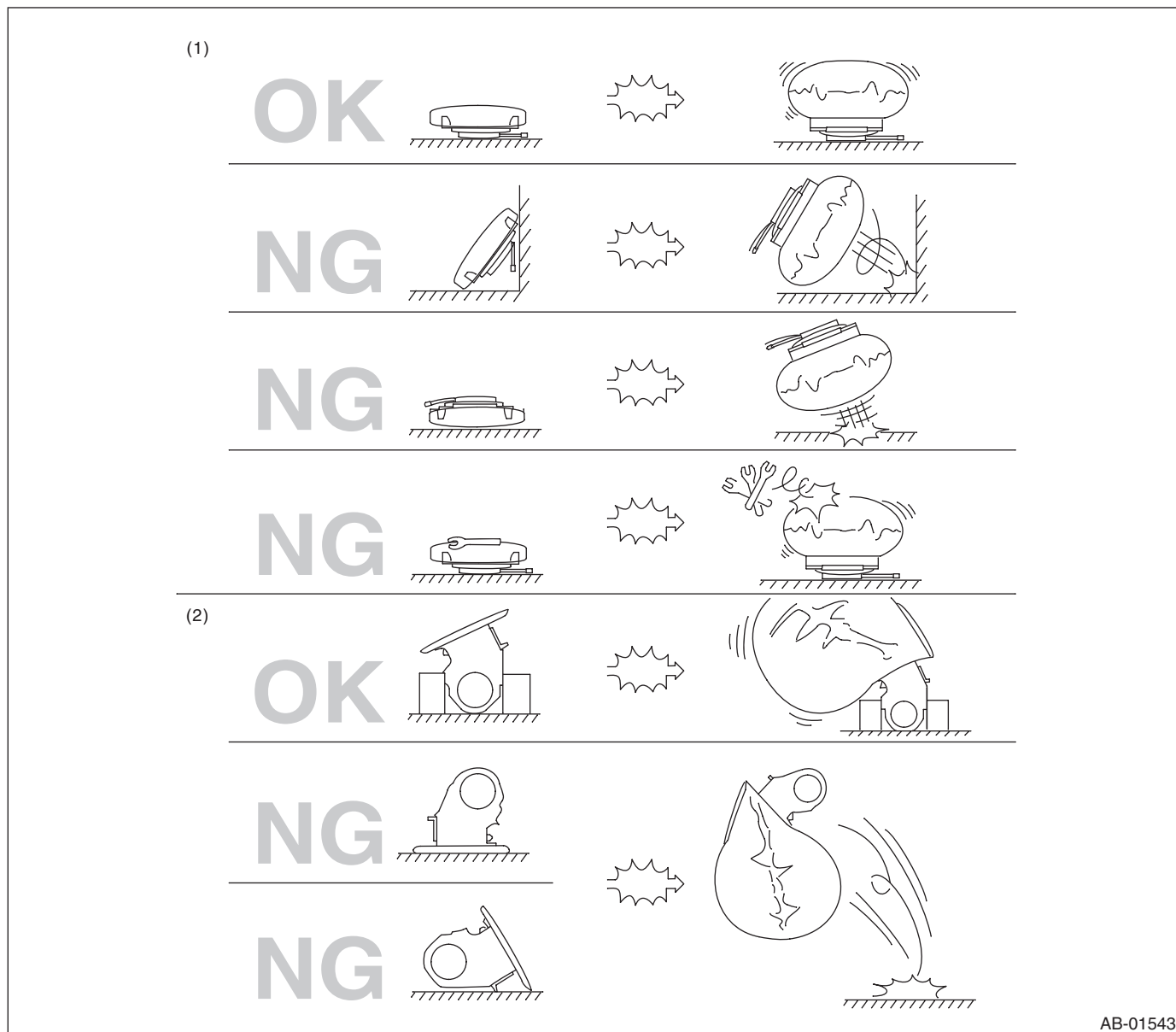


- When performing attachment of the steering wheel and steering roll connector, make sure to perform adjustment of the steering roll connector.
- The removed front seat with airbag module must be kept at least 200 mm (8 in) away from walls and other objects.



(1) 200 mm (8 in) or more

- When storing a removed airbag module, do not place with its pad side facing down. Do not place any objects on the airbag module. Do not pile up the airbag module. If the airbag inflates for some reason when an airbag module pad is touching other objects, it may cause serious accident.



(1) Driver's airbag module

(2) Passenger's airbag module

## C: PREPARATION TOOL

### 1. GENERAL TOOL

TOOL NAME	REMARKS
TORX® bit T30	Used for removing and installing driver's airbag module.

# Airbag Connector

AIRBAG SYSTEM

## 2. Airbag Connector

### A: PROCEDURE

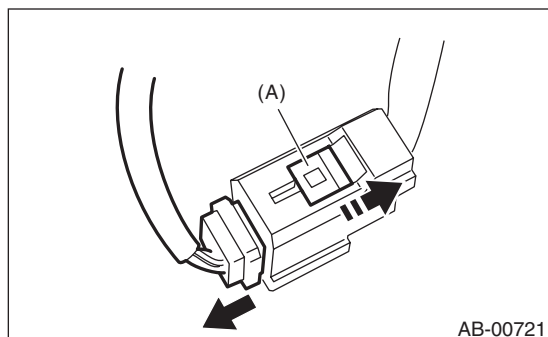
#### 1. BUCKLE SWITCH

1) How to disconnect:

- (1) Move the slide lock (A) in the direction of arrow.
- (2) While holding the slide lock (A) in moved position, disconnect the connector.

#### CAUTION:

When pulling the slide lock or disconnecting connector, be sure to hold the connector, not the harness.

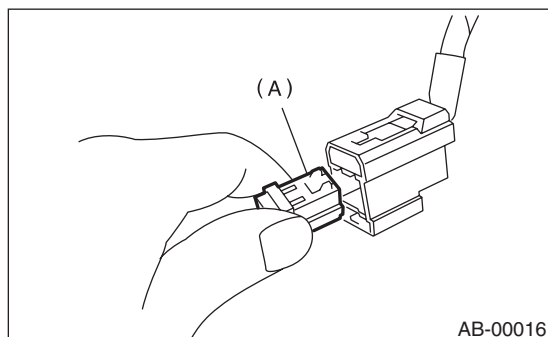


2) How to connect:

Holding the connector (A), and push it in carefully until a clicking sound is heard.

#### CAUTION:

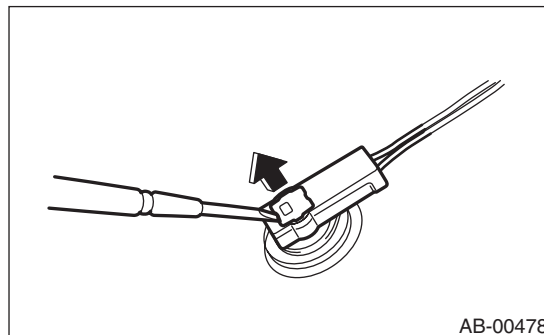
Be sure to insert the connector in until it is locked. Then pull it lightly to make sure that it is locked.



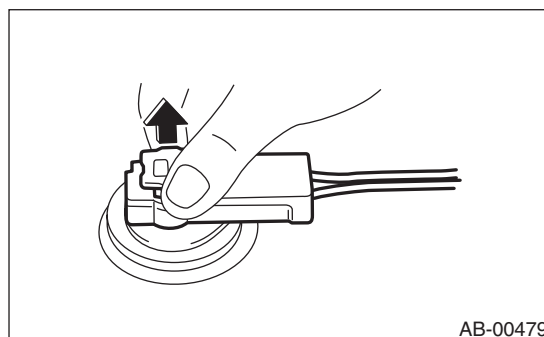
#### 2. DRIVER'S AIRBAG MODULE, CURTAIN AIRBAG MODULE AND PRETENSIONER

1) How to disconnect:

- (1) Using a flat tip screwdriver, pry the push lock upward to unlock.



- (2) Pull and disconnect the connector from the driver's airbag module assembly or retractor assembly.

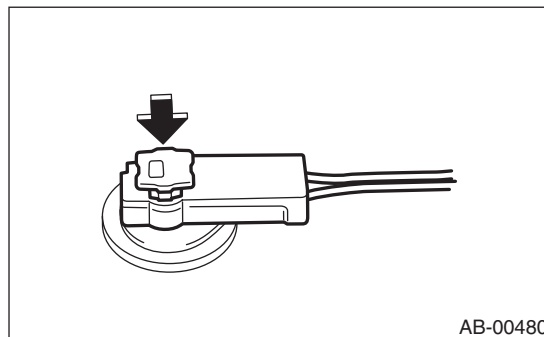


2) How to connect:

Connect the connector in the reverse order of disconnecting. At this time, be sure to insert the push lock until a clicking sound is heard.

#### CAUTION:

- Be sure to insert the connector in until it is locked. Then pull it gently to make sure that it is locked.
- Be sure to push the push lock in securely.



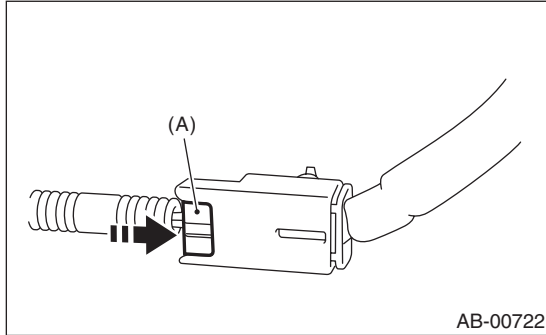
NOTE:

The connector can not be connected when the push lock is in the lock position. To connect the connector, set the push lock to unlock position.

### 3. DRIVER'S AIRBAG (BETWEEN AIRBAG MAIN HARNESS AND ROLL CONNECTOR) AND PASSENGER'S AIRBAG

1) How to disconnect:

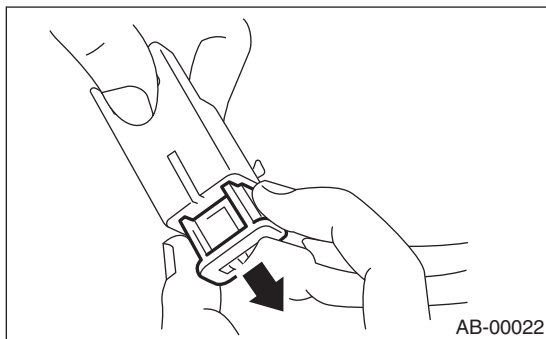
(1) Push the slide lock (A) into the direction of arrow.



(2) With the slide lock pushed, disconnect the connector.

**CAUTION:**

When pulling the slide lock or disconnecting connector, be sure to hold the connector, not the harness.

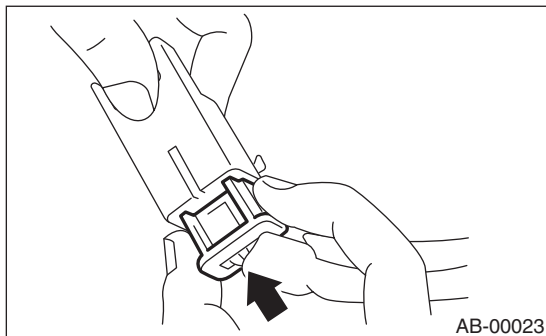


2) How to connect:

Holding the connector, push it in securely until a clicking sound is heard.

**CAUTION:**

Be sure to insert the connector in until it is locked. Then pull it lightly to make sure that it is locked.

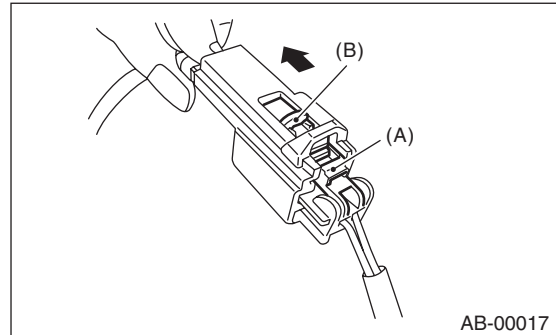


### 4. SIDE AIRBAG

1) How to disconnect:

(1) Push the lock arm (A).

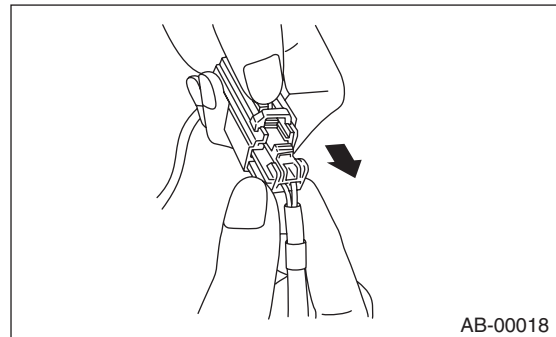
(2) With the lock arm (A) pushed in, move the slide lock (B) in the direction of arrow.



(3) While holding the slide lock in that position, release the lock arm (back to the original position), and disconnect the connector.

**CAUTION:**

When pulling the slide lock or disconnecting connector, be sure to hold the connector, not the harness.

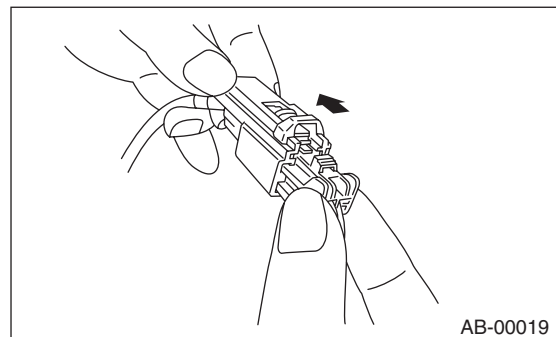


2) How to connect:

Holding the connector, push it in securely until a clicking sound is heard.

**CAUTION:**

Be sure to insert the connector in until it is locked. Then pull it gently to make sure that it is locked.



# Airbag Connector

## AIRBAG SYSTEM

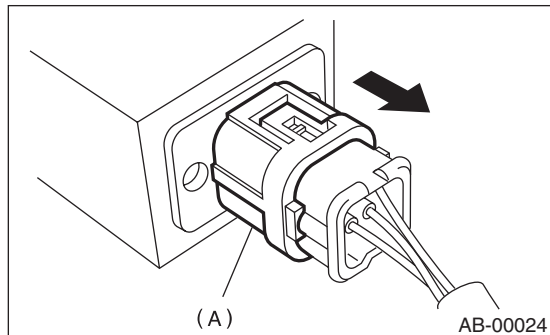
### 5. FRONT SUB SENSOR, SIDE AIRBAG SENSOR, CURTAIN AIRBAG SENSOR SATELLITE SAFING SENSOR, AND SEAT POSITION SENSOR

1) How to disconnect:

Holding outer part (A), pull it in the direction of arrow.

#### CAUTION:

When pulling the slide lock or disconnecting connector, be sure to hold the connector, not the harness.

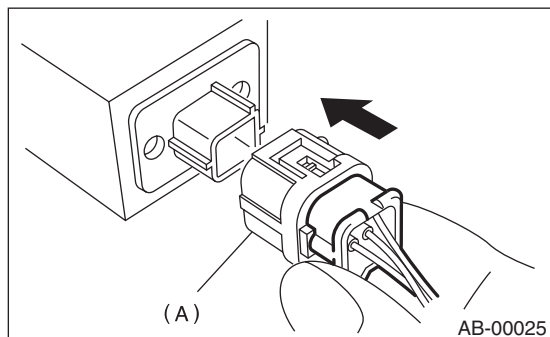


2) How to connect:

Holding the connector, push it in securely until a clicking sound is heard.

#### CAUTION:

- Outer side (A) move back, and so do not put your hand on the outer part.
- Be sure to insert the connector in until it is locked. Then pull it gently to make sure that it is locked.



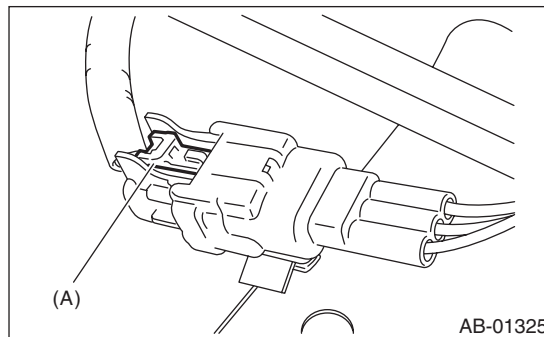
### 6. PASSENGER DETECTION SYSTEM (BETWEEN AIRBAG REAR HARNESS AND SEAT HARNESS) AND BELT TENSION SENSOR

1) How to disconnect:

Push lock arm (A), then disconnect the connector.

#### CAUTION:

When pulling the slide lock or disconnecting connector, be sure to hold the connector, not the harness.



2) How to connect:

Holding the connector, push it in securely until a clicking sound is heard.

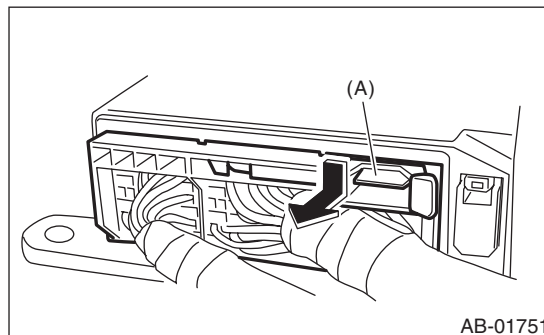
#### CAUTION:

Be sure to insert the connector in until it is locked. Then pull it gently to make sure that it is locked.

### 7. AIRBAG CONTROL MODULE

1) How to disconnect:

Press the lock lever plate (A) and pull out the lock lever.



2) How to connect:

Insert the connector and push the lock lever in securely.

#### CAUTION:

Be sure to insert the connector in until it is locked. Then pull it gently to make sure that it is locked.

## 3. Inspection Locations After a Collision

### A: REPLACEMENT

Replace the following parts when the airbag is deployed.

#### 1. FRONT COLLISION

- 1) Driver's airbag module
- 2) Passenger's airbag module
- 3) Driver's seat belt pretensioner
- 4) Passenger's seat belt pretensioner
- 5) Airbag control module
- 6) Front sub sensor (right and left)
- 7) Roll connector
- 8) Instrument panel (for integrating with passenger's airbag module)
- 9) Passenger side seat cushion pad and frame assembly

#### 2. SIDE COLLISION

- 1) Airbag control module
- 2) Side airbag module (operating side seat backrest)
- 3) Side airbag sensor (operating side)
- 4) Curtain airbag module (operating side)
- 5) Curtain airbag sensor (operating side)
- 6) Driver's seat belt pretensioner (operating side)
- 7) Passenger's seat belt pretensioner (operating side)
- 8) Satellite safing sensor
- 9) Satellite safing sensor cover

#### 3. INSPECTION OF OTHER PARTS

Check for the following parts, and replace the damaged parts with new parts.

- 1) Steering wheel and steering shaft  
Check the steering shaft for mounting conditions and deflection of front and rear, upward and downward directions, and deflection of front and rear direction with tilt lever released. (After a collision, absorbing part of steering shaft may have been operated.)
- 2) Check the connectors of airbag module, pretensioner, etc. for damage, and also check each harness for pinch and connector damage. Replace the harness as a unit if damage is found.
- 3) Check the seat cushion pad and frame assembly, backrest, seat rail and headrest for deformation, distortion, crack, and installing condition and play.
- 4) For passengers seat, replace the seat cushion pad and frame assembly with new part if it is deformed or cracked.

5) If there are tears or loosening in the passenger side seat cushion cover, it may interfere with the proper operation of the passenger detection system. Replace with a new cushion cover.

6) Be sure to perform the system calibration for the occupant detection system after removing or replacing the passenger seat cushion cover. Failure to do so may cause improper operation of the passenger detection system. <Ref. to OD(diag)-14, SYSTEM CALIBRATION (REZEROING), OPERATION, Subaru Select Monitor.>

7) Use the Subaru Select Monitor to check whether the driver's seat position sensor and the driver's and the front left/right seat belt buckle switches are operating normally.

### B: INSPECTION

If the vehicle is involved in a collision, even if it is a slight collision, be sure to check the following systems.

#### 1. DRIVER'S AIRBAG MODULE

1) Check for the following, and replace the damaged parts with new parts.

- Airbag module is cracked or deformed.
- Harness and/or connector is cracked, deformed or open. Harness wire is exposed.
- The module surface is fouled with grease, oil, water or cleaning solvent.

2) When installing a new driver's airbag module, check for the following, and replace the damaged parts with new parts.

- 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 vertical directions exceed limits.

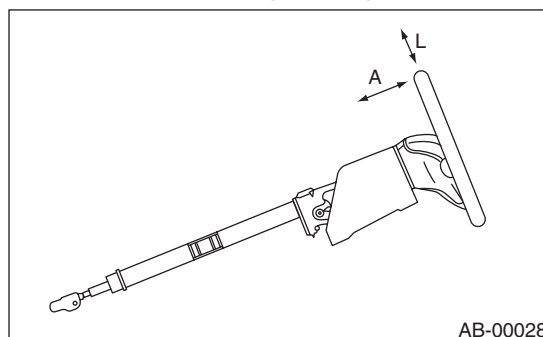
#### Specification:

##### **Axial deflection A**

**Less than 6 mm (0.24 in)**

##### **Vertical deflection L**

**Less than 17 mm (0.67 in)**



AB-00028

# Inspection Locations After a Collision

## AIRBAG SYSTEM

### 2. PASSENGER'S AIRBAG MODULE

Check for the following, and replace the damaged parts with new parts.

- Airbag module and instrument panel are cracked or deformed.
- Harness and/or connector is cracked, deformed or open. Harness wire is exposed.
- Mounting bracket is cracked or deformed.

### 3. SIDE AIRBAG MODULE

Check for the following, and replace the damaged parts with new parts.

- Front seat, airbag module and mounting bracket are damaged or deformed.
- Harness and/or connector is cracked, deformed or open. Harness wire is exposed.

### 4. CURTAIN AIRBAG MODULE

Check for the following, and replace the damaged parts with new parts.

- Airbag cover is scratched or broken.
- Harness and/or connector is cracked, deformed or open. Harness wire is exposed.
- Mounting bracket and securing clip are cracked or deformed.

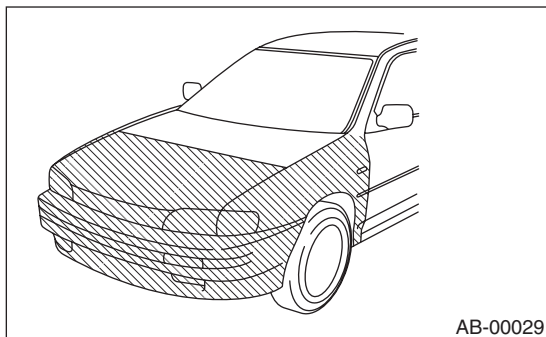
### 5. AIRBAG CONTROL MODULE

Check for the following, and replace the damaged parts with new parts.

- Control module is cracked or deformed.
- Mounting bracket is cracked or deformed.
- Connector is scratched, cracked or deformed.
- Driver's airbag and passenger's airbag are deployed.
- Side airbag is deployed.
- Curtain airbag is deployed.

### 6. FRONT SUB SENSOR

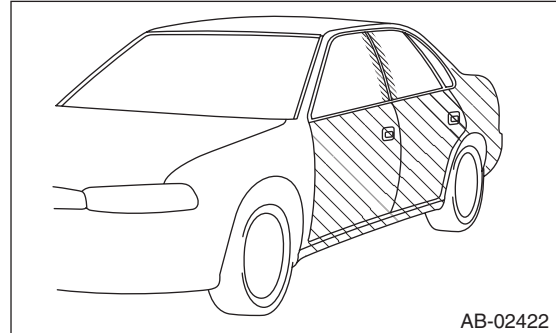
If the section of vehicle as shown in the figure is damaged, check the following items and replace the damaged parts with new parts.



- Front sub sensor is cracked or deformed.
- Connector is scratched, cracked or deformed.
- Driver's airbag and passenger's airbag are deployed.

### 7. SIDE AIRBAG SENSOR, CURTAIN AIRBAG SENSOR AND SATELLITE SAFING SENSOR

If the section of vehicle as shown in the figure is damaged, check the following items and replace the damaged parts with new parts.



- Side airbag sensor, curtain airbag sensor, and satellite safing sensor are cracked or deformed.
- Mounting bracket is cracked or deformed.
- Connector is scratched, cracked or deformed.
- Side airbag or curtain airbag is deployed. (operating side)
- Satellite safing sensor cover is cracked or deformed.

### 8. ROLL CONNECTOR

Check for the following, and replace the damaged parts with new parts.

- Combination switch or steering roll connector is cracked or deformed.

### 9. STEERING SHAFT

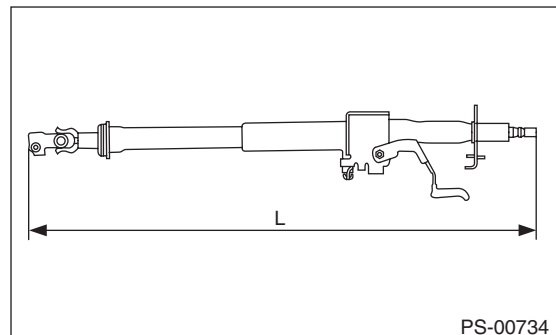
Check for the following, and replace the damaged parts with new parts.

- Overall length of steering column should be within specification.

#### Specification:

#### Overall length L

$$917.5^{+1.3}_{-0.3} \text{ mm } (36.12^{+0.051}_{-0.012} \text{ in})$$





## 10.DRIVER'S SEAT

Check for the following, and replace the damaged parts with new parts.

- Seat belt buckle or seat position sensor body/ bracket is cracked or deformed.
- Harness and/or connector is cracked, deformed or open. Harness wire is exposed.
- Backrest frame for crack or deformation
- Headrest for deformation or play

## 11.PASSENGER'S SEAT

1) Check for the following, and replace the damaged parts with new parts.

- Seat belt buckle body, bracket or connector is scratched, cracked or deformed.
- Backrest frame for crack or deformation
- Headrest for deformation or play
- If the seat cushion cover and seat backrest cover is scratched or coming loose, replace with a new cover and readjust the system. <Ref. to OD(diag)-14, SYSTEM CALIBRATION (REZEROING), OPERATION, Subaru Select Monitor.>

### **CAUTION:**

**If any of the following applies, replace the seat cushion pad and frame assembly. Do not disassemble.**

- **Cracks or deformation found in the seat cushion frame or seat cushion pad.**
- **Scratches, cracks, or deformation found on the passenger detection system pressure sensor hoses or passenger detection control module, or attachment brackets of the control module.**
- **Harness and/or connector is cracked, deformed or open. Harness wire is exposed.**

2) After checking the installing condition of passenger's seat, perform the system calibration of occupant detection system. <Ref. to OD(diag)-14, SYSTEM CALIBRATION (REZEROING), OPERATION, Subaru Select Monitor.>

## 12.BELT TENSION SENSOR

Check for the following, and replace the damaged parts with new parts.

- Belt tension sensor is scratched, cracked, or deformed.
- Harness and/or connector is cracked, deformed or open. Harness wire is exposed.

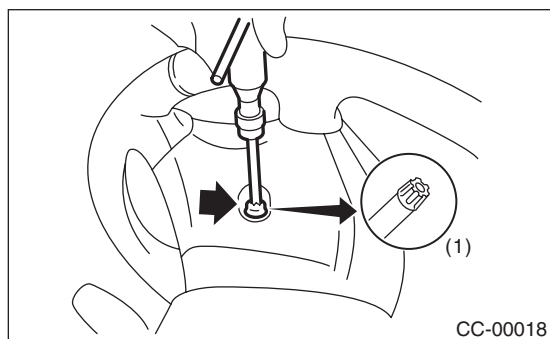
### 4. Driver's Airbag Module

#### A: REMOVAL

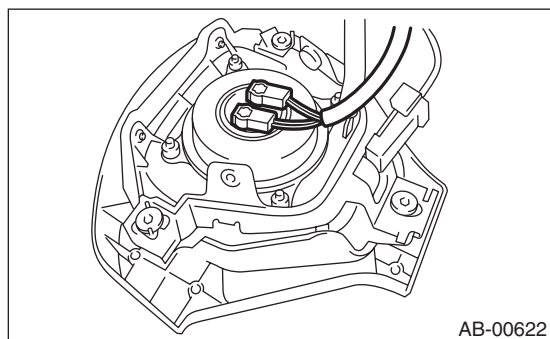
##### CAUTION:

Refer to "CAUTION" of "General Description" before handling the airbag module. <Ref. to AB-4, CAUTION, General Description.>

- 1) Position the front wheels straight ahead. (After moving a vehicle 5 m (16 ft) or more with front wheels positioned straight ahead, make sure that the vehicle moves straight ahead.)
- 2) Turn the ignition switch to OFF.
- 3) Disconnect the ground cable from battery and wait for at least 60 seconds before starting work.
- 4) Using TORX® bit T30 (1), remove the two TORX® bolts on the side of steering wheel.



- 5) Disconnect the horn harness.
- 6) Disconnect the airbag connector on the back of airbag module, and then remove the airbag module. <Ref. to AB-8, PROCEDURE, Airbag Connector.>



- 7) For handling of the removed airbag module, refer to "CAUTION". <Ref. to AB-4, CAUTION, General Description.>

#### B: INSTALLATION

##### CAUTION:

- Refer to "CAUTION" of "General Description" before handling the airbag module. <Ref. to AB-4, CAUTION, General Description.>
- To prevent the misconnection, the connector is colored. Connect the harness side connector to the same color of module side connector. Install in the reverse order of removal.

##### Tightening torque:

10 N·m (1.0 kgf-m, 7.2 ft-lb)

#### C: INSPECTION

##### CAUTION:

Refer to "CAUTION" of "General Description" before handling the airbag module. <Ref. to AB-4, CAUTION, General Description.>

Check for the following, and replace the damaged parts with new parts.

- Airbag module, harness, connector and mounting bracket are damaged. <Ref. to AB-11, DRIVER'S AIRBAG MODULE, INSPECTION, Inspection Locations After a Collision.>

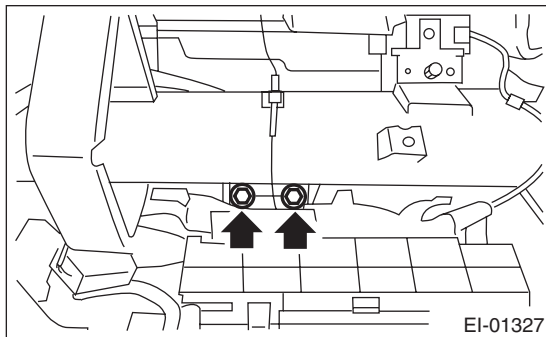
## 5. Passenger's Airbag Module

### A: REMOVAL

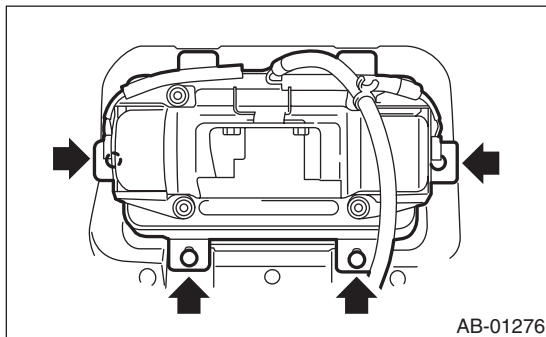
**CAUTION:**

Refer to "CAUTION" of "General Description" before handling the airbag module. <Ref. to AB-4, CAUTION, General Description.>

- 1) Turn the ignition switch to OFF.
- 2) Disconnect the ground cable from battery and wait for at least 60 seconds before starting work.
- 3) Remove the glove box. <Ref. to EI-38, REMOVAL, Glove Box.>
- 4) Remove the mounting bolts of the passenger's side airbag module.



- 5) Remove the instrument panel upper. <Ref. to EI-41, INSTRUMENT PANEL UPPER, REMOVAL, Instrument Panel Assembly.>
- 6) Remove the screws, and remove the passenger's airbag module.



- 7) For handling of the removed airbag module, refer to "CAUTION". <Ref. to AB-4, CAUTION, General Description.>

### B: INSTALLATION

**CAUTION:**

Refer to "CAUTION" of "General Description" before handling the airbag module. <Ref. to AB-4, CAUTION, General Description.>

Install in the reverse order of removal.

**Tightening torque:**

**7.4 N·m (0.75 kgf·m, 5.5 ft·lb)**

### C: INSPECTION

**CAUTION:**

Refer to "CAUTION" of "General Description" before handling the airbag module. <Ref. to AB-4, CAUTION, General Description.>

Check for the following, and replace the damaged parts with new parts.

- Airbag module, harness, connector and mounting bracket are damaged. <Ref. to AB-12, PASSENGER'S AIRBAG MODULE, INSPECTION, Inspection Locations After a Collision.>

# Side Airbag Module

## AIRBAG SYSTEM

### 6. Side Airbag Module

#### A: REMOVAL

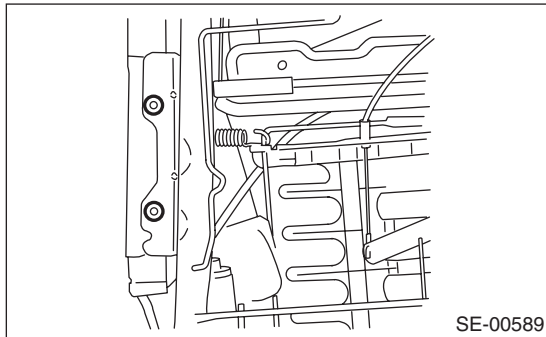
##### CAUTION:

Refer to “CAUTION” of “General Description” before handling the airbag module. <Ref. to AB-4, CAUTION, General Description.>

##### NOTE:

Remove the passenger’s side by referring to driver’s side.

- 1) Turn the ignition switch to OFF.
- 2) Disconnect the ground cable from battery and wait for at least 60 seconds before starting work.
- 3) Remove the front seats. <Ref. to SE-7, REMOVAL, Front Seat.>
- 4) Disconnect the connector from the back side of seat cushion assembly, then remove the side airbag harness.
- 5) Remove the backrest cover. <Ref. to SE-8, DISASSEMBLY, Front Seat.>
- 6) Remove the nuts, and remove the side airbag module assembly from the back rest frame assembly.

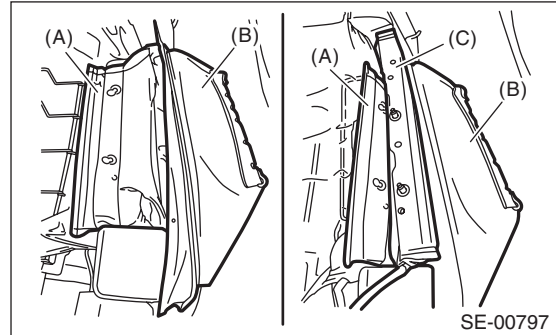


#### B: INSTALLATION

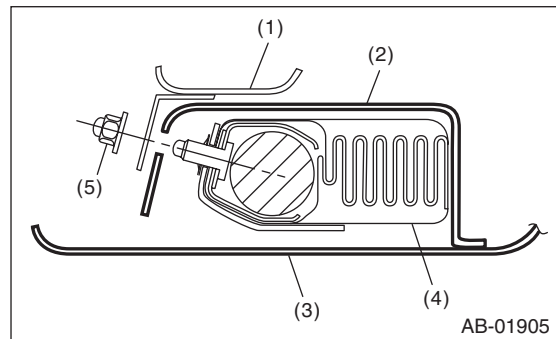
##### CAUTION:

- Refer to “CAUTION” of “General Description” before handling the airbag module. <Ref. to AB-4, CAUTION, General Description.>
- Be sure to perform the system calibration for occupant detection system after passenger’s seat installation. <Ref. to OD(diag)-14, SYSTEM CALIBRATION (REZEROING), OPERATION, Subaru Select Monitor.>

- When installing the side airbag module assembly, be sure to put the side airbag module between backrest cover and airbag guide cloth.



- (A) Airbag guide cloth
- (B) Backrest cover
- (C) Side airbag module ASSY



- (1) Backrest frame ASSY
- (2) Airbag guide cloth
- (3) Backrest cover
- (4) Side airbag module ASSY
- (5) Hexagon cap nut

Besides, when the backrest cover is not installed securely, the side airbag module may not be deployed properly, therefore keep strictly to the following procedure.

- Be careful not to stain or damage the backrest cover during assembly.
- Do not reuse hog rings.
- Secure the hog ring using hog ring pliers.
- Install the hog rings to the specified points securely and make sure that no wrinkle or twisting on backrest cover.

- 1) Make sure that there is no foreign matter on side airbag module.
- 2) Install the side airbag module (A) to backrest frame assembly.

##### Tightening torque:

**6 N·m (0.61 kgf·m, 4.4 ft·lb)**

- 3) Install the side airbag harness to backrest frame assembly.
- 4) Install the backrest cover.

5) Install the side airbag harness to the clips on the back of the seat cushion assembly and on the slide rail.

6) Recline the seat or slide it backward and forward, and check there is no contact between the seat backrest assembly, cushion cover assembly and side airbag harness.

7) Install the front seat to the vehicle body.

**Tightening torque:**

**Refer to “COMPONENT” of “General Description”. <Ref. to SE-2, FRONT SEAT (DRIVER’S SEAT), COMPONENT, General Description.>**

## C: INSPECTION

**CAUTION:**

**Refer to “CAUTION” of “General Description” before handling the airbag module. <Ref. to AB-4, CAUTION, General Description.>**

Check for the following, and replace the damaged parts with new parts. <Ref. to AB-12, SIDE AIRBAG MODULE, INSPECTION, Inspection Locations After a Collision.>

1) With side collision (when side airbag is deployed)

- Side airbag module assembly
- Backrest pad assembly
- Backrest frame assembly
- Backrest cover assembly
- Side airbag sensor
- Curtain airbag sensor
- Satellite safing sensor

2) When damage is found by visual check

- Headrest assembly
- Bushing
- Slide rail OUT
- Slide rail IN
- Seat cushion frame assembly (Passenger’s side)
- Seat hinge cover
- Power seat switch
- Memory switch
- Satellite safing sensor cover
- Satellite safing sensor bracket
- Side airbag harness and connector on body side

3) With side collision (when side airbag is not deployed)

Check the seat, sensor, and airbag module visually, and then replace them with new parts if damaged or cracked.

Specially inspect the damage of airbag module body, mounting bracket and harness connector.

4) Without side collision (dirt and damage of cover)  
Replace the corresponding part with a new part.

## 7. Curtain Airbag Module

### A: REMOVAL

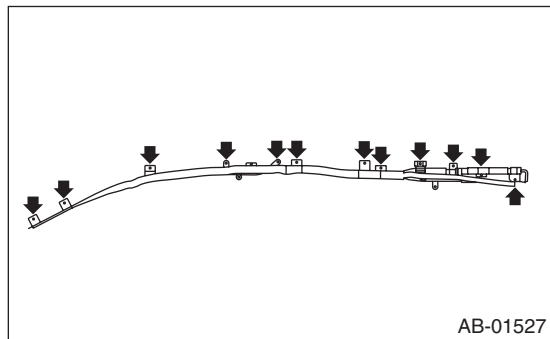
**CAUTION:**

Refer to “CAUTION” of “General Description” before handling the airbag module. <Ref. to AB-4, CAUTION, General Description.>

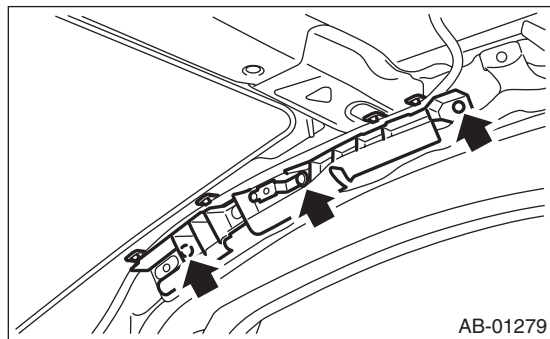
- 1) Turn the ignition switch to OFF.
- 2) Disconnect the ground cable from battery and wait for at least 60 seconds before starting work.
- 3) Remove the front pillar upper trim and center pillar upper trim.
  - Front pillar upper trim <Ref. to EI-44, FRONT PILLAR UPPER TRIM, REMOVAL, Side Trim.>
  - Center pillar upper trim <Ref. to EI-45, CENTER PILLAR UPPER TRIM, REMOVAL, Side Trim.>
- 4) Remove the rear quarter trim. <Ref. to EI-46, REMOVAL, Rear Quarter Trim.>
- 5) Remove the roof trim. <Ref. to EI-51, REMOVAL, Roof Trim.>
- 6) Disconnect the connector from curtain airbag module.
- 7) Remove the bolt, and remove the curtain airbag module.

**CAUTION:**

- Be careful not to damage the curtain airbag module during removal.
- Never open the curtain airbag module before deploying it. Never reuse the deployed curtain airbag module.



- 8) Remove the front pillar pad from the front pillar.



### B: INSTALLATION

**CAUTION:**

- Refer to “CAUTION” of “General Description” before handling the airbag module. <Ref. to AB-4, CAUTION, General Description.>
- When installing the curtain airbag module, install a specified part at specified place.
- Be careful not to damage the curtain airbag module during removal.
- Never open the curtain airbag module before deploying it. Never reuse the deployed curtain airbag module.
- Make sure that there are no foreign matter on airbag module.

Install in the reverse order of removal.

**Tightening torque:**

**7.5 N·m (0.76 kgf·m, 5.5 ft·lb)**

## C: INSPECTION

### CAUTION:

Refer to “CAUTION” of “General Description” before handling the airbag module. <Ref. to AB-4, CAUTION, General Description.>

Check for the following, and replace the damaged parts with new parts. <Ref. to AB-12, CURTAIN AIRBAG MODULE, INSPECTION, Inspection Locations After a Collision.>

1) With side collision (when curtain airbag is deployed)

- Curtain airbag module assembly
- Roof trim
- Front pillar upper trim
- Front pillar pad (blue)
- Center pillar upper trim
- Center pillar pad (green)
- Rear quarter upper trim
- Rear quarter pillar pad (red)
- Airbag guide
- Curtain airbag sensor
- Satellite safing sensor

2) When damage is found by visual check

- Assist grip
- Assist grip bracket
- Curtain airbag harness and connector on body side.
- Satellite safing sensor bracket
- Satellite safing sensor cover

3) With side collision (when curtain airbag is not deployed)

Check the roof trim, pillar trim, airbag module and sensor visually, and then replace them with new parts if damaged or cracked.

Specially inspect the damage of airbag module body, mounting bracket and harness connector.

4) Without side collision (dirt and damage of cover)

Replace the corresponding part with a new part.

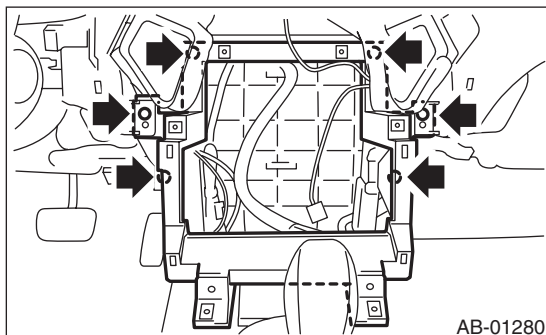
## 8. Airbag Control Module

### A: REMOVAL

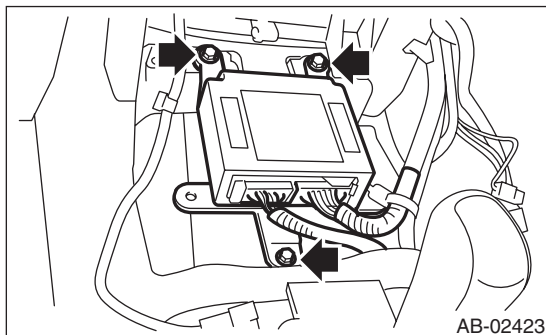
#### CAUTION:

- Do not disassemble the airbag control module.
- If the airbag control module is deformed or if the fault occurs by water, replace the airbag control module with a new 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 the ignition switch to OFF.
- 2) Disconnect the ground cable from battery and wait for at least 60 seconds before starting work.
- 3) Remove the center console. <Ref. to EI-40, REMOVAL, Center Console.>
- 4) Remove the console box. <Ref. to EI-39, REMOVAL, Console Box.>
- 5) Remove the instrument panel lower cover. <Ref. to EI-37, REMOVAL, Instrument Panel Lower Cover.>
- 6) Remove the glove box. <Ref. to EI-38, REMOVAL, Glove Box.>
- 7) Remove the audio unit. <Ref. to ET-13, REMOVAL, Audio.>
- 8) Remove the screws, and remove the center console frame.



- 9) Disconnect the connector from airbag control module.
- 10) Remove the bolts and remove airbag control module.



### B: INSTALLATION

#### CAUTION:

- Do not reuse the bolt and nut.
- Always use new bolts and nuts for them.
- Be sure to put the water protection cover over the connector.

Install in the reverse order of removal.

#### Tightening torque:

25 N·m (2.5 kgf-m, 18.1 ft-lb)

### C: INSPECTION

Check for the following, and replace the damaged parts with new parts.

- Control module, connector, and mounting bracket are damaged.
- Airbag is deployed.
- Side airbag is deployed.
- Curtain airbag is deployed.



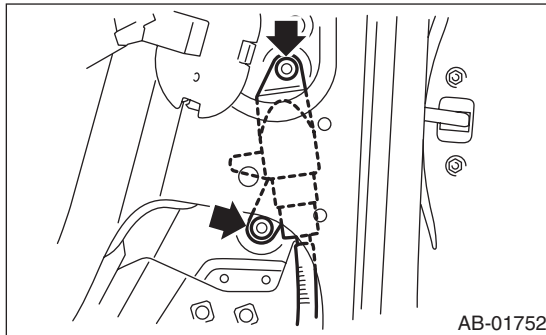
## 9. Side Airbag Sensor

### A: REMOVAL

#### CAUTION:

Do not separate the side airbag sensor and bracket. Doing so will cause the airbag system malfunction. If the sensor is removed from the bracket, be sure to replace with a new part.

- 1) Turn the ignition switch to OFF.
- 2) Disconnect the ground cable from battery and wait for at least 60 seconds before starting work.
- 3) Remove the center pillar lower trim. <Ref. to EI-45, CENTER PILLAR LOWER TRIM, REMOVAL, Side Trim.>
- 4) Remove the seat belt retractor of the front outer seat belt. <Ref. to SB-18, OUTER SEAT BELT ASSEMBLY, REMOVAL, Front Seat Belt.>
- 5) Remove the nut and disconnect the airbag connector to remove side airbag sensor.



### B: INSTALLATION

#### CAUTION:

- Do not reuse the bolt and nut.
- Always use new bolts and nuts for them.

Install in the reverse order of removal.

#### *Tightening torque:*

*7.5 N·m (0.76 kgf-m, 5.5 ft-lb)*

### C: INSPECTION

Check for the following, and replace the damaged parts with new parts.

- Side airbag sensor, mounting bracket or connector is damaged.
- Side airbag is deployed.

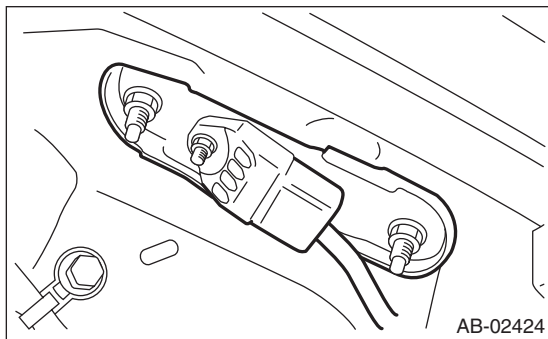
## 10. Curtain Airbag Sensor

### A: REMOVAL

#### CAUTION:

Do not separate the curtain airbag sensor and bracket. Doing so will cause the airbag system malfunction. If the sensor is removed from the bracket, be sure to replace with a new part.

- 1) Turn the ignition switch to OFF.
- 2) Disconnect the ground cable from battery and wait for at least 60 seconds before starting work.
- 3) Remove the rear quarter lower trim. <Ref. to EI-46, REMOVAL, Rear Quarter Trim.>
- 4) Remove the nut and disconnect the airbag connector to remove the curtain airbag sensor.



### B: INSTALLATION

#### CAUTION:

- Do not reuse the bolt and nut.
- Always use new bolts and nuts for them.

Install in the reverse order of removal.

#### *Tightening torque:*

*7.5 N·m (0.76 kgf·m, 5.5 ft·lb)*

### C: INSPECTION

Check for the following, and replace the damaged parts with new parts.

- Curtain airbag sensor, mounting bracket or connector is damaged.
- Curtain airbag is deployed.

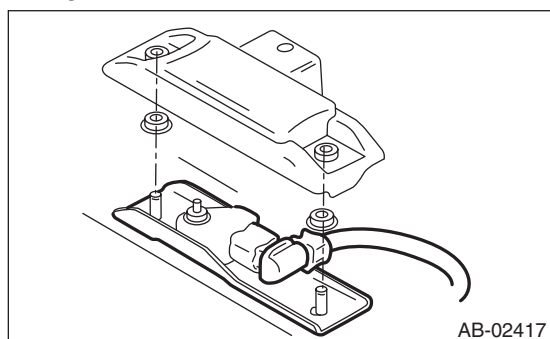
## 11. Satellite Safing Sensor

### A: REMOVAL

#### CAUTION:

Do not separate the satellite safing sensor and bracket. Doing so will cause the airbag system malfunction. If the sensor is removed from the bracket, be sure to replace with a new part.

- 1) Turn the ignition switch to OFF.
- 2) Disconnect the ground cable from battery and wait for at least 60 seconds before starting work.
- 3) Remove the second row seats. <Ref. to SE-15, REMOVAL, Second Seat.>
- 4) Remove the satellite safing sensor.
  - (1) Remove the cover.
  - (2) Disconnect the airbag connector.
  - (3) Remove the nut, and remove the satellite safing sensor.



### B: INSTALLATION

#### CAUTION:

- Do not reuse the bolt and nut.
- Always use new bolts and nuts for them.
- When installing the satellite safing sensor cover, push the cover securely until it contacts the floor panel.
- If the satellite safing sensor cover can be removed easily because the connection part with the satellite safing sensor has become loose, replace the cover with a new part.
- After installing the satellite safing sensor cover, make sure that the sensor harness is not caught.

Install in the reverse order of removal.

#### *Tightening torque:*

*7.5 N·m (0.76 kgf-m, 5.5 ft-lb)*

### C: INSPECTION

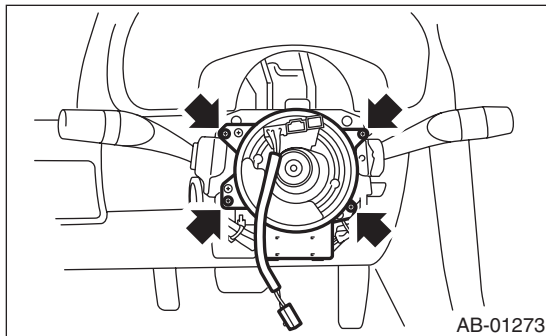
Check for the following, and replace the damaged parts with new parts.

- Satellite safing sensor, mounting bracket or connector is damaged.
- The satellite safing sensor cover is damaged
- Side airbag or curtain airbag is deployed.

## 12.Roll Connector

### A: REMOVAL

- 1) Turn the ignition switch to OFF.
- 2) Disconnect the ground cable from battery and wait for at least 60 seconds before starting work.
- 3) Remove the driver's airbag module. <Ref. to AB-14, REMOVAL, Driver's Airbag Module.>
- 4) Remove the steering wheel. <Ref. to PS-12, REMOVAL, Steering Wheel.>
- 5) Remove the steering column cover.
- 6) Remove the screws, and then remove the roll connector.



### B: INSTALLATION

- 1) Install in the reverse order of removal.
- 2) Before installing steering wheel, be sure to adjust the direction of roll connector with steering. <Ref. to AB-24, ADJUSTMENT, Roll Connector.>

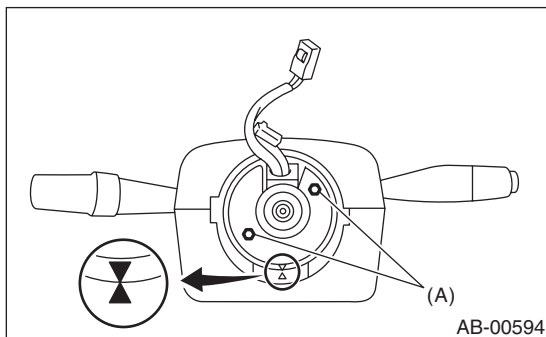
### C: INSPECTION

Check for the following, and replace the damaged parts with new parts.

- Combination switch and roll connector are cracked or deformed.

### D: ADJUSTMENT

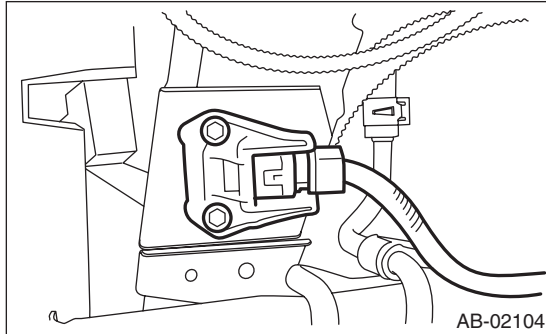
- 1) Check that front wheels are positioned in straight ahead direction.
- 2) Turn the roll connector pin (A) clockwise until it stops.
- 3) Turn the roll connector pins (A) approx. 3.25 turns until "▲" marks are aligned.



## 13. Front Sub Sensor

### A: REMOVAL

- 1) Turn the ignition switch to OFF.
- 2) Disconnect the ground cable from battery and wait for at least 60 seconds before starting work.
- 3) Remove the front bumper face. <Ref. to EI-22, FRONT BUMPER FACE, REMOVAL, Front Bumper.>
- 4) Remove the bolt, and then detach the front sub sensor.



- 5) Disconnect the connector from front sub sensor.

### B: INSTALLATION

#### CAUTION:

- Do not reuse the bolt and nut.
- Always use new bolts and nuts for them.

Install in the reverse order of removal.

#### *Tightening torque:*

*13 N·m (1.32 kgf-m, 9.6 ft-lb)*

### C: INSPECTION

Check for the following, and replace the damaged parts with new parts.

- Front sub sensor and connector are damaged.
- Airbag is deployed.

# Front Sub Sensor

AIRBAG SYSTEM

---

# AIRBAG SYSTEM (DIAGNOSTICS)

# *AB(diag)*

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# Basic Diagnostic Procedure

## AIRBAG SYSTEM (DIAGNOSTICS)

### 1. Basic Diagnostic Procedure

#### A: PROCEDURE

	Step	Check	Yes	No
1	<b>CHECK WARNING LIGHT.</b> Check whether the airbag warning light in the combination meter is lit.	Does the airbag warning light illuminate?	Go to step 2.	Perform the diagnosis according to phenomenon of the problem.
2	<b>READ DTC.</b> 1) Turn the ignition switch to OFF. 2) Connect the Subaru Select Monitor to data link connector. 3) Turn the ignition switch to ON and run the Subaru Select Monitor. 4) Read the DTC. <Ref. to AB(diag)-27, OPERATION, Read Diagnostic Trouble Code (DTC).> NOTE: If the communication function of the Subaru Select Monitor cannot be executed properly, check the communication circuit. <Ref. to AB(diag)-24, COMMUNICATION FOR INITIALIZING IMPOSSIBLE, INSPECTION, Subaru Select Monitor.> 5) Record all DTCs and freeze frame data.	Is DTC displayed?	Go to step 3.	Go to "Airbag Warning Light Failure". <Ref. to AB(diag)-31, Airbag Warning Light Failure.>
3	<b>PERFORM DIAGNOSIS.</b> 1) Determine the possible cause from "List of Diagnostic Trouble Code (DTC)". <Ref. to AB(diag)-35, List of Diagnostic Trouble Code (DTC).> 2) Inspect the DTC using "List of Diagnostic Trouble Code (DTC)". 3) Repair the trouble cause. 4) Perform the Clear Memory Mode. <Ref. to AB(diag)-29, Clear Memory Mode.> 5) Perform the Inspection Mode. <Ref. to AB(diag)-28, Inspection Mode.> 6) Read any other DTCs displayed.	Is DTC displayed?	Perform the procedure 1) to 5) in step 3.	Finish the diagnosis.



## Check List for Interview

AIRBAG SYSTEM (DIAGNOSTICS)

### 2. Check List for Interview

#### A: CHECK

Customer's name		Inspector's name	
Date vehicle brought in	/ /	Registration No.	
Odometer reading	km miles	V.I.N.	
Date problem occurred	/ /	Registration year	/ /
Weather	<input type="checkbox"/> Fine <input type="checkbox"/> Cloudy <input type="checkbox"/> Rainy <input type="checkbox"/> Snowy <input type="checkbox"/> Others:		
Temperature	°C ( °F)		
Road condition	<input type="checkbox"/> Flat road <input type="checkbox"/> Uphill <input type="checkbox"/> Downhill <input type="checkbox"/> Gravel road <input type="checkbox"/> Others:		
Vehicle operation	<input type="checkbox"/> Starting <input type="checkbox"/> Idling <input type="checkbox"/> Driving <input type="checkbox"/> Constant speed <input type="checkbox"/> Accelerating <input type="checkbox"/> Decelerating <input type="checkbox"/> Turning <input type="checkbox"/> Others:		
Details of problem			
Airbag warning light operation	<input type="checkbox"/> Normal (After turning the ignition switch to ON, lit for approximately 6 seconds and goes off.) <input type="checkbox"/> Remains ON <input type="checkbox"/> Remains OFF		
DTC output	<input type="checkbox"/> OK code <input type="checkbox"/> DTC: (Code:                    )		

# General Description

AIRBAG SYSTEM (DIAGNOSTICS)

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## 3. General Description

### A: CAUTION

Refer to "CAUTION" in "General Description" in Airbag System. <Ref. to AB-4, CAUTION, General Description.>

### B: INSPECTION

Measure the battery voltage and check electrolyte.

**Standard voltage: 12 V**

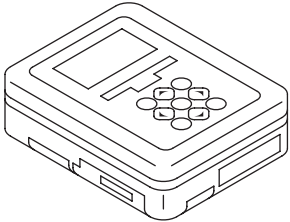
**Specific gravity: 1.260 or more**

### C: PREPARATION TOOL

#### CAUTION:

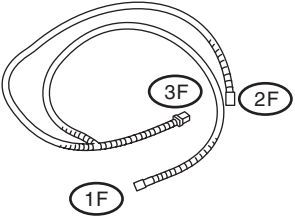
To measure the voltage and resistance of airbag system component, be sure to use the specified test harness.

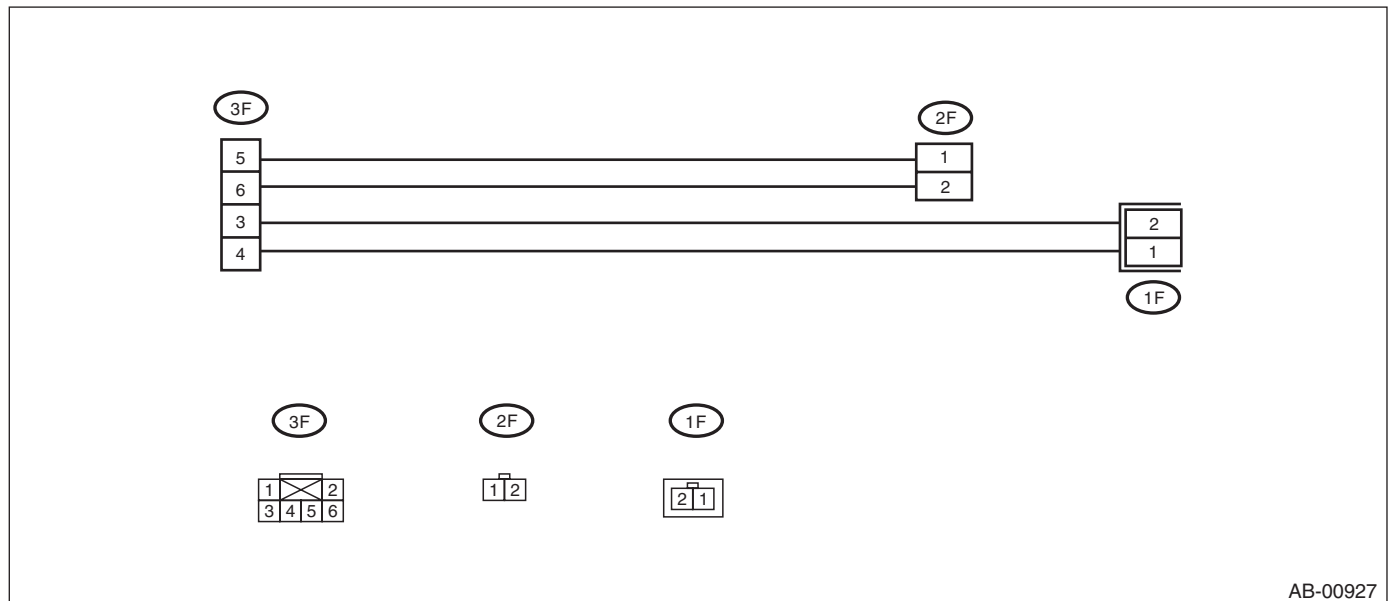
#### 1. SPECIAL TOOL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST1B022XU0	1B022XU0	SUBARU SELECT MONITOR III KIT	Used for troubleshooting the electrical system.

# General Description

• TEST HARNESS F

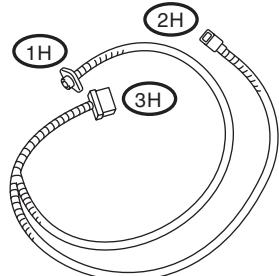
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>ST98299FC010</p>	98299FC010	TEST HARNESS F	Used when measuring voltage and resistance of the side airbag module harnesses.

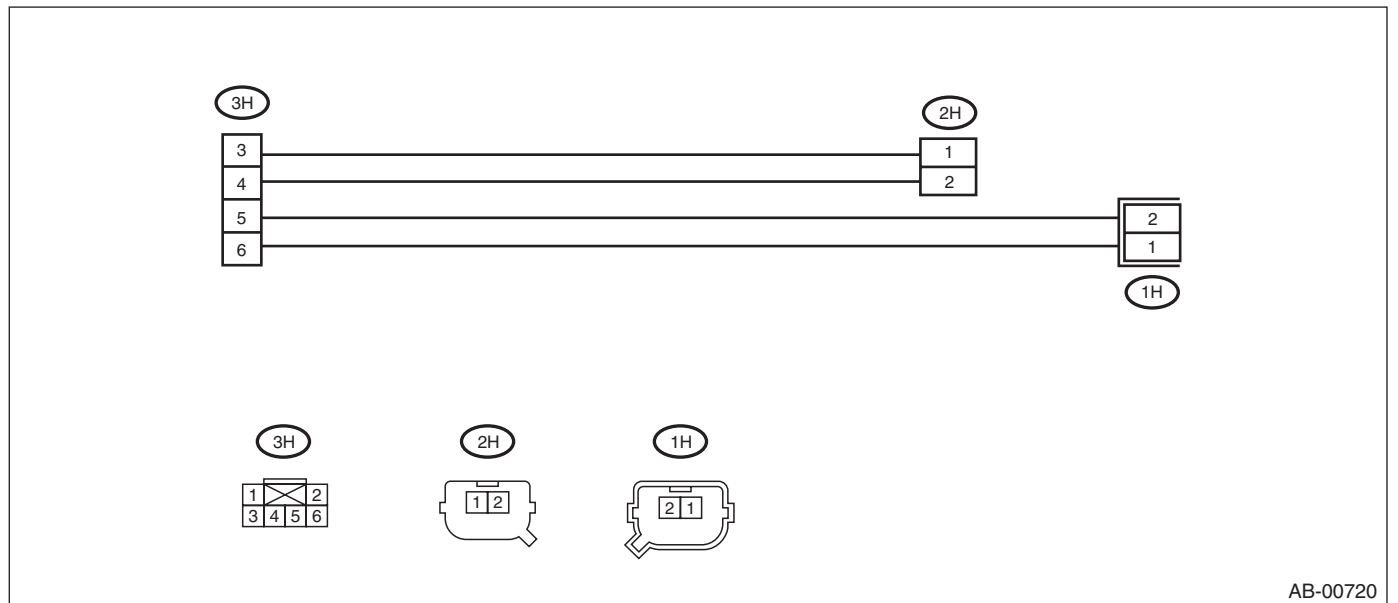


# General Description

## AIRBAG SYSTEM (DIAGNOSTICS)

- TEST HARNESS H

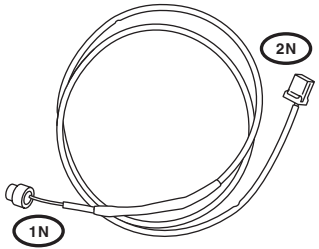
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>ST98299FA030</p>	98299FA030	TEST HARNESS H	Used when measuring voltage and resistance of front sub sensor and satellite safing sensor.

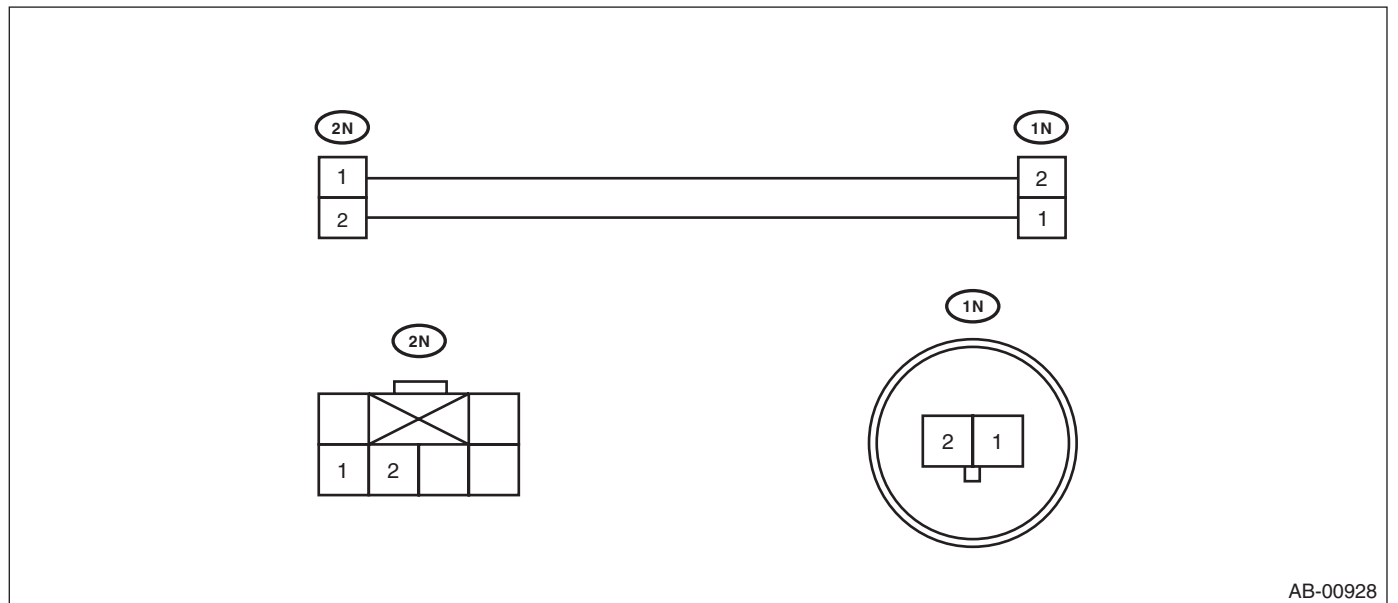


# General Description

AIRBAG SYSTEM (DIAGNOSTICS)

- TEST HARNESS N

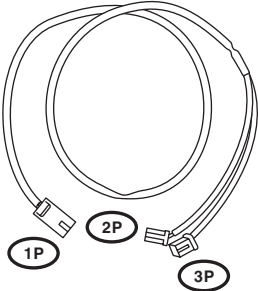
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>ST98299SA000</p>	98299SA000	TEST HARNESS N	Used when measuring voltage and resistance of driver's airbag module, seat belt pretensioner and curtain airbag module.

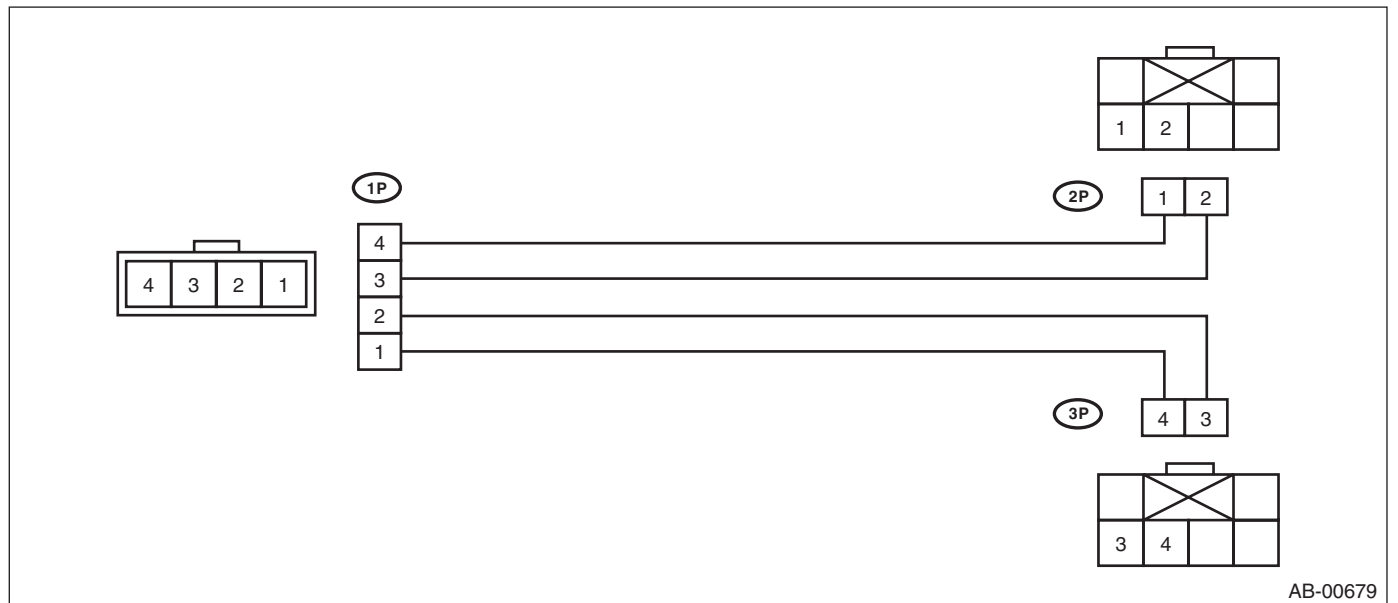


# General Description

## AIRBAG SYSTEM (DIAGNOSTICS)

- TEST HARNESS P

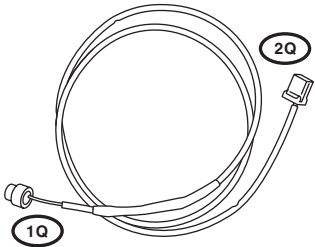
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>ST98299SA020</p>	98299SA020	TEST HARNESS P	Used when measuring voltage and resistance of driver's airbag module harness and passenger's airbag module harness.

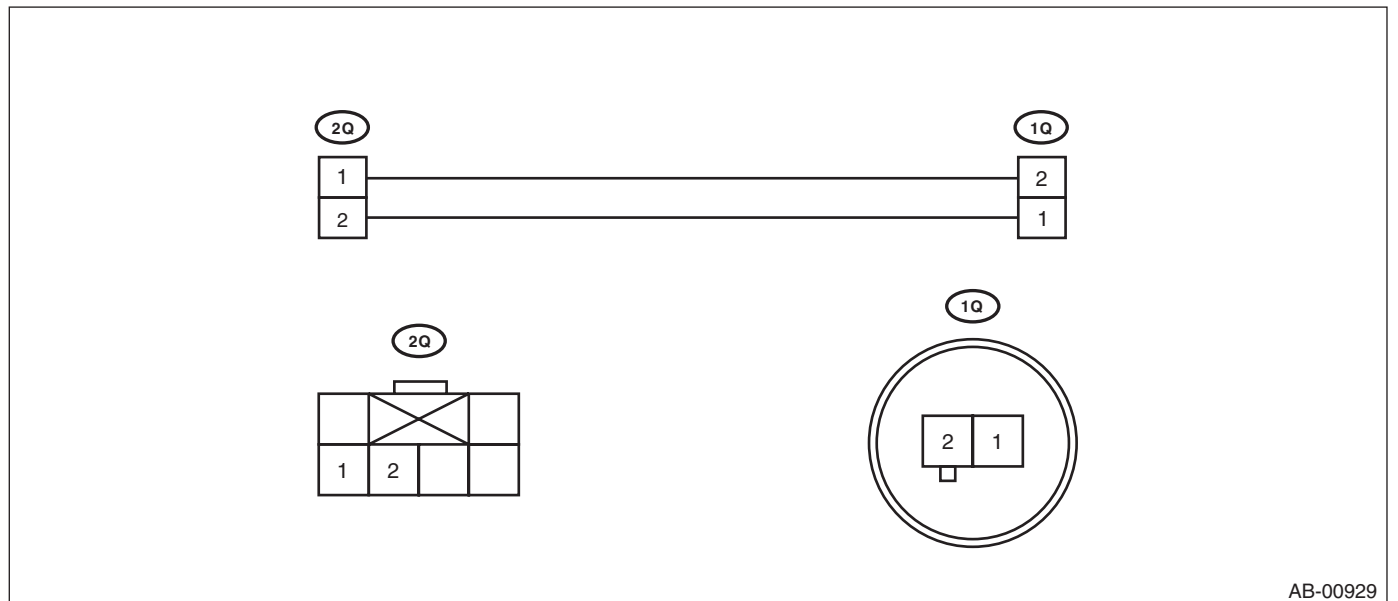


# General Description

AIRBAG SYSTEM (DIAGNOSTICS)

- TEST HARNESS Q

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>ST98299SA040</p>	98299SA040	TEST HARNESS Q	Used when measuring voltage and resistance of driver's airbag module.

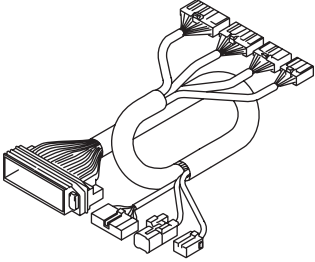


AB-00929

# General Description

## AIRBAG SYSTEM (DIAGNOSTICS)

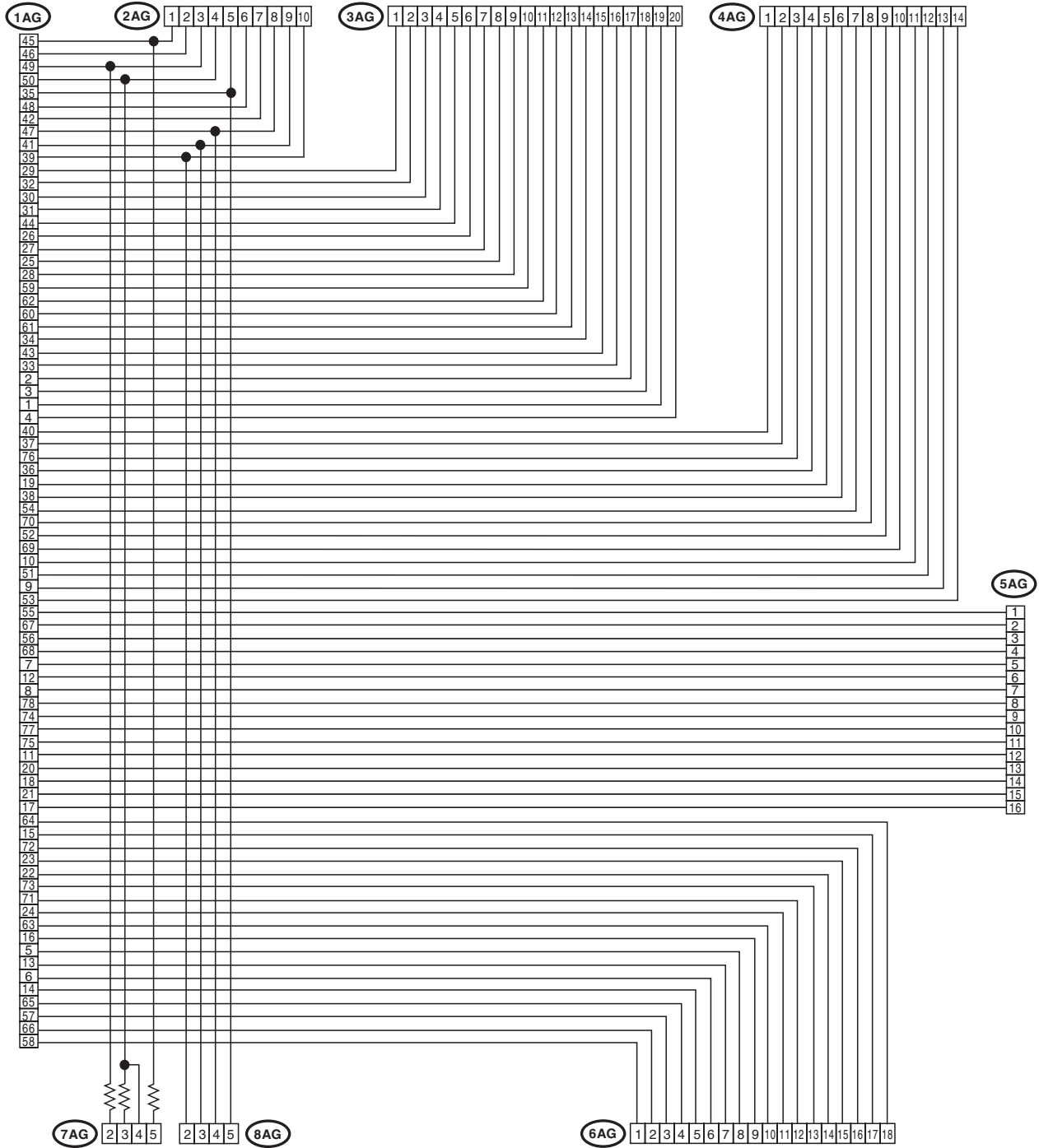
- TEST HARNESS AG

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>ST98299AG070</p>	98299AG070	TEST HARNESS AG	Used when measuring voltage and resistance of airbag control module.



# General Description

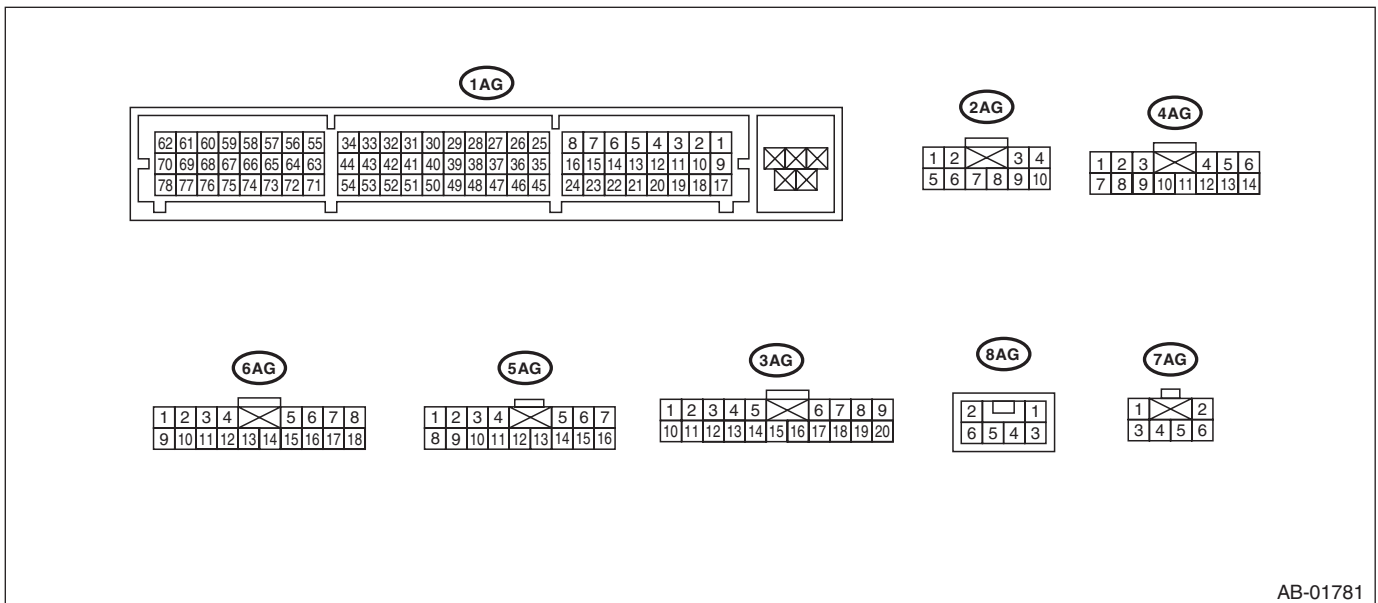
## AIRBAG SYSTEM (DIAGNOSTICS)



AB-01872

# General Description

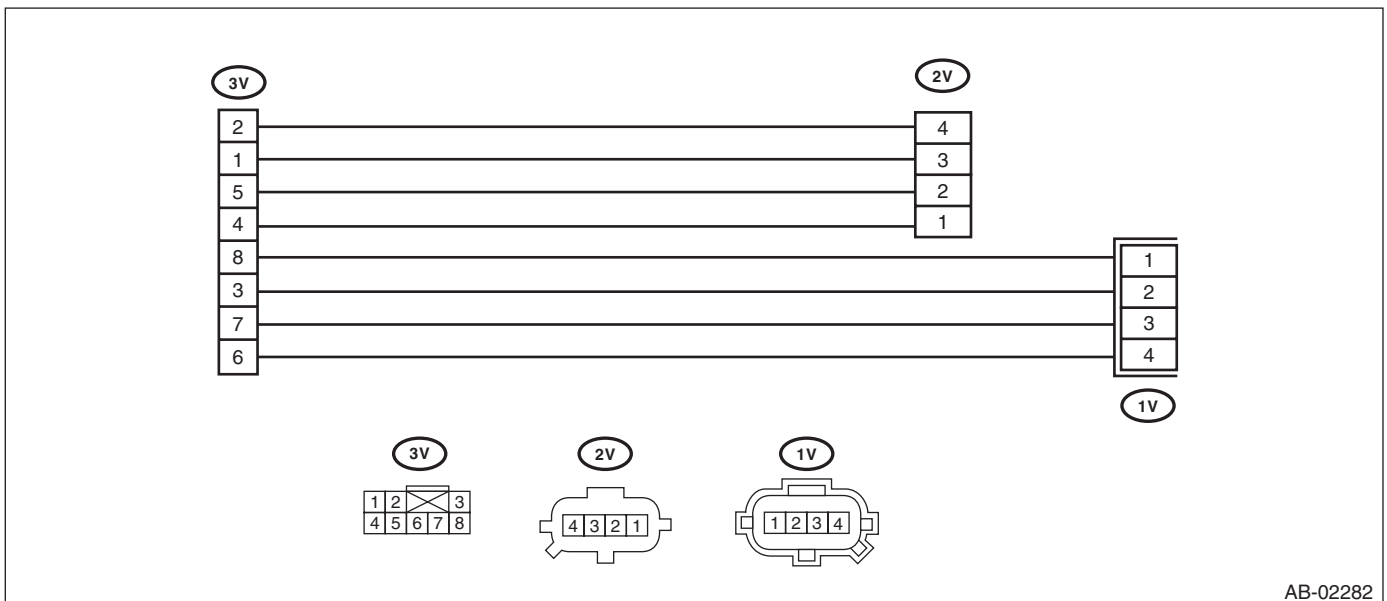
## AIRBAG SYSTEM (DIAGNOSTICS)



AB-01781

### • TEST HARNESS V

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
<p>ST98299AG010</p>	98299AG010	TEST HARNESS V	Used when measuring voltage and resistance of side airbag sensor and curtain airbag sensor.

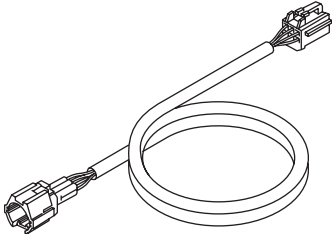


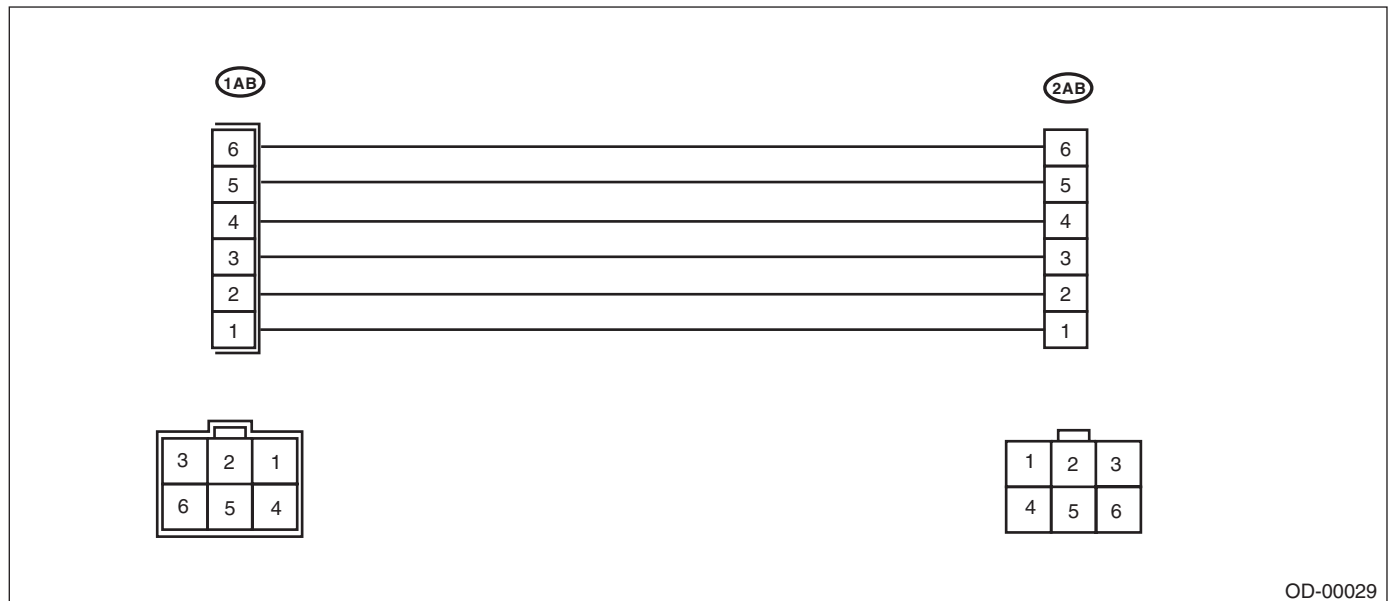
AB-02282

# General Description

AIRBAG SYSTEM (DIAGNOSTICS)

- TEST HARNESS AB

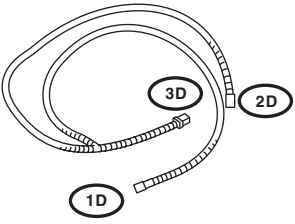
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>ST98299XA000</p>	98299XA000	TEST HARNESS AB	Used when measuring voltage and resistance of occupant detection system.

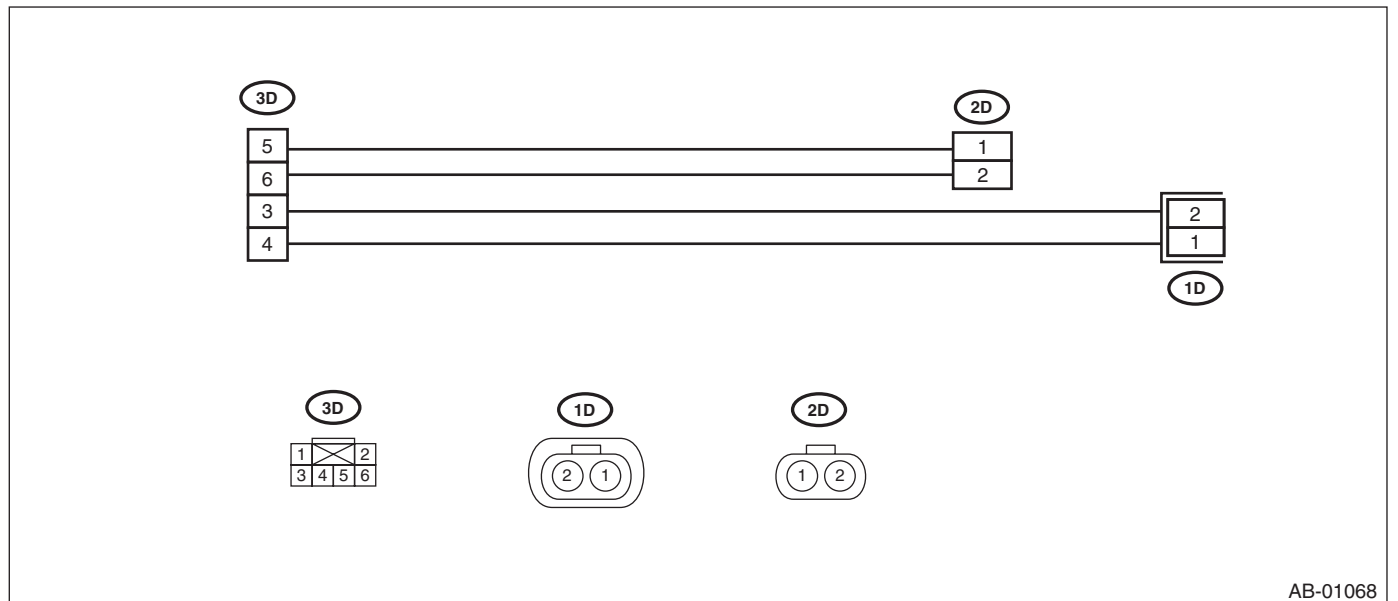


# General Description

## AIRBAG SYSTEM (DIAGNOSTICS)

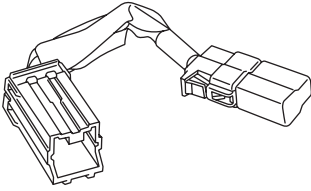
- TEST HARNESS D

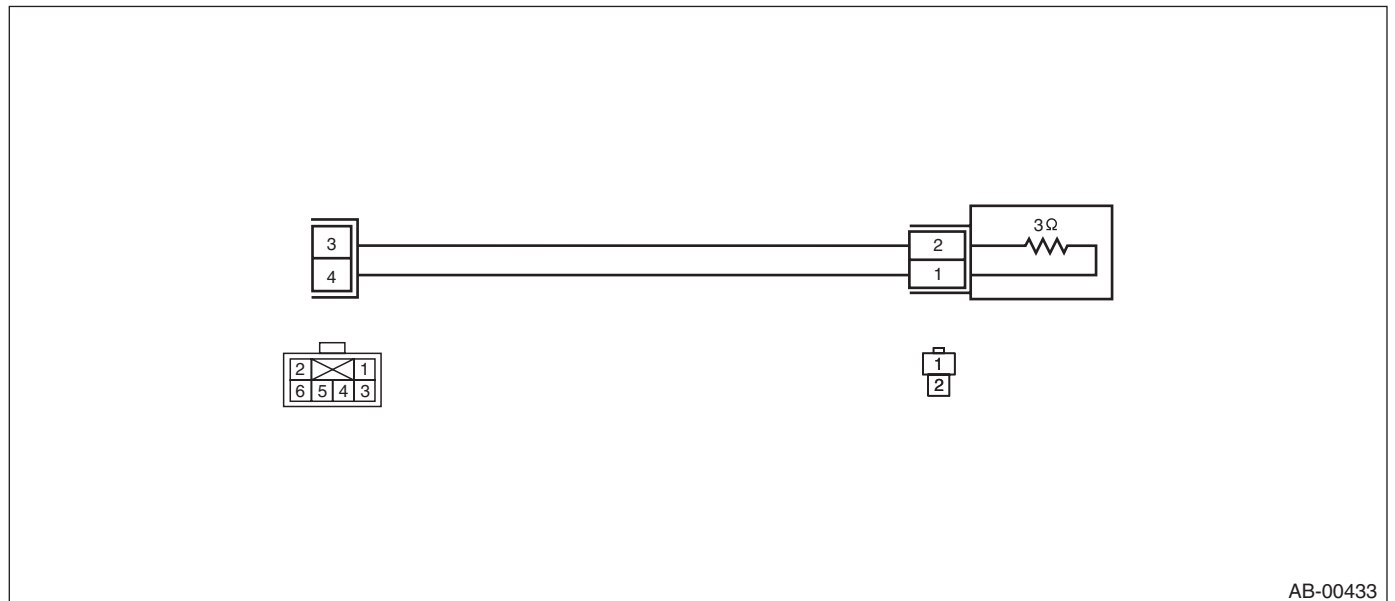
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>ST98299AG060</p>	98299AG060	TEST HARNESS D	Used when measuring voltage and resistance of the front seat belt buckle switch.



# General Description

- AIRBAG RESISTOR

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST98299PA040	98299PA040	AIRBAG RESISTOR	Used in replacement of airbag module for which resistance value is same as airbag module. Two STs are required for diagnosis of two-stage inflator type airbag module.

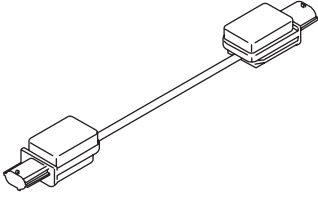


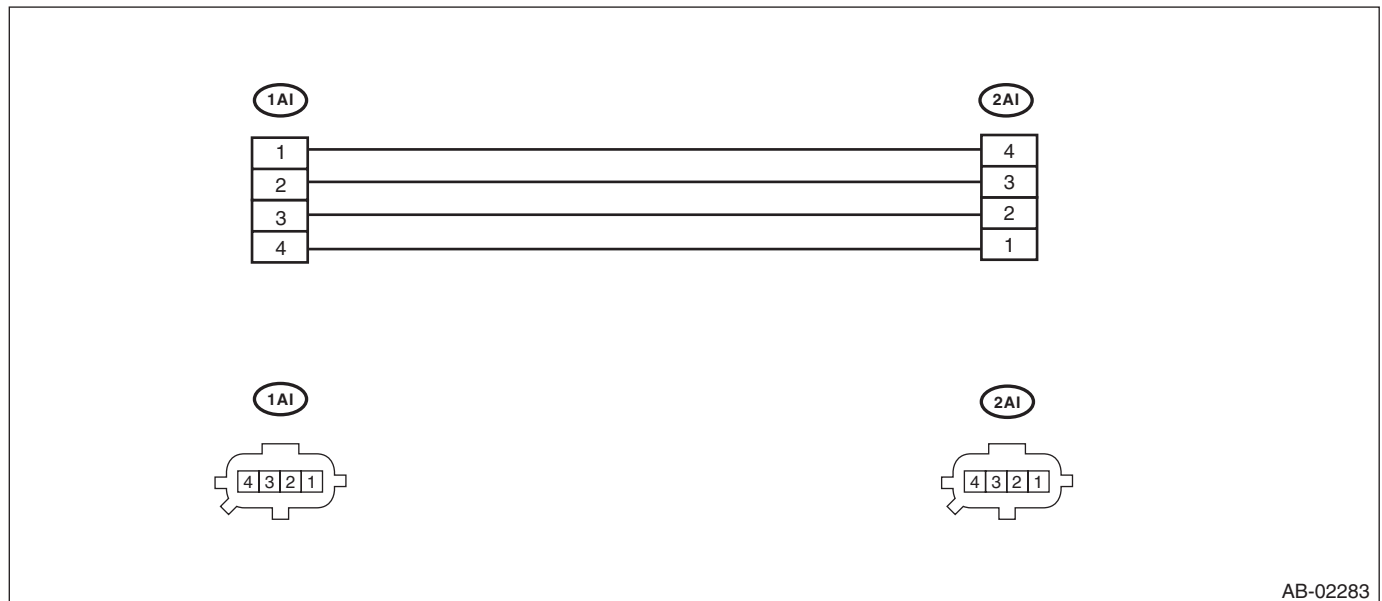
AB-00433

# General Description

## AIRBAG SYSTEM (DIAGNOSTICS)

### • TEST HARNESS AI

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>ST98299AG090</p>	98299AG090	TEST HARNESS AI	<ul style="list-style-type: none"> <li>Used for diagnoses of side airbag sensor and curtain airbag sensor.</li> <li>Used together with test harness V.</li> </ul>



## 2. GENERAL TOOL

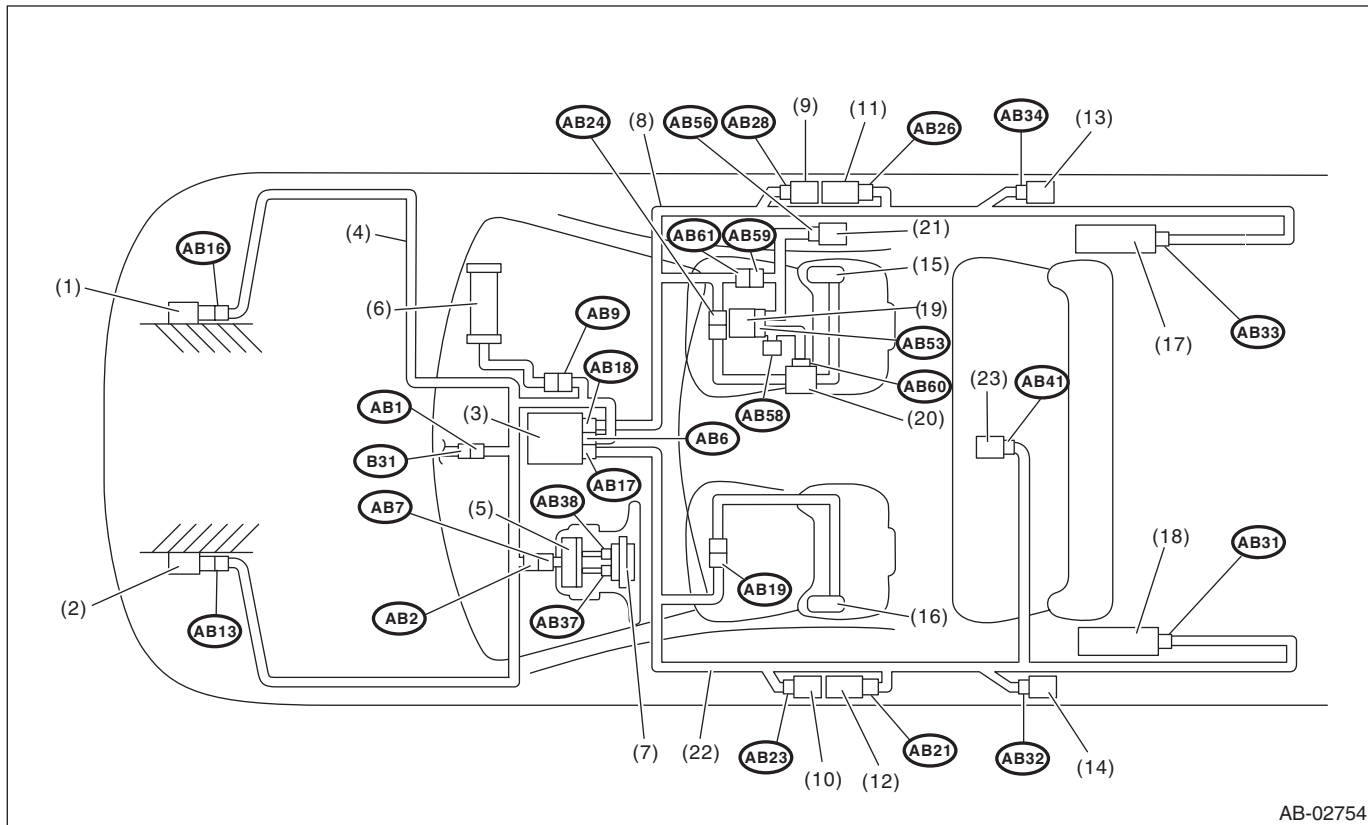
TOOL NAME	REMARKS
Circuit tester	Used for measuring resistance, voltage and current.
Oscilloscope	Used for measuring the sensor.

# Electrical Component Location

AIRBAG SYSTEM (DIAGNOSTICS)

## 4. Electrical Component Location

### A: LOCATION



- |                               |                                  |  |
|-------------------------------|----------------------------------|--|
| (1) Front sub sensor (RH)     | (9) Side airbag sensor (RH)      | (17) Curtain airbag module (RH)        |
| (2) Front sub sensor (LH)     | (10) Side airbag sensor (LH)     | (18) Curtain airbag module (LH)        |
| (3) Airbag control module     | (11) Seat belt pretensioner (RH) | (19) Occupant detection control module |
| (4) Airbag main harness       | (12) Seat belt pretensioner (LH) | (20) Buckle switch (RH)                |
| (5) Roll connector            | (13) Curtain airbag sensor (RH)  | (21) Belt tension sensor               |
| (6) Passenger's airbag module | (14) Curtain airbag sensor (LH)  | (22) Airbag rear harness (LH)          |
| (7) Driver's airbag module    | (15) Side airbag module (RH)     | (23) Satellite safing sensor           |
| (8) Airbag rear harness (RH)  | (16) Side airbag module (LH)     |  |

## Electrical Component Location

### AIRBAG SYSTEM (DIAGNOSTICS)

Connector No.	(AB1)	(AB2)	(AB6)	(AB7)	(AB9)	(AB13)	(AB16)	(AB17)	(AB18)	(AB19)	(AB21)	(AB23)
Pin	10	4	30	4	4	2	2	24	24	2	2	4
Color	Gray	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Black	Yellow
Male/Female	Female	Female	Female	Male	Female	Female	Female	Female	Female	Female	Female	Female
Connector No.	(AB24)	(AB26)	(AB28)	(AB31)	(AB32)	(AB33)	(AB34)	(AB37)	(AB38)	(AB41)	(AB53)	(AB56)
Pin	2	2	4	2	4	2	4	2	2	2	18	3
Color	Yellow	Black	Yellow	Black	Yellow	Black	Yellow	Orange	Black	Yellow	Yellow	Brown
Male/Female	Female	Female	Female	Female	Female	Female	Female	Female	Female	Female	Female	Female
Connector No.	(AB58)	(AB59)	(AB60)	(AB61)								
Pin	3	6	2	6								
Color	Yellow	Gray	Yellow	Gray								
Male/Female	Female	Male	Male	Female								



## 5. Airbag Connector

### A: PROCEDURE

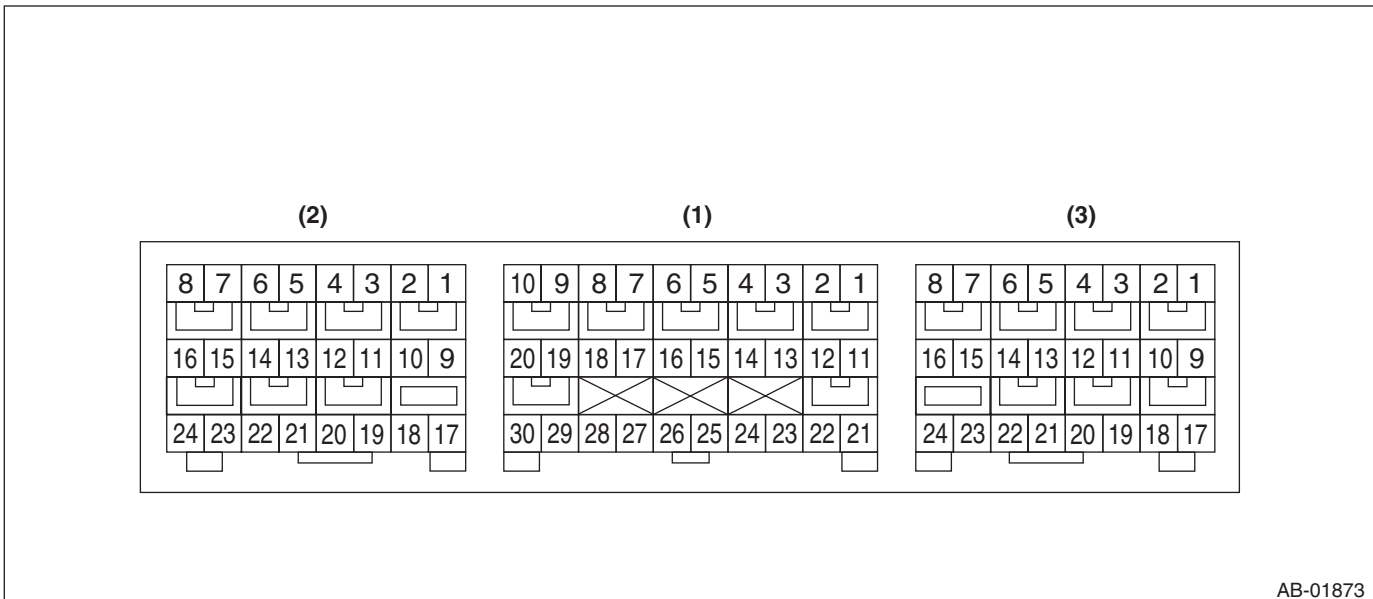
For operation procedures, refer to “Airbag Connector”. <Ref. to AB-8, PROCEDURE, Airbag Connector.>

# Airbag Control Module I/O Signal

AIRBAG SYSTEM (DIAGNOSTICS)

## 6. Airbag Control Module I/O Signal

### A: ELECTRICAL SPECIFICATION



- Terminal numbers in airbag control module connector are shown in the figure.
- The airbag warning light illuminates when the connector is removed from the airbag control module.

Item		Control module terminal No.
Data link connector		(1) — 16
Combination meter		(1) — 11
Ignition power supply	Dedicated fuse	(1) — 21
Passenger's airbag module level one	+	(1) — 4
	-	(1) — 3
Passenger's airbag module level two	+	(1) — 1
	-	(1) — 2
Driver's airbag module level one	+	(1) — 5
	-	(1) — 6
Driver's airbag module level two	+	(1) — 8
	-	(1) — 7
Front sub sensor LH	+	(1) — 30
	-	(1) — 28
Front sub sensor RH	+	(1) — 29
	-	(1) — 27
Ground line (GND)		(1) — 25
		(1) — 26
Passenger's airbag OFF indicator		(1) — 17
Passenger's airbag ON indicator		(1) — 23
Passenger's seat belt warning light (integrated module)		(1) — 15
Seat belt pretensioner LH	+	(2) — 5
	-	(2) — 6
Side airbag sensor LH Curtain airbag sensor LH	+	(2) — 24
	-	(2) — 23
Side airbag module LH	+	(2) — 1
	-	(2) — 2
Curtain airbag module LH	+	(2) — 4
	-	(2) — 3

# Airbag Control Module I/O Signal

AIRBAG SYSTEM (DIAGNOSTICS)

Item		Control module terminal No.
Satellite safing sensor	+	(2) — 20
	—	(2) — 21
Seat belt pretensioner RH	+	(3) — 4
	—	(3) — 3
Side airbag sensor RH Curtain airbag sensor RH	+	(3) — 17
	—	(3) — 18
Side airbag module RH	+	(3) — 8
	—	(3) — 7
Curtain airbag module RH	+	(3) — 5
	—	(3) — 6
Occupant detection control module	+	(3) — 16
	—	(3) — 24

## B: WIRING DIAGRAM

Refer to the WI section wiring diagram. <Ref. to WI-68, WIRING DIAGRAM, Airbag System.>

## 7. Subaru Select Monitor

### A: OPERATION

#### 1. READ DIAGNOSTIC TROUBLE CODE (DTC)

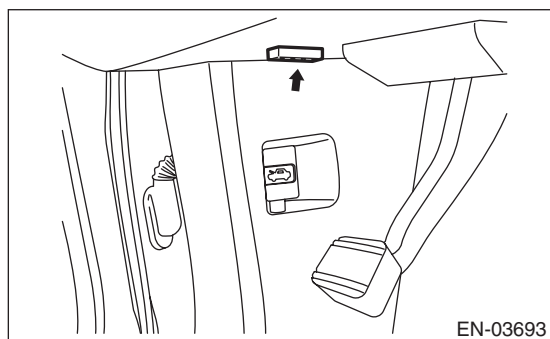
When malfunction of airbag system occurs, the DTC stored in airbag control module will be read out.

1) Prepare the Subaru Select Monitor kit. <Ref. to AB(diag)-4, SPECIAL TOOL, PREPARATION TOOL, General Description.>

2) Connect the diagnosis cable to Subaru Select Monitor.

3) Connect the Subaru Select Monitor to data link connector.

(1) Data link connector is located in the lower portion of instrument panel (on the driver's side).



(2) Connect the diagnosis cable to data link connector.

#### **CAUTION:**

**Do not connect the scan tools other than the Subaru Select Monitor.**

4) Turn the ignition switch to ON and run the Subaru Select Monitor.

5) On «Main Menu» display, select {Each System Check}.

6) On «System Selection Menu» display, select {Airbag System}.

7) After {Airbag System} is displayed, select [OK].

8) Select the {Diagnostic Code(s) Display} in «Airbag System».

#### NOTE:

- For details concerning the operation procedure, refer to “PC application help for Subaru Select Monitor”.

- For details concerning DTCs, refer to List of Diagnostic Trouble Code (DTC). <Ref. to AB(diag)-35, List of Diagnostic Trouble Code (DTC).>

## 2. DISPLAY OF STATUS INFORMATION

Check the operating condition of each sensor in the event of malfunction in the seat belt buckle switch, or when the seat belt buckle switch has been replaced.

- 1) On «Main Menu» display, select {Each System Check}.
- 2) On «System Selection Menu» display, select {Airbag System}.
- 3) On «Airbag System» display, select {Status Data}.

The following table is for support data.

Item	Display
Seat position sensor LH	— <sup>*2</sup>
Seat position sensor RH	— <sup>*2</sup>
Seat belt buckle switch LH	— <sup>*6</sup>
Seat belt buckle switch RH	Latched <sup>*3</sup> / Not Latched <sup>*4</sup> / Others <sup>*5</sup> / Initial setting <sup>*1</sup> /— <sup>*6</sup>
Passenger's airbag control status	ON <sup>*7</sup> / OFF <sup>*8</sup> / Initial setting <sup>*1</sup>

\*1: Displayed when it is initial.

\*2: Seat position sensor not supported

\*3: Seat belt fastened

\*4: Seat belt not fastened

\*5: Displayed when data other than belt fastened or not fastened, such as breakdowns is input.

\*6: Seat belt buckle switch not supported

\*7: Passenger's airbag operating state

\*8: Passenger's airbag non-operating state

### NOTE:

For detailed operation procedures, refer to “PC application help for Subaru Select Monitor”.

## 3. CLEAR MEMORY MODE

Clear the DTC stored in the airbag control module after repairing the airbag system. (After the breakdown is recovered, the breakdown code for completed recoveries are read out when the next breakdown occurs if the memory clear work is not performed.)

- 1) On «Main Menu» display, select {Each System Check}.
- 2) On «System Selection Menu» display, select {Airbag System}.
- 3) On «Airbag System» display, select {Clear Memory}.
- 4) When the “Clear Memory?” is shown on the screen, select [OK].
- 5) When “Done” is displayed, end the Subaru Select Monitor.

### NOTE:

For details concerning the operation procedure, refer to “PC application help for Subaru Select Monitor”.

# Subaru Select Monitor

## AIRBAG SYSTEM (DIAGNOSTICS)

### B: INSPECTION

#### 1. COMMUNICATION FOR INITIALIZING IMPOSSIBLE

##### DTC DETECTING CONDITION:

Defective harness connector

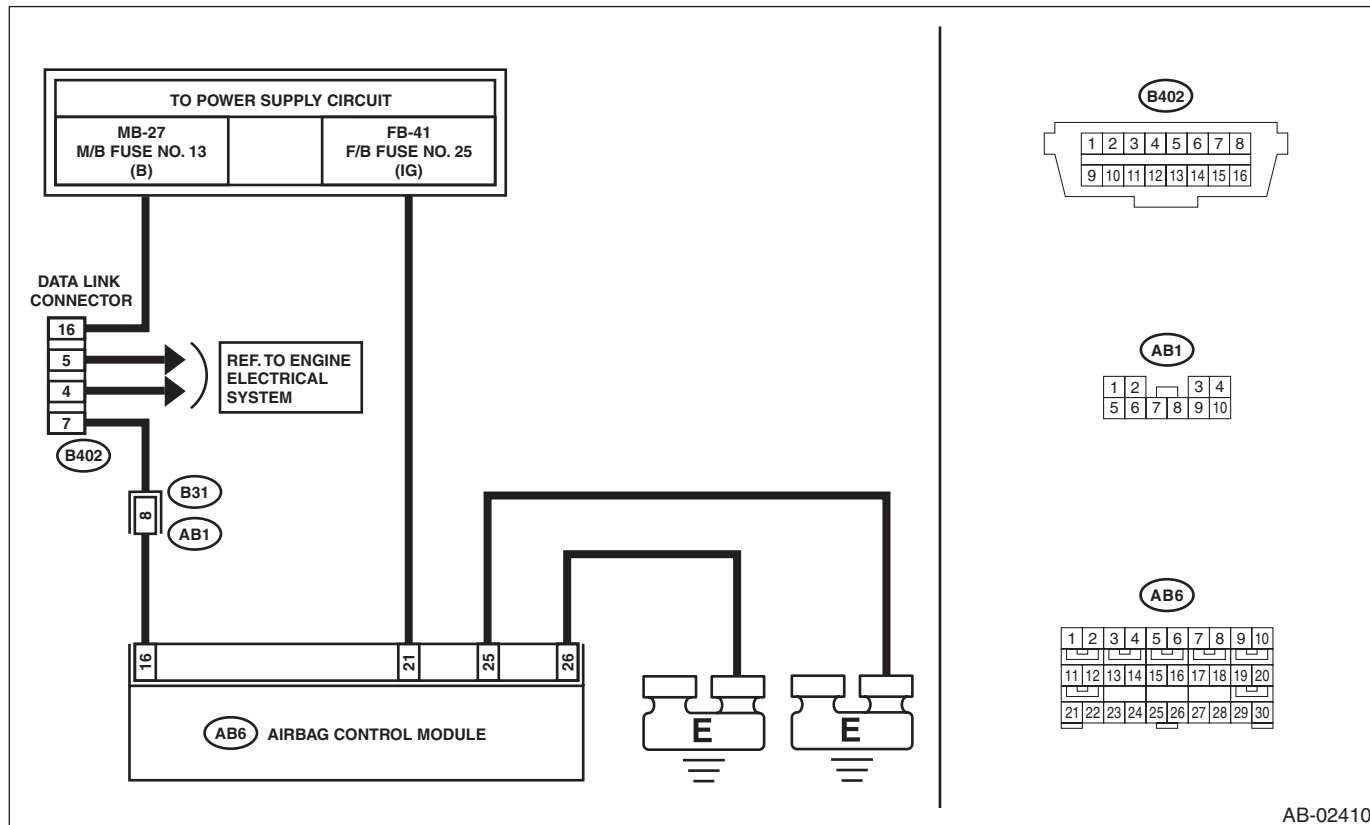
##### TROUBLE SYMPTOM:

Communication is impossible between the airbag control module and the Subaru Select Monitor.

##### CAUTION:

Before performing diagnosis, refer to "CAUTION" in "General Description". <Ref. to AB(diag)-4, CAUTION, General Description.>

##### WIRING DIAGRAM:



AB-02410

Step	Check	Yes	No
1	<b>CHECK IGNITION SWITCH.</b>	Go to step 2.	Turn the ignition switch to ON, and select the airbag mode using the Subaru Select Monitor.
2	<b>CHECK BATTERY.</b> 1) Turn the ignition switch to OFF. 2) Measure the battery voltage.	Go to step 3.	Charge or replace the battery.
3	<b>CHECK BATTERY TERMINAL.</b>	Repair or tighten the battery terminal.	Go to step 4.
4	<b>CHECK SUBARU SELECT MONITOR COMMUNICATION.</b> 1) Turn the ignition switch to ON. 2) Using the Subaru Select Monitor, check whether communication to other systems can be executed normally.	Go to step 11.	Go to step 5.

# Subaru Select Monitor

## AIRBAG SYSTEM (DIAGNOSTICS)

Step	Check	Yes	No	
<b>5</b>	<b>CHECK SUBARU SELECT MONITOR.</b>	Is Subaru Select Monitor powered on?	Go to step 7.	Go to step 6.
<b>6</b>	<b>CHECK FUSE.</b> Remove fuse No. 13 from the fuse & relay box, and perform visual inspection.	Is the fuse OK?	Repair the harness between the battery and the data link connector.	Replace the fuse. If the fuse is blown out again, check the power supply circuit.
<b>7</b>	<b>CHECK AIRBAG CONTROL MODULE CONNECTOR.</b> 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait for 60 seconds or more. 2) Confirm that the connectors of the airbag control modules (AB6, AB17, AB18) are securely connected.	Is the connector of the airbag control module securely connected?	Go to step 8.	Connect the connector of the airbag control module.
<b>8</b>	<b>CHECK SUBARU SELECT MONITOR COMMUNICATION.</b> 1) Disconnect the airbag control module connector. 2) Connect the battery ground terminal. 3) Turn the ignition switch to ON. 4) Check whether communication to other systems can be executed normally.	Is the system name displayed on Subaru Select Monitor?	Replace the airbag control module. <Ref. to AB-20, Airbag Control Module.>	Go to step 9.
<b>9</b>	<b>CHECK HARNESS CONNECTOR BETWEEN EACH CONTROL MODULE AND DATA LINK CONNECTOR.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the airbag control module, VDCCM&H/U, body integrated unit, power steering CM, ECM and TCM. 3) Measure the resistance between data link connector and chassis ground. <b>Connector &amp; terminal</b> <b>(B402) No. 7 — Chassis ground:</b>	Is the resistance 1 MΩ or more?	Go to step 10.	Repair the harness and connector between each control module and data link connector. (Replace the entire harness if repair is necessary for airbag harness.)
<b>10</b>	<b>CHECK OUTPUT SIGNAL TO THE AIRBAG CONTROL MODULE.</b> 1) Turn the ignition switch to ON in the condition of step 9. 2) Measure the voltage between data link connector and chassis ground. <b>Connector &amp; terminal</b> <b>(B402) No. 7 (+) — Chassis ground (-):</b>	Is the voltage less than 1 V?	Repair each control module.	Repair the harness and connector between each control module and data link connector. (Replace the entire harness if repair is necessary for airbag harness.)
<b>11</b>	<b>CHECK FUSE.</b> Remove fuse No. 25 from the fuse & relay box, and perform visual inspection.	Is the fuse OK?	Go to step 12.	Replace the fuse. If the fuse is blown out again, check the power supply circuit.
<b>12</b>	<b>CHECK AIRBAG CONTROL MODULE CONNECTOR.</b> 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait for 60 seconds or more. 2) Confirm that the connectors of airbag control module (AB6, AB17, AB18) are securely connected.	Is the connector of the airbag control module securely connected?	Go to step 13.	Connect the connector of the airbag control module.

# Subaru Select Monitor

## AIRBAG SYSTEM (DIAGNOSTICS)

Step	Check	Yes	No
<b>13 CHECK THE HARNESS BETWEEN THE AIRBAG CONTROL MODULE AND DATA LINK CONNECTOR.</b> 1) Disconnect the connectors (AB6, AB17, AB18) from airbag control module. 2) Connect the test harness AG connector (1AG) to the connectors (AB6, AB17, AB18). 3) Measure the resistance between connector (4AG) in the test harness AG and the data link connector. <i><b>Connector &amp; terminal</b></i> <i><b>(4AG) No. 1 — (B402) No. 7:</b></i>	Is the resistance less than 10 $\Omega$ ?	Go to step 14.	Repair the harness between the airbag control module and the data link connector. Or replace the airbag main harness along with the bulkhead harness.
<b>14 CHECK POWER SUPPLY CIRCUIT.</b> 1) Turn the ignition switch to ON. 2) Measure the voltage between connector (2AG) in the test harness AG and chassis ground. <i><b>Connector &amp; terminal</b></i> <i><b>(2AG) No. 1 (+) — Chassis ground (-):</b></i>	Is the voltage 10 V or more?	Go to step 15.	Repair the harness between the airbag control module and the battery. Or replace the airbag main harness along with the bulkhead harness.
<b>15 CHECK BETWEEN AIRBAG CONTROL MODULE AND CHASSIS GROUND.</b> 1) Turn the ignition switch to OFF. 2) Measure the resistance between connector (2AG) in the test harness AG and chassis ground. <i><b>Connector &amp; terminal</b></i> <i><b>(2AG) No. 4 — Chassis ground:</b></i> <i><b>(2AG) No. 3 — Chassis ground:</b></i>	Is the resistance less than 10 $\Omega$ ?	Go to step 16.	Repair the harness between the airbag control module and the chassis ground. Or replace the airbag main harness along with the bulkhead harness.
<b>16 CHECK POOR CONTACT OF CONNECTOR.</b>	Is there poor contact of the control module power supply, ground circuit and data link connector?	Repair the connector. (Replace the harness instead of repairing the airbag system connector.)	Replace the airbag control module. <Ref. to AB-20, REMOVAL, Airbag Control Module.>



### **8. Read Diagnostic Trouble Code (DTC)**

#### **A: OPERATION**

For details concerning DTC reading procedure, refer to "Subaru Select Monitor". <Ref. to AB(diag)-22, Subaru Select Monitor.>

### **9. Inspection Mode**

#### **A: PROCEDURE**

Recreate the circumstance by referring to the conditions described in the checklist.

## 10. Clear Memory Mode

### A: OPERATION

- Clear the memory in the following steps after the malfunction is repaired.
- For details concerning DTC clear operation, refer to “Subaru Select Monitor”. <Ref. to AB(diag)-22, Subaru Select Monitor.>

# Airbag Warning Light Illumination Pattern

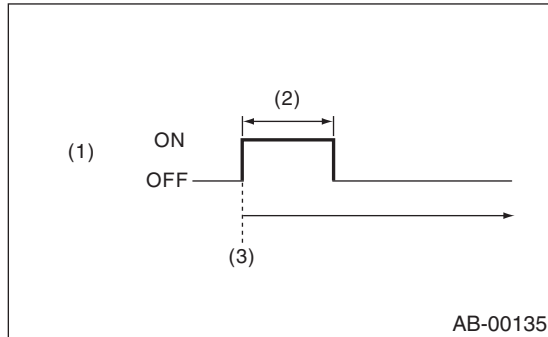
AIRBAG SYSTEM (DIAGNOSTICS)

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## 11. Airbag Warning Light Illumination Pattern

### A: INSPECTION

Turn the ignition switch to ON, and confirm that the airbag warning light remains on for approx. 6 seconds then go off afterwards.



- (1) Airbag warning light
- (2) Approx. 6 sec.
- (3) Ignition switch ON

## Airbag Warning Light Failure

### A: AIRBAG WARNING LIGHT REMAINS ON

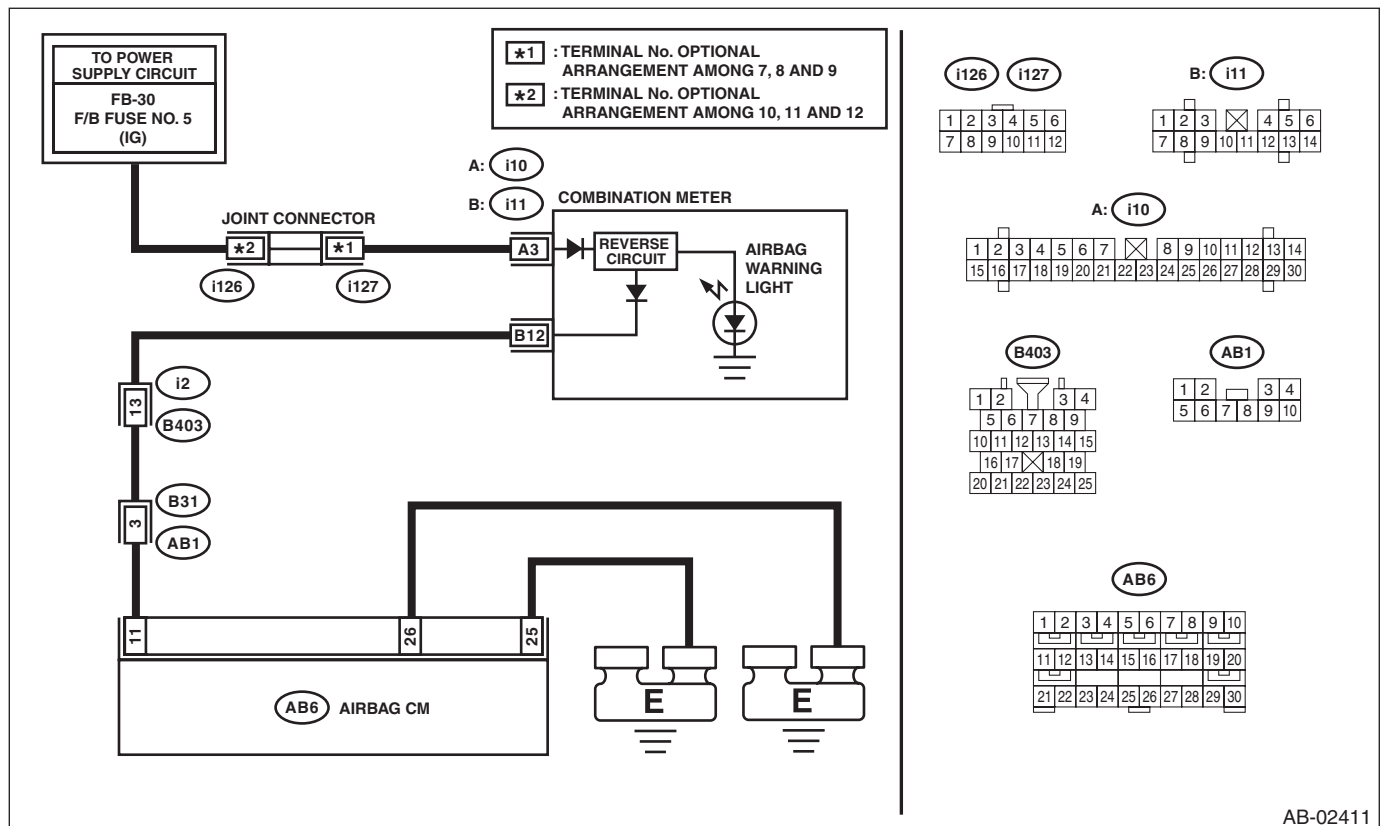
#### DETECTING CONDITION:

- Airbag warning light is faulty.
- Airbag control module to airbag warning light circuit is shorted or open.
- Grounding circuit is faulty.
- Airbag control module is faulty.
- Connection of (AB1) and (B31) is improper.
- Connections of (AB6, AB17, AB18) to airbag control module are improper.

#### CAUTION:

Before performing diagnosis, refer to “CAUTION” in “General Description”. <Ref. to AB(diag)-4, CAUTION, General Description.>

#### WIRING DIAGRAM:



Step	Check	Yes	No	
1	<b>READ DTC.</b> Read the DTC. <Ref. to AB(diag)-22, READ DIAGNOSTIC TROUBLE CODE (DTC), OPERATION, Subaru Select Monitor.>	Is DTC displayed?	Perform the diagnosis according to DTC.	Go to step 2.
2	<b>CHECK FOR POOR CONTACT.</b> 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait for 60 seconds or more. 2) Check that the airbag control module and the connectors (AB6, AB17, AB18) are securely connected.	Are there poor contact of connectors (AB6, AB17, AB18)?	If the faulty connector contact remains, replace the airbag main harness along with body harness or replace the airbag control module. <Ref. to AB-20, Airbag Control Module.>	Go to step 3.

# Airbag Warning Light Failure

## AIRBAG SYSTEM (DIAGNOSTICS)

Step	Check	Yes	No
<b>3 CHECK AIRBAG MAIN HARNESS.</b> 1) Remove the instrument panel lower cover and disconnect the connectors (AB7) and (AB2). 2) Remove the console side panel lower RH and disconnect the connector (AB9). 3) Disconnect the connectors (AB6, AB17, AB18) from the airbag control module, and connect the connector (1AG) in the test harness AG. 4) Connect the battery ground terminal and turn the ignition switch to ON. 5) Connect the connectors (7AG) and (8AG) in the test harness AG. NOTE: After the fault has been cleared, disconnect the connectors (7AG) and (8AG).	Does the airbag warning light go off?	Go to step 4.	Go to step 5.
<b>4 CHECK GROUND CIRCUIT.</b> Measure the resistance between connector (2AG) in the test harness AG and chassis ground. <i>Connector &amp; terminal</i> <i>(2AG) No. 4 — Chassis ground:</i> <i>(2AG) No. 3 — Chassis ground:</i>	Is the resistance less than 10 $\Omega$ ?	Replace the airbag control module. <Ref. to AB-20, Airbag Control Module.>	Repair the chassis ground circuit.
<b>5 CHECK AIRBAG MAIN HARNESS AND BULKHEAD HARNESS.</b> 1) Disconnect the connectors (7AG) and (8AG). 2) Remove the combination meter. 3) Measure the resistance between the combination meter connector and test harness AG connector (2AG). <i>Connector &amp; terminal</i> <i>(2AG) No. 5 — (i11) No. 12:</i>	Is the resistance less than 10 $\Omega$ ?	Check the combination meter.	Go to step 6.
<b>6 CHECK POOR CONTACT OF CONNECTORS (AB1) AND (B31).</b> 1) Turn the ignition switch to OFF, disconnect the battery ground terminal, and wait 60 seconds or more. 2) Confirm that there is a firm contact between connectors (AB1) and (B31).	Is there poor contact of connectors (AB1) and (B31)?	Repair the bulkhead harness or replace the airbag main harness along with body harness.	Go to step 7.
<b>7 CHECK AIRBAG MAIN HARNESS.</b> Check the airbag main harness for defect.	Is there any defect in the airbag main harness?	Replace the airbag main harness along with bulkhead harness.	Repair the bulkhead harness.

# Airbag Warning Light Failure

AIRBAG SYSTEM (DIAGNOSTICS)

## B: AIRBAG WARNING LIGHT REMAINS OFF

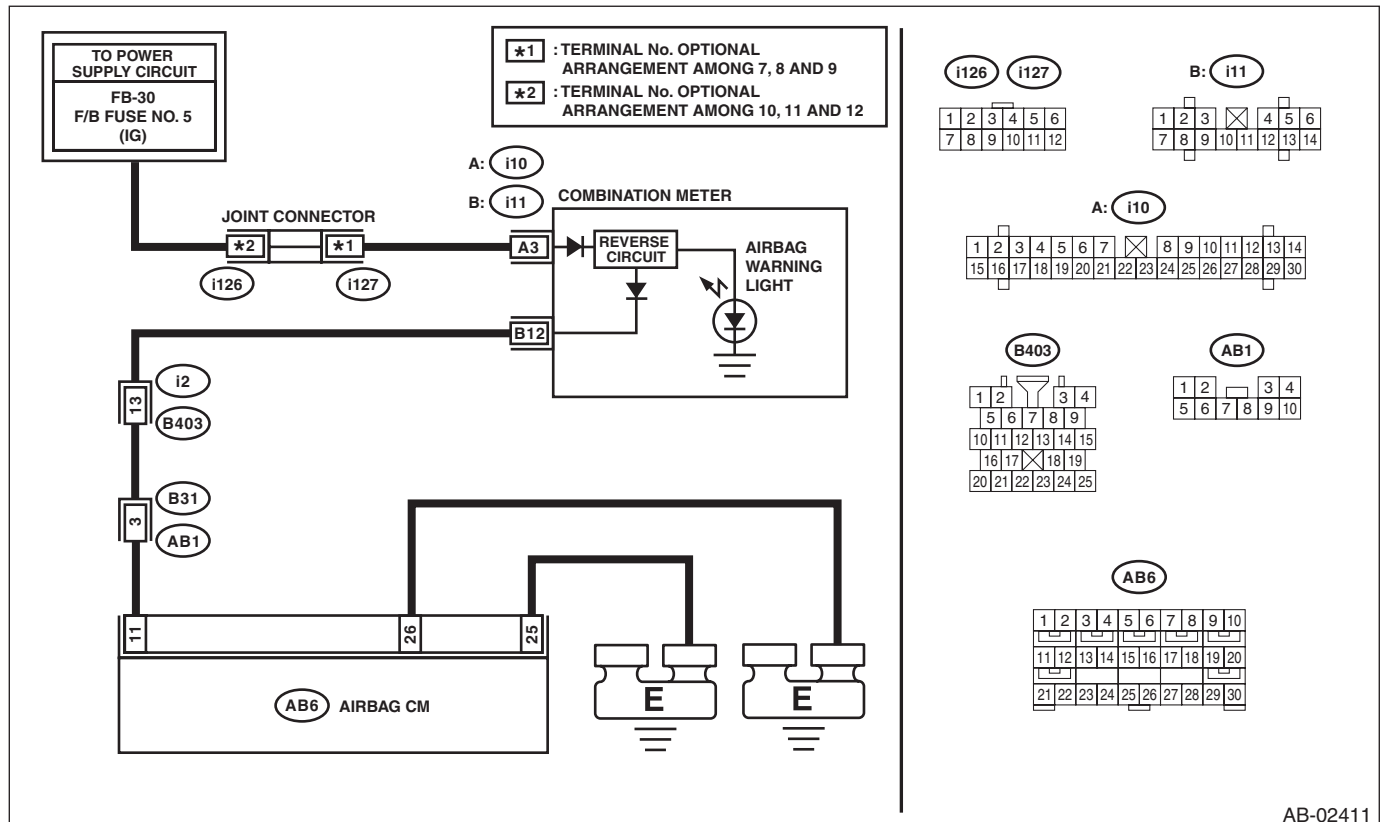
### DETECTING CONDITION:

- Fuse No. 5 (in fuse box) is blown out.
- Body harness circuit is open.
- Airbag warning light is faulty.
- Airbag main harness is faulty.
- Airbag control module is faulty.

### CAUTION:

Before performing diagnosis, refer to “CAUTION” in “General Description”. <Ref. to AB(diag)-4, CAUTION, General Description.>

### WIRING DIAGRAM:



AB-02411

Step	Check	Yes	No
1	<b>CHECK COMBINATION METER.</b> Turn the ignition switch to ON, and confirm that warning lights of combination meter illuminate.	Go to step 2.	Check the combination meter.
2	<b>CHECK DTC.</b> Read the DTC. <Ref. to AB(diag)-22, READ DIAGNOSTIC TROUBLE CODE (DTC), OPERATION, Subaru Select Monitor.>	Perform the diagnosis according to DTC.	Go to step 3.
3	<b>CHECK FUSE NO. 5 (IN MAIN FUSE BOX).</b> Remove the fuse No. 5 and perform visual inspection.	Replace the fuse No. 5. If the fuse No. 5 is blown out again, go to step 4.	Go to step 4.

## Airbag Warning Light Failure

### AIRBAG SYSTEM (DIAGNOSTICS)

Step	Check	Yes	No
<b>4</b> <b>CHECK AIRBAG WARNING LIGHT CIRCUIT (IN COMBINATION METER).</b> 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait for 60 seconds or more. 2) Disconnect the connectors (AB1) and (B31). 3) Connect the battery ground terminal and turn the ignition switch to ON.	Does airbag warning light illuminate?	Go to step 5.	Check the combination meter.
<b>5</b> <b>CHECK AIRBAG MAIN HARNESS.</b> 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait for 60 seconds or more. 2) Connect the connector (AB1) and (B31). 3) Disconnect the connectors (AB6, AB17, AB18) from airbag control module. 4) Connect the battery ground terminal and turn the ignition switch to ON.	Does airbag warning light illuminate?	Replace the airbag control module. <Ref. to AB-20, Airbag Control Module.>	Replace the airbag main harness along with bulkhead harness.



# List of Diagnostic Trouble Code (DTC)

AIRBAG SYSTEM (DIAGNOSTICS)

## 13. List of Diagnostic Trouble Code (DTC)

### A: LIST

DTC	Item	Content of diagnosis	Reference
11	Driver's Airbag failure	<ul style="list-style-type: none"> <li>• Airbag main harness circuit is open, shorted or shorted to ground.</li> <li>• Airbag module harness (driver's side) circuit is open, shorted or shorted to ground.</li> <li>• Roll connector circuit is open, shorted or shorted to ground.</li> <li>• Airbag control module is faulty.</li> <li>• Driver's airbag module is faulty.</li> </ul>	<Ref. to AB(diag)-43, DTC 11 DRIVER'S AIRBAG FAILURE, Diagnostic Chart with Trouble Code.>
12	Passenger's Airbag failure	<ul style="list-style-type: none"> <li>• Airbag main harness circuit is open, shorted or shorted to ground.</li> <li>• Airbag module harness (passenger's side) circuit is open, shorted or shorted to ground.</li> <li>• Airbag control module is faulty.</li> <li>• Passenger's airbag module is faulty.</li> </ul>	<Ref. to AB(diag)-46, DTC 12 PASSENGER'S AIRBAG FAILURE, Diagnostic Chart with Trouble Code.>
15	Driver's Airbag failure	<ul style="list-style-type: none"> <li>• Airbag main harness circuit (driver's side) is shorted to power supply.</li> <li>• Airbag module harness circuit (driver's side) is shorted to power supply.</li> <li>• Roll connector is shorted to power supply.</li> <li>• Airbag control module is faulty.</li> <li>• Driver's airbag module is faulty.</li> </ul>	<Ref. to AB(diag)-48, DTC 15 DRIVER'S AIRBAG FAILURE, Diagnostic Chart with Trouble Code.>
16	Passenger's Airbag failure	<ul style="list-style-type: none"> <li>• Airbag main harness circuit (passenger's side) is shorted to power supply.</li> <li>• Airbag module harness circuit (passenger's side) is shorted to power supply.</li> <li>• Airbag control module is faulty.</li> <li>• Passenger's airbag module is faulty.</li> </ul>	<Ref. to AB(diag)-50, DTC 16 PASSENGER'S AIRBAG FAILURE, Diagnostic Chart with Trouble Code.>
21	Airbag ECU failure	Airbag control module is faulty.	<Ref. to AB(diag)-52, DTC 21 AIRBAG ECM FAILURE, Diagnostic Chart with Trouble Code.>
22	Front Airbag: Firing output	Front airbag module and seat belt pretensioner (LH/RH) are inflated.	<Ref. to AB(diag)-52, DTC 22 FRONT AIRBAG FIRING OUTPUT, Diagnostic Chart with Trouble Code.>
26	Passenger's Airbag indicator failure	<ul style="list-style-type: none"> <li>• Passenger's airbag indicator is faulty.</li> <li>• Airbag control module is faulty.</li> <li>• Airbag main harness circuit is open, shorted or shorted to ground.</li> <li>• Body harness circuit is open.</li> </ul>	<Ref. to AB(diag)-53, DTC 26 PASSENGER'S AIRBAG INDICATOR FAILURE, Diagnostic Chart with Trouble Code.>
27	ODS Communication error	<ul style="list-style-type: none"> <li>• Occupant detection control module communication is faulty.</li> <li>• Airbag rear harness circuit is open, shorted, shorted to ground or shorted to power supply.</li> <li>• Occupant detection harness is faulty.</li> <li>• Airbag control module is faulty.</li> <li>• Occupant detection system is faulty.</li> </ul>	<Ref. to AB(diag)-55, DTC 27 ODS COMMUNICATION ERROR, Diagnostic Chart with Trouble Code.>

## List of Diagnostic Trouble Code (DTC)

### AIRBAG SYSTEM (DIAGNOSTICS)

DTC	Item	Content of diagnosis	Reference
29	ODS failure	<ul style="list-style-type: none"> <li>• Occupant detection sensor is faulty.</li> <li>• Occupant detection control module is faulty.</li> <li>• Occupant detection harness is faulty.</li> <li>• Fuse No. 25 (in joint box) is blown.</li> </ul>	Refer to "Occupant Detection System" for details on DTC 29. <Ref. to OD(diag)-25, DTC 29 ODS FAILURE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
2A	ODS Calibration error	System calibration (rezeroing) of the occupant detection system was not ended normally.	Refer to "Occupant Detection System" for details on DTC 2A. <Ref. to OD(diag)-22, DTC 2A ODS CALIBRATION ERROR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
2B	ODS System wrong parts	<ul style="list-style-type: none"> <li>• Wrong airbag control module is installed.</li> <li>• Wrong occupant detection system is installed.</li> <li>• Occupant detection system is faulty.</li> </ul>	Refer to "Occupant Detection System" for details on DTC 2B. <Ref. to OD(diag)-22, DTC 2B ODS SYSTEM WRONG PARTS, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
2C	Belt tension Sensor failure	<ul style="list-style-type: none"> <li>• Passenger's seat belt tension sensor is faulty.</li> <li>• Occupant detection system is faulty.</li> <li>• Airbag rear harness circuit is open, shorted, shorted to ground or shorted to power supply.</li> <li>• Occupant detection harness is faulty.</li> </ul>	Refer to "Occupant Detection System" for details on DTC 2C. <Ref. to OD(diag)-23, DTC 2C BELT TENSION SENSOR FAILURE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
33	FrontSubSensor RH failure	Front sub sensor (RH) is faulty.	<Ref. to AB(diag)-56, DTC 33 FRONT SUB SENSOR RH FAILURE, Diagnostic Chart with Trouble Code.>
34	FrontSubSensor LH failure	Front sub sensor (LH) is faulty.	<Ref. to AB(diag)-56, DTC 34 FRONT SUB SENSOR LH FAILURE, Diagnostic Chart with Trouble Code.>
37	Buckle Switch RH failure	<ul style="list-style-type: none"> <li>• Passenger's buckle switch circuit is open, shorted or shorted to ground.</li> <li>• Occupant detection system is faulty.</li> <li>• Occupant detection harness is faulty.</li> </ul>	Refer to "Occupant Detection System" for details on DTC 37. <Ref. to OD(diag)-26, DTC 37 BUCKLE SWITCH RH FAILURE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
39	Seatbelt Warning failure	<ul style="list-style-type: none"> <li>• Airbag control module is faulty.</li> <li>• Body integrated unit is faulty.</li> <li>• Harness circuits between body integrated unit and airbag control module are open, shorted or shorted to ground.</li> </ul>	<Ref. to AB(diag)-57, DTC 39 SEAT BELT WARNING FAILURE, Diagnostic Chart with Trouble Code.>

# List of Diagnostic Trouble Code (DTC)

## AIRBAG SYSTEM (DIAGNOSTICS)

DTC	Item	Content of diagnosis	Reference
41	Side Airbag RH failure	<ul style="list-style-type: none"> <li>Side airbag harness (RH) circuit is faulty.</li> <li>Side airbag module (RH) is faulty.</li> <li>Airbag control module is faulty.</li> </ul>	<Ref. to AB(diag)-59, DTC 41 SIDE AIRBAG RH FAILURE, Diagnostic Chart with Trouble Code.>
42	Side Airbag LH failure	<ul style="list-style-type: none"> <li>Side airbag harness (LH) circuit is faulty.</li> <li>Side airbag module (LH) is faulty.</li> <li>Airbag control module is faulty.</li> </ul>	<Ref. to AB(diag)-61, DTC 42 SIDE AIRBAG LH FAILURE, Diagnostic Chart with Trouble Code.>
45	Side Airbag RH failure	<ul style="list-style-type: none"> <li>Side airbag harness (RH) is shorted to power supply.</li> <li>Airbag control module is faulty.</li> </ul>	<Ref. to AB(diag)-63, DTC 45 SIDE AIRBAG RH FAILURE, Diagnostic Chart with Trouble Code.>
46	Side Airbag LH failure	<ul style="list-style-type: none"> <li>Side airbag harness (LH) is shorted to power supply.</li> <li>Airbag control module is faulty.</li> </ul>	<Ref. to AB(diag)-65, DTC 46 SIDE AIRBAG LH FAILURE, Diagnostic Chart with Trouble Code.>
53	Side Airbag Sensor RH failure	Side airbag sensor (RH) is faulty.	<Ref. to AB(diag)-67, DTC 53 SIDE AIRBAG SENSOR RH FAILURE, Diagnostic Chart with Trouble Code.>
54	Side Airbag Sensor LH failure	Side airbag sensor (LH) is faulty.	<Ref. to AB(diag)-67, DTC 54 SIDE AIRBAG SENSOR LH FAILURE, Diagnostic Chart with Trouble Code.>
55	Side/Curtain Airbag: Firing output	<ul style="list-style-type: none"> <li>Side airbag module and curtain airbag module are deployed.</li> <li>Curtain airbag module is deployed.</li> </ul>	<Ref. to AB(diag)-67, DTC 55 SIDE CURTAIN AIRBAG FIRING OUTPUT, Diagnostic Chart with Trouble Code.>
58	Curtain Airbag Sensor RH failure	Curtain airbag sensor (RH) is faulty.	<Ref. to AB(diag)-67, DTC 58 CURTAIN AIRBAG SENSOR RH FAILURE, Diagnostic Chart with Trouble Code.>
59	Curtain Airbag Sensor LH failure	Curtain airbag sensor (LH) is faulty.	<Ref. to AB(diag)-67, DTC 59 CURTAIN AIRBAG SENSOR LH FAILURE, Diagnostic Chart with Trouble Code.>
61	Belt Pretensioner RH failure	<ul style="list-style-type: none"> <li>Seat belt pretensioner (RH) circuit is open, shorted or shorted to ground.</li> <li>Airbag control module is faulty.</li> <li>Pretensioner is faulty.</li> <li>Pretensioner harness is faulty.</li> </ul>	<Ref. to AB(diag)-68, DTC 61 BELT PRETENSIONER RH FAILURE, Diagnostic Chart with Trouble Code.>
62	Belt Pretensioner LH failure	<ul style="list-style-type: none"> <li>Seat belt pretensioner (LH) circuit is open, shorted or shorted to ground.</li> <li>Airbag control module is faulty.</li> <li>Pretensioner is faulty.</li> <li>Pretensioner harness is faulty.</li> </ul>	<Ref. to AB(diag)-70, DTC 62 BELT PRETENSIONER LH FAILURE, Diagnostic Chart with Trouble Code.>

## List of Diagnostic Trouble Code (DTC)

### AIRBAG SYSTEM (DIAGNOSTICS)

DTC	Item	Content of diagnosis	Reference
65	Belt Pretensioner RH failure	<ul style="list-style-type: none"> <li>• Seat belt pretensioner (RH) circuit is shorted to power supply.</li> <li>• Pretensioner is faulty.</li> <li>• Pretensioner harness is faulty.</li> <li>• Airbag control module is faulty.</li> </ul>	<Ref. to AB(diag)-72, DTC 65 BELT PRETENSIONER RH FAILURE, Diagnostic Chart with Trouble Code.>
66	Belt Pretensioner LH failure	<ul style="list-style-type: none"> <li>• Seat belt pretensioner (LH) circuit is shorted to power supply.</li> <li>• Pretensioner is faulty.</li> <li>• Pretensioner harness is faulty.</li> <li>• Airbag control module is faulty.</li> </ul>	<Ref. to AB(diag)-74, DTC 66 BELT PRETENSIONER LH FAILURE, Diagnostic Chart with Trouble Code.>
71	Driver's Airbag failure	<ul style="list-style-type: none"> <li>• Airbag main harness circuit is open, shorted or shorted to ground.</li> <li>• Airbag module harness (driver's side) circuit is open, shorted or shorted to ground.</li> <li>• Roll connector circuit is open, shorted or shorted to ground.</li> <li>• Airbag control module is faulty.</li> <li>• Driver's airbag module is faulty.</li> </ul>	<Ref. to AB(diag)-76, DTC 71 DRIVER'S AIRBAG FAILURE, Diagnostic Chart with Trouble Code.>
72	Passenger's Airbag failure	<ul style="list-style-type: none"> <li>• Airbag main harness circuit is open, shorted or shorted to ground.</li> <li>• Airbag module harness (passenger's side) circuit is open, shorted or shorted to ground.</li> <li>• Airbag control module is faulty.</li> <li>• Passenger's airbag module is faulty.</li> </ul>	<Ref. to AB(diag)-79, DTC 72 PASSENGER'S AIRBAG FAILURE, Diagnostic Chart with Trouble Code.>
75	Driver's Airbag failure	<ul style="list-style-type: none"> <li>• Airbag main harness circuit (driver's side) is shorted to power supply.</li> <li>• Airbag module harness circuit (driver's side) is shorted to power supply.</li> <li>• Roll connector is shorted to power supply.</li> <li>• Airbag control module is faulty.</li> <li>• Driver's airbag module is faulty.</li> </ul>	<Ref. to AB(diag)-81, DTC 75 DRIVER'S AIRBAG FAILURE, Diagnostic Chart with Trouble Code.>
76	Passenger's Airbag failure	<ul style="list-style-type: none"> <li>• Airbag main harness circuit (passenger's side) is shorted to power supply.</li> <li>• Airbag module harness circuit (passenger's side) is shorted to power supply.</li> <li>• Airbag control module is faulty.</li> <li>• Passenger's airbag module is faulty.</li> </ul>	<Ref. to AB(diag)-83, DTC 76 PASSENGER'S AIRBAG FAILURE, Diagnostic Chart with Trouble Code.>
91	Curtain Airbag RH failure	<ul style="list-style-type: none"> <li>• Curtain airbag harness (RH) circuit is faulty.</li> <li>• Curtain airbag module (RH) is faulty.</li> <li>• Airbag control module is faulty.</li> </ul>	<Ref. to AB(diag)-85, DTC 91 CURTAIN AIRBAG MODULE RH FAILURE, Diagnostic Chart with Trouble Code.>
92	Curtain Airbag LH failure	<ul style="list-style-type: none"> <li>• Curtain airbag harness (LH) circuit is faulty.</li> <li>• Curtain airbag module (LH) is faulty.</li> <li>• Airbag control module is faulty.</li> </ul>	<Ref. to AB(diag)-87, DTC 92 CURTAIN AIRBAG MODULE LH FAILURE, Diagnostic Chart with Trouble Code.>
95	Curtain Airbag RH failure	<ul style="list-style-type: none"> <li>• Curtain airbag harness (RH) is shorted to power supply.</li> <li>• Curtain airbag module (RH) is faulty.</li> <li>• Airbag control module is faulty.</li> </ul>	<Ref. to AB(diag)-89, DTC 95 CURTAIN AIRBAG MODULE RH FAILURE, Diagnostic Chart with Trouble Code.>
96	Curtain Airbag LH failure	<ul style="list-style-type: none"> <li>• Curtain airbag harness (LH) is shorted to power supply.</li> <li>• Curtain airbag module (LH) is faulty.</li> <li>• Airbag control module is faulty.</li> </ul>	<Ref. to AB(diag)-91, DTC 96 CURTAIN AIRBAG MODULE LH FAILURE, Diagnostic Chart with Trouble Code.>

# List of Diagnostic Trouble Code (DTC)

AIRBAG SYSTEM (DIAGNOSTICS)

DTC	Item	Content of diagnosis	Reference
BB	Roll Over : Firing output	Curtain airbag module (LH/RH) and seat belt pretensioner (LH/RH) are deployed.	<Ref. to AB(diag)-92, DTC BB ROLL OVER: FIRING OUTPUT, Diagnostic Chart with Trouble Code.>
E2 E3 E4	Front Sensor Bus RH Communication error	<ul style="list-style-type: none"> <li>• Open or short circuit in harness (RH) between airbag control module and front sub sensor.</li> <li>• Front sub sensor (RH) is faulty.</li> <li>• Airbag control module is faulty.</li> </ul>	<Ref. to AB(diag)-92, DTC E2 FRONT SENSOR BUS RH COMMUNICATION ERROR, Diagnostic Chart with Trouble Code.> <Ref. to AB(diag)-92, DTC E3 FRONT SENSOR BUS RH COMMUNICATION ERROR, Diagnostic Chart with Trouble Code.> <Ref. to AB(diag)-93, DTC E4 FRONT SENSOR BUS RH COMMUNICATION ERROR, Diagnostic Chart with Trouble Code.>
E6 E7 E8	Front Sensor Bus LH Communication error	<ul style="list-style-type: none"> <li>• Open or short circuit in harness (LH) between airbag control module and front sub sensor.</li> <li>• Front sub sensor (LH) is faulty.</li> <li>• Airbag control module is faulty.</li> </ul>	<Ref. to AB(diag)-94, DTC E6 FRONT SENSOR BUS LH COMMUNICATION ERROR, Diagnostic Chart with Trouble Code.> <Ref. to AB(diag)-94, DTC E7 FRONT SENSOR BUS LH COMMUNICATION ERROR, Diagnostic Chart with Trouble Code.> <Ref. to AB(diag)-95, DTC E8 FRONT SENSOR BUS LH COMMUNICATION ERROR, Diagnostic Chart with Trouble Code.>

## List of Diagnostic Trouble Code (DTC)

### AIRBAG SYSTEM (DIAGNOSTICS)

DTC	Item	Content of diagnosis	Reference
E9 EA EB EC	Side Sensor Bus RH Communication error	<ul style="list-style-type: none"> <li>• Open or short circuit in harness (RH) between airbag control module and side sensor.</li> <li>• Side airbag sensor (RH) or curtain airbag sensor (RH) is faulty.</li> <li>• Airbag control module is faulty.</li> </ul>	<p>&lt;Ref. to AB(diag)-96, DTC E9 SIDE SENSOR BUS RH COMMUNICATION ERROR, Diagnostic Chart with Trouble Code.&gt; &lt;Ref. to AB(diag)-96, DTC EA SIDE SENSOR BUS RH COMMUNICATION ERROR, Diagnostic Chart with Trouble Code.&gt; &lt;Ref. to AB(diag)-96, DTC EB SIDE SENSOR BUS RH COMMUNICATION ERROR, Diagnostic Chart with Trouble Code.&gt; &lt;Ref. to AB(diag)-97, DTC EC SIDE SENSOR BUS RH COMMUNICATION ERROR, Diagnostic Chart with Trouble Code.&gt;</p>
ED EE	Side Sensor Bus RH Communication error	<ul style="list-style-type: none"> <li>• Open or short circuit in harness (RH) between airbag control module and side sensor.</li> <li>• Side airbag sensor (RH) or curtain airbag sensor (RH) is faulty.</li> <li>• Airbag control module is faulty.</li> </ul>	<p>&lt;Ref. to AB(diag)-99, DTC ED SIDE SENSOR BUS RH COMMUNICATION ERROR, Diagnostic Chart with Trouble Code.&gt; &lt;Ref. to AB(diag)-100, DTC EE SIDE SENSOR BUS RH COMMUNICATION ERROR, Diagnostic Chart with Trouble Code.&gt;</p>
F1 F2 F3 F4	Side Sensor Bus LH Communication error	<ul style="list-style-type: none"> <li>• Open or short circuit in harness (LH) between airbag control module and side sensor.</li> <li>• Side airbag sensor (LH) or curtain airbag sensor (LH) is faulty.</li> <li>• Airbag control module is faulty.</li> </ul>	<p>&lt;Ref. to AB(diag)-103, DTC F1 SIDE SENSOR BUS LH COMMUNICATION ERROR, Diagnostic Chart with Trouble Code.&gt; &lt;Ref. to AB(diag)-103, DTC F2 SIDE SENSOR BUS LH COMMUNICATION ERROR, Diagnostic Chart with Trouble Code.&gt; &lt;Ref. to AB(diag)-103, DTC F3 SIDE SENSOR BUS LH COMMUNICATION ERROR, Diagnostic Chart with Trouble Code.&gt; &lt;Ref. to AB(diag)-104, DTC F4 SIDE SENSOR BUS LH COMMUNICATION ERROR, Diagnostic Chart with Trouble Code.&gt;</p>

# List of Diagnostic Trouble Code (DTC)

## AIRBAG SYSTEM (DIAGNOSTICS)

DTC	Item	Content of diagnosis	Reference
F5 F6	Side Sensor Bus LH Communication error	<ul style="list-style-type: none"> <li>• Open or short circuit in harness (LH) between airbag control module and side sensor.</li> <li>• Side airbag sensor (LH) or curtain airbag sensor (LH) is faulty.</li> <li>• Airbag control module is faulty.</li> </ul>	<Ref. to AB(diag)-106, DTC F5 SIDE SENSOR BUS LH COMMUNICATION ERROR, Diagnostic Chart with Trouble Code.> <Ref. to AB(diag)-107, DTC F6 SIDE SENSOR BUS LH COMMUNICATION ERROR, Diagnostic Chart with Trouble Code.>
F8 F9 FA	Satellite Sensor Bus Communication error	<ul style="list-style-type: none"> <li>• Open or short circuit in harness between airbag control module and satellite safing sensor.</li> <li>• Satellite safing sensor is faulty.</li> <li>• Airbag control module is faulty.</li> </ul>	<Ref. to AB(diag)-109, DTC F8 SATELLITE SENSOR BUS COMMUNICATION ERROR, Diagnostic Chart with Trouble Code.> <Ref. to AB(diag)-109, DTC F9 SATELLITE SENSOR BUS COMMUNICATION ERROR, Diagnostic Chart with Trouble Code.> <Ref. to AB(diag)-110, DTC FA SATELLITE SENSOR BUS COMMUNICATION ERROR, Diagnostic Chart with Trouble Code.>
3A	Front Sub Sensor RH false installation	<ul style="list-style-type: none"> <li>• Front sensor (RH) is misinstalled.</li> <li>• Airbag control module is faulty.</li> </ul>	<Ref. to AB(diag)-112, DTC 3A FRONT SUB SENSOR RH FALSE INSTALLATION, Diagnostic Chart with Trouble Code.>
3B	Front Sub Sensor LH false installation	<ul style="list-style-type: none"> <li>• Front sensor (LH) is misinstalled.</li> <li>• Airbag control module is faulty.</li> </ul>	<Ref. to AB(diag)-112, DTC 3B FRONT SUB SENSOR LH FALSE INSTALLATION, Diagnostic Chart with Trouble Code.>
3C	Satellite Sensor Bus failure	Satellite safing sensor is faulty.	<Ref. to AB(diag)-112, DTC 3C SATELLITE SENSOR BUS FAILURE, Diagnostic Chart with Trouble Code.>
3D	Satellite Sensor false installation	<ul style="list-style-type: none"> <li>• Satellite safing sensor is misinstalled.</li> <li>• Airbag control module is faulty.</li> </ul>	<Ref. to AB(diag)-112, DTC 3D SATELLITE SENSOR FALSE INSTALLATION, Diagnostic Chart with Trouble Code.>
5A	Side Airbag Sensor RH false installation	<ul style="list-style-type: none"> <li>• Side A/B sensor is misinstalled.</li> <li>• Airbag control module is faulty.</li> </ul>	<Ref. to AB(diag)-113, DTC 5A SIDE AIRBAG SENSOR RH FALSE INSTALLATION, Diagnostic Chart with Trouble Code.>

## List of Diagnostic Trouble Code (DTC)

### AIRBAG SYSTEM (DIAGNOSTICS)

DTC	Item	Content of diagnosis	Reference
5B	Side Airbag Sensor LH false installation	<ul style="list-style-type: none"><li>• Side A/B sensor is misinstalled.</li><li>• Airbag control module is faulty.</li></ul>	<Ref. to AB(diag)-113, DTC 5B SIDE AIRBAG SENSOR LH FALSE INSTALLATION, Diagnostic Chart with Trouble Code.>
5C	Curtain Airbag Sensor RH false installation	<ul style="list-style-type: none"><li>• Curtain A/B sensor is misinstalled.</li><li>• Airbag control module is faulty.</li></ul>	<Ref. to AB(diag)-113, DTC 5C CURTAIN AIRBAG SENSOR RH FALSE INSTALLATION, Diagnostic Chart with Trouble Code.>
5D	Curtain Airbag Sensor LH false installation	<ul style="list-style-type: none"><li>• Curtain A/B sensor is misinstalled.</li><li>• Airbag control module is faulty.</li></ul>	<Ref. to AB(diag)-113, DTC 5D CURTAIN AIRBAG SENSOR LH FALSE INSTALLATION, Diagnostic Chart with Trouble Code.>



# Diagnostic Chart with Trouble Code

AIRBAG SYSTEM (DIAGNOSTICS)

## 14. Diagnostic Chart with Trouble Code

### A: DTC 11 DRIVER'S AIRBAG FAILURE

#### DTC DETECTING CONDITION:

- Airbag main harness circuit is open, shorted or shorted to ground.
- Airbag module harness (Driver's side) 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.

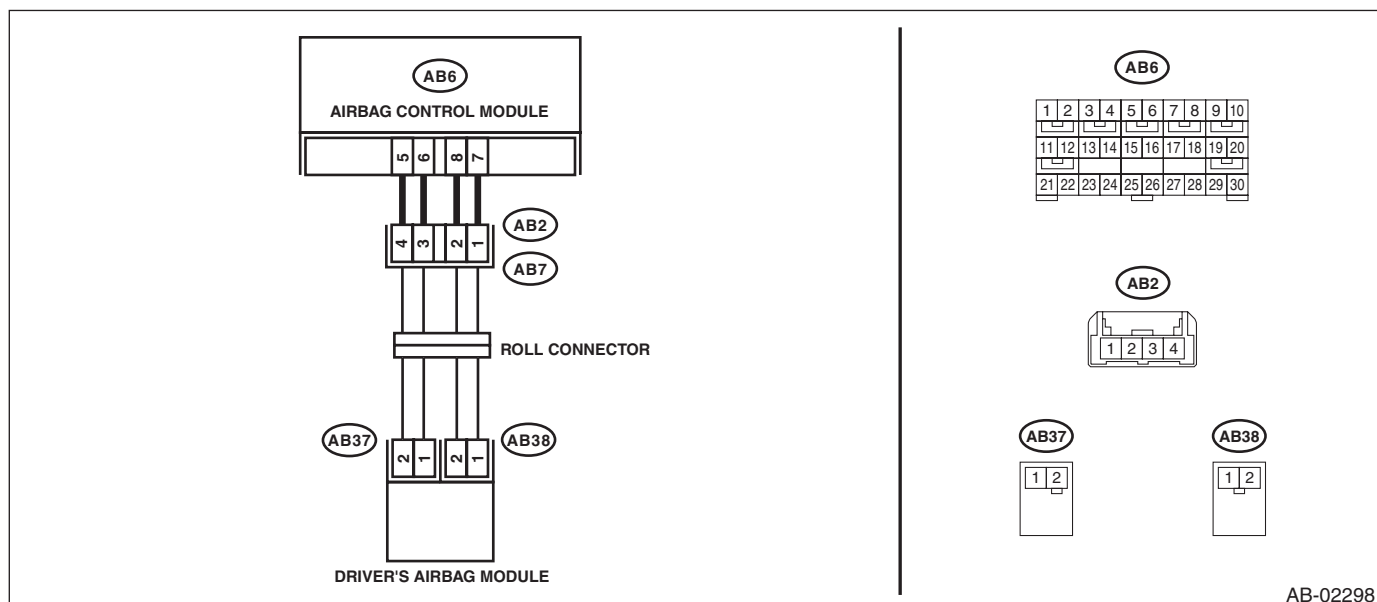
#### CAUTION:

**Before performing diagnosis, refer to "CAUTION" in "General Description". <Ref. to AB(diag)-4, CAUTION, General Description.>**

#### NOTE:

Prior to starting work, prepare two AIRBAG RESISTORS (98299PA040).

#### WIRING DIAGRAM:



Step	Check	Yes	No
<b>1 CHECK POOR CONTACT OF CONNECTORS.</b> Check for poor contact of the connectors between the airbag control module and the driver's airbag module.	Is there poor contact?	Replace the airbag harness.	Go to step 2.
<b>2 CHECK DRIVER'S AIRBAG MODULE.</b> 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait for 60 seconds or more. 2) Remove the driver's airbag module. 3) Connect the connector (1N) in the test harness N to the connector (AB38). 4) Connect the airbag resistor to the connector (2N) of test harness N. 5) Connect the connector (1Q) in the test harness Q to connector (AB37). 6) Connect the airbag resistor to the connector (2Q) in the test harness Q. 7) Connect the battery ground terminal and turn the ignition switch to ON.	Does the airbag warning light illuminate for six seconds and go off?	Replace the driver's airbag module. <Ref. to AB-14, Driver's Airbag Module.>	Go to step 3.

# Diagnostic Chart with Trouble Code

## AIRBAG SYSTEM (DIAGNOSTICS)

Step	Check	Yes	No
<b>3</b> <b>CHECK ROLL CONNECTOR.</b> 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait for 60 seconds or more. 2) Disconnect the test harness N from connector (AB38). 3) Disconnect the test harness Q from connector (AB37). 4) Remove the instrument panel lower cover and disconnect the connector (AB7) from (AB2). 5) Connect the connector (1P) in the test harness P to connector (AB2). 6) Connect the airbag resistor to the connectors (2P) and (3P) of test harness P. 7) Connect the battery ground terminal and turn the ignition switch to ON.	Does the airbag warning light illuminate for six seconds and go off?	Replace the roll connector. <Ref. to AB-24, Roll Connector.>	Go to step 4.
<b>4</b> <b>CHECK AIRBAG MAIN HARNESS (DRIVER'S AIRBAG HARNESS).</b> 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait for 60 seconds or more. 2) Disconnect the airbag resistor from the connectors (2P) and (3P) of test harness P. 3) Remove the console side panel lower RH and disconnect the connector (AB9). 4) Disconnect the connectors (AB6, AB17, AB18) from the airbag control module, and connect the connector (1AG) in the test harness AG. 5) Measure the resistance between connector (3AG) of test harness AG and connector (3P) of test harness P. <i>Connector &amp; terminal</i> <i>(3AG) No. 1 — (2P) No. 1:</i> <i>(3AG) No. 3 — (2P) No. 2:</i>	Is the resistance less than 10 Ω?	Go to step 5.	Replace the airbag main harness along with body harness.
<b>5</b> <b>CHECK AIRBAG MAIN HARNESS (DRIVER'S AIRBAG HARNESS).</b> Measure the resistance between connector (3AG) terminals in the test harness AG. <i>Connector &amp; terminal</i> <i>(3AG) No. 1 — (3AG) No. 2:</i> <i>(3AG) No. 1 — (3AG) No. 4:</i> <i>(3AG) No. 2 — (3AG) No. 3:</i> <i>(3AG) No. 3 — (3AG) No. 4:</i> <i>(3AG) No. 1 — (3AG) No. 3:</i> <i>(3AG) No. 3 — Chassis ground:</i> <i>(3AG) No. 1 — Chassis ground:</i> <i>(3AG) No. 2 — (3AG) No. 4:</i> <i>(3AG) No. 2 — Chassis ground:</i> <i>(3AG) No. 4 — Chassis ground:</i>	Is the resistance 1 MΩ or more?	Go to step 6.	Replace the airbag main harness along with body harness.
<b>6</b> <b>CHECK AIRBAG CONTROL MODULE.</b> 1) Connect all connectors. 2) Clear the memory. 3) Perform the Inspection Mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the airbag control module. <Ref. to AB-20, Airbag Control Module.>	Go to step 7.

# Diagnostic Chart with Trouble Code

AIRBAG SYSTEM (DIAGNOSTICS)

Step	Check	Yes	No
7 <b>CHECK FOR ANY OTHER DTC ON DISPLAY.</b>	Is any other DTC displayed?	Check DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to AB(diag)-35, List of Diagnostic Trouble Code (DTC).>	Finish the diagnosis.

# Diagnostic Chart with Trouble Code

AIRBAG SYSTEM (DIAGNOSTICS)

## B: DTC 12 PASSENGER'S AIRBAG FAILURE

### DTC DETECTING CONDITION:

- Airbag main harness circuit is open, shorted or shorted to ground.
- Airbag module harness (Passenger's side) circuit is open, shorted or shorted to ground.
- Passenger's airbag module is faulty.
- Airbag control module is faulty.

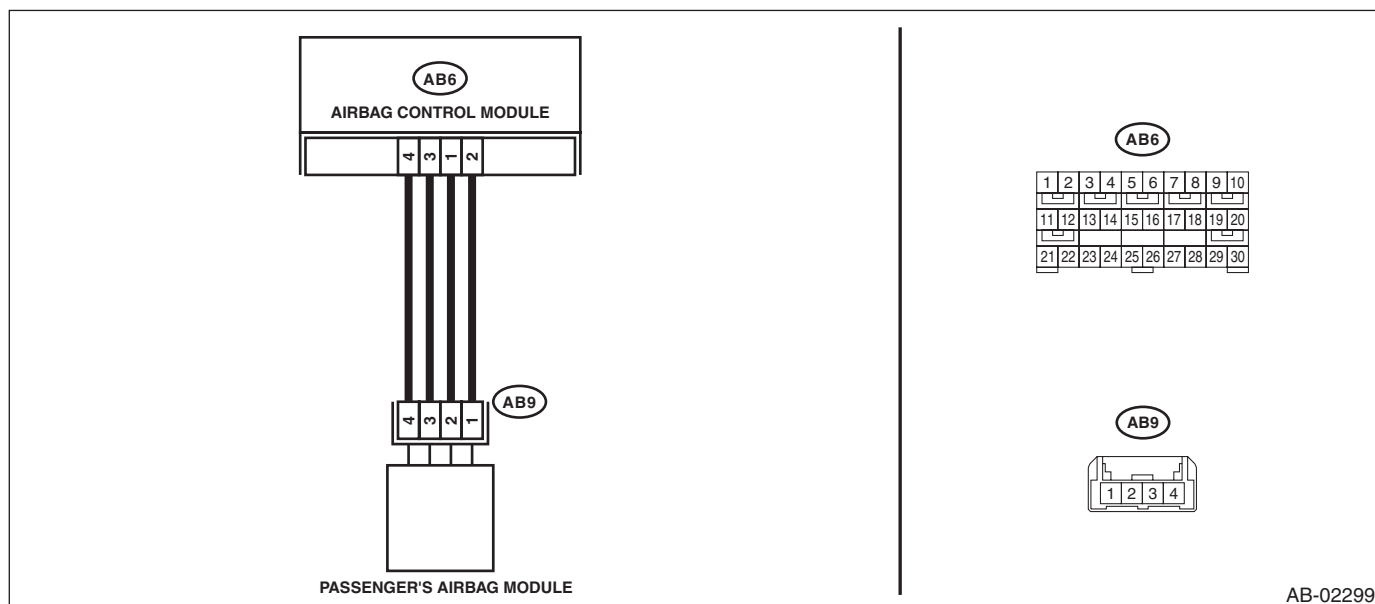
### CAUTION:

Before performing diagnosis, refer to "CAUTION" in "General Description". <Ref. to AB(diag)-4, CAUTION, General Description.>

### NOTE:

Prior to starting work, prepare two AIRBAG RESISTORS (98299PA040).

### WIRING DIAGRAM:



	Step	Check	Yes	No
1	<p><b>CHECK POOR CONTACT OF CONNECTORS.</b></p> <p>Check for poor contact of the connectors between the airbag control module and the passenger's airbag module.</p>	Is there poor contact?	Replace the airbag harness.	Go to step 2.
2	<p><b>CHECK PASSENGER'S AIRBAG MODULE.</b></p> <p>1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait for 60 seconds or more.</p> <p>2) Remove the console side panel lower RH and disconnect the connector (AB9).</p> <p>3) Connect the connector (1P) in the test harness P to connector (AB9).</p> <p>4) Connect the airbag resistor to the connectors (2P) and (3P) of test harness P.</p> <p>5) Connect the battery ground terminal and turn the ignition switch to ON.</p>	Does the airbag warning light illuminate for six seconds and go off?	Replace the passenger's airbag module. <Ref. to AB-15, Passenger's Airbag Module.>	Go to step 3.

# Diagnostic Chart with Trouble Code

## AIRBAG SYSTEM (DIAGNOSTICS)

Step	Check	Yes	No
<b>3 CHECK AIRBAG MAIN HARNESS (PASSENGER'S AIRBAG HARNESS).</b> 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait for 60 seconds or more. 2) Disconnect the airbag resistor from the connectors (2P) and (3P) of test harness P. 3) Remove the instrument panel lower cover and disconnect the connector (AB7) from (AB2). 4) Disconnect the connectors (AB6, AB17, AB18) from the airbag control module, and connect the connector (1AG) in the test harness AG. 5) Measure the resistance between connector (3AG) in the test harness AG and connectors (2P) and (3P) in the test harness P. <b>Connector &amp; terminal</b> <b>(3AG) No. 9 — (2P) No. 1:</b> <b>(3AG) No. 7 — (2P) No. 2:</b>	Is the resistance less than 10 $\Omega$ ?	Go to step 4.	Replace the airbag main harness along with body harness.
<b>4 CHECK AIRBAG MAIN HARNESS (PASSENGER'S AIRBAG HARNESS).</b> Measure the resistance between connectors (3AG) in the test harness AG, and between connector (3AG) and chassis ground. <b>Connector &amp; terminal</b> <b>(3AG) No. 9 — (3AG) No. 7:</b> <b>(3AG) No. 9 — Chassis ground:</b> <b>(3AG) No. 7 — Chassis ground:</b> <b>(3AG) No. 8 — (3AG) No. 6:</b> <b>(3AG) No. 8 — Chassis ground:</b> <b>(3AG) No. 6 — Chassis ground:</b> <b>(3AG) No. 9 — (3AG) No. 6:</b> <b>(3AG) No. 9 — (3AG) No. 8:</b> <b>(3AG) No. 7 — (3AG) No. 8:</b> <b>(3AG) No. 6 — (3AG) No. 7:</b>	Is the resistance 1 M $\Omega$ or more?	Go to step 5.	Replace the airbag main harness along with body harness.
<b>5 CHECK AIRBAG CONTROL MODULE.</b> 1) Connect all connectors. 2) Clear the memory. 3) Perform the Inspection Mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the airbag control module. <Ref. to AB-20, Airbag Control Module.>	Go to step 6.
<b>6 CHECK FOR ANY OTHER DTC ON DISPLAY.</b>	Is any other DTC displayed?	Check DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to AB(diag)-35, List of Diagnostic Trouble Code (DTC).>	Finish the diagnosis.

# Diagnostic Chart with Trouble Code

## AIRBAG SYSTEM (DIAGNOSTICS)

### C: DTC 15 DRIVER'S AIRBAG FAILURE

#### DTC DETECTING CONDITION:

- Airbag main harness circuit (Driver's side) is shorted to power supply.
- Airbag module harness circuit (Driver's side) is shorted to power supply.
- Roll connector is shorted to power supply.
- Driver's airbag module is faulty.
- Airbag control module is faulty.

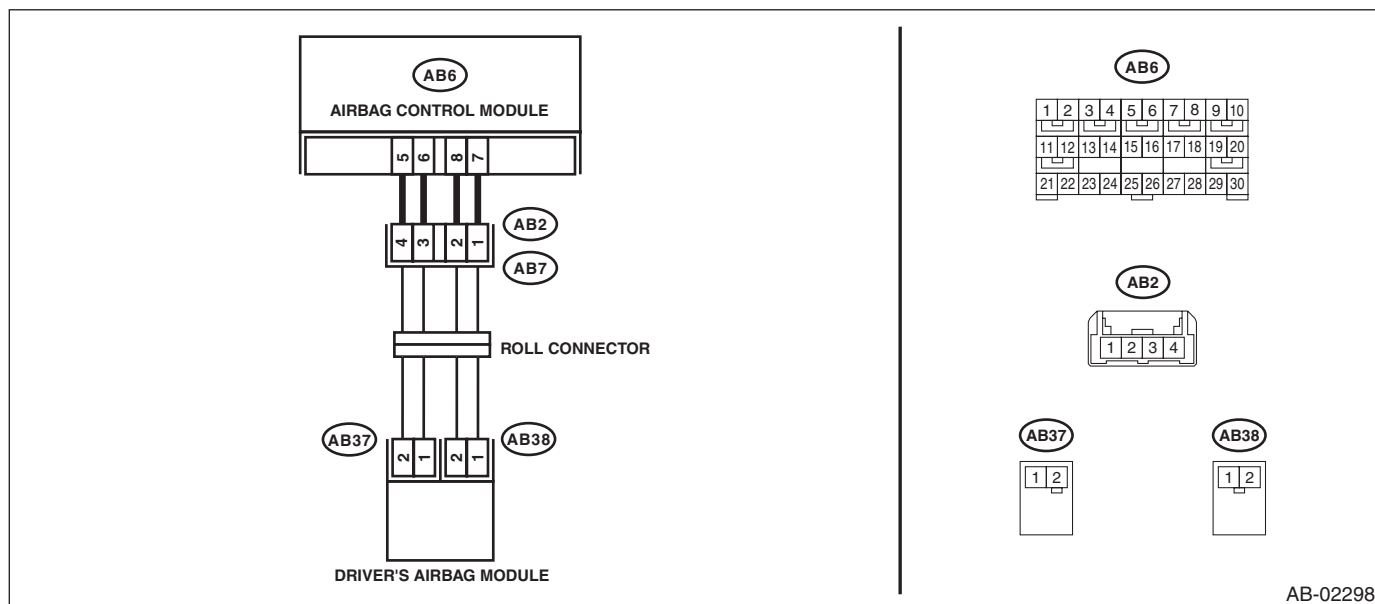
#### CAUTION:

Before performing diagnosis, refer to "CAUTION" in "General Description". <Ref. to AB(diag)-4, CAUTION, General Description.>

#### NOTE:

Prior to starting work, prepare two AIRBAG RESISTORS (98299PA040).

#### WIRING DIAGRAM:



Step	Check	Yes	No
<b>1 CHECK POOR CONTACT OF CONNECTORS.</b> Check for poor contact of the connectors between the airbag control module and the driver's airbag module.	Is there poor contact?	Replace the airbag harness.	Go to step 2.
<b>2 CHECK DRIVER'S AIRBAG MODULE.</b> 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait for 60 seconds or more. 2) Remove the driver's airbag module. 3) Connect the connector (AB38) to the connector (1N) in the test harness N. 4) Connect the airbag resistor to the connector (2N) of test harness N. 5) Connect the connector (1Q) in the test harness Q to connector (AB37). 6) Connect the airbag resistor to the connector (2Q) in the test harness Q. 7) Connect the battery ground terminal and turn the ignition switch to ON.	Does the airbag warning light illuminate for six seconds and go off?	Replace the driver's airbag module. <Ref. to AB-14, Driver's Airbag Module.>	Go to step 3.

# Diagnostic Chart with Trouble Code

AIRBAG SYSTEM (DIAGNOSTICS)

Step	Check	Yes	No
<b>3 CHECK ROLL CONNECTOR.</b> 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait for 60 seconds or more. 2) Disconnect the test harness N from connector (AB38). 3) Disconnect the test harness Q from connector (AB37). 4) Remove the instrument panel lower cover and disconnect the connector (AB7) from (AB2). 5) Connect the connector (1P) in the test harness P to connector (AB2). 6) Connect the airbag resistor to the connectors (2P) and (3P) of test harness P. 7) Connect the battery ground terminal and turn the ignition switch to ON.	Does the airbag warning light illuminate for six seconds and go off?	Replace the roll connector. <Ref. to AB-24, Roll Connector.>	Go to step 4.
<b>4 CHECK AIRBAG MAIN HARNESS (DRIVER'S AIRBAG HARNESS).</b> 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait for 60 seconds or more. 2) Disconnect the airbag resistor from the connectors (2P) and (3P) of test harness P. 3) Remove the console side panel lower RH and disconnect the connector (AB9). 4) Disconnect the connectors (AB6, AB17, AB18) from the airbag control module, and connect the connector (1AG) in the test harness AG. 5) Connect the battery ground terminal and turn the ignition switch to ON. 6) Measure the voltage between connector (3AG) in the test harness AG and chassis ground.  <i>Connector &amp; terminal</i> <i>(3AG) No. 3 (+) — Chassis ground (-):</i> <i>(3AG) No. 1 (+) — Chassis ground (-):</i>	Is the voltage less than 1 V?	Go to step 5.	Replace the airbag main harness along with body harness.
<b>5 CHECK AIRBAG CONTROL MODULE.</b> 1) Connect all connectors. 2) Clear the memory. 3) Perform the Inspection Mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the airbag control module. <Ref. to AB-20, Airbag Control Module.>	Go to step 6.
<b>6 CHECK FOR ANY OTHER DTC ON DISPLAY.</b>	Is any other DTC displayed?	Check DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to AB(diag)-35, List of Diagnostic Trouble Code (DTC).>	Finish the diagnosis.

# Diagnostic Chart with Trouble Code

## AIRBAG SYSTEM (DIAGNOSTICS)

### D: DTC 16 PASSENGER'S AIRBAG FAILURE

#### DTC DETECTING CONDITION:

- Airbag main harness circuit (Passenger's side) is shorted to power supply.
- Airbag module harness circuit (Passenger's side) is shorted to power supply.
- Passenger's airbag module is faulty.
- Airbag control module is faulty.

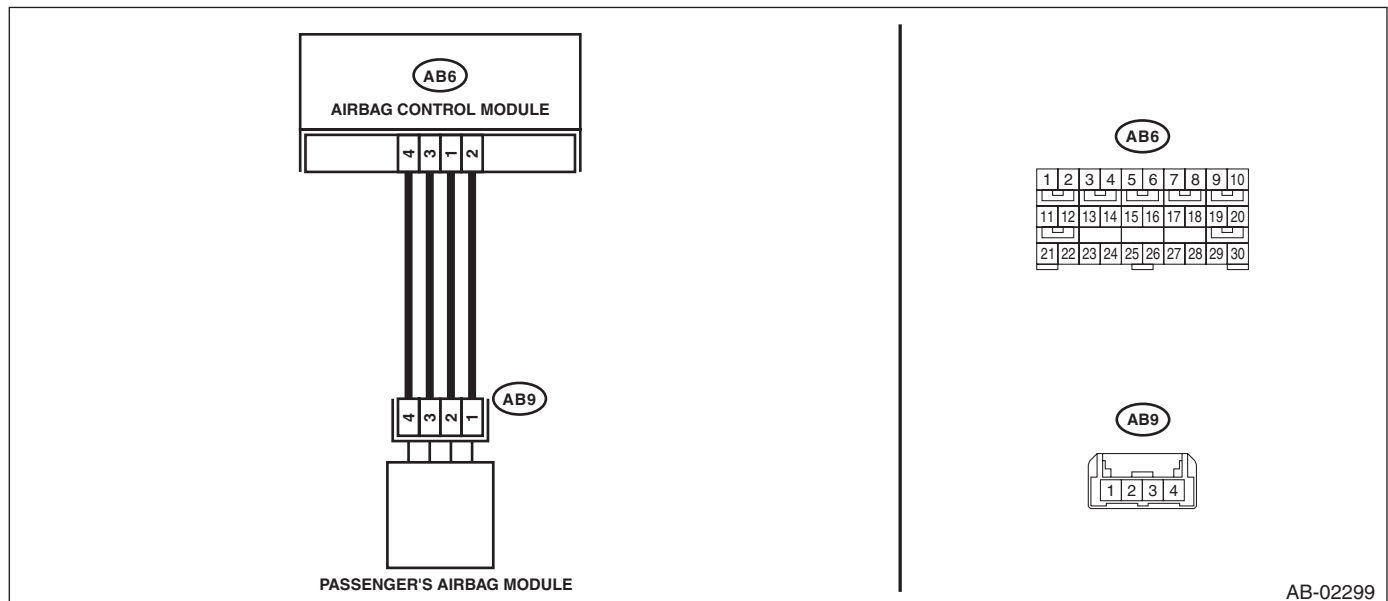
#### CAUTION:

Before performing diagnosis, refer to "CAUTION" in "General Description". <Ref. to AB(diag)-4, CAUTION, General Description.>

#### NOTE:

Prior to starting work, prepare two AIRBAG RESISTORS (98299PA040).

#### WIRING DIAGRAM:



Step	Check	Yes	No
<b>1 CHECK POOR CONTACT OF CONNECTORS.</b> Check for poor contact of the connectors between the airbag control module and the passenger's airbag module.	Is there poor contact?	Replace the airbag harness along with chassis harness.	Go to step 2.
<b>2 CHECK PASSENGER'S AIRBAG MODULE.</b> 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait for 60 seconds or more. 2) Remove the console side panel lower RH and disconnect the connector (AB9). 3) Connect the connector (1P) in the test harness P to connector (AB9). 4) Connect the airbag resistor to the connectors (2P) and (3P) of test harness P. 5) Connect the battery ground terminal and turn the ignition switch to ON.	Does the airbag warning light illuminate for six seconds and go off?	Replace the passenger's airbag module. <Ref. to AB-15, Passenger's Airbag Module.>	Go to step 3.



# Diagnostic Chart with Trouble Code

## AIRBAG SYSTEM (DIAGNOSTICS)

Step	Check	Yes	No
<b>3 CHECK AIRBAG MAIN HARNESS (PASSENGER'S AIRBAG HARNESS).</b> 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait for 60 seconds or more. 2) Disconnect the airbag resistor from the connectors (2P) and (3P) of test harness P. 3) Remove the instrument panel lower cover and disconnect the connector (AB7) from (AB2). 4) Disconnect the connectors (AB6, AB17, AB18) from the airbag control module, and connect the connector (1AG) in the test harness AG. 5) Connect the battery ground terminal and turn the ignition switch to ON. 6) Measure the voltage between connector (3AG) in the test harness AG and chassis ground. <i><b>Connector &amp; terminal</b></i> <i><b>(3AG) No. 9 (+) — Chassis ground (-):</b></i> <i><b>(3AG) No. 7 (+) — Chassis ground (-):</b></i>	Is the voltage less than 1 V?	Go to step 4.	Replace the airbag main harness along with body harness.
<b>4 CHECK AIRBAG CONTROL MODULE.</b> 1) Connect all connectors. 2) Clear the memory. 3) Perform the Inspection Mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the airbag control module. <Ref. to AB-20, Airbag Control Module.>	Go to step 5.
<b>5 CHECK FOR ANY OTHER DTC ON DISPLAY.</b>	Is any other DTC displayed?	Check DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to AB(diag)-35, List of Diagnostic Trouble Code (DTC).>	Finish the diagnosis.

# Diagnostic Chart with Trouble Code

## AIRBAG SYSTEM (DIAGNOSTICS)

### E: DTC 21 AIRBAG ECM FAILURE

#### DTC DETECTING CONDITION:

Airbag control module is faulty.

#### CAUTION:

Before performing diagnosis, refer to “CAUTION” in “General Description”. <Ref. to AB(diag)-4, CAUTION, General Description.>

Step	Check	Yes	No
1 <b>CHECK IF DTC 21 IS INDICATED.</b> Read the DTC. <Ref. to AB(diag)-22, READ DIAGNOSTIC TROUBLE CODE (DTC), OPERATION, Subaru Select Monitor.>	Does the Subaru Select Monitor display DTC21?	Replace the airbag control module. <Ref. to AB-20, Airbag Control Module.>	Perform the Clear Memory Mode. <Ref. to AB(diag)-23, CLEAR MEMORY MODE, OPERATION, Subaru Select Monitor.>

### F: DTC 22 FRONT AIRBAG FIRING OUTPUT

#### DTC DETECTING CONDITION:

This DTC is indicated when the front airbag module and the pretensioner are deployed.

Once this DTC is displayed, the memory cannot be cleared. Therefore replace the following parts.

- Airbag control module <Ref. to AB-20, Airbag Control Module.>
- Driver’s airbag module <Ref. to AB-14, Driver’s Airbag Module.>
- Passenger’s airbag module <Ref. to AB-15, Passenger’s Airbag Module.>
- Front sub sensor of both sides. <Ref. to AB-25, Front Sub Sensor.>
- Front outer seat belt with pretensioner of both sides. <Ref. to SB-18, Front Seat Belt.>
- Steering roll connector <Ref. to AB-24, Roll Connector.>
- Occupant detection system (passenger’s seat cushion & frame assembly.) <Ref. to SE-7, Front Seat.>
- Inner seat belt assembly of both side <Ref. to SB-18, INNER SEAT BELT ASSEMBLY, REMOVAL, Front Seat Belt.>

# Diagnostic Chart with Trouble Code

AIRBAG SYSTEM (DIAGNOSTICS)

## G: DTC 26 PASSENGER'S AIRBAG INDICATOR FAILURE

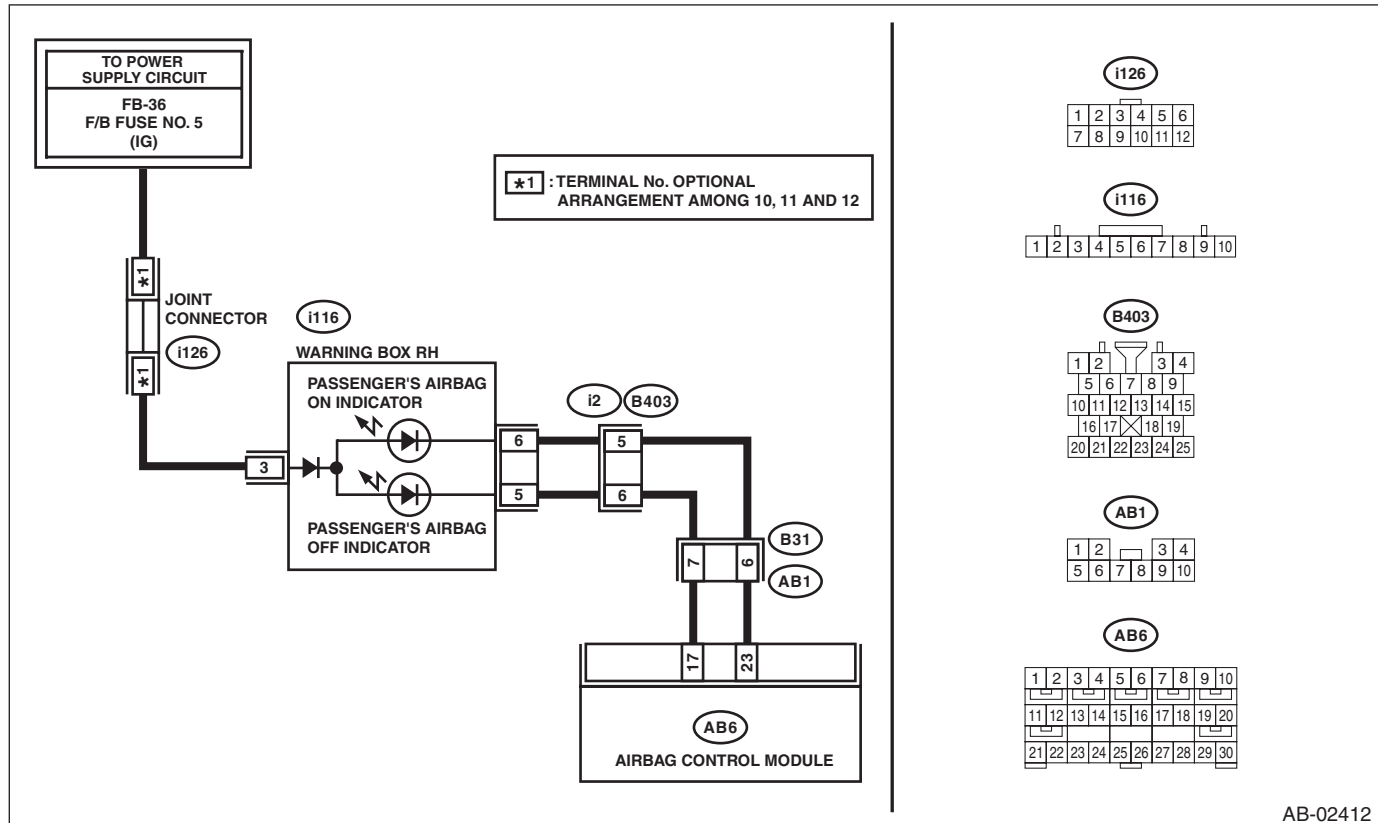
### DTC DETECTING CONDITION:

- Passenger's airbag indicator is faulty.
- Airbag control module is faulty.
- Airbag main harness circuit is open.
- Body harness circuit is open.

### CAUTION:

Before performing diagnosis, refer to "CAUTION" in "General Description". <Ref. to AB(diag)-4, CAUTION, General Description.>

### WIRING DIAGRAM:



AB-02412

Step	Check	Yes	No
<b>1 CHECK FOR POOR CONTACT.</b> 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait for 60 seconds or more. 2) Confirm that the connector between the airbag control module and the warning box RH is securely connected.	Is there poor contact of any connector?	Replace the airbag harness connector.	Go to step 2.
<b>2 CHECK AIRBAG MAIN HARNESS.</b> 1) Disconnect the connectors (AB6, AB17, AB18) from airbag control module. 2) Connect the battery ground terminal and turn the ignition switch to ON.  NOTE: Neither of ON/OFF illuminates when it is normal.	Does the passenger's airbag indicator illuminate?	Go to step 3.	Go to step 4.

## Diagnostic Chart with Trouble Code

### AIRBAG SYSTEM (DIAGNOSTICS)

Step	Check	Yes	No
<b>3 CHECK AIRBAG MAIN HARNESS.</b> 1) Turn the ignition switch to OFF. 2) Remove the warning box RH and disconnect the connector (i116). 3) Connect the test harness AG connector (1AG) to the connectors (AB6, AB17, AB18). 4) Measure the resistance between connector (2AG) in the test harness AG and chassis ground. <b>Connector &amp; terminal</b> <b>(2AG) No. 9 — (2AG) No. 8:</b> <b>(2AG) No. 9 — Chassis ground:</b> <b>(2AG) No. 8 — Chassis ground:</b>	Is the resistance 1 M $\Omega$ or more?	Replace the warning box RH. <Ref. to AC-49, REMOVAL, Air Vent Grille.>	Repair the bulkhead harness. Or replace the airbag main harness along with body harness.
<b>4 CHECK AIRBAG HARNESS.</b> 1) Connect the connectors (7AG) and (8AG) in the test harness AG. 2) Connect the battery ground terminal and turn the ignition switch to ON.	Does the passenger's airbag indicator illuminate?	Replace the airbag control module. <Ref. to AB-20, Airbag Control Module.>	Go to step 5.
<b>5 CHECK AIRBAG HARNESS.</b> 1) Turn the ignition switch to OFF. 2) Connect the test harness AG connector (1AG) to the connectors (AB6, AB17, AB18). 3) Measure the resistance between connector (2AG) in the test harness AG and connector (i116). <b>Connector &amp; terminal</b> <b>(2AG) No. 9 — (i116) No. 5:</b> <b>(2AG) No. 8 — (i116) No. 6:</b>	Is the resistance less than 10 $\Omega$ ?	Go to step 6.	Repair the bulkhead harness. Or replace the airbag main harness along with body harness.
<b>6 CHECK BODY HARNESS.</b> 1) Turn the ignition switch to ON. 2) Measure the voltage between connector (i116) and chassis ground. <b>Connector &amp; terminal</b> <b>(i116) No. 3 (+) — Chassis ground (-):</b>	Is the voltage 10 V or more?	Replace the warning box RH. <Ref. to AC-49, REMOVAL, Air Vent Grille.>	Repair the power supply line to the warning box RH.

# Diagnostic Chart with Trouble Code

AIRBAG SYSTEM (DIAGNOSTICS)

## H: DTC 27 ODS COMMUNICATION ERROR

### DTC DETECTING CONDITION:

- Communication to the occupant detection control module is faulty.
- Airbag rear harness circuit is open, shorted, shorted to ground or shorted to power supply.
- Occupant detection harness (seat harness) is faulty.
- Occupant detection system is faulty.
- Airbag control module is faulty.

### CAUTION:

<Ref. to OD(diag)-4, CAUTION, General Description.>

Step	Check	Yes	No
<b>1</b> <b>CHECK POOR CONTACT OF CONNECTORS.</b> Check for poor contact of the connectors between the airbag control module and the occupant detection control module.	Is there poor contact?	Reconnect the connector. If defective is not improved, replace the airbag rear harness along with the body harness or the occupant detection harness (seat harness).	Go to step 2.
<b>2</b> <b>CHECK AIRBAG HARNESS.</b> 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait for 60 seconds or more. 2) Disconnect the connectors (AB6, AB17, AB18) from airbag control module. 3) Disconnect the connectors (AB59) and (AB53) under the passenger's seat. 4) Connect the test harness AG connector (1AG) to the connectors (AB6, AB17, AB18). 5) Connect the connector (1AB) in the test harness AB to the connector (AB53). 6) Measure the resistance between connector (6AG) in the test harness AG and connector (2AB) in the test harness AB. <b>Connector &amp; terminal</b> <b>(6AG) No. 9 — (2AB) No. 1:</b> <b>(6AG) No. 11 — (2AB) No. 2:</b>	Is the resistance less than 10 $\Omega$ ?	Go to step 3.	Replace the airbag rear harness along with body harness.
<b>3</b> <b>CHECK AIRBAG HARNESS.</b> Measure the resistance between connector (6AG) in the test harness AG and chassis ground, and between connector terminals (6AG). <b>Connector &amp; terminal</b> <b>(6AG) No. 9 — Chassis ground:</b> <b>(6AG) No. 9 — (6AG) No. 11:</b>	Is the resistance less than 10 $\Omega$ ?	Go to step 4.	Replace the airbag rear harness along with body harness.
<b>4</b> <b>CHECK AIRBAG HARNESS.</b> 1) Turn the ignition switch to ON. 2) Measure the voltage between connector (2AB) in the test harness AB and chassis ground. <b>Connector &amp; terminal</b> <b>(2AB) No. 3 (+) — Chassis ground (-):</b>	Is the voltage 9 V or more?	Replace the occupant detection harness (seat harness). If defective is not improved, replace the occupant detection system (seat cushion & frame assembly), and then the airbag control module in this order.	Check the battery voltage and fuse. If there is no fault, replace the airbag rear harness along with body harness or replace the body harness.

## Diagnostic Chart with Trouble Code

### AIRBAG SYSTEM (DIAGNOSTICS)

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#### **I: DTC 29 ODS FAILURE**

**NOTE:**

Refer to “Occupant Detection System” for details on DTC 29. <Ref. to OD(diag)-25, DTC 29 ODS FAILURE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

#### **J: DTC 2A ODS CALIBRATION ERROR**

**NOTE:**

Refer to “Occupant Detection System” for details on DTC 2A. <Ref. to OD(diag)-22, DTC 2A ODS CALIBRATION ERROR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

#### **K: DTC 2B ODS SYSTEM WRONG PARTS**

**NOTE:**

Refer to “Occupant Detection System” for details on DTC 2B. <Ref. to OD(diag)-22, DTC 2B ODS SYSTEM WRONG PARTS, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

#### **L: DTC 2C BELT TENSION SENSOR FAILURE**

**NOTE:**

Refer to “Occupant Detection System” for details on DTC 2C. <Ref. to OD(diag)-23, DTC 2C BELT TENSION SENSOR FAILURE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

#### **M: DTC 33 FRONT SUB SENSOR RH FAILURE**

**DTC DETECTING CONDITION:**

Front sub sensor (RH) is faulty.

If DTC 33 is displayed, the circuit within the front sub sensor (RH) is faulty.

Replace the front sub sensor (RH). <Ref. to AB-25, Front Sub Sensor.>

#### **N: DTC 34 FRONT SUB SENSOR LH FAILURE**

**DTC DETECTING CONDITION:**

Front sub sensor (LH) is faulty.

If DTC 34 is displayed, the circuit within the front sub sensor (LH) is faulty.

Replace the front sub sensor (LH). <Ref. to AB-25, Front Sub Sensor.>

#### **O: DTC 37 BUCKLE SWITCH RH FAILURE**

**NOTE:**

Refer to “Occupant Detection System” for details on DTC 37. <Ref. to OD(diag)-26, DTC 37 BUCKLE SWITCH RH FAILURE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

# Diagnostic Chart with Trouble Code

AIRBAG SYSTEM (DIAGNOSTICS)

## P: DTC 39 SEAT BELT WARNING FAILURE

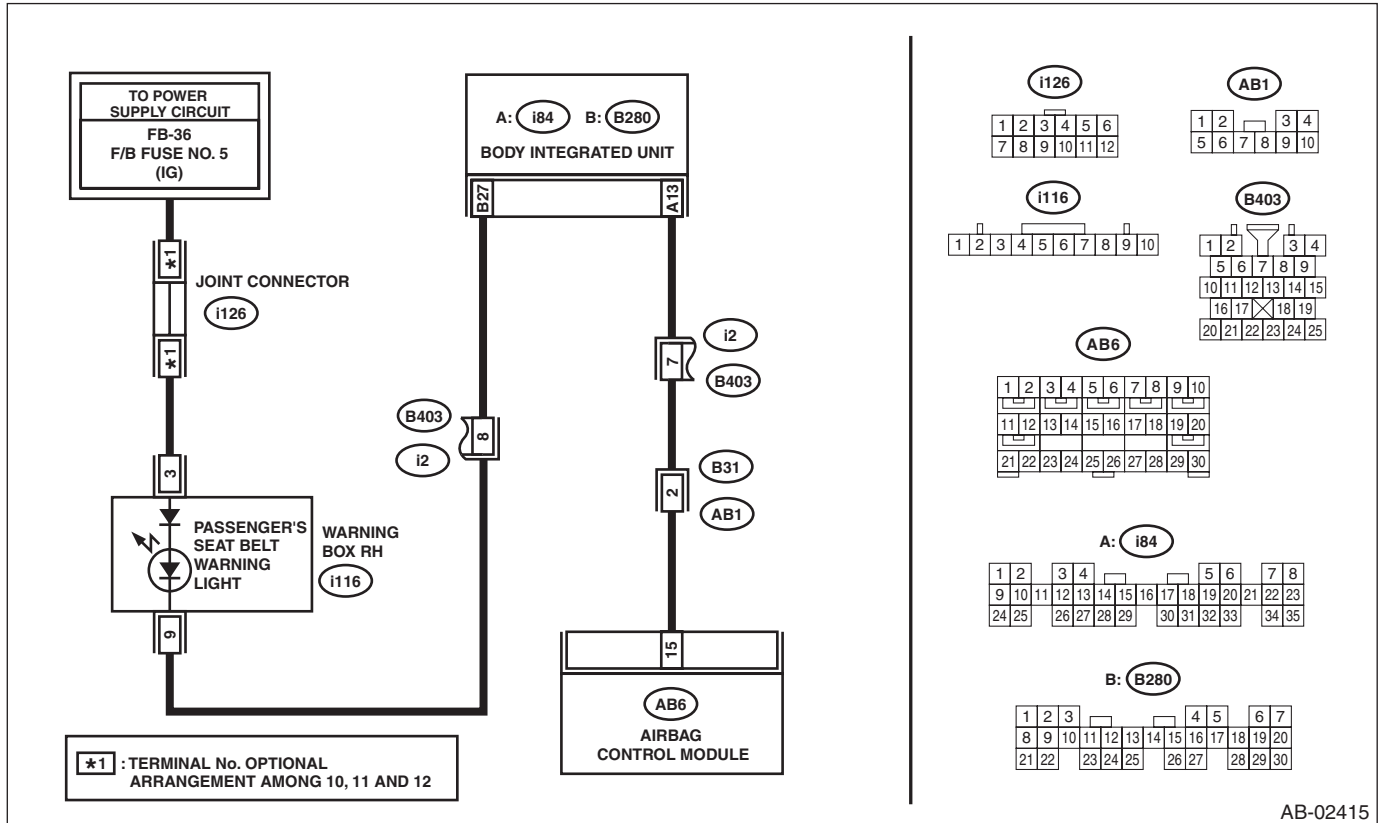
### DTC DETECTING CONDITION:

- Airbag control module is faulty.
- Body integrated unit is faulty.
- Harness circuits between body integrated unit and airbag control module are open, shorted or shorted to ground.

### CAUTION:

Before performing diagnosis, refer to “CAUTION” in “General Description”. <Ref. to AB(diag)-4, CAUTION, General Description.>

### WIRING DIAGRAM:



Step	Check	Yes	No
<b>1 CHECK AIRBAG HARNESS.</b> 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait for 60 seconds or more. 2) Disconnect the connectors (AB6, AB17, AB18) from airbag control module. 3) Connect the battery ground terminal and turn the ignition switch to ON.	Does the passenger's seat belt warning light blink for 6 seconds and go off?	Go to step 3.	Go to step 2.
<b>2 CHECK AIRBAG HARNESS.</b> 1) Turn the ignition switch to OFF. 2) Connect the test harness AG connector (1AG) to the connectors (AB6, AB17, AB18). 3) Measure the resistance between connector (2AG) in the test harness AG and chassis ground. <i>Connector &amp; terminal (2AG) No. 10 — Chassis ground:</i>	Is the resistance 1 MΩ or more?	Replace the body integrated unit.	Repair the bulk-head harness. Or replace the airbag main harness along with body harness.

## Diagnostic Chart with Trouble Code

### AIRBAG SYSTEM (DIAGNOSTICS)

Step	Check	Yes	No
<b>3</b> <b>CHECK AIRBAG HARNESS.</b> 1) Connect the connectors (7AG) and (8AG) in the test harness AG in the condition of step 2. 2) Turn the ignition switch to ON.	Does the passenger's seat belt warning light blink for 6 seconds, then repeatedly light and go off?	Replace the airbag control module. <Ref. to AB-20, Airbag Control Module.>	Go to step 4.
<b>4</b> <b>CHECK AIRBAG HARNESS.</b> 1) Disconnect the connectors (7AG) and (8AG) in the test harness AG in the condition of step 3. 2) Measure the resistance between connector (2AG) in the test harness AG and connector (i84). <i>Connector &amp; terminal (2AG) No. 10 — (i84) No. 13:</i>	Is the resistance less than 10 Ω?	Replace the body integrated unit.	Repair the bulkhead harness. Or replace the airbag main harness along with body harness.



# Diagnostic Chart with Trouble Code

AIRBAG SYSTEM (DIAGNOSTICS)

## Q: DTC 41 SIDE AIRBAG RH FAILURE

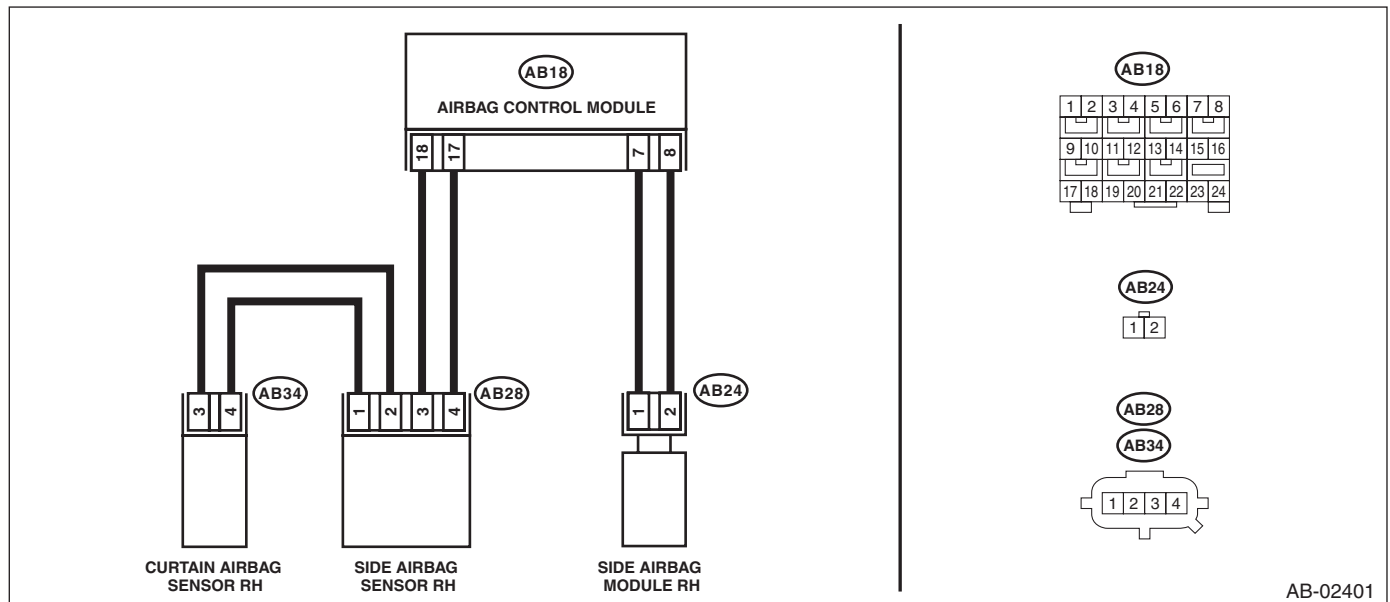
### DTC DETECTING CONDITION:

- Side airbag harness (RH) is faulty.
- Side airbag module (RH) is faulty.
- Airbag control module is faulty.

### CAUTION:

Before performing diagnosis, refer to “CAUTION” in “General Description”. <Ref. to AB(diag)-4, CAUTION, General Description.>

### WIRING DIAGRAM:



AB-02401

Step	Check	Yes	No
<b>1</b> <b>CHECK POOR CONTACT OF CONNECTORS.</b> Check for poor contact of the connectors between the airbag control module, side airbag module RH and the side airbag sensor RH.	Is there poor contact?	Replace the airbag rear harness along with body harness.	Go to step 2.
<b>2</b> <b>CHECK SIDE AIRBAG MODULE.</b> 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait for 60 seconds or more. 2) Disconnect the connector (AB24), and connect the connector (1F) in test harness F to connector (AB24). 3) Connect the airbag resistor to the connector (3F) of test harness F. 4) Connect the battery ground terminal and turn the ignition switch to ON.	Does the airbag warning light illuminate for six seconds and go off?	Replace the side airbag module (RH). <Ref. to AB-16, REMOVAL, Side Airbag Module.>	Go to step 3.

# Diagnostic Chart with Trouble Code

## AIRBAG SYSTEM (DIAGNOSTICS)

Step	Check	Yes	No
<b>3 CHECK AIRBAG REAR HARNESS (SIDE AIRBAG MODULE HARNESS RH).</b> 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait for 60 seconds or more. 2) Disconnect the connector (AB26) from seat belt pretensioner (RH). 3) Disconnect the connector (AB33) from curtain airbag module (RH). 4) Disconnect the airbag resistor from test harness F. 5) Disconnect the connectors (AB6, AB17, AB18) from airbag control module. 6) Connect the connector (1AG) in the test harness AG to the connectors (AB6, AB17, AB18). 7) Measure the resistance between connector (5AG) in the test harness AG and connector (3F) in the test harness F. <b>Connector &amp; terminal</b> <b>(5AG) No. 5 — (3F) No. 4:</b> <b>(5AG) No. 7 — (3F) No. 3:</b>	Is the resistance less than 10 $\Omega$ ?	Go to step 4.	Replace the airbag rear harness along with body harness.
<b>4 CHECK AIRBAG REAR HARNESS (SIDE AIRBAG MODULE HARNESS RH).</b> Measure the resistance between connector (5AG) terminals in the test harness AG. <b>Connector &amp; terminal</b> <b>(5AG) No. 5 — (5AG) No. 7:</b>	Is the resistance 1 M $\Omega$ or more?	Go to step 5.	Replace the airbag rear harness along with body harness.
<b>5 CHECK AIRBAG REAR HARNESS (SIDE AIRBAG MODULE HARNESS RH).</b> Measure the resistance between connector (5AG) in the test harness AG and chassis ground. <b>Connector &amp; terminal</b> <b>(5AG) No. 5 — Chassis ground:</b> <b>(5AG) No. 7 — Chassis ground:</b>	Is the resistance 1 M $\Omega$ or more?	Go to step 6.	Replace the airbag rear harness along with body harness.
<b>6 CHECK AIRBAG CONTROL MODULE.</b> 1) Connect all connectors. 2) Clear the memory. 3) Perform the Inspection Mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the airbag control module. <Ref. to AB-20, Airbag Control Module.>	Go to step 7.
<b>7 CHECK FOR ANY OTHER DTC ON DISPLAY.</b>	Is any other DTC displayed?	Check DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to AB(diag)-35, List of Diagnostic Trouble Code (DTC).>	Finish the diagnosis.

# Diagnostic Chart with Trouble Code

AIRBAG SYSTEM (DIAGNOSTICS)

## R: DTC 42 SIDE AIRBAG LH FAILURE

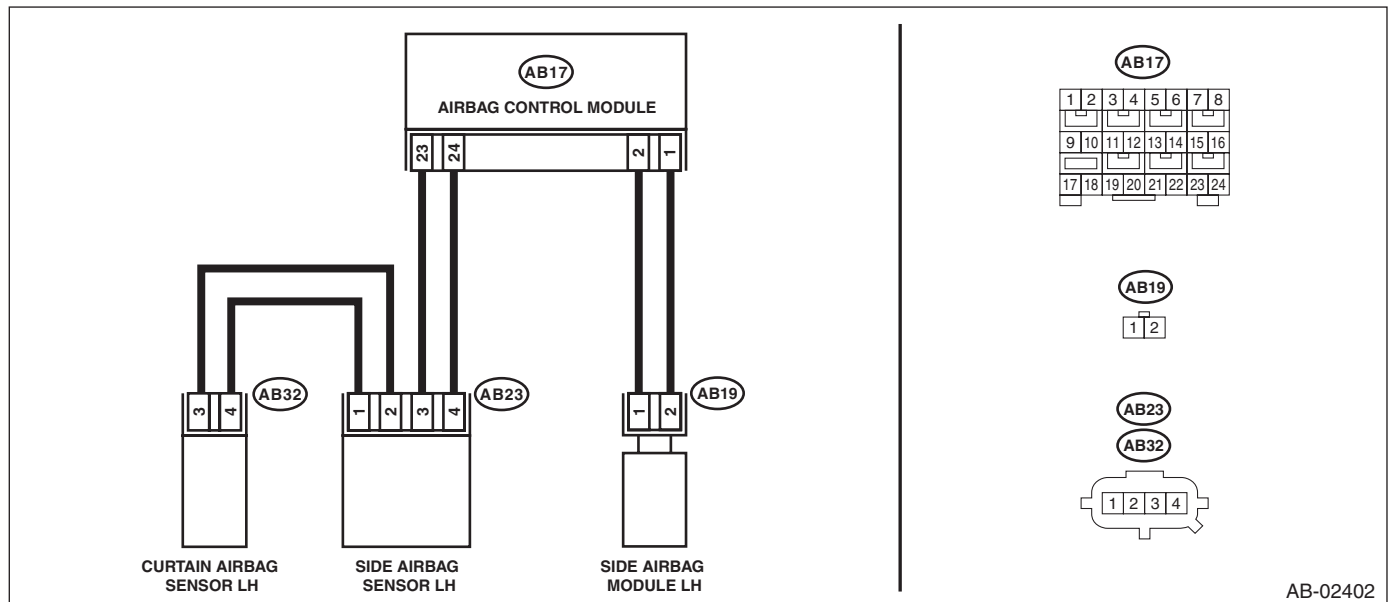
### DTC DETECTING CONDITION:

- Side airbag harness (LH) is faulty.
- Side airbag module (LH) is faulty.
- Airbag control module is faulty.

### CAUTION:

Before performing diagnosis, refer to “CAUTION” in “General Description”. <Ref. to AB(diag)-4, CAUTION, General Description.>

### WIRING DIAGRAM:



AB-02402

Step	Check	Yes	No
<b>1</b> <b>CHECK POOR CONTACT OF CONNECTORS.</b> Check for poor contact of the connectors between the airbag control module, side airbag module LH and the side airbag sensor LH.	Is there poor contact?	Replace the airbag rear harness along with body harness.	Go to step 2.
<b>2</b> <b>CHECK SIDE AIRBAG MODULE.</b> 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait for 60 seconds or more. 2) Disconnect the connector (AB19), and connect the connector (1F) in test harness F to connector (AB19). 3) Connect the airbag resistor to the connector (3F) of test harness F. 4) Connect the battery ground terminal and turn the ignition switch to ON.	Does the airbag warning light illuminate for six seconds and go off?	Replace the side airbag module (LH). <Ref. to AB-16, REMOVAL, Side Airbag Module.>	Go to step 3.

# Diagnostic Chart with Trouble Code

## AIRBAG SYSTEM (DIAGNOSTICS)

Step	Check	Yes	No
<b>3 CHECK AIRBAG REAR HARNESS (SIDE AIRBAG MODULE HARNESS LH).</b> 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait for 60 seconds or more. 2) Disconnect the connector (AB21) from seat belt pretensioner (LH). 3) Disconnect the connector (AB31) from curtain airbag module (LH). 4) Disconnect the airbag resistor from test harness. 5) Disconnect the connectors (AB6, AB17, AB18) from airbag control module. 6) Connect the connector (1AG) in the test harness AG to the connectors (AB6, AB17, AB18). 7) Measure the resistance between connector (5AG) in the test harness AG and connector (3F) in the test harness F. <b>Connector &amp; terminal</b> <b>(5AG) No. 1 — (3F) No. 3:</b> <b>(5AG) No. 3 — (3F) No. 4:</b>	Is the resistance less than 10 Ω?	Go to step 4.	Replace the airbag rear harness along with body harness.
<b>4 CHECK AIRBAG REAR HARNESS (SIDE AIRBAG MODULE HARNESS LH).</b> Measure the resistance between connector (5AG) terminals in the test harness AG. <b>Connector &amp; terminal</b> <b>(5AG) No. 1 — (5AG) No. 3:</b>	Is the resistance 1 MΩ or more?	Go to step 5.	Replace the airbag rear harness along with body harness.
<b>5 CHECK AIRBAG REAR HARNESS (SIDE AIRBAG MODULE HARNESS LH).</b> Measure the resistance between connector (5AG) in the test harness AG and chassis ground. <b>Connector &amp; terminal</b> <b>(5AG) No. 1 — Chassis ground:</b> <b>(5AG) No. 3 — Chassis ground:</b>	Is the resistance 1 MΩ or more?	Go to step 6.	Replace the airbag rear harness along with body harness.
<b>6 CHECK AIRBAG CONTROL MODULE.</b> 1) Connect all connectors. 2) Clear the memory. 3) Perform the Inspection Mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the airbag control module. <Ref. to AB-20, Airbag Control Module.>	Go to step 7.
<b>7 CHECK FOR ANY OTHER DTC ON DISPLAY.</b>	Is any other DTC displayed?	Check DTC using “List of Diagnostic Trouble Code (DTC)”. <Ref. to AB(diag)-35, List of Diagnostic Trouble Code (DTC).>	Finish the diagnosis.

# Diagnostic Chart with Trouble Code

AIRBAG SYSTEM (DIAGNOSTICS)

## S: DTC 45 SIDE AIRBAG RH FAILURE

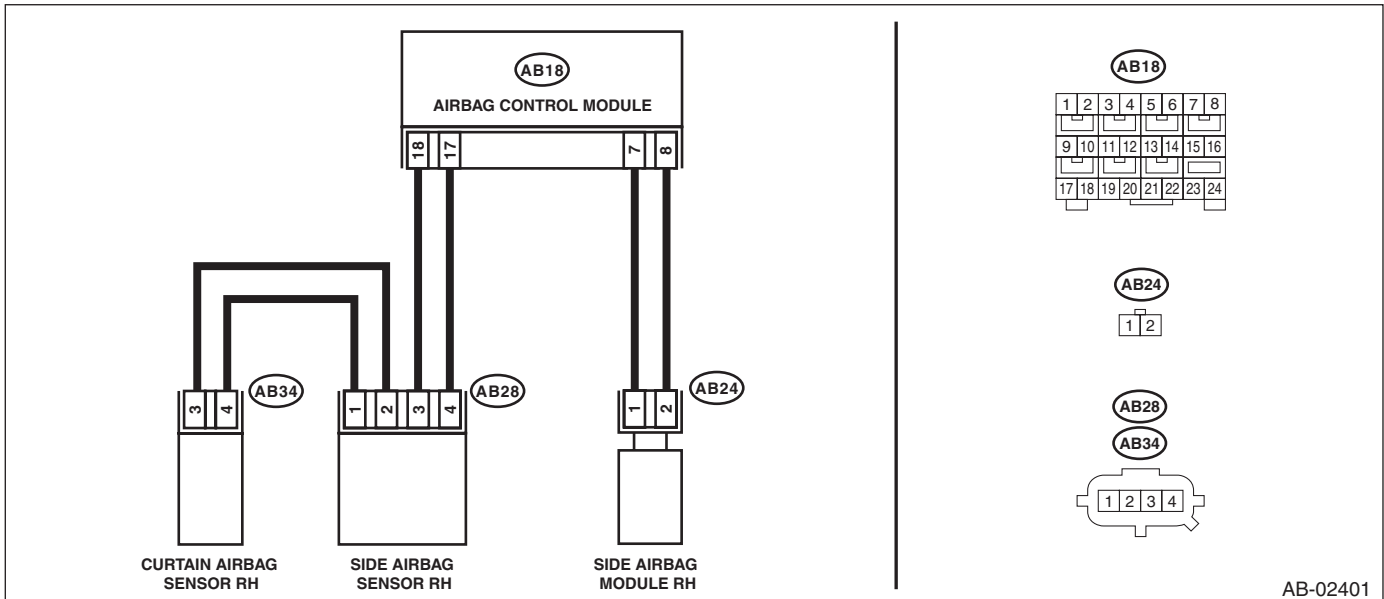
### DTC DETECTING CONDITION:

- Side airbag harness (RH) is shorted to power supply.
- Airbag control module is faulty.

### CAUTION:

Before performing diagnosis, refer to “CAUTION” in “General Description”. <Ref. to AB(diag)-4, CAUTION, General Description.>

### WIRING DIAGRAM:



AB-02401

Step	Check	Yes	No
<b>1</b> <b>CHECK POOR CONTACT OF CONNECTORS.</b> Check for poor contact of the connectors between the airbag control module, side airbag module RH and the side airbag sensor RH.	Is there poor contact?	Replace the airbag rear harness along with body harness.	Go to step 2.
<b>2</b> <b>CHECK SIDE AIRBAG MODULE.</b> 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait for 60 seconds or more. 2) Disconnect the connector (AB24), and connect the connector (1F) in test harness F to connector (AB24). 3) Connect the airbag resistor to the connector (3F) of test harness F. 4) Connect the battery ground terminal and turn the ignition switch to ON.	Does the airbag warning light illuminate for six seconds and go off?	Replace the side airbag module (RH). <Ref. to AB-16, REMOVAL, Side Airbag Module.>	Go to step 3.

# Diagnostic Chart with Trouble Code

## AIRBAG SYSTEM (DIAGNOSTICS)

Step	Check	Yes	No
<b>3</b> <b>CHECK AIRBAG REAR HARNESS (SIDE AIRBAG MODULE HARNESS RH).</b> 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait for 60 seconds or more. 2) Disconnect the connector (AB26) from seat belt pretensioner (RH). 3) Disconnect the connector (AB33) from curtain airbag module (RH). 4) Disconnect the airbag resistor from test harness. 5) Disconnect the connectors (AB6, AB17, AB18) from airbag control module. 6) Connect the connector (1AG) in the test harness AG to the connectors (AB6, AB17, AB18). 7) Connect the battery ground terminal and turn the ignition switch to ON. 8) Measure the voltage between connector (5AG) in the test harness AG and chassis ground. <b>Connector &amp; terminal</b> <b>(5AG) No. 5 (+) — Chassis ground (-):</b> <b>(5AG) No. 7 (+) — Chassis ground (-):</b>	Is the voltage less than 1 V?	Go to step 4.	Replace the airbag rear harness along with body harness.
<b>4</b> <b>CHECK AIRBAG CONTROL MODULE.</b> 1) Connect all connectors. 2) Clear the memory. 3) Perform the Inspection Mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the airbag control module. <Ref. to AB-20, Airbag Control Module.>	Go to step 5.
<b>5</b> <b>CHECK FOR ANY OTHER DTC ON DISPLAY.</b>	Is any other DTC displayed?	Check DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to AB(diag)-35, List of Diagnostic Trouble Code (DTC).>	Finish the diagnosis.

# Diagnostic Chart with Trouble Code

AIRBAG SYSTEM (DIAGNOSTICS)

## T: DTC 46 SIDE AIRBAG LH FAILURE

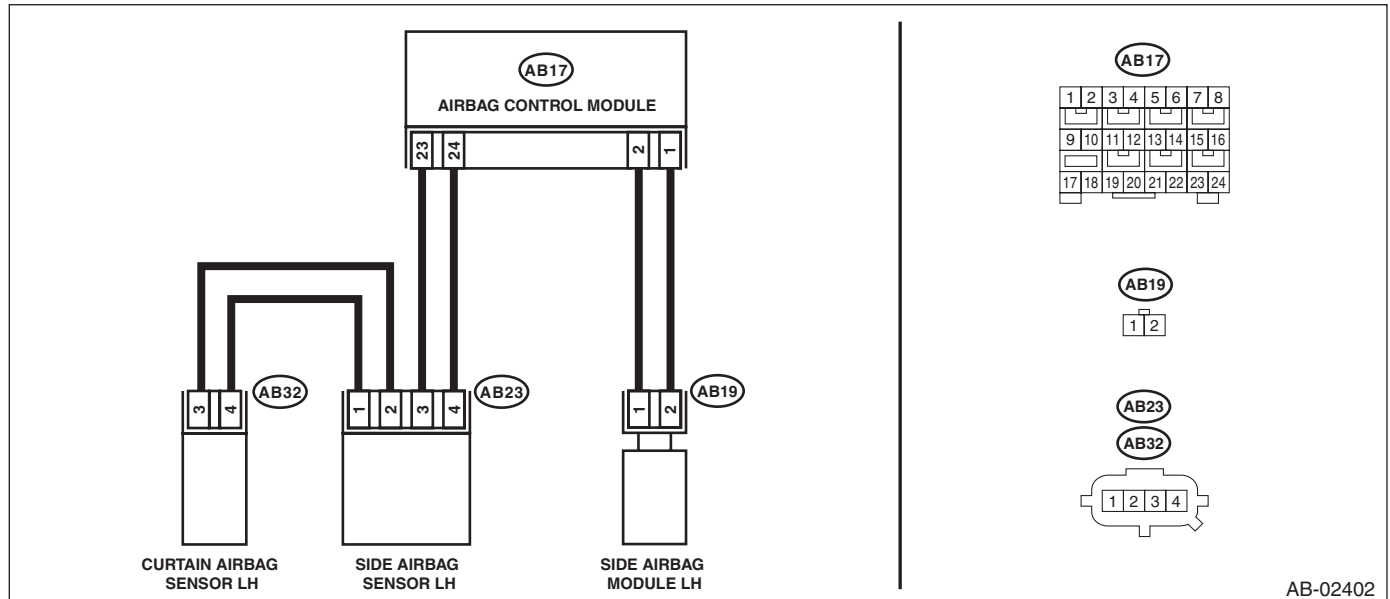
### DTC DETECTING CONDITION:

- Side airbag harness (LH) is shorted to power supply.
- Airbag control module is faulty.

### CAUTION:

Before performing diagnosis, refer to “CAUTION” in “General Description”. <Ref. to AB(diag)-4, CAUTION, General Description.>

### WIRING DIAGRAM:



AB-02402

Step	Check	Yes	No
<b>1</b> <b>CHECK POOR CONTACT OF CONNECTORS.</b> Check for poor contact of the connectors between the airbag control module, side airbag module LH and the side airbag sensor LH.	Is there poor contact?	Replace the airbag rear harness along with body harness.	Go to step 2.
<b>2</b> <b>CHECK SIDE AIRBAG MODULE.</b> 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait for 60 seconds or more. 2) Disconnect the connector (AB19), and connect the connector (1F) in test harness F to connector (AB19). 3) Connect the airbag resistor to the connector (3F) of test harness F. 4) Connect the battery ground terminal and turn the ignition switch to ON.	Does the airbag warning light illuminate for six seconds and go off?	Replace the side airbag module (LH). <Ref. to AB-16, REMOVAL, Side Airbag Module.>	Go to step 3.

## Diagnostic Chart with Trouble Code

### AIRBAG SYSTEM (DIAGNOSTICS)

Step	Check	Yes	No
<b>3 CHECK AIRBAG REAR HARNESS (SIDE AIRBAG MODULE HARNESS LH).</b> 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait for 60 seconds or more. 2) Disconnect the connector (AB21) from seat belt pretensioner (LH). 3) Disconnect the connector (AB31) from curtain airbag module (LH). 4) Disconnect the airbag resistor from test harness. 5) Disconnect the connectors (AB6, AB17, AB18) from airbag control module. 6) Connect the connector (1AG) in the test harness AG to the connectors (AB6, AB17, AB18). 7) Connect the battery ground terminal and turn the ignition switch to ON. 8) Measure the voltage between connector (5AG) in the test harness AG and chassis ground. <b>Connector &amp; terminal</b> <b>(5AG) No. 3 (+) — Chassis ground (-):</b> <b>(5AG) No. 1 (+) — Chassis ground (-):</b>	Is the voltage less than 1 V?	Go to step 4.	Replace the airbag rear harness along with body harness.
<b>4 CHECK AIRBAG CONTROL MODULE.</b> 1) Connect all connectors. 2) Clear the memory. 3) Perform the Inspection Mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the airbag control module. <Ref. to AB-20, Airbag Control Module.>	Go to step 5.
<b>5 CHECK FOR ANY OTHER DTC ON DISPLAY.</b>	Is any other DTC displayed?	Check DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to AB(diag)-35, List of Diagnostic Trouble Code (DTC).>	Finish the diagnosis.



## **U: DTC 53 SIDE AIRBAG SENSOR RH FAILURE**

### **DTC DETECTING CONDITION:**

Side airbag sensor (RH) is faulty.

When DTC 53 is displayed, the circuit within the side airbag sensor (RH) is faulty.

Replace the side airbag sensor (RH). <Ref. to AB-21, Side Airbag Sensor.>

## **V: DTC 54 SIDE AIRBAG SENSOR LH FAILURE**

### **DTC DETECTING CONDITION:**

Side airbag sensor (LH) is faulty.

When DTC 54 is displayed, the circuit within the side airbag sensor (LH) is faulty.

Replace the side airbag sensor (LH). <Ref. to AB-21, Side Airbag Sensor.>

## **W: DTC 55 SIDE CURTAIN AIRBAG FIRING OUTPUT**

This DTC is displayed when the side airbag module and curtain airbag module are deployed.

Once this DTC is displayed, the memory cannot be cleared. Replace the following parts.

- Airbag control module <Ref. to AB-20, Airbag Control Module.>
- Front seat with side airbag module (operating side) <Ref. to SE-7, Front Seat.>
- Side airbag sensor (operating side) <Ref. to AB-21, Side Airbag Sensor.>
- Curtain airbag module (operating side) <Ref. to AB-18, Curtain Airbag Module.>
- Curtain airbag sensor (operating side) <Ref. to AB-22, Curtain Airbag Sensor.>
- Satellite safing sensor

## **X: DTC 58 CURTAIN AIRBAG SENSOR RH FAILURE**

### **DTC DETECTING CONDITION:**

Curtain airbag sensor (RH) is faulty.

If DTC 58 is displayed, the circuit within the curtain airbag sensor (RH) is faulty.

Replace the curtain airbag sensor (RH). <Ref. to AB-22, Curtain Airbag Sensor.>

## **Y: DTC 59 CURTAIN AIRBAG SENSOR LH FAILURE**

### **DTC DETECTING CONDITION:**

Curtain airbag sensor (LH) is faulty.

If DTC 59 is displayed, the circuit within the curtain airbag sensor (LH) is faulty.

Replace the curtain airbag sensor (LH). <Ref. to AB-22, Curtain Airbag Sensor.>

# Diagnostic Chart with Trouble Code

AIRBAG SYSTEM (DIAGNOSTICS)

## Z: DTC 61 BELT PRETENSIONER RH FAILURE

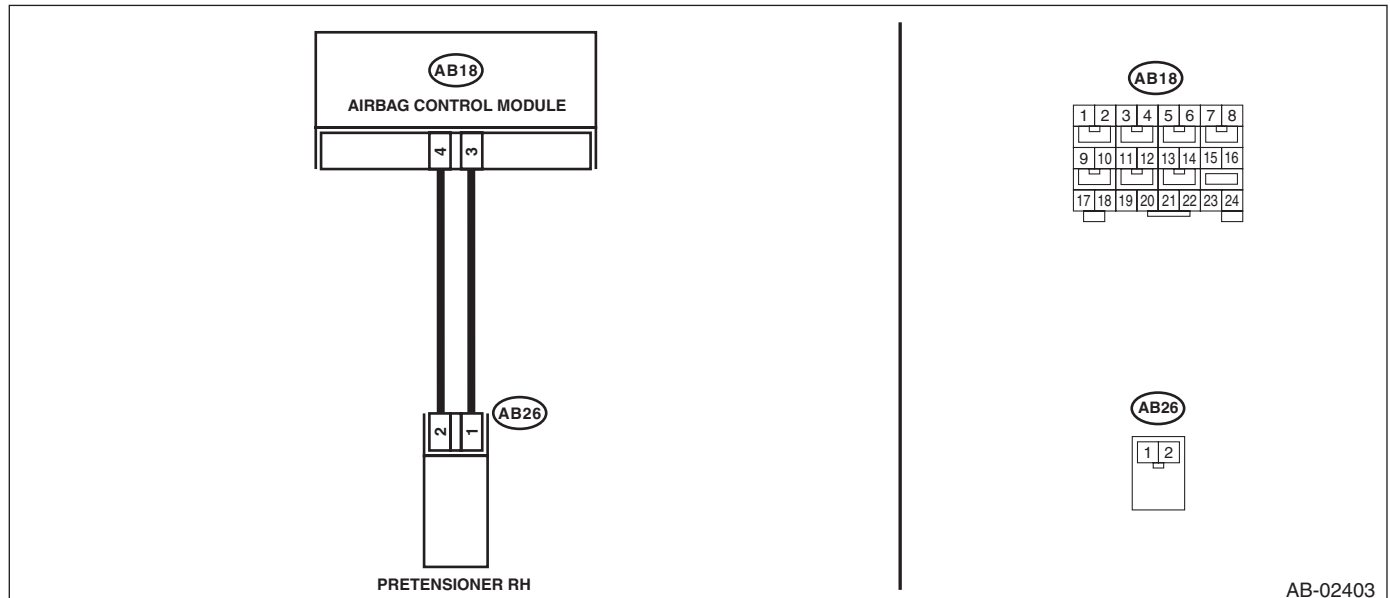
### DTC DETECTING CONDITION:

- Seat belt pretensioner (RH) circuit is open, shorted or shorted to ground.
- Airbag control module is faulty.
- Pretensioner is faulty.
- Pretensioner harness is faulty.

### CAUTION:

Before performing diagnosis, refer to “CAUTION” in “General Description”. <Ref. to AB(diag)-4, CAUTION, General Description.>

### WIRING DIAGRAM:



Step	Check	Yes	No
<b>1</b> <b>CHECK POOR CONTACT OF CONNECTORS.</b> Check for poor contact of the connectors between the airbag control module and the seat belt pretensioner RH.	Is there poor contact?	Replace the airbag rear harness along with body harness.	Go to step 2.
<b>2</b> <b>CHECK SEAT BELT PRETENSIONER.</b> 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait for 60 seconds or more. 2) Disconnect the connector (AB26) from seat belt pretensioner (RH). 3) Connect the connector (1N) in the test harness N to the connector (AB26). 4) Connect the airbag resistor to the connector (2N) of test harness N. 5) Connect the battery ground terminal and turn the ignition switch to ON.	Does the airbag warning light illuminate for six seconds and go off?	Replace the seat belt pretensioner (RH). <Ref. to SB-18, Front Seat Belt.>	Go to step 3.

# Diagnostic Chart with Trouble Code

AIRBAG SYSTEM (DIAGNOSTICS)

Step	Check	Yes	No
<b>3 CHECK AIRBAG REAR HARNESS (PRE-TENSIONER HARNESS RH).</b> 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait for 60 seconds or more. 2) Disconnect the airbag resistor from the connector (2N) of test harness N. 3) Disconnect connector (AB24) from side airbag module (RH). 4) Disconnect the connector (AB33) from curtain airbag module (RH). 5) Disconnect the connectors (AB6, AB17, AB18) from airbag control module. 6) Connect the test harness AG connector (1AG) to connectors (AB18, AB17, AB6). 7) Measure the resistance between connector (3AG) in the test harness AG and connector (2N) in the test harness N. <i><b>Connector &amp; terminal</b></i> <i><b>(3AG) No. 18 — (2N) No. 2:</b></i> <i><b>(3AG) No. 20 — (2N) No. 1:</b></i>	Is the resistance less than 10 Ω?	Go to step 4.	Replace the airbag rear harness along with body harness.
<b>4 CHECK AIRBAG REAR HARNESS (PRE-TENSIONER HARNESS RH).</b> Measure the resistance between connector (3AG) terminals in the test harness AG. <i><b>Connector &amp; terminal</b></i> <i><b>(3AG) No. 18 — (3AG) No. 20:</b></i>	Is the resistance 1 MΩ or more?	Go to step 5.	Replace the airbag rear harness along with body harness.
<b>5 CHECK AIRBAG REAR HARNESS (PRE-TENSIONER HARNESS RH).</b> Measure the resistance between connector (3AG) in the test harness AG and chassis ground. <i><b>Connector &amp; terminal</b></i> <i><b>(3AG) No. 18 — Chassis ground:</b></i> <i><b>(3AG) No. 20 — Chassis ground:</b></i>	Is the resistance 1 MΩ or more?	Go to step 6.	Replace the airbag rear harness along with body harness.
<b>6 CHECK AIRBAG CONTROL MODULE.</b> 1) Connect all connectors. 2) Clear the memory. 3) Perform the Inspection Mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the airbag control module. <Ref. to AB-20, Airbag Control Module.>	Go to step 7.
<b>7 CHECK FOR ANY OTHER DTC ON DISPLAY.</b>	Is any other DTC displayed?	Check DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to AB(diag)-35, List of Diagnostic Trouble Code (DTC).>	Finish the diagnosis.

# Diagnostic Chart with Trouble Code

AIRBAG SYSTEM (DIAGNOSTICS)

## AA:DTC 62 BELT PRETENSIONER LH FAILURE

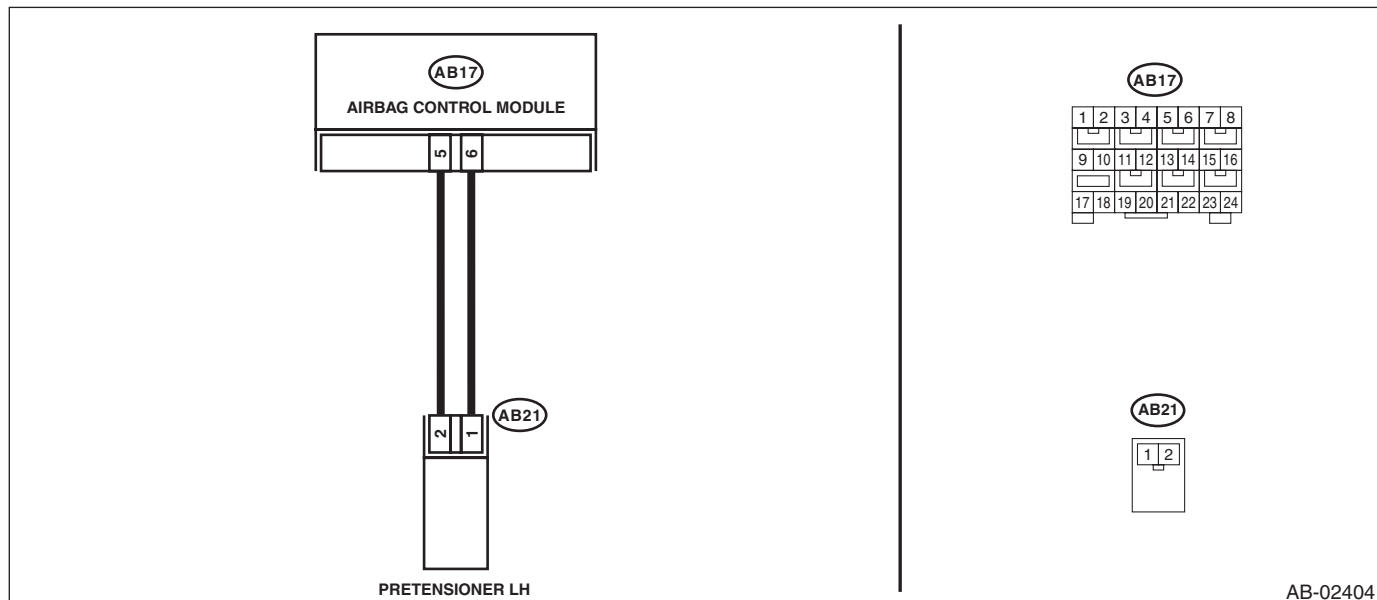
### DTC DETECTING CONDITION:

- Seat belt pretensioner (LH) circuit is open, shorted or shorted to ground.
- Airbag control module is faulty.
- Pretensioner is faulty.
- Pretensioner harness is faulty.

### CAUTION:

Before performing diagnosis, refer to “CAUTION” in “General Description”. <Ref. to AB(diag)-4, CAUTION, General Description.>

### WIRING DIAGRAM:



Step	Check	Yes	No
<b>1</b> <b>CHECK POOR CONTACT OF CONNECTORS.</b> Check for poor contact of the connectors between the airbag control module and the seat belt pretensioner LH.	Is there poor contact?	Replace the airbag rear harness along with body harness.	Go to step 2.
<b>2</b> <b>CHECK SEAT BELT PRETENSIONER.</b> 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait for 60 seconds or more. 2) Disconnect the connector (AB21) from seat belt pretensioner (LH). 3) Connect the connector (1N) in the test harness N to the connector (AB21). 4) Connect the airbag resistor to the connector (2N) of test harness N. 5) Connect the battery ground terminal and turn the ignition switch to ON.	Does the airbag warning light illuminate for six seconds and go off?	Replace the seat belt pretensioner (LH). <Ref. to SB-18, Front Seat Belt.>	Go to step 3.

# Diagnostic Chart with Trouble Code

AIRBAG SYSTEM (DIAGNOSTICS)

Step	Check	Yes	No
<b>3 CHECK AIRBAG REAR HARNESS (PRE-TENSIONER HARNESS LH).</b> 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait for 60 seconds or more. 2) Disconnect the airbag resistor from the connector (2N) of test harness N. 3) Disconnect connector (AB19) from side airbag module (LH). 4) Disconnect the connector (AB31) from curtain airbag module (LH). 5) Disconnect the connectors (AB6, AB17, AB18) from airbag control module. 6) Connect the connector (1AG) in the test harness AG to the connectors (AB6, AB17, AB18). 7) Measure the resistance between connector (3AG) in the test harness AG and connector (2N) in the test harness N. <i><b>Connector &amp; terminal</b></i> <i><b>(3AG) No. 12 — (2N) No. 2:</b></i> <i><b>(3AG) No. 10 — (2N) No. 1:</b></i>	Is the resistance less than 10 Ω?	Go to step 4.	Replace the airbag rear harness along with body harness.
<b>4 CHECK AIRBAG REAR HARNESS (PRE-TENSIONER HARNESS LH).</b> Measure the resistance between connector (3AG) terminals in the test harness AG. <i><b>Connector &amp; terminal</b></i> <i><b>(3AG) No. 10 — (3AG) No. 12:</b></i>	Is the resistance 1 MΩ or more?	Go to step 5.	Replace the airbag rear harness along with body harness.
<b>5 CHECK AIRBAG REAR HARNESS (PRE-TENSIONER HARNESS LH).</b> Measure the resistance between connector (3AG) in the test harness AG and chassis ground. <i><b>Connector &amp; terminal</b></i> <i><b>(3AG) No. 10 — Chassis ground:</b></i> <i><b>(3AG) No. 12 — Chassis ground:</b></i>	Is the resistance 1 MΩ or more?	Go to step 6.	Replace the airbag rear harness along with body harness.
<b>6 CHECK AIRBAG CONTROL MODULE.</b> 1) Connect all connectors. 2) Clear the memory. 3) Perform the Inspection Mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the airbag control module. <Ref. to AB-20, Airbag Control Module.>	Go to step 7.
<b>7 CHECK FOR ANY OTHER DTC ON DISPLAY.</b>	Is any other DTC displayed?	Check DTC using “List of Diagnostic Trouble Code (DTC)”. <Ref. to AB(diag)-35, List of Diagnostic Trouble Code (DTC).>	Finish the diagnosis.

# Diagnostic Chart with Trouble Code

AIRBAG SYSTEM (DIAGNOSTICS)

## AB:DTC 65 BELT PRETENSIONER RH FAILURE

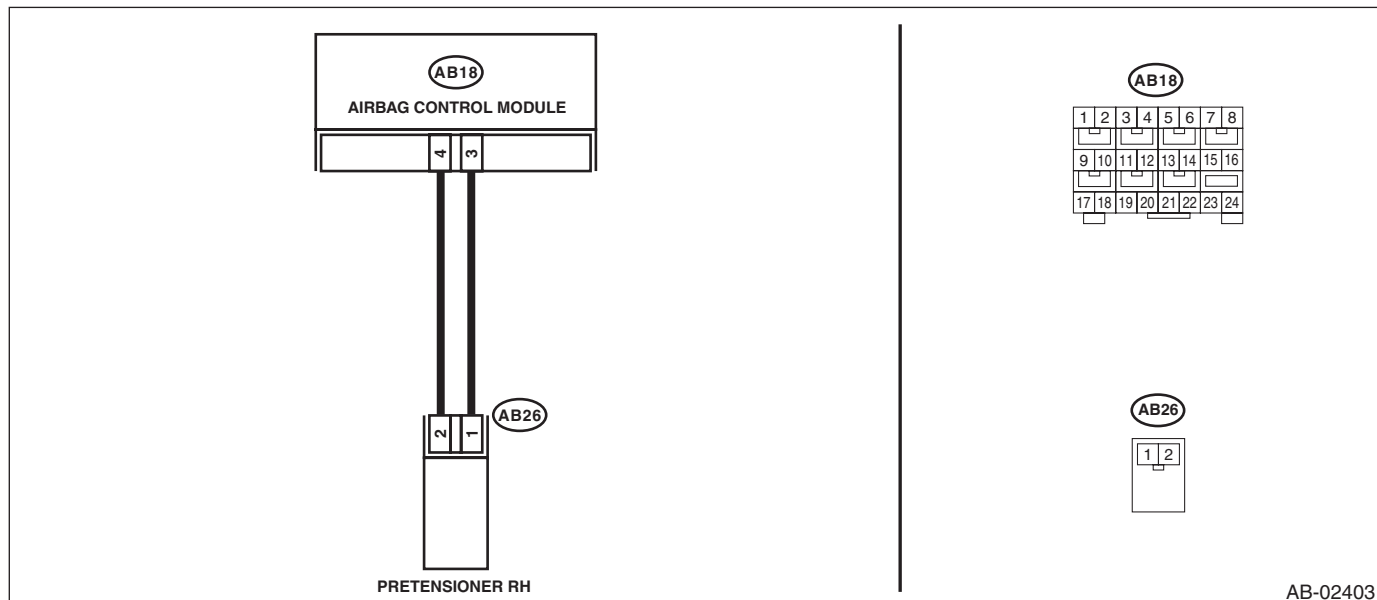
### DTC DETECTING CONDITION:

- Seat belt pretensioner (RH) circuit is shorted to power supply.
- Pretensioner is faulty.
- Pretensioner harness is faulty.
- Airbag control module is faulty.

### CAUTION:

Before performing diagnosis, refer to “CAUTION” in “General Description”. <Ref. to AB(diag)-4, CAUTION, General Description.>

### WIRING DIAGRAM:



Step	Check	Yes	No
<b>1</b> <b>CHECK POOR CONTACT OF CONNECTORS.</b> Check for poor contact of the connectors between the airbag control module and the seat belt pretensioner RH.	Is there poor contact?	Replace the airbag rear harness along with body harness.	Go to step 2.
<b>2</b> <b>CHECK SEAT BELT PRETENSIONER.</b> 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait for 60 seconds or more. 2) Disconnect the connector (AB26) from seat belt pretensioner (RH). 3) Connect the connector (1N) in the test harness N to the connector (AB26). 4) Connect the airbag resistor to the connector (2N) of test harness N. 5) Connect the battery ground terminal and turn the ignition switch to ON.	Does the airbag warning light illuminate for six seconds and go off?	Replace the seat belt pretensioner (RH). <Ref. to SB-18, Front Seat Belt.>	Go to step 3.

# Diagnostic Chart with Trouble Code

## AIRBAG SYSTEM (DIAGNOSTICS)

Step	Check	Yes	No
<b>3 CHECK AIRBAG REAR HARNESS (PRE-TENSIONER HARNESS RH).</b> 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait for 60 seconds or more. 2) Disconnect the airbag resistor from the connector (2N) of test harness N. 3) Disconnect connector (AB24) from side airbag module (RH). 4) Disconnect the connector (AB33) from curtain airbag module (RH). 5) Disconnect the connectors (AB6, AB17, AB18) from airbag control module. 6) Connect the connector (1AG) in the test harness AG to the connectors (AB6, AB17, AB18). 7) Connect the battery ground terminal and turn the ignition switch to ON. 8) Measure the voltage between connector (3AG) in the test harness AG and chassis ground. <b>Connector &amp; terminal</b> <b>(3AG) No. 20 (+) — Chassis ground (-):</b> <b>(3AG) No. 18 (+) — Chassis ground (-):</b>	Is the voltage less than 1 V?	Go to step 4.	Replace the airbag rear harness along with body harness.
<b>4 CHECK AIRBAG CONTROL MODULE.</b> 1) Connect all connectors. 2) Clear the memory. 3) Perform the Inspection Mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the airbag control module. <Ref. to AB-20, Airbag Control Module.>	Go to step 5.
<b>5 CHECK FOR ANY OTHER DTC ON DISPLAY.</b>	Is any other DTC displayed?	Check DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to AB(diag)-35, List of Diagnostic Trouble Code (DTC).>	Finish the diagnosis.

# Diagnostic Chart with Trouble Code

AIRBAG SYSTEM (DIAGNOSTICS)

## AC:DTC 66 BELT PRETENSIONER LH FAILURE

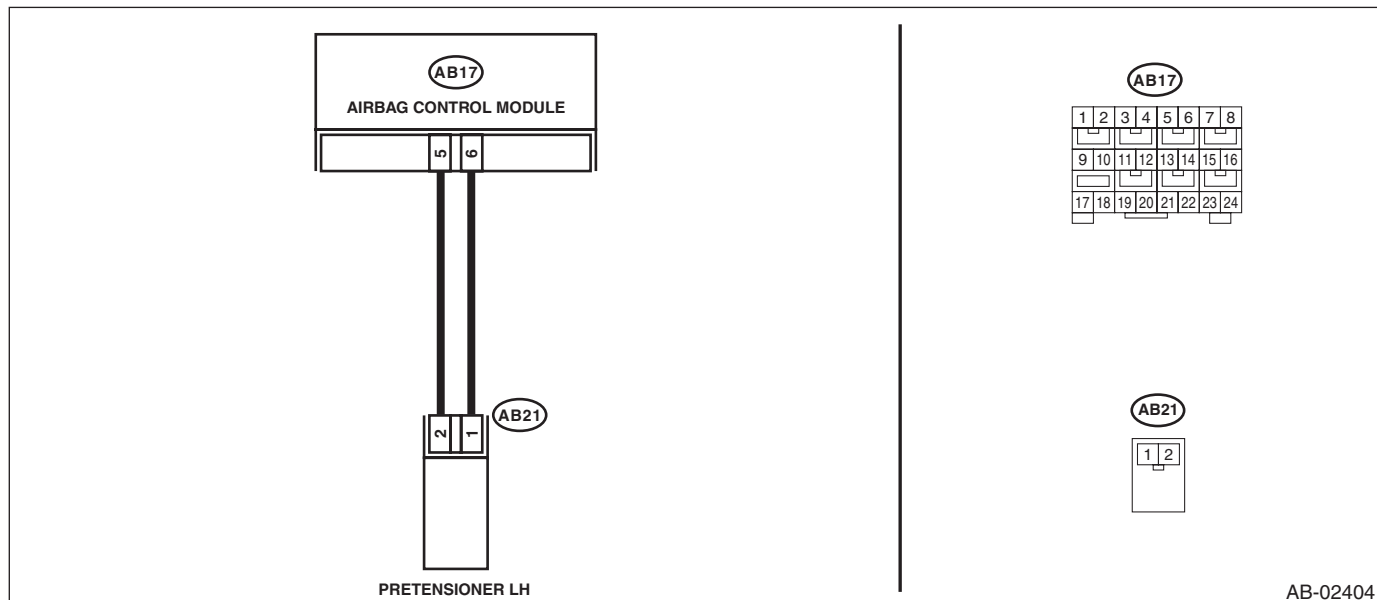
### DTC DETECTING CONDITION:

- Seat belt pretensioner (LH) circuit is shorted to power supply.
- Pretensioner is faulty.
- Pretensioner harness is faulty.
- Airbag control module is faulty.

### CAUTION:

Before performing diagnosis, refer to “CAUTION” in “General Description”. <Ref. to AB(diag)-4, CAUTION, General Description.>

### WIRING DIAGRAM:



Step	Check	Yes	No
<b>1</b> <b>CHECK POOR CONTACT OF CONNECTORS.</b> Check for poor contact of the connectors between the airbag control module and the seat belt pretensioner LH.	Is there poor contact?	Replace the airbag rear harness along with body harness.	Go to step 2.
<b>2</b> <b>CHECK SEAT BELT PRETENSIONER.</b> 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait for 60 seconds or more. 2) Disconnect the connector (AB21) from seat belt pretensioner (LH). 3) Connect the connector (1N) in the test harness N to the connector (AB21). 4) Connect the airbag resistor to the connector (2N) of test harness N. 5) Connect the battery ground terminal and turn the ignition switch to ON.	Does the airbag warning light illuminate for six seconds and go off?	Replace the seat belt pretensioner (LH). <Ref. to SB-18, Front Seat Belt.>	Go to step 3.



# Diagnostic Chart with Trouble Code

## AIRBAG SYSTEM (DIAGNOSTICS)

Step	Check	Yes	No
<b>3 CHECK AIRBAG REAR HARNESS (PRE-TENSIONER HARNESS LH).</b> 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait for 60 seconds or more. 2) Disconnect the airbag resistor from the connector (2N) of test harness N. 3) Disconnect connector (AB19) from side airbag module (LH). 4) Disconnect the connector (AB31) from curtain airbag module (LH). 5) Disconnect the connectors (AB6, AB17, AB18) from airbag control module. 6) Connect the connector (1AG) in the test harness AG to the connectors (AB6, AB17, AB18). 7) Connect the battery ground terminal and turn the ignition switch to ON. 8) Measure the voltage between connector (3AG) in the test harness AG and chassis ground. <i><b>Connector &amp; terminal</b></i> <i><b>(3AG) No. 10 (+) — Chassis ground (-):</b></i> <i><b>(3AG) No. 12 (+) — Chassis ground (-):</b></i>	Is the voltage less than 1 V?	Go to step 4.	Replace the airbag rear harness along with body harness.
<b>4 CHECK AIRBAG CONTROL MODULE.</b> 1) Connect all connectors. 2) Clear the memory. 3) Perform the Inspection Mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the airbag control module. <Ref. to AB-20, Airbag Control Module.>	Go to step 5.
<b>5 CHECK FOR ANY OTHER DTC ON DISPLAY.</b>	Is any other DTC displayed?	Check DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to AB(diag)-35, List of Diagnostic Trouble Code (DTC).>	Finish the diagnosis.

# Diagnostic Chart with Trouble Code

## AIRBAG SYSTEM (DIAGNOSTICS)

### AD:DTC 71 DRIVER'S AIRBAG FAILURE

#### DTC DETECTING CONDITION:

- Airbag main harness circuit is open, shorted or shorted to ground.
- Airbag module harness (Driver's side) 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.

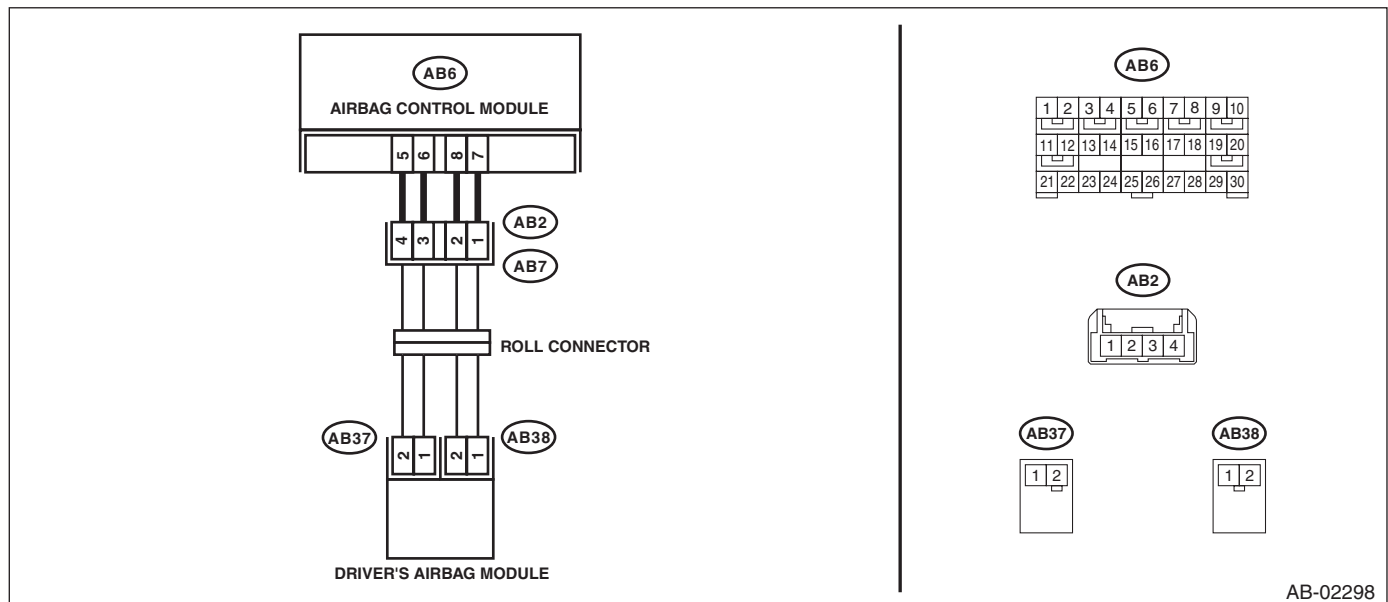
#### CAUTION:

Before performing diagnosis, refer to "CAUTION" in "General Description". <Ref. to AB(diag)-4, CAUTION, General Description.>

#### NOTE:

Prior to starting work, prepare two AIRBAG RESISTORS (98299PA040).

#### WIRING DIAGRAM:



AB-02298

Step	Check	Yes	No
<b>1 CHECK POOR CONTACT OF CONNECTORS.</b> Check for poor contact of the connectors between the airbag control module and the driver's airbag module.	Is there poor contact?	Replace the airbag main harness along with body harness.	Go to step 2.
<b>2 CHECK DRIVER'S AIRBAG MODULE.</b> 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait for 60 seconds or more. 2) Remove the driver's airbag module. 3) Connect the connector (1N) in the test harness N to the connector (AB38). 4) Connect the airbag resistor to the connector (2N) of test harness N. 5) Connect the connector (1Q) in the test harness Q to connector (AB37). 6) Connect the airbag resistor to the connector (2Q) in the test harness Q. 7) Connect the battery ground terminal and turn the ignition switch to ON.	Does the airbag warning light illuminate for six seconds and go off?	Replace the driver's airbag module. <Ref. to AB-14, Driver's Airbag Module.>	Go to step 3.

# Diagnostic Chart with Trouble Code

AIRBAG SYSTEM (DIAGNOSTICS)

Step	Check	Yes	No
<b>3</b> <b>CHECK ROLL CONNECTOR.</b> 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait for 60 seconds or more. 2) Disconnect the test harness N from connector (AB38). 3) Disconnect the test harness Q from connector (AB37). 4) Remove the instrument panel lower cover and disconnect the connector (AB7) from (AB2). 5) Connect the connector (1P) in the test harness P to connector (AB2). 6) Connect the airbag resistor to the connectors (2P) and (3P) of test harness P. 7) Connect the battery ground terminal and turn the ignition switch to ON.	Does the airbag warning light illuminate for six seconds and go off?	Replace the roll connector. <Ref. to AB-24, Roll Connector.>	Go to step 4.
<b>4</b> <b>CHECK AIRBAG MAIN HARNESS (DRIVER'S AIRBAG HARNESS).</b> 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait for 60 seconds or more. 2) Disconnect the airbag resistor from the connectors (2P) and (3P) of test harness P. 3) Remove the console side panel lower RH and disconnect the connector (AB9). 4) Disconnect the connectors (AB6, AB17, AB18) from the airbag control module, and connect the test harness AG connector (1AG). 5) Measure the resistance between connector (3AG) in the test harness AG and connectors (2P) and (3P) in the test harness P. <b>Connector &amp; terminal</b> <b>(3AG) No. 2 — (3P) No. 3:</b> <b>(3AG) No. 4 — (3P) No. 4:</b>	Is the resistance less than 10 Ω?	Go to step 5.	Replace the airbag main harness along with body harness.
<b>5</b> <b>CHECK AIRBAG MAIN HARNESS (DRIVER'S AIRBAG HARNESS).</b> Measure the resistance between connectors (3AG) in the test harness AG, and between connector (3AG) and chassis ground. <b>Connector &amp; terminal</b> <b>(3AG) No. 1 — (3AG) No. 2:</b> <b>(3AG) No. 1 — (3AG) No. 4:</b> <b>(3AG) No. 2 — (3AG) No. 3:</b> <b>(3AG) No. 3 — (3AG) No. 4:</b> <b>(3AG) No. 1 — (3AG) No. 3:</b> <b>(3AG) No. 3 — Chassis ground:</b> <b>(3AG) No. 1 — Chassis ground:</b> <b>(3AG) No. 2 — (3AG) No. 4:</b> <b>(3AG) No. 2 — Chassis ground:</b> <b>(3AG) No. 4 — Chassis ground:</b>	Is the resistance 1 MΩ or more?	Go to step 6.	Replace the airbag main harness along with body harness.
<b>6</b> <b>CHECK AIRBAG CONTROL MODULE.</b> 1) Connect all connectors. 2) Clear the memory. 3) Perform the Inspection Mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the airbag control module. <Ref. to AB-20, Airbag Control Module.>	Go to step 7.

# Diagnostic Chart with Trouble Code

## AIRBAG SYSTEM (DIAGNOSTICS)

Step	Check	Yes	No
7 <b>CHECK FOR ANY OTHER DTC ON DISPLAY.</b>	Is any other DTC displayed?	Check DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to AB(diag)-35, List of Diagnostic Trouble Code (DTC).>	Finish the diagnosis.

# Diagnostic Chart with Trouble Code

AIRBAG SYSTEM (DIAGNOSTICS)

## AE:DTC 72 PASSENGER'S AIRBAG FAILURE

### DTC DETECTING CONDITION:

- Airbag main harness circuit is open, shorted or shorted to ground.
- Airbag module harness (Passenger's side) circuit is open, shorted or shorted to ground.
- Passenger's airbag module is faulty.
- Airbag control module is faulty.

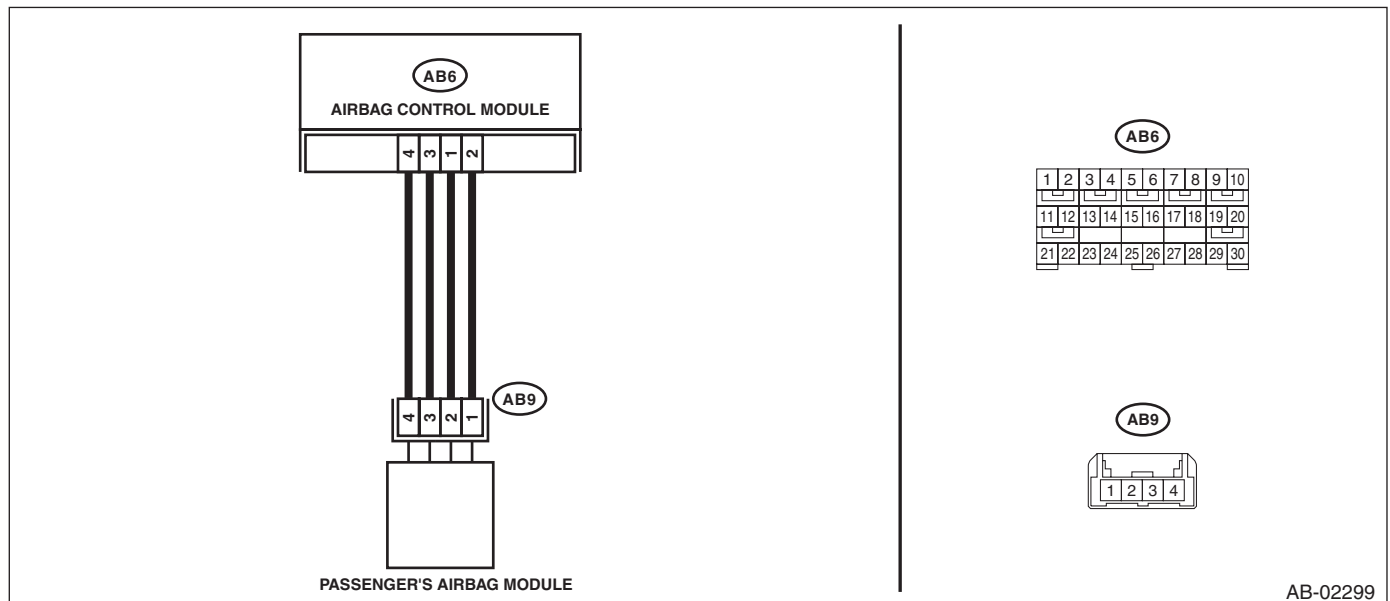
### CAUTION:

Before performing diagnosis, refer to "CAUTION" in "General Description". <Ref. to AB(diag)-4, CAUTION, General Description.>

### NOTE:

Prior to starting work, prepare two AIRBAG RESISTORS (98299PA040).

### WIRING DIAGRAM:



Step	Check	Yes	No
1	<p><b>CHECK POOR CONTACT OF CONNECTORS.</b></p> <p>Check for poor contact of the connectors between the airbag control module and the passenger's airbag module.</p>	Is there poor contact?	<p>Replace the airbag main harness along with body harness.</p> <p>Go to step 2.</p>
2	<p><b>CHECK PASSENGER'S AIRBAG MODULE.</b></p> <p>1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait for 60 seconds or more.</p> <p>2) Remove the console side panel lower RH and disconnect the connector (AB9).</p> <p>3) Connect the connector (1P) in the test harness P to connector (AB9).</p> <p>4) Connect the airbag resistor to the connectors (2P) and (3P) of test harness P.</p> <p>5) Connect the battery ground terminal and turn the ignition switch to ON.</p>	Does the airbag warning light illuminate for six seconds and go off?	<p>Replace the passenger's airbag module. &lt;Ref. to AB-15, Passenger's Airbag Module.&gt;</p> <p>Go to step 3.</p>

# Diagnostic Chart with Trouble Code

## AIRBAG SYSTEM (DIAGNOSTICS)

Step	Check	Yes	No
<b>3 CHECK AIRBAG MAIN HARNESS (PASSENGER'S AIRBAG HARNESS).</b> 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait for 60 seconds or more. 2) Disconnect the airbag resistor from the connectors (2P) and (3P) of test harness P. 3) Remove the instrument panel lower cover and disconnect the connector (AB7) from (AB2). 4) Disconnect the connectors (AB6, AB17, AB18) from the airbag control module, and connect the connector (1AG) in the test harness AG. 5) Measure the resistance between connector (3AG) in the test harness AG and connectors (2P) and (3P) in the test harness P. <b>Connector &amp; terminal</b> <b>(3AG) No. 8 — (3P) No. 3:</b> <b>(3AG) No. 6 — (3P) No. 4:</b>	Is the resistance less than 10 $\Omega$ ?	Go to step 4.	Replace the airbag main harness along with body harness.
<b>4 CHECK AIRBAG MAIN HARNESS (PASSENGER'S AIRBAG HARNESS).</b> Measure the resistance between connectors (3AG) in the test harness AG, and between connector (3AG) and chassis ground. <b>Connector &amp; terminal</b> <b>(3AG) No. 9 — (3AG) No. 7:</b> <b>(3AG) No. 9 — Chassis ground:</b> <b>(3AG) No. 7 — Chassis ground:</b> <b>(3AG) No. 8 — (3AG) No. 6:</b> <b>(3AG) No. 8 — Chassis ground:</b> <b>(3AG) No. 6 — Chassis ground:</b> <b>(3AG) No. 9 — (3AG) No. 6:</b> <b>(3AG) No. 9 — (3AG) No. 8:</b> <b>(3AG) No. 7 — (3AG) No. 8:</b> <b>(3AG) No. 6 — (3AG) No. 7:</b>	Is the resistance 1 M $\Omega$ or more?	Go to step 5.	Replace the airbag main harness along with body harness.
<b>5 CHECK AIRBAG CONTROL MODULE.</b> 1) Connect all connectors. 2) Clear the memory. 3) Perform the Inspection Mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the airbag control module. <Ref. to AB-20, Airbag Control Module.>	Go to step 6.
<b>6 CHECK FOR ANY OTHER DTC ON DISPLAY.</b>	Is any other DTC displayed?	Check DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to AB(diag)-35, List of Diagnostic Trouble Code (DTC).>	Finish the diagnosis.

# Diagnostic Chart with Trouble Code

AIRBAG SYSTEM (DIAGNOSTICS)

## AF:DTC 75 DRIVER'S AIRBAG FAILURE

### DTC DETECTING CONDITION:

- Airbag main harness circuit (Driver's side) is shorted to power supply.
- Airbag module harness circuit (Driver's side) is shorted to power supply.
- Roll connector is shorted to power supply.
- Driver's airbag module is faulty.
- Airbag control module is faulty.

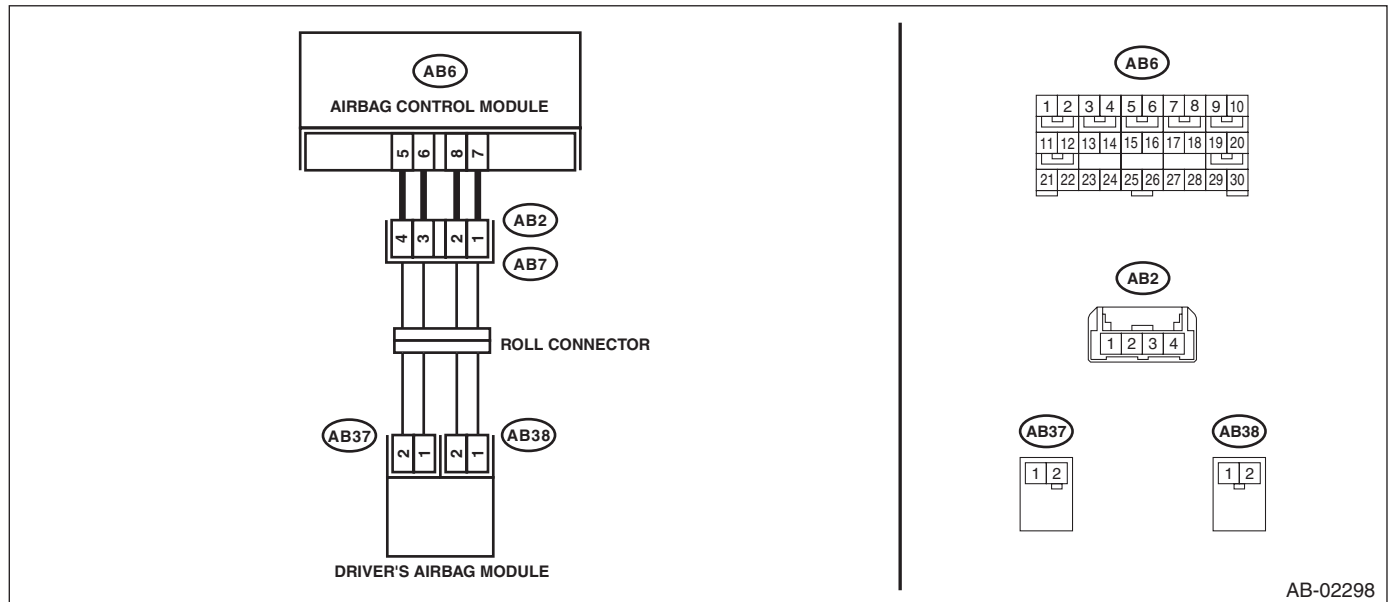
### CAUTION:

**Before performing diagnosis, refer to "CAUTION" in "General Description". <Ref. to AB(diag)-4, CAUTION, General Description.>**

### NOTE:

Prior to starting work, prepare two AIRBAG RESISTORS (98299PA040).

### WIRING DIAGRAM:



Step	Check	Yes	No
<b>1</b>	<b>CHECK POOR CONTACT OF CONNECTORS.</b> Check for poor contact of the connectors between the airbag control module and the driver's airbag module.	Is there poor contact?	Replace the airbag main harness along with body harness.
<b>2</b>	<b>CHECK DRIVER'S AIRBAG MODULE.</b> 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait for 60 seconds or more. 2) Remove the driver's airbag module. 3) Connect the connector (AB38) to the connector (1N) in the test harness N. 4) Connect the airbag resistor to the connector (2N) of test harness N. 5) Connect the connector (1Q) in the test harness Q to connector (AB37). 6) Connect the airbag resistor to the connector (2Q) in the test harness Q. 7) Connect the battery ground terminal and turn the ignition switch to ON.	Does the airbag warning light illuminate for six seconds and go off?	Replace the driver's airbag module. <Ref. to AB-14, Driver's Airbag Module.>

## Diagnostic Chart with Trouble Code

### AIRBAG SYSTEM (DIAGNOSTICS)

Step	Check	Yes	No
<b>3 CHECK ROLL CONNECTOR.</b> 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait for 60 seconds or more. 2) Disconnect the test harness N from connector (AB38). 3) Disconnect the test harness Q from connector (AB37). 4) Remove the instrument panel lower cover and disconnect the connector (AB7) from (AB2). 5) Connect the connector (1P) in the test harness P to connector (AB2). 6) Connect the airbag resistor to the connectors (2P) and (3P) of test harness P. 7) Connect the battery ground terminal and turn the ignition switch to ON.	Does the airbag warning light illuminate for six seconds and go off?	Replace the roll connector. <Ref. to AB-24, Roll Connector.>	Go to step 4.
<b>4 CHECK AIRBAG MAIN HARNESS (DRIVER'S AIRBAG HARNESS).</b> 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait for 60 seconds or more. 2) Disconnect the airbag resistor from the connectors (2P) and (3P) of test harness P. 3) Remove the console side panel lower RH and disconnect the connector (AB9). 4) Disconnect the connectors (AB6, AB17, AB18) from the airbag control module, and connect the test harness AG connector (1AG). 5) Connect the battery ground terminal and turn the ignition switch to ON. 6) Measure the voltage between connector (3AG) in the test harness AG and chassis ground.  <i><b>Connector &amp; terminal</b></i> <i><b>(3AG) No. 2 (+) — Chassis ground (-):</b></i> <i><b>(3AG) No. 4 (+) — Chassis ground (-):</b></i>	Is the voltage less than 1 V?	Go to step 5.	Replace the airbag main harness along with body harness.
<b>5 CHECK AIRBAG CONTROL MODULE.</b> 1) Connect all connectors. 2) Clear the memory. 3) Perform the Inspection Mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the airbag control module. <Ref. to AB-20, Airbag Control Module.>	Go to step 6.
<b>6 CHECK FOR ANY OTHER DTC ON DISPLAY.</b>	Is any other DTC displayed?	Check DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to AB(diag)-35, List of Diagnostic Trouble Code (DTC).>	Finish the diagnosis.



# Diagnostic Chart with Trouble Code

AIRBAG SYSTEM (DIAGNOSTICS)

## AG:DTC 76 PASSENGER'S AIRBAG FAILURE

### DTC DETECTING CONDITION:

- Airbag main harness circuit (Passenger's side) is shorted to power supply.
- Airbag module harness circuit (Passenger's side) is shorted to power supply.
- Passenger's airbag module is faulty.
- Airbag control module is faulty.

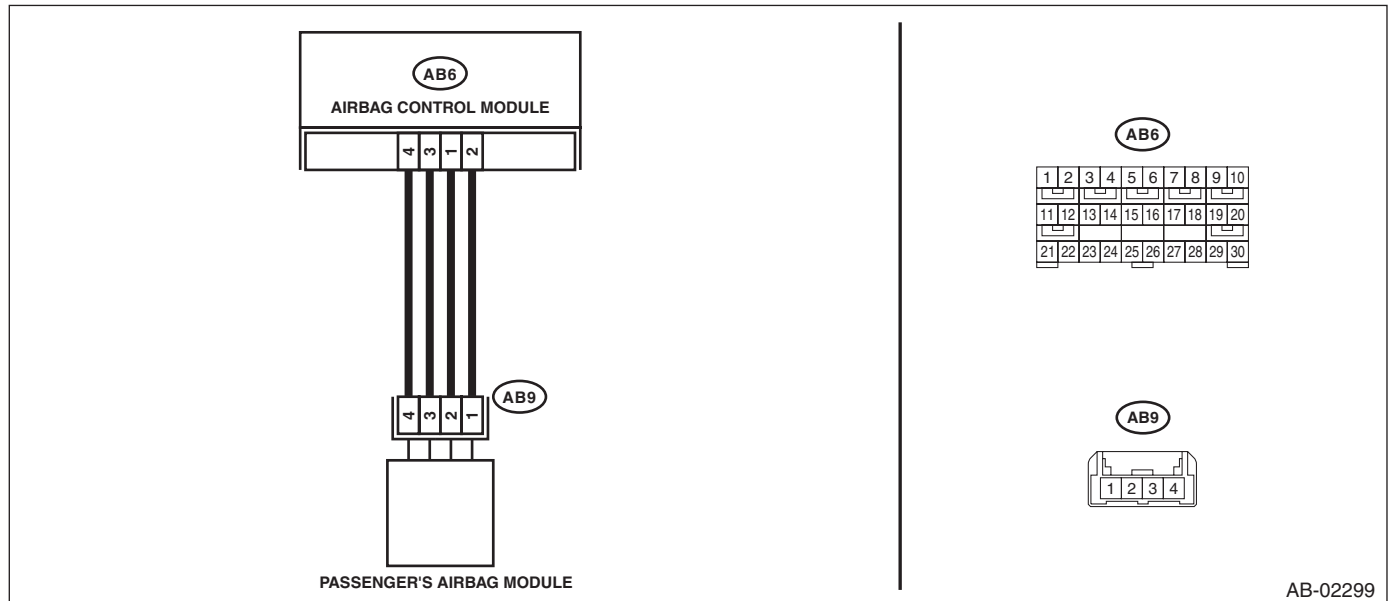
### CAUTION:

Before performing diagnosis, refer to "CAUTION" in "General Description". <Ref. to AB(diag)-4, CAUTION, General Description.>

### NOTE:

Prior to starting work, prepare two AIRBAG RESISTORS (98299PA040).

### WIRING DIAGRAM:



Step	Check	Yes	No
1	<b>CHECK POOR CONTACT OF CONNECTORS.</b> Check for poor contact of the connectors between the airbag control module and the passenger's airbag module.	Replace the airbag main harness along with body harness.	Go to step 2.
2	<b>CHECK PASSENGER'S AIRBAG MODULE.</b> 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait for 60 seconds or more. 2) Remove the console side panel lower RH and disconnect the connector (AB9). 3) Connect the connector (1P) in the test harness P to connector (AB9). 4) Connect the airbag resistor to the connectors (2P) and (3P) of test harness P. 5) Connect the battery ground terminal and turn the ignition switch to ON.	Replace the passenger's airbag module. <Ref. to AB-15, Passenger's Airbag Module.>	Go to step 3.

## Diagnostic Chart with Trouble Code

### AIRBAG SYSTEM (DIAGNOSTICS)

Step	Check	Yes	No
<b>3 CHECK AIRBAG MAIN HARNESS (PASSENGER'S AIRBAG HARNESS).</b> 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait for 60 seconds or more. 2) Disconnect the airbag resistor from the connectors (2P) and (3P) of test harness P. 3) Remove the instrument panel lower cover and disconnect the connector (AB7) from (AB2). 4) Disconnect the connectors (AB6, AB17, AB18) from the airbag control module, and connect the connector (1AG) in the test harness AG. 5) Measure the voltage between connector (3AG) in the test harness AG and chassis ground. <b>Connector &amp; terminal</b> <b>(3AG) No. 8 (+) — Chassis ground (-):</b> <b>(3AG) No. 6 (+) — Chassis ground (-):</b>	Is the voltage less than 1 V?	Go to step 4.	Replace the airbag main harness along with body harness.
<b>4 CHECK AIRBAG CONTROL MODULE.</b> 1) Connect all connectors. 2) Clear the memory. 3) Perform the Inspection Mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the airbag control module. <Ref. to AB-20, Airbag Control Module.>	Go to step 5.
<b>5 CHECK FOR ANY OTHER DTC ON DISPLAY.</b>	Is any other DTC displayed?	Check DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to AB(diag)-35, List of Diagnostic Trouble Code (DTC).>	Finish the diagnosis.

# Diagnostic Chart with Trouble Code

AIRBAG SYSTEM (DIAGNOSTICS)

## AH:DTC 91 CURTAIN AIRBAG MODULE RH FAILURE

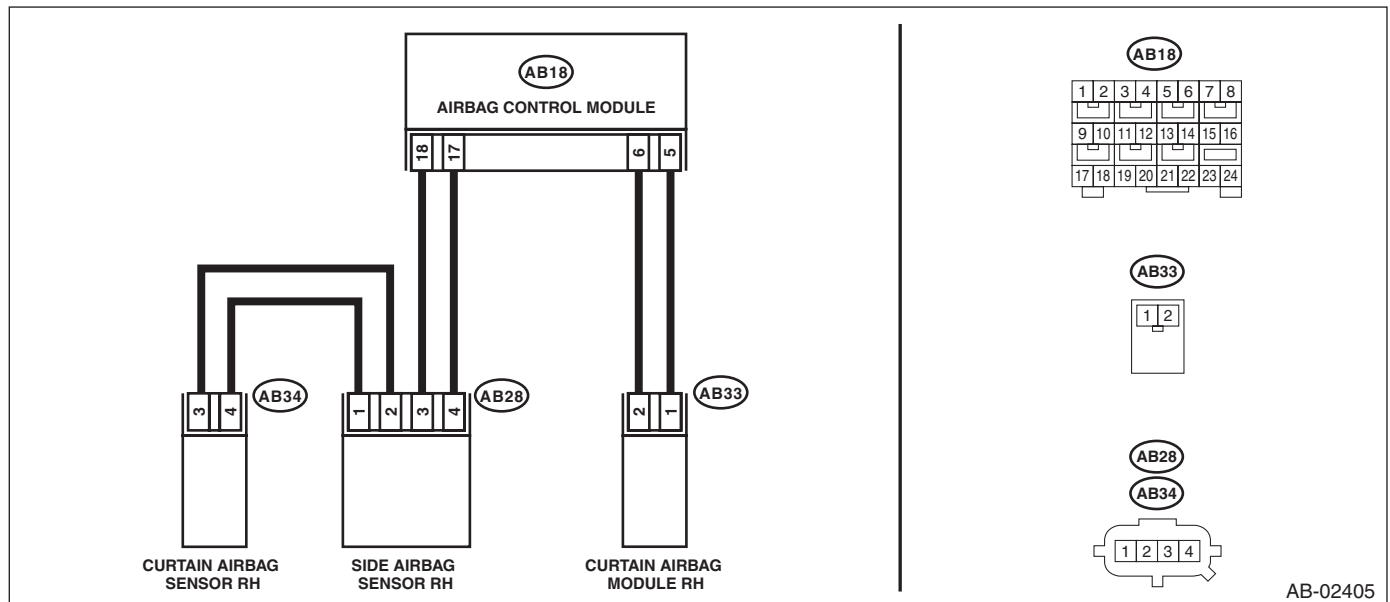
### DTC DETECTING CONDITION:

- Curtain airbag harness (RH) is faulty.
- Curtain airbag module (RH) is faulty.
- Airbag control module is faulty.

### CAUTION:

Before performing diagnosis, refer to “CAUTION” in “General Description”. <Ref. to AB(diag)-4, CAUTION, General Description.>

### WIRING DIAGRAM:



Step	Check	Yes	No
<b>1 CHECK POOR CONTACT OF CONNECTORS.</b> Check for poor contact of the connectors between the airbag control module, curtain airbag module RH and the curtain airbag sensor RH.	Is there poor contact?	Replace the airbag rear harness along with body harness.	Go to step 2.
<b>2 CHECK CURTAIN AIRBAG MODULE.</b> 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait for 60 seconds or more. 2) Disconnect the connector (AB33), and connect the connector (1N) in test harness N to connector (AB33). 3) Connect the airbag resistor to the connector (2N) of test harness N. 4) Connect the battery ground terminal and turn the ignition switch to ON.	Does the airbag warning light illuminate for six seconds and go off?	Replace the curtain airbag module (RH). <Ref. to AB-18, Curtain Airbag Module.>	Go to step 3.

# Diagnostic Chart with Trouble Code

## AIRBAG SYSTEM (DIAGNOSTICS)

Step	Check	Yes	No
<b>3 CHECK AIRBAG REAR HARNESS (CURTAIN AIRBAG MODULE HARNESS RH).</b> 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait for 60 seconds or more. 2) Disconnect the connector (AB26) from seat belt pretensioner (RH). 3) Disconnect connector (AB24) from side airbag module (RH). 4) Disconnect the airbag resistor from test harness N. 5) Disconnect the connectors (AB6, AB17, AB18) from airbag control module. 6) Connect the connector (1AG) in the test harness AG to the connectors (AB6, AB17, AB18). 7) Measure the resistance between connector (6AG) in the test harness AG and connector (2N) in the test harness N. <i><b>Connector &amp; terminal</b></i> <i><b>(6AG) No. 6 — (2N) No. 1:</b></i> <i><b>(6AG) No. 8 — (2N) No. 2:</b></i>	Is the resistance less than 10 Ω?	Go to step 4.	Replace the airbag rear harness along with body harness.
<b>4 CHECK AIRBAG REAR HARNESS (CURTAIN AIRBAG MODULE HARNESS RH).</b> Measure the resistance between connector (6AG) terminals in the test harness AG. <i><b>Connector &amp; terminal</b></i> <i><b>(6AG) No. 6 — (6AG) No. 8:</b></i>	Is the resistance 1 MΩ or more?	Go to step 5.	Replace the airbag rear harness along with body harness.
<b>5 CHECK AIRBAG REAR HARNESS (CURTAIN AIRBAG MODULE HARNESS RH).</b> Measure the resistance between connector (6AG) in the test harness AG and chassis ground. <i><b>Connector &amp; terminal</b></i> <i><b>(6AG) No. 6 — Chassis ground:</b></i> <i><b>(6AG) No. 8 — Chassis ground:</b></i>	Is the resistance 1 MΩ or more?	Go to step 6.	Replace the airbag rear harness along with body harness.
<b>6 CHECK AIRBAG CONTROL MODULE.</b> 1) Connect all connectors. 2) Clear the memory. 3) Perform the Inspection Mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the airbag control module. <Ref. to AB-20, Airbag Control Module.>	Go to step 7.
<b>7 CHECK FOR ANY OTHER DTC ON DISPLAY.</b>	Is any other DTC displayed?	Check DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to AB(diag)-35, List of Diagnostic Trouble Code (DTC).>	Finish the diagnosis.

# Diagnostic Chart with Trouble Code

AIRBAG SYSTEM (DIAGNOSTICS)

## AI: DTC 92 CURTAIN AIRBAG MODULE LH FAILURE

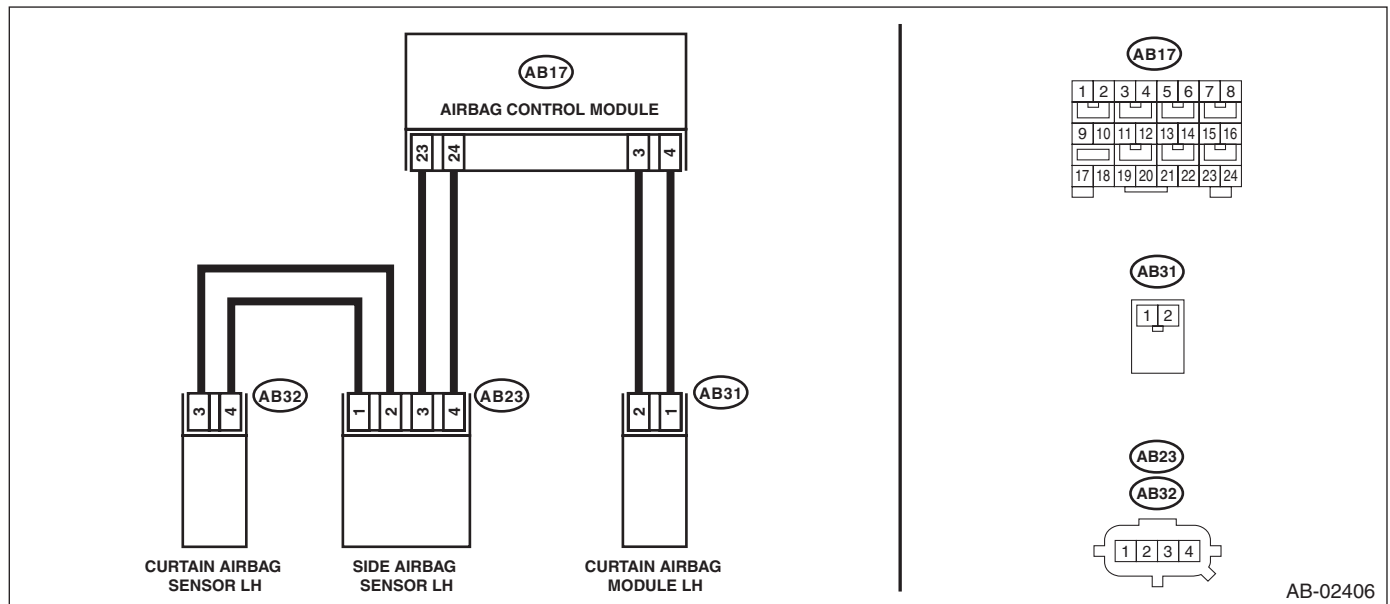
### DTC DETECTING CONDITION:

- Curtain airbag harness (LH) is faulty.
- Curtain airbag module (LH) is faulty.
- Airbag control module is faulty.

### CAUTION:

Before performing diagnosis, refer to "CAUTION" in "General Description". <Ref. to AB(diag)-4, CAUTION, General Description.>

### WIRING DIAGRAM:



Step	Check	Yes	No
<b>1 CHECK POOR CONTACT OF CONNECTORS.</b> Check for poor contact of the connectors between the airbag control module, curtain airbag module LH and the curtain airbag sensor LH.	Is there poor contact?	Replace the airbag rear harness along with body harness.	Go to step 2.
<b>2 CHECK CURTAIN AIRBAG MODULE.</b> 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait for 60 seconds or more. 2) Disconnect the connector (AB31), and connect the connector (1N) in test harness N to connector (AB31). 3) Connect the airbag resistor to the connector (2N) of test harness N. 4) Connect the battery ground terminal and turn the ignition switch to ON.	Does the airbag warning light illuminate for six seconds and go off?	Replace the curtain airbag module (LH). <Ref. to AB-18, Curtain Airbag Module.>	Go to step 3.

# Diagnostic Chart with Trouble Code

## AIRBAG SYSTEM (DIAGNOSTICS)

Step	Check	Yes	No
<b>3 CHECK AIRBAG REAR HARNESS (CURTAIN AIRBAG MODULE HARNESS LH).</b> 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait for 60 seconds or more. 2) Disconnect the connector (AB21) from seat belt pretensioner (LH). 3) Disconnect connector (AB19) from side airbag module (LH). 4) Disconnect the airbag resistor from test harness N. 5) Disconnect the connectors (AB6, AB17, AB18) from airbag control module. 6) Connect the connector (1AG) in the test harness AG to the connectors (AB6, AB17, AB18). 7) Measure the resistance between connector (6AG) in the test harness AG and connector (2N) in the test harness N. <b>Connector &amp; terminal</b> <b>(6AG) No. 1 — (2N) No. 2:</b> <b>(6AG) No. 3 — (2N) No. 1:</b>	Is the resistance less than 10 $\Omega$ ?	Go to step 4.	Replace the airbag rear harness along with body harness.
<b>4 CHECK AIRBAG REAR HARNESS (CURTAIN AIRBAG MODULE HARNESS LH).</b> Measure the resistance between connector (6AG) terminals in the test harness AG. <b>Connector &amp; terminal</b> <b>(6AG) No. 1 — (6AG) No. 3:</b>	Is the resistance 1 M $\Omega$ or more?	Go to step 5.	Replace the airbag rear harness along with body harness.
<b>5 CHECK AIRBAG REAR HARNESS (CURTAIN AIRBAG MODULE HARNESS LH).</b> Measure the resistance between connector (6AG) in the test harness AG and chassis ground. <b>Connector &amp; terminal</b> <b>(6AG) No. 1 — Chassis ground:</b> <b>(6AG) No. 3 — Chassis ground:</b>	Is the resistance 1 M $\Omega$ or more?	Go to step 6.	Replace the airbag rear harness along with body harness.
<b>6 CHECK AIRBAG CONTROL MODULE.</b> 1) Connect all connectors. 2) Clear the memory. 3) Perform the Inspection Mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the airbag control module. <Ref. to AB-20, Airbag Control Module.>	Go to step 7.
<b>7 CHECK FOR ANY OTHER DTC ON DISPLAY.</b>	Is any other DTC displayed?	Check DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to AB(diag)-35, List of Diagnostic Trouble Code (DTC).>	Finish the diagnosis.

# Diagnostic Chart with Trouble Code

AIRBAG SYSTEM (DIAGNOSTICS)

## AJ:DTC 95 CURTAIN AIRBAG MODULE RH FAILURE

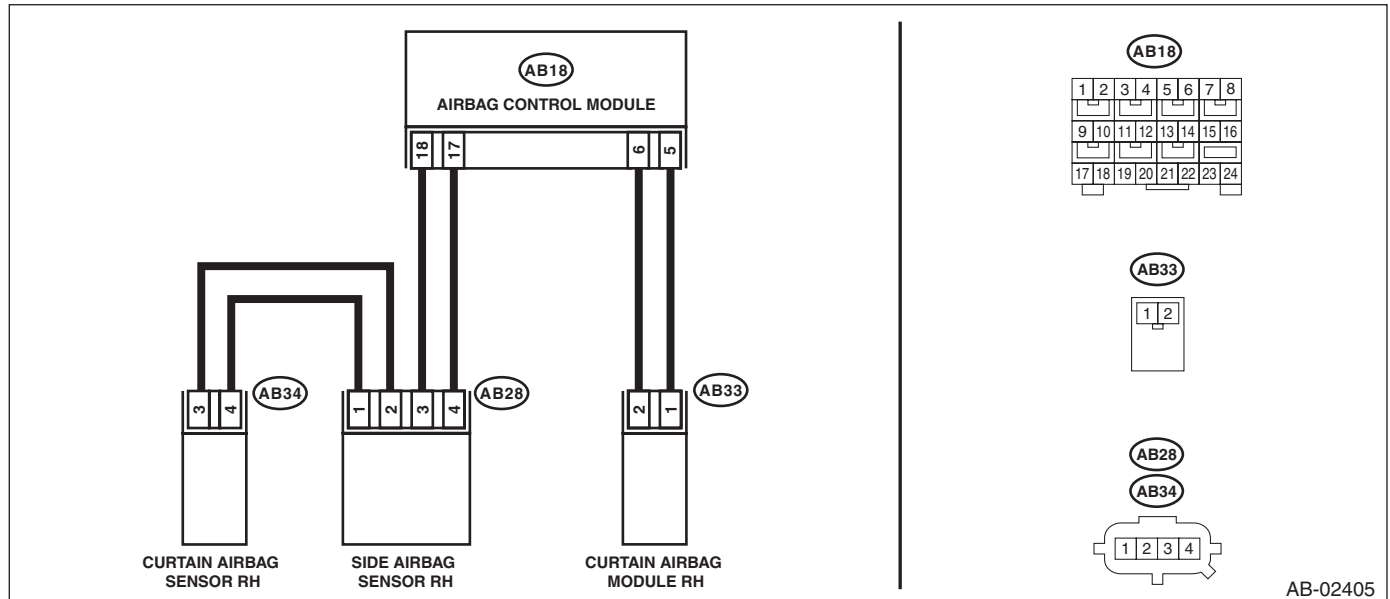
### DTC DETECTING CONDITION:

- Curtain airbag harness (RH) is shorted to power supply.
- Airbag control module is faulty.

### CAUTION:

Before performing diagnosis, refer to “CAUTION” in “General Description”. <Ref. to AB(diag)-4, CAUTION, General Description.>

### WIRING DIAGRAM:



Step	Check	Yes	No
<b>1 CHECK POOR CONTACT OF CONNECTORS.</b> Check for poor contact of the connectors between the airbag control module, curtain airbag module RH and the curtain airbag sensor RH.	Is there poor contact?	Replace the airbag rear harness along with body harness.	Go to step 2.
<b>2 CHECK CURTAIN AIRBAG MODULE.</b> 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait for 60 seconds or more. 2) Disconnect the connector (AB33), and connect the connector (1N) in test harness N to connector (AB33). 3) Connect the airbag resistor to the connector (2N) of test harness N. 4) Connect the battery ground terminal and turn the ignition switch to ON.	Does the airbag warning light illuminate for six seconds and go off?	Replace the curtain airbag module (RH). <Ref. to AB-18, Curtain Airbag Module.>	Go to step 3.

## Diagnostic Chart with Trouble Code

### AIRBAG SYSTEM (DIAGNOSTICS)

Step	Check	Yes	No
<b>3 CHECK AIRBAG REAR HARNESS (CURTAIN AIRBAG MODULE HARNESS RH).</b> 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait for 60 seconds or more. 2) Disconnect the connector (AB26) from seat belt pretensioner (RH). 3) Disconnect connector (AB24) from side airbag module (RH). 4) Disconnect the airbag resistor from test harness N. 5) Disconnect the connectors (AB6, AB17, AB18) from airbag control module. 6) Connect the connector (1AG) in the test harness AG to the connectors (AB6, AB17, AB18). 7) Connect the battery ground terminal and turn the ignition switch to ON. 8) Measure the voltage between connector (6AG) in the test harness AG and chassis ground. <i><b>Connector &amp; terminal</b></i> <i><b>(6AG) No. 6 (+) — Chassis ground (-):</b></i> <i><b>(6AG) No. 8 (+) — Chassis ground (-):</b></i>	Is the voltage less than 1 V?	Go to step 4.	Replace the airbag rear harness along with body harness.
<b>4 CHECK AIRBAG CONTROL MODULE.</b> 1) Connect all connectors. 2) Clear the memory. 3) Perform the Inspection Mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the airbag control module. <Ref. to AB-20, Airbag Control Module.>	Go to step 5.
<b>5 CHECK FOR ANY OTHER DTC ON DISPLAY.</b>	Is any other DTC displayed?	Check DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to AB(diag)-35, List of Diagnostic Trouble Code (DTC).>	Finish the diagnosis.



# Diagnostic Chart with Trouble Code

AIRBAG SYSTEM (DIAGNOSTICS)

## AK:DTC 96 CURTAIN AIRBAG MODULE LH FAILURE

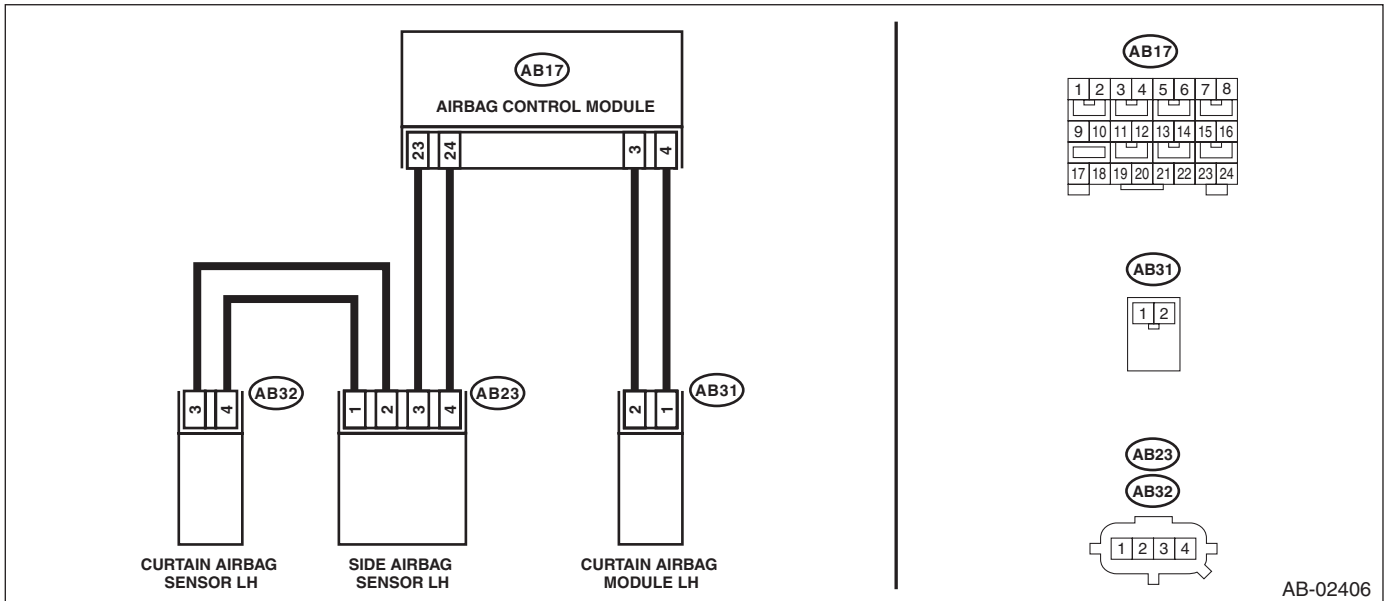
### DTC DETECTING CONDITION:

- Curtain airbag harness (LH) is shorted to power supply.
- Airbag control module is faulty.

### CAUTION:

Before performing diagnosis, refer to “CAUTION” in “General Description”. <Ref. to AB(diag)-4, CAUTION, General Description.>

### WIRING DIAGRAM:



Step	Check	Yes	No
<b>1 CHECK POOR CONTACT OF CONNECTORS.</b> Check for poor contact of the connectors between the airbag control module, curtain airbag module LH and the curtain airbag sensor LH.	Is there poor contact?	Replace the airbag rear harness along with body harness.	Go to step 2.
<b>2 CHECK CURTAIN AIRBAG MODULE.</b> 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait for 60 seconds or more. 2) Disconnect the connector (AB31), and connect the connector (1N) in test harness N to connector (AB31). 3) Connect the airbag resistor to the connector (2N) of test harness N. 4) Connect the battery ground terminal and turn the ignition switch to ON.	Does the airbag warning light illuminate for six seconds and go off?	Replace the curtain airbag module (LH). <Ref. to AB-18, Curtain Airbag Module.>	Go to step 3.

# Diagnostic Chart with Trouble Code

## AIRBAG SYSTEM (DIAGNOSTICS)

Step	Check	Yes	No
<b>3 CHECK AIRBAG REAR HARNESS (CURTAIN AIRBAG MODULE HARNESS LH).</b> 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait for 60 seconds or more. 2) Disconnect the connector (AB21) from seat belt pretensioner (LH). 3) Disconnect connector (AB19) from side airbag module (LH). 4) Disconnect the airbag resistor from test harness N. 5) Disconnect the connectors (AB6, AB17, AB18) from airbag control module. 6) Connect the connector (1AG) in the test harness AG to the connectors (AB6, AB17, AB18). 7) Connect the battery ground terminal and turn the ignition switch to ON. 8) Measure the voltage between connector (6AG) in the test harness AG and chassis ground. <i><b>Connector &amp; terminal</b></i> <i><b>(6AG) No. 1 (+) — Chassis ground (-):</b></i> <i><b>(6AG) No. 3 (+) — Chassis ground (-):</b></i>	Is the voltage less than 1 V?	Go to step 4.	Replace the airbag rear harness along with body harness.
<b>4 CHECK AIRBAG CONTROL MODULE.</b> 1) Connect all connectors. 2) Clear the memory. 3) Perform the Inspection Mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the airbag control module. <Ref. to AB-20, Airbag Control Module.>	Go to step 5.
<b>5 CHECK FOR ANY OTHER DTC ON DISPLAY.</b>	Is any other DTC displayed?	Check DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to AB(diag)-35, List of Diagnostic Trouble Code (DTC).>	Finish the diagnosis.

### AL:DTC BB ROLL OVER: FIRING OUTPUT

This DTC is indicated when the curtain airbag module and the seat belt pretensioner are deployed. Once this DTC is displayed, the memory cannot be cleared. Replace the following parts.

- Airbag control module <Ref. to AB-20, Airbag Control Module.>
- Curtain airbag module (operating side) <Ref. to AB-18, Curtain Airbag Module.>
- Curtain airbag sensor (operating side) <Ref. to AB-22, Curtain Airbag Sensor.>
- Seat belt pretensioner (operating side) <Ref. to SB-18, Front Seat Belt.>

### AM:DTC E2 FRONT SENSOR BUS RH COMMUNICATION ERROR

NOTE:

Refer to DTC E4 for details on DTC E2. <Ref. to AB(diag)-93, DTC E4 FRONT SENSOR BUS RH COMMUNICATION ERROR, Diagnostic Chart with Trouble Code.>

### AN:DTC E3 FRONT SENSOR BUS RH COMMUNICATION ERROR

NOTE:

Refer to DTC E4 for details on DTC E3. <Ref. to AB(diag)-93, DTC E4 FRONT SENSOR BUS RH COMMUNICATION ERROR, Diagnostic Chart with Trouble Code.>

# Diagnostic Chart with Trouble Code

AIRBAG SYSTEM (DIAGNOSTICS)

## AO:DTC E4 FRONT SENSOR BUS RH COMMUNICATION ERROR

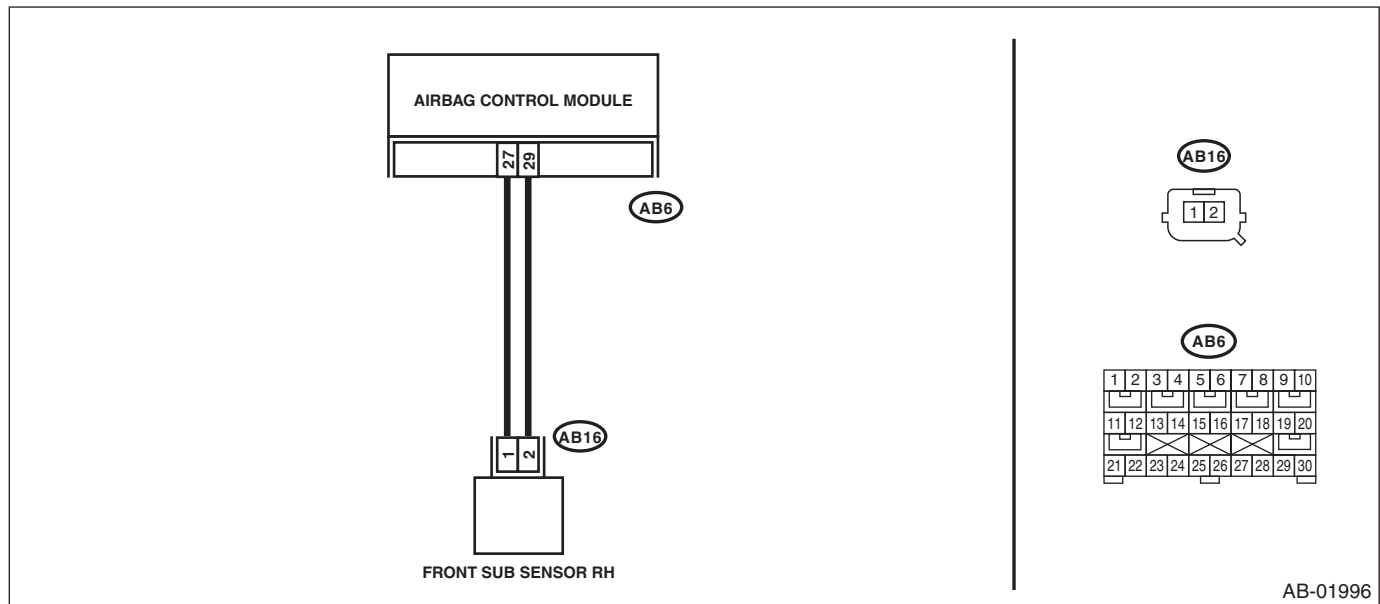
### DTC DETECTING CONDITION:

- Open or short circuit in harness of front sensor bus (RH).
- Front sub sensor (RH) is faulty.
- Airbag control module is faulty.

### CAUTION:

Before performing diagnosis, refer to “CAUTION” in “General Description”. <Ref. to AB(diag)-4, CAUTION, General Description.>

### WIRING DIAGRAM:



AB-01996

Step	Check	Yes	No
<b>1</b> <b>CHECK POOR CONTACT OF CONNECTORS.</b> Check for poor contact of the connectors (AB6, AB16) between the airbag control module and the front sub sensor (RH).	Is there poor contact?	Replace the airbag main harness along with body harness.	Go to step 2.
<b>2</b> <b>CHECK AIRBAG MAIN HARNESS (FRONT SENSOR BUS RH).</b> 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait for 60 seconds or more. 2) Remove the instrument panel lower cover and disconnect the connectors (AB7) and (AB2). 3) Remove the console side panel lower RH and disconnect the connector (AB9). 4) Disconnect the connectors (AB17, AB6, AB18) from airbag control module. 5) Connect the connector (1AG) in the test harness AG to the connectors (AB17, AB6, AB18). 6) Disconnect the front sub sensor (RH), and then connect the connector (1H) in the test harness H to connector (AB16). 7) Measure the resistance between connector (4AG) in the test harness AG and connector (3H) in the test harness H. <b>Connector &amp; terminal</b> (4AG) No. 14 — (3H) No. 5: (4AG) No. 12 — (3H) No. 6:	Is the resistance less than 10 Ω?	Go to step 3.	Replace the airbag main harness along with body harness.

# Diagnostic Chart with Trouble Code

## AIRBAG SYSTEM (DIAGNOSTICS)

Step	Check	Yes	No
<b>3 CHECK AIRBAG MAIN HARNESS (FRONT SENSOR BUS RH).</b> Measure the resistance between connector (4AG) in the test harness AG and chassis ground, and the resistance between connector (4AG) terminals in the test harness AG. <b>Connector &amp; terminal</b> <b>(4AG) No. 14 — Chassis ground:</b> <b>(4AG) No. 12 — Chassis ground:</b> <b>(4AG) No. 14 — (4AG) No. 12:</b>	Is the resistance 1 MΩ or more?	Go to step 4.	Replace the airbag main harness along with body harness.
<b>4 CHECK AIRBAG CONTROL MODULE.</b> 1) Connect all connectors. 2) Clear the memory. 3) Perform the Inspection Mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the front sub sensor (RH). <Ref. to AB-25, REMOVAL, Front Sub Sensor.> Replace the airbag control module if not operating normally even after replacing the sensor. <Ref. to AB-20, REMOVAL, Airbag Control Module.>	Go to step 5.
<b>5 CHECK FOR ANY OTHER DTC ON DISPLAY.</b>	Is any other DTC displayed?	Check DTC using “List of Diagnostic Trouble Code”. <Ref. to AB(diag)-35, LIST, List of Diagnostic Trouble Code (DTC).>	Finish the diagnosis.

### AP:DTC E6 FRONT SENSOR BUS LH COMMUNICATION ERROR

**NOTE:**

Refer to DTC E8 for details on DTC E6. <Ref. to AB(diag)-95, DTC E8 FRONT SENSOR BUS LH COMMUNICATION ERROR, Diagnostic Chart with Trouble Code.>

### AQ:DTC E7 FRONT SENSOR BUS LH COMMUNICATION ERROR

**NOTE:**

Refer to DTC E8 for details on DTC E7. <Ref. to AB(diag)-95, DTC E8 FRONT SENSOR BUS LH COMMUNICATION ERROR, Diagnostic Chart with Trouble Code.>

# Diagnostic Chart with Trouble Code

AIRBAG SYSTEM (DIAGNOSTICS)

## AR:DTC E8 FRONT SENSOR BUS LH COMMUNICATION ERROR

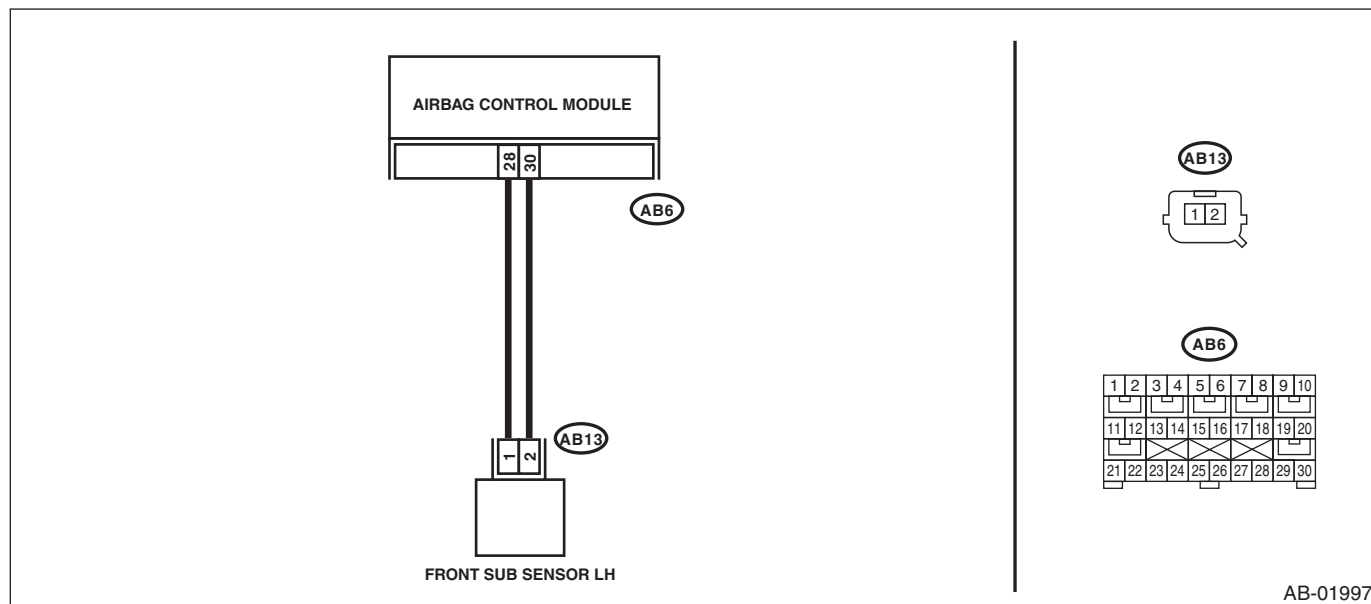
### DTC DETECTING CONDITION:

- Open or short circuit in harness of front sensor bus (LH).
- Front sub sensor (LH) is faulty.
- Airbag control module is faulty.

### CAUTION:

Before performing diagnosis, refer to “CAUTION” in “General Description”. <Ref. to AB(diag)-4, CAUTION, General Description.>

### WIRING DIAGRAM:



AB-01997

Step	Check	Yes	No
<b>1</b> <b>CHECK POOR CONTACT OF CONNECTORS.</b> Check for poor contact of the connectors (AB6, AB13) between the airbag control module and the front sub sensor (LH).	Is there poor contact?	Replace the airbag main harness along with body harness.	Go to step 2.
<b>2</b> <b>CHECK AIRBAG MAIN HARNESS (FRONT SENSOR BUS LH).</b> 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait for 60 seconds or more. 2) Remove the instrument panel lower cover and disconnect the connectors (AB7) and (AB2). 3) Remove the console side panel lower RH and disconnect the connector (AB9). 4) Disconnect the connectors (AB17, AB6, AB18) from airbag control module. 5) Connect the connector (1AG) in the test harness AG to the connectors (AB17, AB6, AB18). 6) Disconnect the front sub sensor (LH), and then connect the connector (1H) in the test harness H to connector (AB13). 7) Measure the resistance between connector (4AG) in the test harness AG and connector (3H) in the test harness H. <b>Connector &amp; terminal</b> (4AG) No. 7 — (3H) No. 5: (4AG) No. 9 — (3H) No. 6:	Is the resistance less than 10 Ω?	Go to step 3.	Replace the airbag main harness along with body harness.

# Diagnostic Chart with Trouble Code

## AIRBAG SYSTEM (DIAGNOSTICS)

Step	Check	Yes	No
<b>3</b> <b>CHECK AIRBAG MAIN HARNESS (FRONT SENSOR BUS LH).</b> Measure the resistance between connector (4AG) in the test harness AG and chassis ground, and the resistance between connector (4AG) terminals in the test harness AG. <b>Connector &amp; terminal</b> <b>(4AG) No. 7 — Chassis ground:</b> <b>(4AG) No. 9 — Chassis ground:</b> <b>(4AG) No. 7 — (4AG) No. 9:</b>	Is the resistance 1 MΩ or more?	Go to step 4.	Replace the airbag main harness along with body harness.
<b>4</b> <b>CHECK AIRBAG CONTROL MODULE.</b> 1) Connect all connectors. 2) Clear the memory. 3) Perform the Inspection Mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the front sub sensor (LH). <Ref. to AB-25, REMOVAL, Front Sub Sensor.> Replace the airbag control module if not operating normally even after replacing the sensor. <Ref. to AB-20, REMOVAL, Airbag Control Module.>	Go to step 5.
<b>5</b> <b>CHECK FOR ANY OTHER DTC ON DISPLAY.</b>	Is any other DTC displayed?	Check DTC using “List of Diagnostic Trouble Code”. <Ref. to AB(diag)-35, LIST, List of Diagnostic Trouble Code (DTC).>	Finish the diagnosis.

### AS:DTC E9 SIDE SENSOR BUS RH COMMUNICATION ERROR

**NOTE:**

Refer to DTC EC for details on DTC E9. <Ref. to AB(diag)-97, DTC EC SIDE SENSOR BUS RH COMMUNICATION ERROR, Diagnostic Chart with Trouble Code.>

### AT:DTC EA SIDE SENSOR BUS RH COMMUNICATION ERROR

**NOTE:**

Refer to DTC EC for details on DTC EA. <Ref. to AB(diag)-97, DTC EC SIDE SENSOR BUS RH COMMUNICATION ERROR, Diagnostic Chart with Trouble Code.>

### AU:DTC EB SIDE SENSOR BUS RH COMMUNICATION ERROR

**NOTE:**

Refer to DTC EC for details on DTC EB. <Ref. to AB(diag)-97, DTC EC SIDE SENSOR BUS RH COMMUNICATION ERROR, Diagnostic Chart with Trouble Code.>

# Diagnostic Chart with Trouble Code

AIRBAG SYSTEM (DIAGNOSTICS)

## AV:DTC EC SIDE SENSOR BUS RH COMMUNICATION ERROR

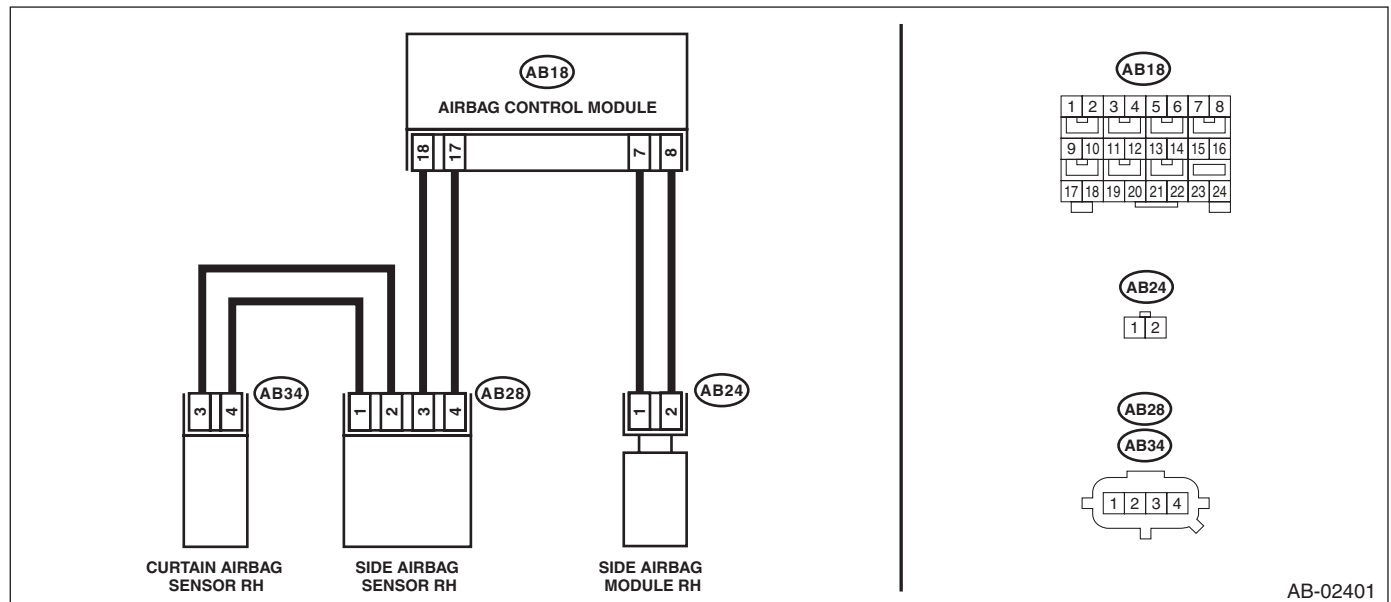
### DTC DETECTING CONDITION:

- Open or short circuit in harness of side sensor bus (RH).
- Side airbag sensor (RH) and curtain airbag sensor (RH) are faulty.
- Airbag control module is faulty.

### CAUTION:

Before performing diagnosis, refer to “CAUTION” in “General Description”. <Ref. to AB(diag)-4, CAUTION, General Description.>

### WIRING DIAGRAM:



AB-02401

Step	Check	Yes	No
<b>1</b> <b>CHECK POOR CONTACT OF CONNECTORS.</b> Check for poor contact of the connectors (AB18, AB28, AB34) between the airbag control module and the curtain airbag sensor (RH).	Is there poor contact?	Replace the airbag rear harness along with body harness.	Go to step 2.

# Diagnostic Chart with Trouble Code

## AIRBAG SYSTEM (DIAGNOSTICS)

Step	Check	Yes	No
<p><b>2</b></p> <p><b>CHECK AIRBAG REAR HARNESS (BETWEEN AIRBAG CONTROL MODULE AND SIDE AIRBAG SENSOR RH).</b></p> <p>1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait for 60 seconds or more.</p> <p>2) Disconnect the connector (AB26) from seat belt pretensioner (RH).</p> <p>3) Disconnect the connector (AB33) from curtain airbag module (RH).</p> <p>4) Disconnect connector (AB24) of the side airbag module (RH).</p> <p>5) Disconnect the connectors (AB17, AB6, AB18) from airbag control module.</p> <p>6) Connect the connector (1AG) in the test harness AG to the connectors (AB17, AB6, AB18).</p> <p>7) Disconnect the connector (AB28) from side airbag sensor (RH), and connect the connector (2V) in test harness V to connector (AB28).</p> <p>8) Measure the resistance between connector (5AG) in the test harness AG and connector (3V) in the test harness V.</p> <p><b>Connector &amp; terminal</b>  <b>(5AG) No. 16 — (3V) No. 2:</b>  <b>(5AG) No. 14 — (3V) No. 1:</b></p>	<p>Is the resistance less than 10 <math>\Omega</math>?</p>	<p>Go to step 3.</p>	<p>Replace the airbag rear harness along with body harness.</p>
<p><b>3</b></p> <p><b>CHECK AIRBAG REAR HARNESS (BETWEEN AIRBAG CONTROL MODULE AND SIDE AIRBAG SENSOR RH).</b></p> <p>Measure the resistance between connector (5AG) in the test harness AG and chassis ground, and the resistance between connector (5AG) terminals in the test harness AG.</p> <p><b>Connector &amp; terminal</b>  <b>(5AG) No. 16 — Chassis ground:</b>  <b>(5AG) No. 14 — Chassis ground:</b>  <b>(5AG) No. 16 — (5AG) No. 14:</b></p>	<p>Is the resistance 1 M<math>\Omega</math> or more?</p>	<p>Go to step 4.</p>	<p>Replace the airbag rear harness along with body harness.</p>
<p><b>4</b></p> <p><b>CHECK AIRBAG REAR HARNESS (BETWEEN SIDE AIRBAG SENSOR AND CURTAIN AIRBAG SENSOR RH).</b></p> <p>1) Disconnect the connector (2V) in the test harness V from the connector (AB28) of side airbag sensor (RH).</p> <p>2) Connect the connector (AB28) of side airbag sensor (RH) and the connector (1AI) in the test harness AI.</p> <p>3) Connect the connector (2AI) in the test harness AI and the connector (1V) in the test harness V.</p> <p>4) Disconnect the connector (AB34) from curtain airbag sensor (RH), and connect the connector (2V) in test harness V to connector (AB34).</p> <p>5) Measure the resistance between connector (3V) terminals in the test harness V.</p> <p><b>Connector &amp; terminal</b>  <b>(3V) No. 2 — (3V) No. 6:</b>  <b>(3V) No. 1 — (3V) No. 7:</b></p>	<p>Is the resistance less than 10 <math>\Omega</math>?</p>	<p>Go to step 5.</p>	<p>Replace the airbag rear harness along with body harness.</p>



# Diagnostic Chart with Trouble Code

AIRBAG SYSTEM (DIAGNOSTICS)

Step	Check	Yes	No
<b>5 CHECK AIRBAG REAR HARNESS (BETWEEN SIDE AIRBAG SENSOR AND CURTAIN AIRBAG SENSOR RH).</b> Measure the resistance between connector (3V) in test harness V and chassis ground, and the resistance between connector (3V) in test harness V. <i>Connector &amp; terminal</i> <i>(3V) No. 2 — Chassis ground:</i> <i>(3V) No. 1 — Chassis ground:</i> <i>(3V) No. 2 — (3V) No. 1:</i>	Is the resistance 1 MΩ or more?	Go to step 6.	Replace the airbag rear harness along with body harness.
<b>6 CHECK AIRBAG CONTROL MODULE.</b> 1) Connect all connectors. 2) Clear the memory. 3) Perform the Inspection Mode. 4) Read the DTC.	Is the same DTC displayed?	Go to step 7.	Go to step 8.
<b>7 REPLACE SIDE AIRBAG SENSOR (RH) AND CHECK AIRBAG CONTROL MODULE AFTER REPLACEMENT.</b> 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait for 60 seconds or more. 2) Replace the side airbag sensor (RH). <Ref. to AB-21, REMOVAL, Side Airbag Sensor.> 3) Connect all connectors. 4) Clear the memory. 5) Perform the Inspection Mode. 6) Read the DTC.	Is the system normal?	Go to step 8.	Replace the curtain airbag sensor (RH). <Ref. to AB-22, REMOVAL, Curtain Airbag Sensor.> Replace the airbag control module if not operating normally even after replacing the sensor. <Ref. to AB-20, REMOVAL, Airbag Control Module.>
<b>8 CHECK FOR ANY OTHER DTC ON DISPLAY.</b>	Is any other DTC displayed?	Check DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to AB(diag)-35, List of Diagnostic Trouble Code (DTC).>	Finish the diagnosis.

## AW:DTC ED SIDE SENSOR BUS RH COMMUNICATION ERROR

**NOTE:**

Refer to DTC EE for details on DTC ED. <Ref. to AB(diag)-100, DTC EE SIDE SENSOR BUS RH COMMUNICATION ERROR, Diagnostic Chart with Trouble Code.>

# Diagnostic Chart with Trouble Code

AIRBAG SYSTEM (DIAGNOSTICS)

## AX:DTC EE SIDE SENSOR BUS RH COMMUNICATION ERROR

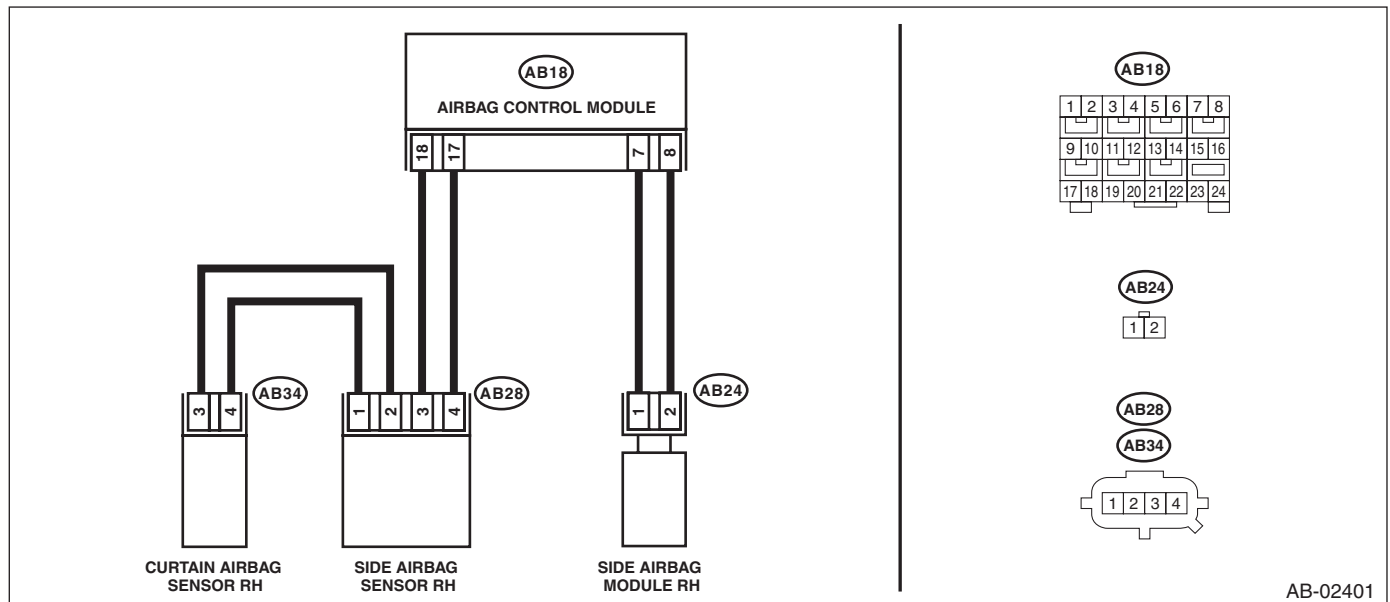
### DTC DETECTING CONDITION:

- Open or short circuit in harness of side sensor bus (RH).
- Side airbag sensor (RH) or curtain airbag sensor (RH) are faulty.
- Airbag control module is faulty.

### CAUTION:

Before performing diagnosis, refer to “CAUTION” in “General Description”. <Ref. to AB(diag)-4, CAUTION, General Description.>

### WIRING DIAGRAM:



AB-02401

Step	Check	Yes	No	
1	<p><b>CHECK POOR CONTACT OF CONNECTORS.</b> Check for poor contact of the connectors (AB18, AB28, AB34) between the airbag control module and the curtain airbag sensor (RH).</p>	Is there poor contact?	Replace the airbag rear harness along with body harness.	Go to step 2.

# Diagnostic Chart with Trouble Code

AIRBAG SYSTEM (DIAGNOSTICS)

Step	Check	Yes	No
<p><b>2</b></p> <p><b>CHECK AIRBAG REAR HARNESS (BETWEEN SIDE AIRBAG SENSOR (RH) AND CURTAIN AIRBAG SENSOR (RH)).</b></p> <p>1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait for 60 seconds or more.</p> <p>2) Disconnect the connector (AB26) from seat belt pretensioner (RH).</p> <p>3) Disconnect the connector (AB33) from curtain airbag module (RH).</p> <p>4) Disconnect connector (AB24) of the side airbag module (RH).</p> <p>5) Disconnect connector (AB28) from side airbag sensor (RH).</p> <p>6) Connect the connector (AB28) of side airbag sensor (RH) and the connector (1A1) in the test harness A1.</p> <p>7) Connect the connector (2A1) in the test harness A1 and the connector (1V) in the test harness V.</p> <p>8) Disconnect the connector (AB34) from curtain airbag sensor (RH), and connect the connector (2V) in test harness V to connector (AB34).</p> <p>9) Measure the resistance between connector (3V) terminals in the test harness V.</p> <p><b>Connector &amp; terminal</b>  <b>(3V) No. 2 — (3V) No. 6:</b>  <b>(3V) No. 1 — (3V) No. 7:</b></p>	<p>Is the resistance less than 10 <math>\Omega</math>?</p>	<p>Go to step 3.</p>	<p>Replace the airbag rear harness along with body harness.</p>
<p><b>3</b></p> <p><b>CHECK AIRBAG REAR HARNESS (BETWEEN SIDE AIRBAG SENSOR AND CURTAIN AIRBAG SENSOR RH).</b></p> <p>Measure the resistance between connector (3V) in test harness V and chassis ground, and the resistance between connector (3V) in test harness V.</p> <p><b>Connector &amp; terminal</b>  <b>(3V) No. 2 — Chassis ground:</b>  <b>(3V) No. 1 — Chassis ground:</b>  <b>(3V) No. 2 — (3V) No. 1:</b></p>	<p>Is the resistance 1 M<math>\Omega</math> or more?</p>	<p>Go to step 4.</p>	<p>Replace the airbag rear harness along with body harness.</p>

# Diagnostic Chart with Trouble Code

## AIRBAG SYSTEM (DIAGNOSTICS)

Step	Check	Yes	No
<p><b>4 CHECK AIRBAG REAR HARNESS (BETWEEN AIRBAG CONTROL MODULE AND SIDE AIRBAG SENSOR (RH)).</b></p> <p>1) Disconnect the connectors (AB17, AB6, AB18) from airbag control module.</p> <p>2) Connect the connector (1AG) in the test harness AG to the connectors (AB17, AB6, AB18).</p> <p>3) Disconnect the connector (AB28) in the side airbag sensor (RH) from the connector (1AI) in the test harness AI.</p> <p>4) Disconnect the connector (2AI) in the test harness AI from the connector (1V) in the test harness V.</p> <p>5) Connect the connector (AB28) of side airbag sensor (RH) and the connector (2V) in the test harness V.</p> <p>6) Measure the resistance between connector (5AG) in the test harness AG and connector (3V) in the test harness V.</p> <p><b>Connector &amp; terminal</b>  <b>(5AG) No. 16 — (3V) No. 2:</b>  <b>(5AG) No. 14 — (3V) No. 1:</b></p>	Is the resistance less than 10 Ω?	Go to step 5.	Replace the airbag rear harness along with body harness.
<p><b>5 CHECK AIRBAG REAR HARNESS (BETWEEN AIRBAG CONTROL MODULE AND SIDE AIRBAG SENSOR RH).</b></p> <p>Measure the resistance between connector (5AG) in the test harness AG and chassis ground, and the resistance between connector (5AG) terminals in the test harness AG.</p> <p><b>Connector &amp; terminal</b>  <b>(5AG) No. 16 — Chassis ground:</b>  <b>(5AG) No. 14 — Chassis ground:</b>  <b>(5AG) No. 16 — (5AG) No. 14:</b></p>	Is the resistance 1 MΩ or more?	Go to step 6.	Replace the airbag rear harness along with body harness.
<p><b>6 CHECK AIRBAG CONTROL MODULE.</b></p> <p>1) Connect all connectors.</p> <p>2) Clear the memory.</p> <p>3) Perform the Inspection Mode.</p> <p>4) Read the DTC.</p>	Is the same DTC displayed?	Go to step 7.	Go to step 8.
<p><b>7 REPLACE SIDE AIRBAG SENSOR (RH) AND CHECK AIRBAG CONTROL MODULE AFTER REPLACEMENT.</b></p> <p>1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait for 60 seconds or more.</p> <p>2) Replace the side airbag sensor (RH). &lt;Ref. to AB-21, REMOVAL, Side Airbag Sensor.&gt;</p> <p>3) Connect all connectors.</p> <p>4) Clear the memory.</p> <p>5) Perform the Inspection Mode.</p> <p>6) Read the DTC.</p>	Is the system normal?	Go to step 8.	Replace the curtain airbag sensor (RH). <Ref. to AB-22, REMOVAL, Curtain Airbag Sensor.> Replace the airbag control module if not operating normally even after replacing the sensor. <Ref. to AB-20, REMOVAL, Airbag Control Module.>
<p><b>8 CHECK FOR ANY OTHER DTC ON DISPLAY.</b></p>	Is any other DTC displayed?	Check DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to AB(diag)-35, List of Diagnostic Trouble Code (DTC).>	Finish the diagnosis.

# Diagnostic Chart with Trouble Code

AIRBAG SYSTEM (DIAGNOSTICS)

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## **AY:DTC F1 SIDE SENSOR BUS LH COMMUNICATION ERROR**

**NOTE:**

Refer to DTC F4 for details on DTC F1. <Ref. to AB(diag)-104, DTC F4 SIDE SENSOR BUS LH COMMUNICATION ERROR, Diagnostic Chart with Trouble Code.>

## **AZ:DTC F2 SIDE SENSOR BUS LH COMMUNICATION ERROR**

**NOTE:**

Refer to DTC F4 for details on DTC F2. <Ref. to AB(diag)-104, DTC F4 SIDE SENSOR BUS LH COMMUNICATION ERROR, Diagnostic Chart with Trouble Code.>

## **BA:DTC F3 SIDE SENSOR BUS LH COMMUNICATION ERROR**

**NOTE:**

Refer to DTC F4 for details on DTC F3. <Ref. to AB(diag)-104, DTC F4 SIDE SENSOR BUS LH COMMUNICATION ERROR, Diagnostic Chart with Trouble Code.>

# Diagnostic Chart with Trouble Code

AIRBAG SYSTEM (DIAGNOSTICS)

## BB:DTC F4 SIDE SENSOR BUS LH COMMUNICATION ERROR

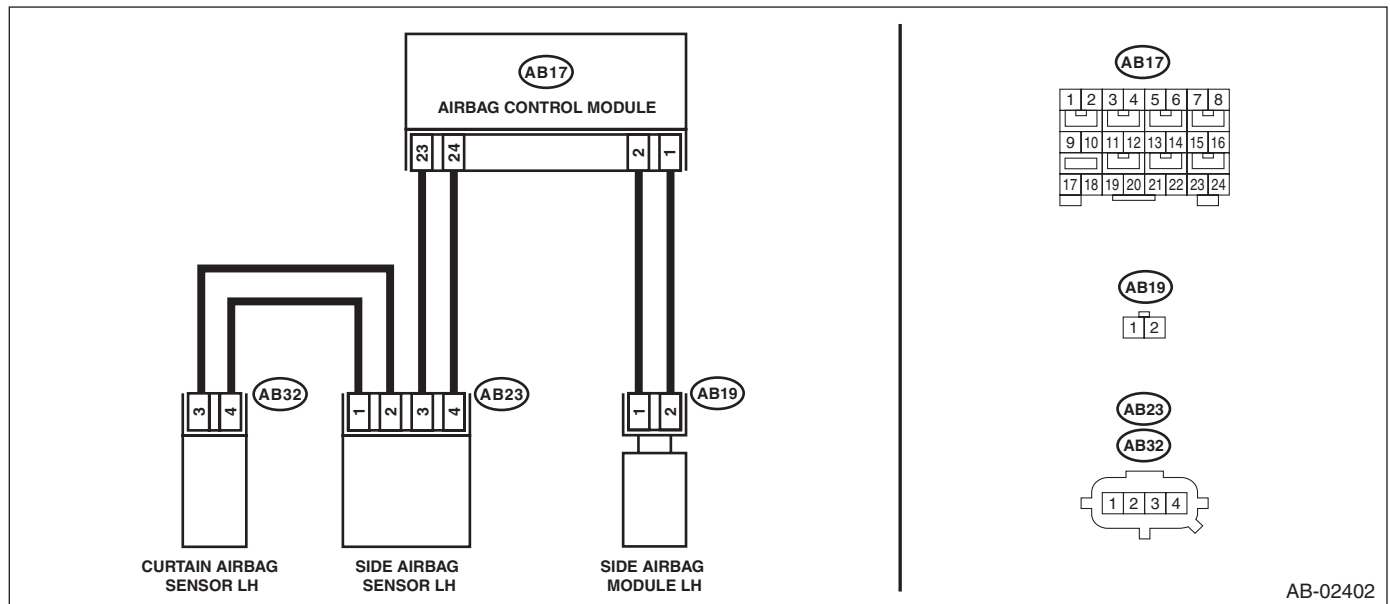
### DTC DETECTING CONDITION:

- Open or short circuit in harness of side sensor bus (LH).
- Side airbag sensor (LH) and curtain airbag sensor (LH) are faulty.
- Airbag control module is faulty.

### CAUTION:

Before performing diagnosis, refer to “CAUTION” in “General Description”. <Ref. to AB(diag)-4, CAUTION, General Description.>

### WIRING DIAGRAM:



AB-02402

Step	Check	Yes	No
<b>1</b> <b>CHECK POOR CONTACT OF CONNECTORS.</b> Check for poor contact of the connectors (AB17, AB23, AB32) between the airbag control module and the curtain airbag sensor (LH).	Is there poor contact?	Replace the airbag rear harness along with body harness.	Go to step 2.

# Diagnostic Chart with Trouble Code

AIRBAG SYSTEM (DIAGNOSTICS)

Step	Check	Yes	No
<p><b>2 CHECK AIRBAG REAR HARNESS (BETWEEN AIRBAG CONTROL MODULE AND SIDE AIRBAG SENSOR LH).</b></p> <p>1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait for 60 seconds or more.</p> <p>2) Disconnect the connector (AB21) from seat belt pretensioner (LH).</p> <p>3) Disconnect the connector (AB31) from curtain airbag module (LH).</p> <p>4) Disconnect connector (AB19) of the side airbag module (LH).</p> <p>5) Disconnect the connectors (AB17, AB6, AB18) from airbag control module.</p> <p>6) Connect the connector (1AG) in the test harness AG to the connectors (AB17, AB6, AB18).</p> <p>7) Disconnect the connector (AB23) from side airbag sensor (LH), and connect the connector (2V) in test harness V to connector (AB23).</p> <p>8) Measure the resistance between connector (5AG) in the test harness AG and connector (3V) in the test harness V.</p> <p><b>Connector &amp; terminal</b>  <b>(5AG) No. 10 — (3V) No. 1:</b>  <b>(5AG) No. 8 — (3V) No. 2:</b></p>	<p>Is the resistance less than 10 <math>\Omega</math>?</p>	<p>Go to step 3.</p>	<p>Replace the airbag rear harness along with body harness.</p>
<p><b>3 CHECK AIRBAG REAR HARNESS (BETWEEN AIRBAG CONTROL MODULE AND SIDE AIRBAG SENSOR LH).</b></p> <p>Measure the resistance between connector (5AG) in the test harness AG and chassis ground, and the resistance between connector (5AG) terminals in the test harness AG.</p> <p><b>Connector &amp; terminal</b>  <b>(5AG) No. 10 — Chassis ground:</b>  <b>(5AG) No. 8 — Chassis ground:</b>  <b>(5AG) No. 10 — (5AG) No. 8:</b></p>	<p>Is the resistance 1 M<math>\Omega</math> or more?</p>	<p>Go to step 4.</p>	<p>Replace the airbag rear harness along with body harness.</p>
<p><b>4 CHECK AIRBAG REAR HARNESS (BETWEEN SIDE AIRBAG SENSOR LH AND CURTAIN AIRBAG SENSOR LH).</b></p> <p>1) Disconnect the connector (2V) in the test harness V from the connector (AB23) of side airbag sensor (LH).</p> <p>2) Connect the connector (AB23) of side airbag sensor (LH) and the connector (1AI) in the test harness AI.</p> <p>3) Connect the connector (2AI) in the test harness AI and the connector (1V) in the test harness V.</p> <p>4) Disconnect the connector (AB32) from curtain airbag sensor (LH), and connect the connector (2V) in test harness V to connector (AB32).</p> <p>5) Measure the resistance between connector (3V) terminals in the test harness V.</p> <p><b>Connector &amp; terminal</b>  <b>(3V) No. 2 — (3V) No. 6:</b>  <b>(3V) No. 1 — (3V) No. 7:</b></p>	<p>Is the resistance less than 10 <math>\Omega</math>?</p>	<p>Go to step 5.</p>	<p>Replace the airbag rear harness along with body harness.</p>

# Diagnostic Chart with Trouble Code

## AIRBAG SYSTEM (DIAGNOSTICS)

Step	Check	Yes	No
<b>5 CHECK AIRBAG REAR HARNESS (BETWEEN SIDE AIRBAG SENSOR LH AND CURTAIN AIRBAG SENSOR LH).</b> Measure the resistance between connector (3V) in test harness V and chassis ground, and the resistance between connector (3V) in test harness V. <b>Connector &amp; terminal</b> <b>(3V) No. 2 — Chassis ground:</b> <b>(3V) No. 1 — Chassis ground:</b> <b>(3V) No. 2 — (3V) No. 1:</b>	Is the resistance 1 MΩ or more?	Go to step 6.	Replace the airbag rear harness along with body harness.
<b>6 CHECK AIRBAG CONTROL MODULE.</b> 1) Connect all connectors. 2) Clear the memory. 3) Perform the Inspection Mode. 4) Read the DTC.	Is the same DTC displayed?	Go to step 7.	Go to step 8.
<b>7 REPLACE SIDE AIRBAG SENSOR (LH) AND CHECK AIRBAG CONTROL MODULE AFTER REPLACEMENT.</b> 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait for 60 seconds or more. 2) Replace the side airbag sensor (LH). <Ref. to AB-21, REMOVAL, Side Airbag Sensor.> 3) Connect all connectors. 4) Clear the memory. 5) Perform the Inspection Mode. 6) Read the DTC.	Is the system normal?	Go to step 8.	Replace the curtain airbag sensor (LH). <Ref. to AB-22, REMOVAL, Curtain Airbag Sensor.> Replace the airbag control module if not operating normally even after replacing the sensor. <Ref. to AB-20, REMOVAL, Airbag Control Module.>
<b>8 CHECK FOR ANY OTHER DTC ON DISPLAY.</b>	Is any other DTC displayed?	Check DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to AB(diag)-35, List of Diagnostic Trouble Code (DTC).>	Finish the diagnosis.

### BC:DTC F5 SIDE SENSOR BUS LH COMMUNICATION ERROR

**NOTE:**

Refer to DTC F6 for details on DTC F5. <Ref. to AB(diag)-107, DTC F6 SIDE SENSOR BUS LH COMMUNICATION ERROR, Diagnostic Chart with Trouble Code.>



# Diagnostic Chart with Trouble Code

AIRBAG SYSTEM (DIAGNOSTICS)

## BD:DTC F6 SIDE SENSOR BUS LH COMMUNICATION ERROR

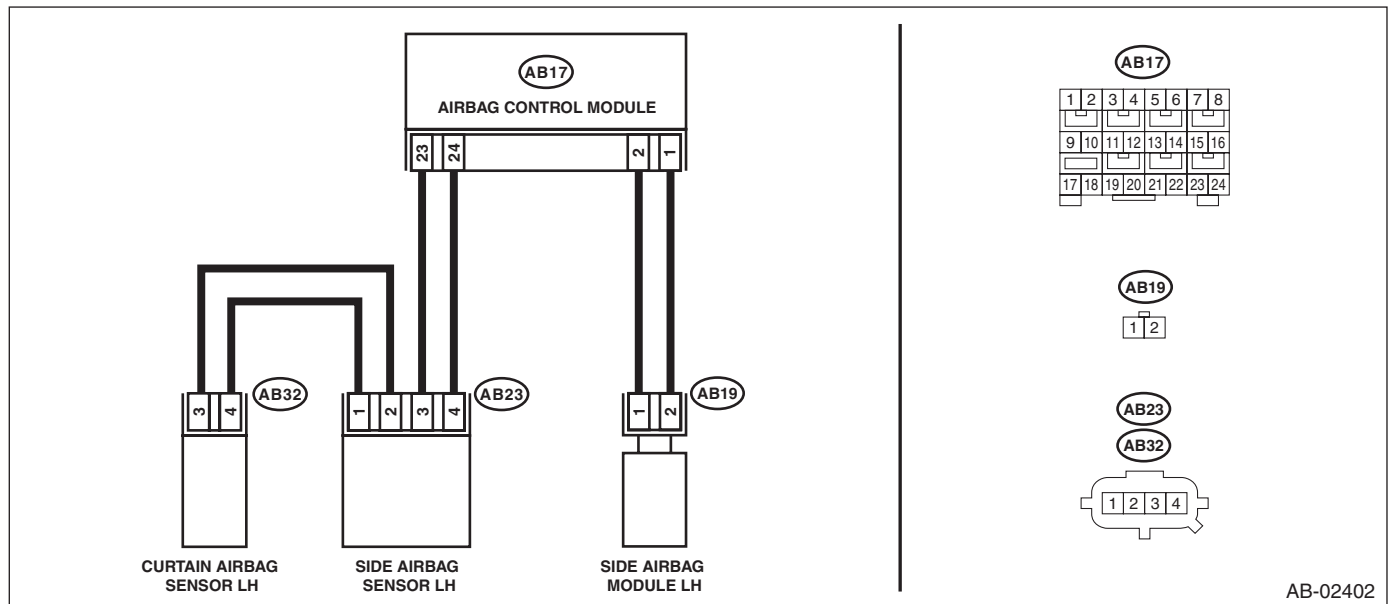
### DTC DETECTING CONDITION:

- Open or short circuit in harness of side sensor bus (LH).
- Side airbag sensor (LH) or curtain airbag sensor (LH) are faulty.
- Airbag control module is faulty.

### CAUTION:

Before performing diagnosis, refer to “CAUTION” in “General Description”. <Ref. to AB(diag)-4, CAUTION, General Description.>

### WIRING DIAGRAM:



AB-02402

Step	Check	Yes	No
<b>1</b> <b>CHECK POOR CONTACT OF CONNECTORS.</b> Check for poor contact of the connectors (AB17, AB23, AB32) between the airbag control module and the curtain airbag sensor (LH).	Is there poor contact?	Replace the airbag rear harness along with body harness.	Go to step 2.

## Diagnostic Chart with Trouble Code

### AIRBAG SYSTEM (DIAGNOSTICS)

Step	Check	Yes	No
<p><b>2</b></p> <p><b>CHECK AIRBAG REAR HARNESS (BETWEEN SIDE AIRBAG SENSOR LH AND CURTAIN AIRBAG SENSOR LH).</b></p> <p>1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait for 60 seconds or more.</p> <p>2) Disconnect the connector (AB21) from seat belt pretensioner (LH).</p> <p>3) Disconnect the connector (AB31) from curtain airbag module (LH).</p> <p>4) Disconnect connector (AB19) of the side airbag module (LH).</p> <p>5) Disconnect the connector (AB23) in the side airbag sensor (LH).</p> <p>6) Connect the connector (AB23) of side airbag sensor (LH) and the connector (1AI) in the test harness AI.</p> <p>7) Connect the connector (2AI) in the test harness AI and the connector (1V) in the test harness V.</p> <p>8) Disconnect the connector (AB32) from curtain airbag sensor (LH), and connect to the connector (2V) in test harness V.</p> <p>9) Measure the resistance between connector (3V) terminals in the test harness V.</p> <p><b>Connector &amp; terminal</b>  <b>(3V) No. 2 — (3V) No. 6:</b>  <b>(3V) No. 1 — (3V) No. 7:</b></p>	<p>Is the resistance less than 10 <math>\Omega</math>?</p>	<p>Go to step 3.</p>	<p>Replace the airbag rear harness along with body harness.</p>
<p><b>3</b></p> <p><b>CHECK AIRBAG REAR HARNESS (BETWEEN SIDE AIRBAG SENSOR AND CURTAIN AIRBAG SENSOR LH).</b></p> <p>Measure the resistance between connector (3V) in test harness V and chassis ground, and the resistance between connector (3V) in test harness V.</p> <p><b>Connector &amp; terminal</b>  <b>(3V) No. 2 — Chassis ground:</b>  <b>(3V) No. 1 — Chassis ground:</b>  <b>(3V) No. 2 — (3V) No. 1:</b></p>	<p>Is the resistance 1 M<math>\Omega</math> or more?</p>	<p>Go to step 4.</p>	<p>Replace the airbag rear harness along with body harness.</p>
<p><b>4</b></p> <p><b>CHECK AIRBAG REAR HARNESS (BETWEEN AIRBAG CONTROL MODULE AND SIDE AIRBAG SENSOR LH).</b></p> <p>1) Disconnect the connectors (AB17, AB6, AB18) from airbag control module.</p> <p>2) Connect the connector (1AG) in the test harness AG to the connectors (AB17, AB6, AB18).</p> <p>3) Disconnect the connector (AB23) in the side airbag sensor (LH) from the connector (1AI) in the test harness AI.</p> <p>4) Disconnect the connector (2AI) in the test harness AI from the connector (1V) in the test harness V.</p> <p>5) Connect the connector (2V) in the test harness V to the connector (AB23).</p> <p>6) Measure the resistance between connector (5AG) in the test harness AG and connector (3V) in the test harness V.</p> <p><b>Connector &amp; terminal</b>  <b>(5AG) No. 10 — (3V) No. 1:</b>  <b>(5AG) No. 8 — (3V) No. 2:</b></p>	<p>Is the resistance less than 10 <math>\Omega</math>?</p>	<p>Go to step 5.</p>	<p>Replace the airbag rear harness along with body harness.</p>

# Diagnostic Chart with Trouble Code

AIRBAG SYSTEM (DIAGNOSTICS)

Step	Check	Yes	No
<b>5 CHECK AIRBAG REAR HARNESS (BETWEEN AIRBAG CONTROL MODULE AND SIDE AIRBAG SENSOR LH).</b> Measure the resistance between connector (5AG) in the test harness AG and chassis ground, and the resistance between connector (5AG) terminals in the test harness AG. <b>Connector &amp; terminal</b> <b>(5AG) No. 10 — Chassis ground:</b> <b>(5AG) No. 8 — Chassis ground:</b> <b>(5AG) No. 10 — (5AG) No. 8:</b>	Is the resistance 1 MΩ or more?	Go to step 6.	Replace the airbag rear harness along with body harness.
<b>6 CHECK AIRBAG CONTROL MODULE.</b> 1) Connect all connectors. 2) Clear the memory. 3) Perform the Inspection Mode. 4) Read the DTC.	Is the same DTC displayed?	Go to step 7.	Go to step 8.
<b>7 REPLACE SIDE AIRBAG SENSOR (LH) AND CHECK AIRBAG CONTROL MODULE AFTER REPLACEMENT.</b> 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait for 60 seconds or more. 2) Replace the side airbag sensor (LH). <Ref. to AB-21, REMOVAL, Side Airbag Sensor.> 3) Connect all connectors. 4) Clear the memory. 5) Perform the Inspection Mode. 6) Read the DTC.	Is the system normal?	Go to step 8.	Replace the curtain airbag sensor (LH). <Ref. to AB-22, REMOVAL, Curtain Airbag Sensor.> Replace the airbag control module if not operating normally even after replacing the sensor. <Ref. to AB-20, REMOVAL, Airbag Control Module.>
<b>8 CHECK FOR ANY OTHER DTC ON DISPLAY.</b>	Is any other DTC displayed?	Check DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to AB(diag)-35, List of Diagnostic Trouble Code (DTC).>	Finish the diagnosis.

## BE:DTC F8 SATELLITE SENSOR BUS COMMUNICATION ERROR

NOTE:

Refer to DTC FA for details on DTC F8. <Ref. to AB(diag)-110, DTC FA SATELLITE SENSOR BUS COMMUNICATION ERROR, Diagnostic Chart with Trouble Code.>

## BF:DTC F9 SATELLITE SENSOR BUS COMMUNICATION ERROR

NOTE:

Refer to DTC FA for details on DTC F9. <Ref. to AB(diag)-110, DTC FA SATELLITE SENSOR BUS COMMUNICATION ERROR, Diagnostic Chart with Trouble Code.>

# Diagnostic Chart with Trouble Code

AIRBAG SYSTEM (DIAGNOSTICS)

## BG:DTC FA SATELLITE SENSOR BUS COMMUNICATION ERROR

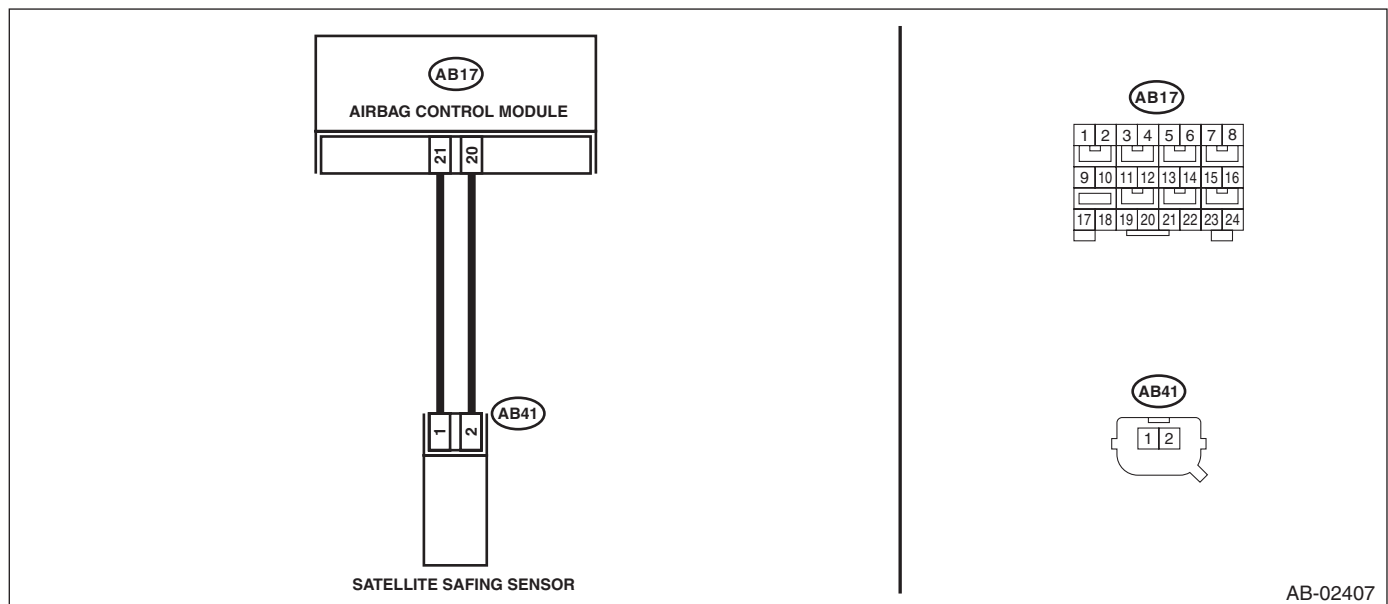
### DTC DETECTING CONDITION:

- Open or short circuit in harness of satellite safing sensor.
- Satellite safing sensor is faulty.
- Airbag control module is faulty.

### CAUTION:

Before performing diagnosis, refer to “CAUTION” in “General Description”. <Ref. to AB(diag)-4, CAUTION, General Description.>

### WIRING DIAGRAM:



Step	Check	Yes	No
1	<p><b>CHECK POOR CONTACT OF CONNECTORS.</b> Check for poor contact of the connectors (AB17, AB41) between the airbag control module and the satellite safing sensor.</p>	Is there poor contact?	<p>Replace the airbag rear harness along with body harness.</p> <p>Go to step 2.</p>

# Diagnostic Chart with Trouble Code

AIRBAG SYSTEM (DIAGNOSTICS)

Step	Check	Yes	No
<p><b>2 CHECK AIRBAG REAR HARNESS (BETWEEN AIRBAG CONTROL MODULE AND SATELLITE SAFING SENSOR).</b></p> <p>1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait for 60 seconds or more.</p> <p>2) Disconnect the connectors (AB21, AB26) from seat belt pretensioner.</p> <p>3) Disconnect the connectors (AB31, AB33) from curtain airbag module.</p> <p>4) Disconnect connectors (AB19) and (AB24) from the side airbag module.</p> <p>5) Disconnect the connectors (AB17, AB6, AB18) from airbag control module.</p> <p>6) Connect the connector (1AG) in the test harness AG to the connectors (AB17, AB6, AB18).</p> <p>7) Disconnect the connector (AB41) from the satellite safing sensor and connect to the test harness H connector (1H).</p> <p>8) Measure the resistance between connector (5AG) in the test harness AG and connector (3H) in the test harness H.</p> <p><b>Connector &amp; terminal</b>  <b>(5AG) No. 9 — (3H) No. 5:</b>  <b>(5AG) No. 11 — (3H) No. 6:</b></p>	<p>Is the resistance less than 10 Ω?</p>	<p>Go to step 3.</p>	<p>Replace the airbag rear harness along with body harness.</p>
<p><b>3 CHECK AIRBAG REAR HARNESS (BETWEEN AIRBAG CONTROL MODULE AND SATELLITE SAFING SENSOR).</b></p> <p>Measure the resistance between connector (5AG) in the test harness AG and chassis ground, and the resistance between connector (5AG) terminals in the test harness AG.</p> <p><b>Connector &amp; terminal</b>  <b>(5AG) No. 9 — Chassis ground:</b>  <b>(5AG) No. 11 — Chassis ground:</b>  <b>(5AG) No. 9 — (5AG) No. 11:</b></p>	<p>Is the resistance 1 MΩ or more?</p>	<p>Go to step 4.</p>	<p>Replace the airbag rear harness along with body harness.</p>
<p><b>4 CHECK AIRBAG CONTROL MODULE.</b></p> <p>1) Connect all connectors.</p> <p>2) Clear the memory.</p> <p>3) Perform the Inspection Mode.</p> <p>4) Read the DTC.</p>	<p>Is the same DTC displayed?</p>	<p>Replace the satellite safing sensor.</p> <p>Replace the airbag control module if not operating normally even after replacing the sensor. &lt;Ref. to AB-20, REMOVAL, Airbag Control Module.&gt;</p>	<p>Go to step 5.</p>
<p><b>5 CHECK FOR ANY OTHER DTC ON DISPLAY.</b></p>	<p>Is any other DTC displayed?</p>	<p>Check DTC using "List of Diagnostic Trouble Code (DTC)". &lt;Ref. to AB(diag)-35, List of Diagnostic Trouble Code (DTC).&gt;</p>	<p>Finish the diagnosis.</p>

## Diagnostic Chart with Trouble Code

AIRBAG SYSTEM (DIAGNOSTICS)

### BH:DTC 3A FRONT SUB SENSOR RH FALSE INSTALLATION

#### DTC DETECTING CONDITION:

Front sub sensor (RH) is misinstalled.

Step	Check	Yes	No
<b>1</b> <b>REPLACE FRONT SUB SENSOR.</b> 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait for 60 seconds or more. 2) Replace the front sub sensor (RH) with a genuine sensor. <Ref. to AB-25, REMOVAL, Front Sub Sensor.>	Does the warning light go off?	Finish the diagnosis.	Replace the airbag control module. <Ref. to AB-20, REMOVAL, Airbag Control Module.>

### BI: DTC 3B FRONT SUB SENSOR LH FALSE INSTALLATION

#### DTC DETECTING CONDITION:

Front sub sensor (LH) is misinstalled.

Step	Check	Yes	No
<b>1</b> <b>REPLACE FRONT SUB SENSOR.</b> 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait for 60 seconds or more. 2) Replace the front sub sensor (LH) with a genuine sensor. <Ref. to AB-25, REMOVAL, Front Sub Sensor.>	Does the warning light go off?	Finish the diagnosis.	Replace the airbag control module. <Ref. to AB-20, REMOVAL, Airbag Control Module.>

### BJ:DTC 3C SATELLITE SENSOR BUS FAILURE

#### DTC DETECTING CONDITION:

Satellite safing sensor is faulty.

Step	Check	Yes	No
<b>1</b> <b>REPLACE SATELLITE SAFING SENSOR.</b> 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait for 60 seconds or more. 2) Replace the satellite safing sensor with a genuine sensor.	Does the warning light go off?	Finish the diagnosis.	Replace the airbag control module. <Ref. to AB-20, REMOVAL, Airbag Control Module.>

### BK:DTC 3D SATELLITE SENSOR FALSE INSTALLATION

#### DTC DETECTING CONDITION:

Satellite safing sensor is misinstalled.

Step	Check	Yes	No
<b>1</b> <b>REPLACE SATELLITE SAFING SENSOR.</b> 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait for 60 seconds or more. 2) Replace the satellite safing sensor with a genuine sensor.	Does the warning light go off?	Finish the diagnosis.	Replace the airbag control module. <Ref. to AB-20, REMOVAL, Airbag Control Module.>

# Diagnostic Chart with Trouble Code

AIRBAG SYSTEM (DIAGNOSTICS)

## BL:DTC 5A SIDE AIRBAG SENSOR RH FALSE INSTALLATION

### DTC DETECTING CONDITION:

Side airbag sensor RH is misinstalled.

Step	Check	Yes	No
<b>1 REPLACE SIDE AIRBAG SENSOR (RH).</b> 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait for 60 seconds or more. 2) Replace the side A/B sensor (RH) with a genuine sensor. <Ref. to AB-21, REMOVAL, Side Airbag Sensor.>	Does the warning light go off?	Finish the diagnosis.	Replace the airbag control module. <Ref. to AB-20, REMOVAL, Airbag Control Module.>

## BM:DTC 5B SIDE AIRBAG SENSOR LH FALSE INSTALLATION

### DTC DETECTING CONDITION:

Side airbag sensor LH is misinstalled.

Step	Check	Yes	No
<b>1 REPLACE SIDE AIRBAG SENSOR (LH).</b> 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait for 60 seconds or more. 2) Replace the side A/B sensor (LH) with a genuine sensor. <Ref. to AB-21, REMOVAL, Side Airbag Sensor.>	Does the warning light go off?	Finish the diagnosis.	Replace the airbag control module. <Ref. to AB-20, REMOVAL, Airbag Control Module.>

## BN:DTC 5C CURTAIN AIRBAG SENSOR RH FALSE INSTALLATION

### DTC DETECTING CONDITION:

Curtain airbag sensor RH is misinstalled.

Step	Check	Yes	No
<b>1 REPLACE CURTAIN AIRBAG SENSOR (RH).</b> 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait for 60 seconds or more. 2) Replace the curtain A/B sensor (RH) with a genuine sensor. <Ref. to AB-22, REMOVAL, Curtain Airbag Sensor.>	Does the warning light go off?	Finish the diagnosis.	Replace the airbag control module. <Ref. to AB-20, REMOVAL, Airbag Control Module.>

## BO:DTC 5D CURTAIN AIRBAG SENSOR LH FALSE INSTALLATION

### DTC DETECTING CONDITION:

Curtain airbag sensor LH is misinstalled.

Step	Check	Yes	No
<b>1 REPLACE CURTAIN AIRBAG SENSOR (LH).</b> 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait for 60 seconds or more. 2) Replace the curtain A/B sensor (LH) with a genuine sensor. <Ref. to AB-22, REMOVAL, Curtain Airbag Sensor.>	Does the warning light go off?	Finish the diagnosis.	Replace the airbag control module. <Ref. to AB-20, REMOVAL, Airbag Control Module.>

# Diagnostic Chart with Trouble Code

AIRBAG SYSTEM (DIAGNOSTICS)

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# OCCUPANT DETECTION SYSTEM (DIAGNOSTICS)

## *OD(diag)*

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# Basic Diagnostic Procedure

## OCCUPANT DETECTION SYSTEM (DIAGNOSTICS)

### 1. Basic Diagnostic Procedure

#### A: PROCEDURE

	Step	Check	Yes	No
1	<b>CHECK WARNING LIGHT.</b> Check whether the airbag warning light in the combination meter is lit.	Does the airbag warning light illuminate?	Go to step 2.	Perform the diagnosis according to phenomenon of the problem.
2	<b>READ DTC.</b> 1) Turn the ignition switch to OFF. 2) Connect the Subaru Select Monitor to data link connector. 3) Turn the ignition switch to ON and run the Subaru Select Monitor. 4) Read the DTC. <Ref. to OD(diag)-16, OPERATION, Read Diagnostic Trouble Code (DTC).> NOTE: If the communication function of the Subaru Select Monitor cannot be executed normally, check the communication circuit. <Ref. to OD(diag)-15, COMMUNICATION FOR INITIALIZING IMPOSSIBLE, INSPECTION, Subaru Select Monitor.> 5) Record all DTCs and freeze frame data.	Is DTC displayed?	Go to step 3.	Go to "Airbag warning light failure" <Ref. to AB(diag)-31, Airbag Warning Light Failure.>.
3	<b>PERFORM DIAGNOSIS.</b> 1) Determine the possible cause "List of Diagnostic Trouble Code (DTC)" <Ref. to OD(diag)-21, List of Diagnostic Trouble Code (DTC).>. 2) Inspect the DTC using "List of Diagnostic Trouble Code (DTC)". 3) Repair the trouble cause. 4) Perform the Clear Memory Mode. <Ref. to OD(diag)-18, Clear Memory Mode.> 5) Perform the Inspection Mode. <Ref. to OD(diag)-17, Inspection Mode.> 6) Read any other DTCs displayed.	Is DTC displayed?	Perform the procedure 1) to 5) in step 3.	Finish the diagnosis.

## Check List for Interview

OCCUPANT DETECTION SYSTEM (DIAGNOSTICS)

### 2. Check List for Interview

#### A: CHECK

Customer's name		Inspector's name	
Date vehicle brought in	/ /	Registration No.	
Odometer reading	km miles	V.I.N.	
Date problem occurred	/ /	Registration year	/ /
Weather	<input type="checkbox"/> Fine <input type="checkbox"/> Cloudy <input type="checkbox"/> Rainy <input type="checkbox"/> Snowy <input type="checkbox"/> Others:		
Temperature	°C ( °F)		
Road condition	<input type="checkbox"/> Flat road <input type="checkbox"/> Uphill <input type="checkbox"/> Downhill <input type="checkbox"/> Gravel road <input type="checkbox"/> Others:		
Vehicle operation	<input type="checkbox"/> Starting <input type="checkbox"/> Idling <input type="checkbox"/> Driving <input type="checkbox"/> Constant speed <input type="checkbox"/> Accelerating <input type="checkbox"/> Decelerating <input type="checkbox"/> Turning <input type="checkbox"/> Others:		
Details of problem			
Airbag warning light operation	<input type="checkbox"/> Normal (After turning the ignition switch to ON, illuminates for 6 seconds then goes off.) <input type="checkbox"/> Remains ON <input type="checkbox"/> Remains OFF		
Passenger's airbag ON/OFF indicator operation	<input type="checkbox"/> Normal (After turning the ignition switch to ON, illuminates for 6 seconds then goes off for 2 seconds; Lights ON (adult) or OFF (children/unoccupied).) <input type="checkbox"/> Both remain ON <input type="checkbox"/> Both remain OFF		
DTC output	<input type="checkbox"/> OK code <input type="checkbox"/> DTC: (Code:                    )		

## General Description

### OCCUPANT DETECTION SYSTEM (DIAGNOSTICS)

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## 3. General Description

### A: CAUTION

1) Never remove the occupant detection control module, occupant detection sensor and seat cushion from seat frame because the occupant detection system is integrated into seat frame as one unit.

2) Always perform "system calibration (Rezeroing)" when removing or removing and disassembling the passenger's seat. <Ref. to OD(diag)-14, SYSTEM CALIBRATION (REZEROING), OPERATION, Subaru Select Monitor.>

3) Never connect the battery in reverse polarity. Occupant detection system may be destroyed instantly.

4) Do not disconnect the battery terminals while the engine is running.

A large counter electromotive force will be generated in the generator, and this voltage may damage electronic parts such as occupant detection control module.

5) Before disconnecting the connectors of each sensor and control module, be sure to turn the ignition switch to OFF and wait for 60 seconds or more. Occupant detection control module may be damaged.

6) Every occupant detection system-related part is a precision part. Do not drop them.

7) Airbag system wiring harness is routed near the occupant detection system.

#### CAUTION:

- **Do not use the electrical test equipment on airbag system circuits.**
- **Be careful not to damage the airbag system wiring harness when servicing the occupant detection system.**
- **Refer to CAUTION in Airbag System when repairing the occupant detection system. <Ref. to AB(diag)-4, CAUTION, General Description.>**

### B: INSPECTION

Measure the battery voltage and check electrolyte.

**Standard voltage: 12 V**

**Specific gravity: 1.260 or more**

# General Description

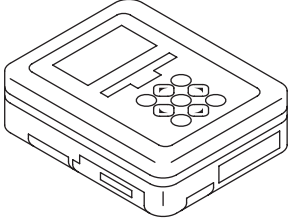
OCCUPANT DETECTION SYSTEM (DIAGNOSTICS)

## C: PREPARATION TOOL

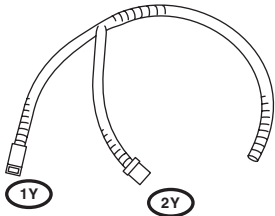
### CAUTION:

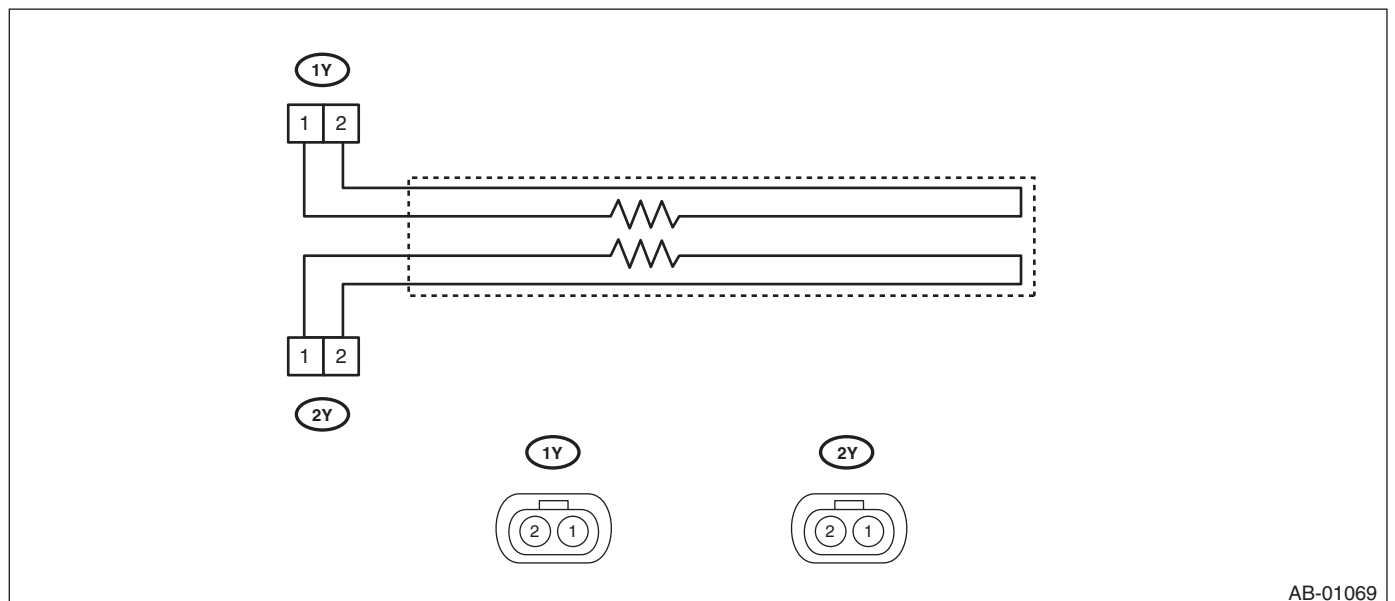
To measure the voltage and resistance of airbag system and occupant detection system components, be sure to use the specified test harness.

### 1. SPECIAL TOOL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>ST1B022XU0</p>	1B022XU0	SUBARU SELECT MONITOR III KIT	Used for troubleshooting the electrical system.

### • TEST HARNESS Y

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>ST98299AG040</p>	98299AG040	TEST HARNESS Y	Used for troubleshooting seat belt buckle switch.

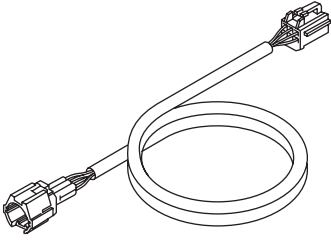


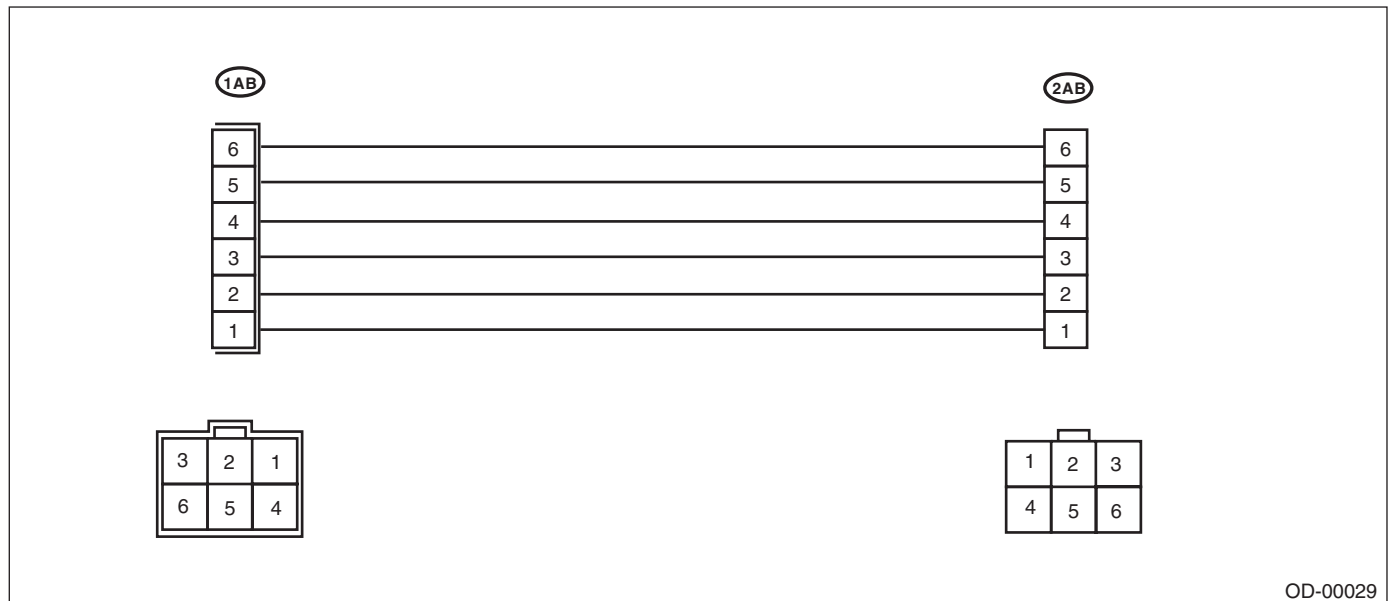
AB-01069

# General Description

## OCCUPANT DETECTION SYSTEM (DIAGNOSTICS)

- TEST HARNESS AB

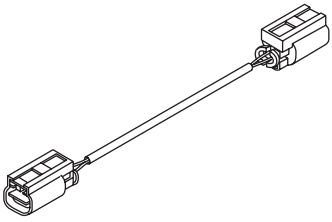
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>ST98299XA000</p>	98299XA000	TEST HARNESS AB	Used when measuring voltage and resistance of occupant detection system.

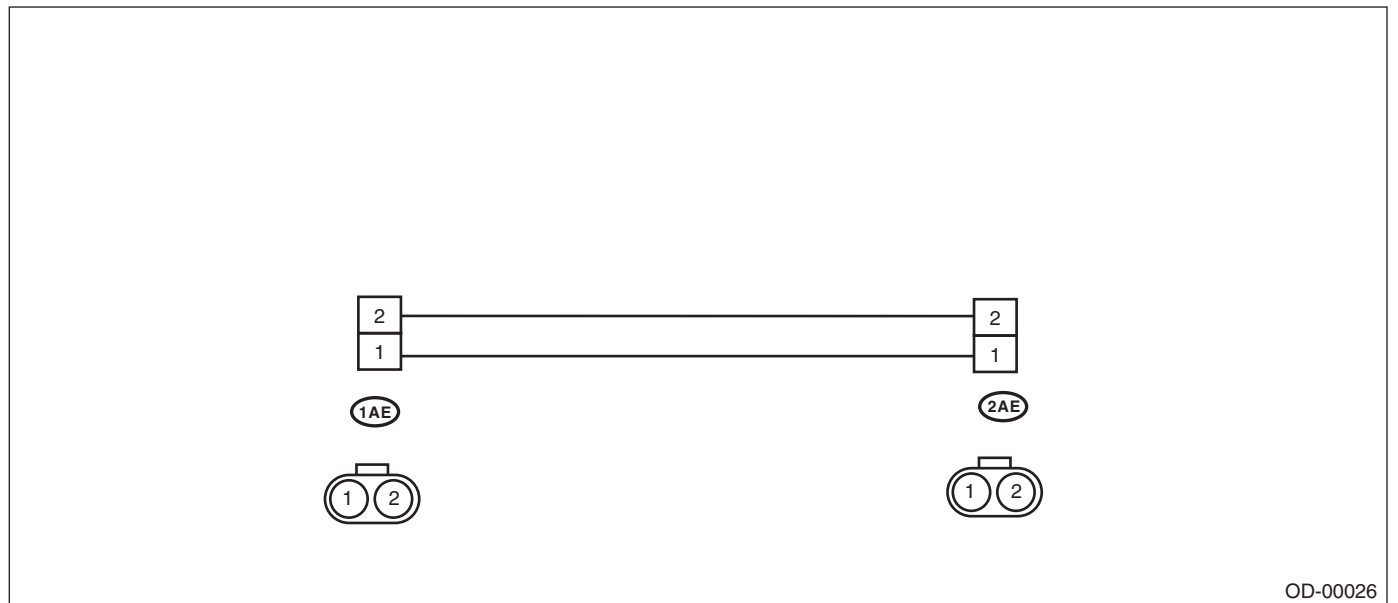


# General Description

## OCCUPANT DETECTION SYSTEM (DIAGNOSTICS)

- TEST HARNESS AE

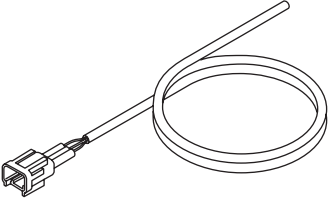
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST98299XA030	98299XA030	TEST HARNESS AE	TEST HARNESS Y adapter harness Used for troubleshooting seat belt buckle switch.

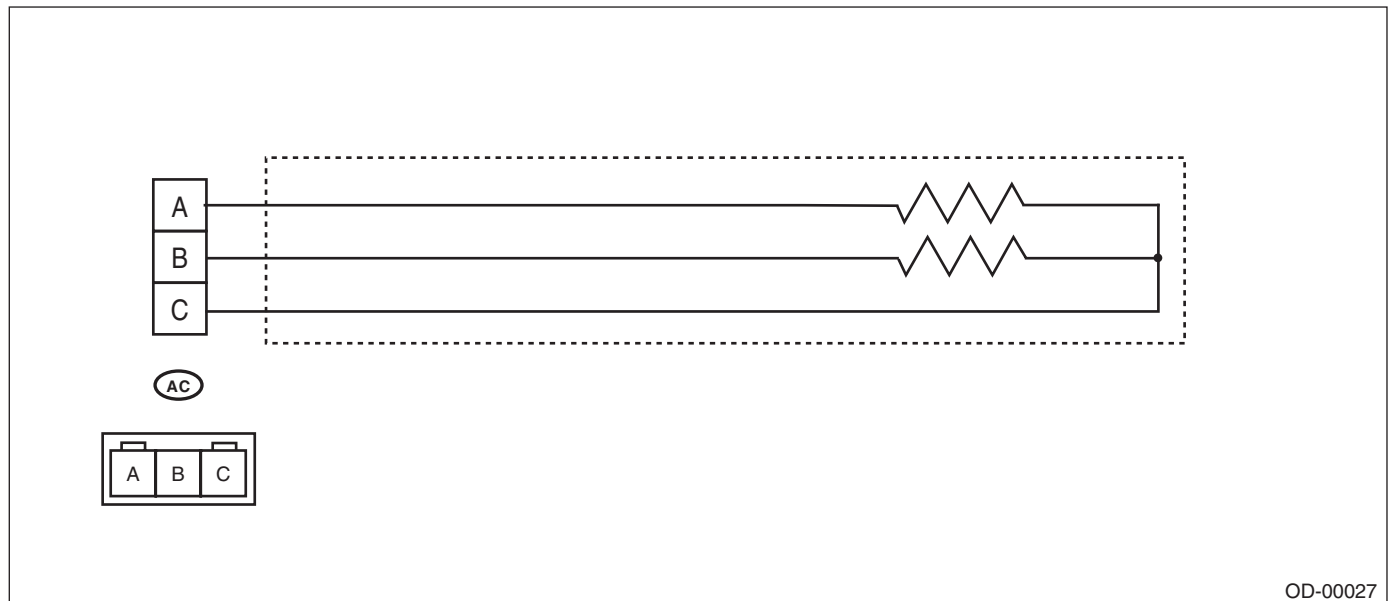


# General Description

## OCCUPANT DETECTION SYSTEM (DIAGNOSTICS)

- TEST HARNESS AC

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>ST98299XA010</p>	98299XA010	TEST HARNESS AC	Used for troubleshooting seat belt tension sensor.

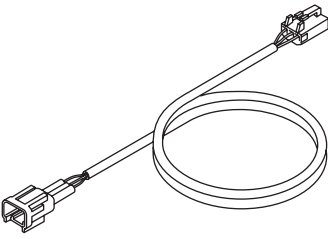


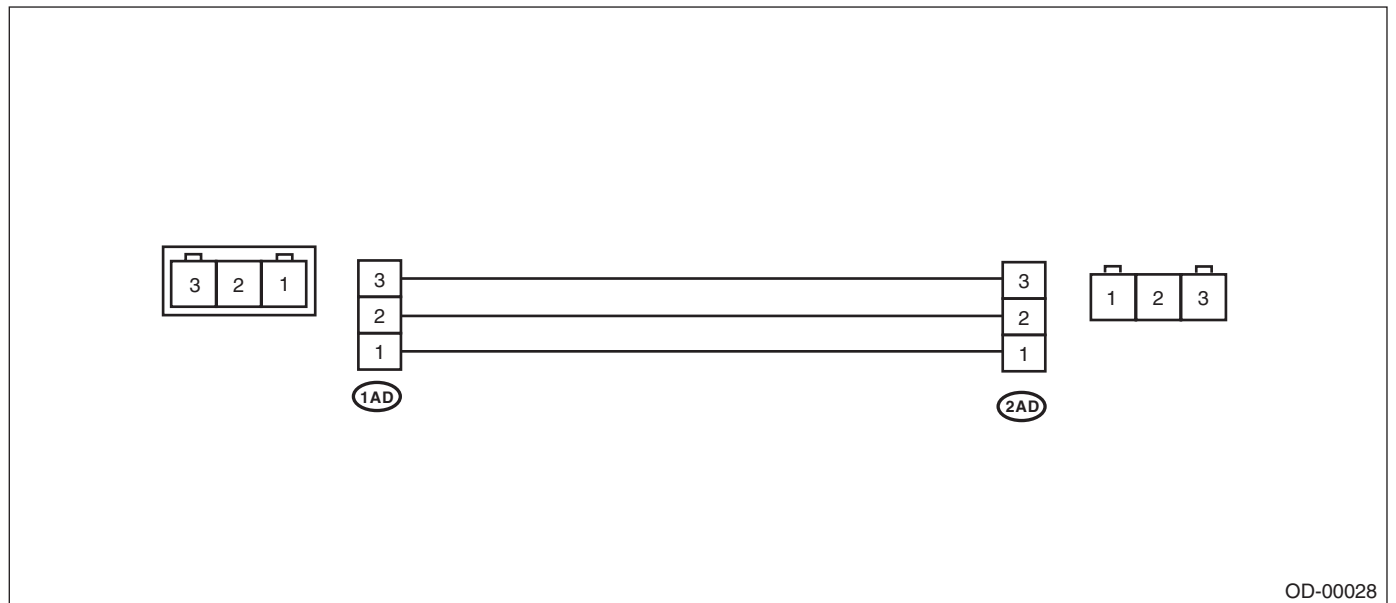


# General Description

## OCCUPANT DETECTION SYSTEM (DIAGNOSTICS)

### • TEST HARNESS AD

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>ST98299XA020</p>	98299XA020	TEST HARNESS AD	Used when measuring voltage and resistance of the seat belt tension sensor.



### 2. GENERAL TOOL

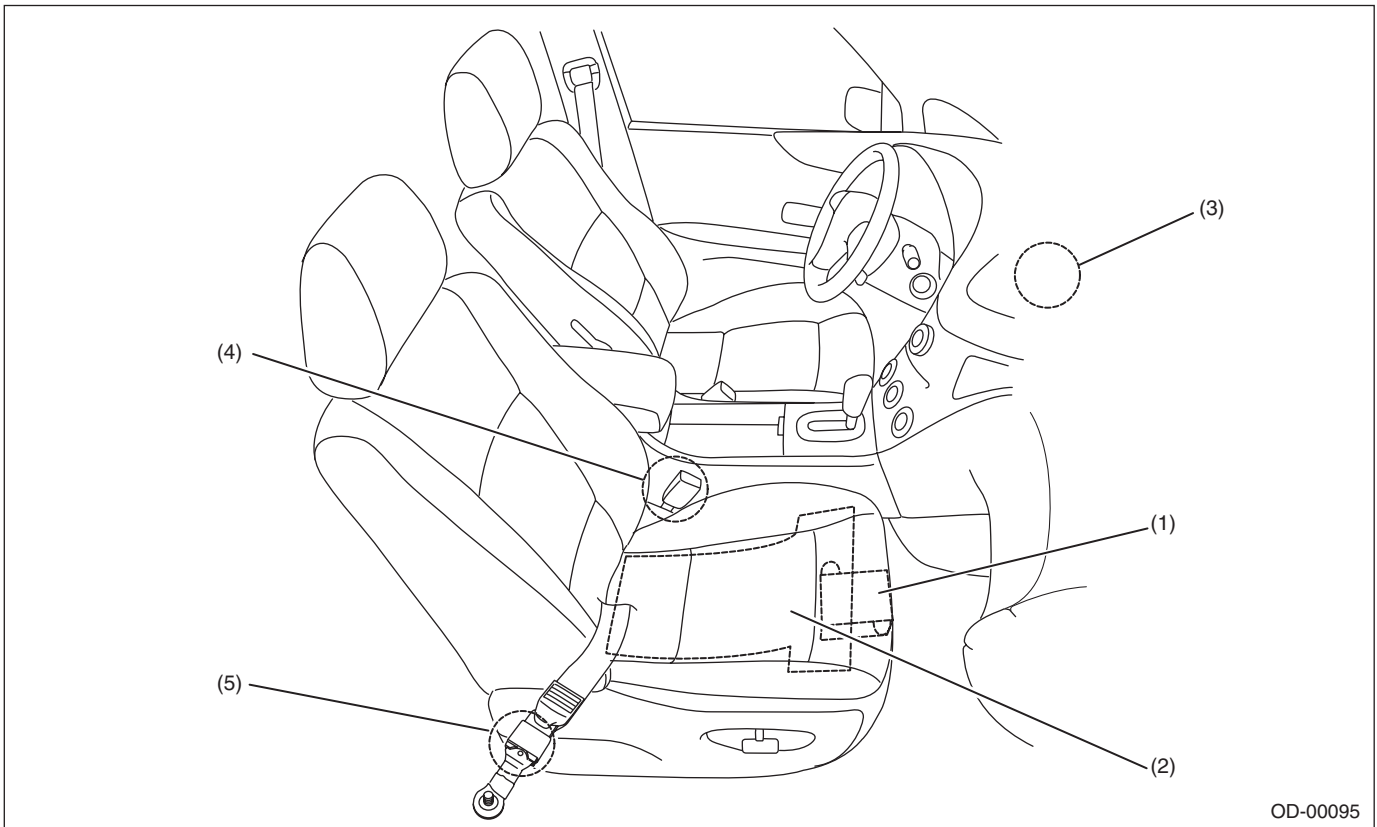
TOOL NAME	REMARKS
Circuit tester	Used for measuring resistance, voltage and current.

# Electrical Component Location

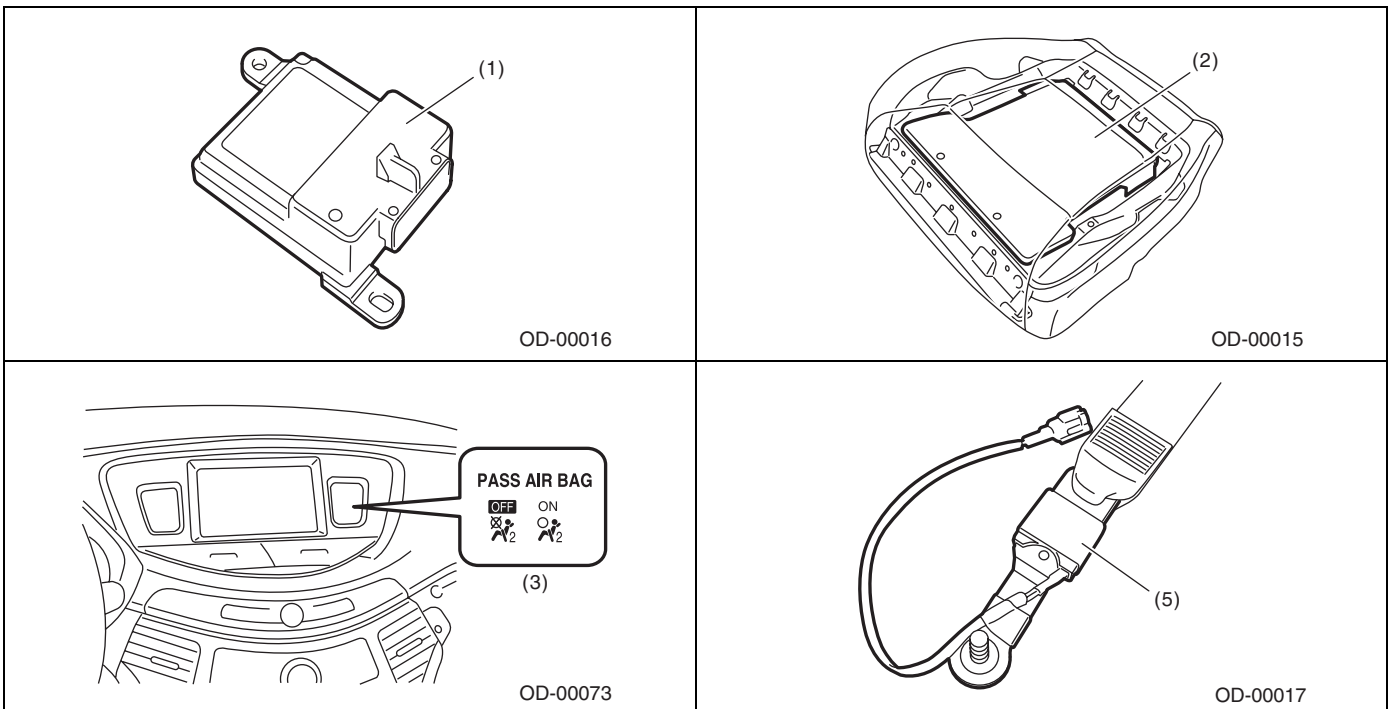
## OCCUPANT DETECTION SYSTEM (DIAGNOSTICS)

### 4. Electrical Component Location

#### A: LOCATION



- |                                       |   |                              |
|---------------------------------------|---|------------------------------|
| (1) Occupant detection control module | (3) Airbag ON/OFF indicator light (Warning box) | (5) Seat belt tension sensor |
| (2) Occupant detection sensor         | (4) Buckle switch (Passenger's seat)            |                              |



## 5. Airbag Connector

### A: PROCEDURE

For detailed operation procedure, refer to the AB section "Airbag connector". <Ref. to AB-8, Airbag Connector.>

## Control Module I/O Signal

OCCUPANT DETECTION SYSTEM (DIAGNOSTICS)

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### 6. Control Module I/O Signal

#### A: ELECTRICAL SPECIFICATION

##### CAUTION:

Never remove the occupant detection control module, occupant detection sensor or seat frame because they are integrated into one unit.

Terminal Name	Terminal No.	Input/Output value	Remarks	
IG – power supply	9	9 — 16 V	When ignition switch ON	
Airbag control module communication (COM)	10	Open collector terminal	Communication line	
Airbag control module communication (GND)	5	0 V	Ground	
Belt tensioner sensor	(Vcc)	4	0 — 5 V	Belt tension sensor power supply
	(Vout)	16	0.5 — 4.5 V	Sensor output voltage
	(GND)	14	0 V	Sensor ground
Occupant detection sensor	(Vcc)	6	0 — 5 V	Pressure sensor power supply
	(Vout)	7	0.5 — 4.5 V	Sensor output voltage
	(GND)	15	0 V	Sensor ground
Buckle switch	1	0 — IG voltage	Ignition voltage when switch ON	
Buckle switch (GND)	2	0 V	Switch ground	

#### B: WIRING DIAGRAM

Refer to the electrical wiring diagram. <Ref. to WI-73, Occupant Detection System.>

## 7. Subaru Select Monitor

### A: OPERATION

#### 1. READ DIAGNOSTIC TROUBLE CODE (DTC)

When malfunction of the airbag system and the occupant detection system occur, the DTC stored in airbag control module will be read out.

Refer to DTC readout of airbag system (diagnosis). <Ref. to AB(diag)-22, READ DIAGNOSTIC TROUBLE CODE (DTC), OPERATION, Subaru Select Monitor.>

NOTE:

- For details concerning operation procedure, refer to the “PC application help for Subaru Select Monitor”.
- For details concerning DTCs, refer to the List of Diagnostic Trouble Code (Airbag system, Occupant detection system). <Ref. to AB(diag)-35, List of Diagnostic Trouble Code (DTC).> <Ref. to OD(diag)-21, List of Diagnostic Trouble Code (DTC).>

#### 2. DISPLAY OF STATUS INFORMATION

Check the operating condition of each sensor in the event of malfunction in the seat belt buckle switch, or when the seat belt buckle switch has been replaced.

- 1) On «Main Menu» display, select {Each System Check}.
- 2) On «System Selection Menu» display, select {Airbag System}.
- 3) On «Airbag System» display, select {Status Data}.

The following table is for support data.

Item	Display
Seat position sensor LH	— <sup>*2</sup>
Seat position sensor RH	— <sup>*2</sup>
Seat belt buckle switch LH	— <sup>*6</sup>
Seat belt buckle switch RH	Latched <sup>*3</sup> / Not Latched <sup>*4</sup> / Others <sup>*5</sup> / Initial setting <sup>*1</sup> /— <sup>*6</sup>
Passenger's airbag control status	ON <sup>*7</sup> / OFF <sup>*8</sup> / Initial setting <sup>*1</sup>

\*1: Displayed when it is initial.

\*2: Seat position sensor not supported

\*3: Seat belt fastened

\*4: Seat belt not fastened

\*5: Displayed when data other than belt fastened or not fastened, such as breakdowns is input.

\*6: Seat belt buckle switch not supported

\*7: Passenger's airbag operating state

\*8: Passenger's airbag non-operating state

NOTE:

For detailed operation procedures, refer to “PC application help for Subaru Select Monitor”.

# Subaru Select Monitor

## OCCUPANT DETECTION SYSTEM (DIAGNOSTICS)

### 3. CLEAR MEMORY MODE

Clear the DTC stored in the airbag control module after repairing the airbag system and occupant detection system. (After the breakdown is recovered, the breakdown code for completed recoveries are read out when the next breakdown occurs if the memory clear work is not performed.)

- 1) On «Main Menu» display, select {Each System Check}.
- 2) On «System Selection Menu» display, select {Airbag System}.
- 3) Select {Clear Memory} in {Airbag System} menu screen.
- 4) When the “Clear Memory?” is shown on the screen, select [OK].
- 5) When “Done” is displayed, end the Subaru Select Monitor.

#### NOTE:

For details concerning the operation procedure, refer to “PC application help for Subaru Select Monitor”.

### 4. SYSTEM CALIBRATION (REZEROING)

#### NOTE:

When replacing the occupant detection system, or removing and disassembling the passenger's seat, always perform the system calibration after installing a seat in the vehicle.

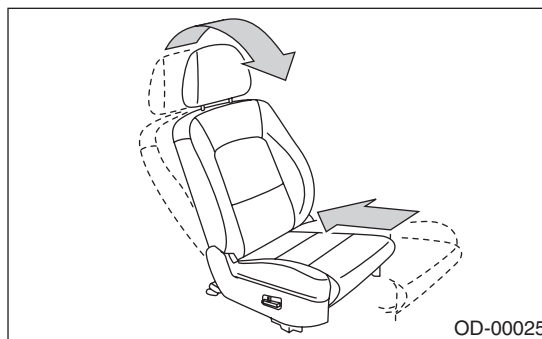
#### CAUTION:

**When the trouble occurs in the system during calibration process, “Occupant detection calibration failure” is detected in the DTC 2A of the airbag system and the airbag warning light lights. In this case, after turning the ignition switch to OFF once, redo the system calibration (Rezeroing), or after clearing the cause of the failure, perform the system calibration again.**

- 1) Park empty vehicle on a level surface.
- 2) On «Main Menu» display, select {Each System Check}.
- 3) On «System Selection Menu» display, select {Occupant Detection System}.
- 4) On the {Occupant Detection System} display, select {Rezeroing}.
- 5) «See service manual. And check vehicle condition for successfully completing the rezeroing» is displayed. Check the following to adjust the condition of the vehicle.
  - Adjust the seat backrest to be vertical. (Press the power seat switch to put the seat in a position where it will not move.)
  - Adjust the seat sliding position to all the way back. (Press the power seat switch to put the seat in a position where it will not move.)

- Do not place anything on the top of the seat cushion.
- Sit on the seat cushion to smooth the seat surface.
- Check that the passenger's seat belt is not inserted into the buckle, not tense or not stuck.
- Check that ambient temperature is in a range from 0 to 40°C.

- 6) When the «Re-zeroing Adjust the passenger seat to the condition shown in service manual» is displayed, slide the passenger seat all the way to the back, check that the backrest is adjusted to all the way up, and select the [OK].



- 7) When the «Re-zeroing Unbelt the Passenger seatbelt Continue: OK, Quit: NO» is displayed, make sure the passenger's seatbelt is disconnected from the buckle and select the [OK].
- 8) When the «Re-zeroing Empty the passenger seat Continue: OK, Quit: NO» is displayed, make sure that the passenger's seat is empty, airbag OFF indicator illuminates and airbag ON indicator does not illuminate, and select the [OK].

#### NOTE:

- After selecting the [OK], «In process... Please wait for a while without touching vehicle» is displayed. Do not touch or rock the vehicle while the message is displayed.
  - During the system calibration process, if the «Re-zeroing is unsuccessful See service manual Press OK to END» is displayed, go to step 10).
- 9) When the re-zeroing is ended normally, the «Rezeroing is successfully completed Press OK to END» is displayed. Select the [OK] and turn the ignition switch to OFF to finish the diagnosis.

10) During the system calibration process, if «Re-zeroing is unsuccessful See service manual Press OK to END» is displayed, turn the ignition switch to OFF once and turn it ON again, then read the DTC of the airbag system. <Ref. to AB(diag)-22, READ DIAGNOSTIC TROUBLE CODE (DTC), OPERATION, Subaru Select Monitor.>

When DTC is input, fix the fault and then perform the system calibration. When DTC is not input, check the seat and vehicle status and then perform the system calibration again. <Ref. to OD(diag)-14, SYSTEM CALIBRATION (REZEROING), OPERATION, Subaru Select Monitor.>

### NOTE:

When the re-zeroing is unsuccessful, there could be occupant detection system failure or improper seat and vehicle status. When the airbag warning light illuminates, read the DTC of the airbag system, and perform the diagnosis while referring to List of Diagnostic Trouble Code (DTC). <Ref. to AB(diag)-22, READ DIAGNOSTIC TROUBLE CODE (DTC), OPERATION, Subaru Select Monitor.> <Ref. to AB(diag)-35, LIST, List of Diagnostic Trouble Code (DTC).>

## **B: INSPECTION**

### **1. COMMUNICATION FOR INITIALIZING IMPOSSIBLE**

#### **DETECTING CONDITION:**

Defective harness connector

#### **TROUBLE SYMPTOM:**

Communication is impossible between the airbag control module and the Subaru Select Monitor.

Refer to “Initial Communication Impossible” in the DTC of the airbag system (diagnosis). <Ref. to AB(diag)-24, COMMUNICATION FOR INITIALIZING IMPOSSIBLE, INSPECTION, Subaru Select Monitor.>

### **2. WITHOUT DTC**

#### **DETECTING CONDITION:**

- Defective combination meter
- Open circuit of harness

#### **TROUBLE SYMPTOM:**

- Airbag warning light remains on.
- “No diagnostic Code Present” will be displayed on the Subaru Select Monitor.

For detailed operation procedures, refer to “Airbag Warning Light Failure”. <Ref. to AB(diag)-31, Airbag Warning Light Failure.>

### NOTE:

When the airbag warning light is OFF and “No diagnostic Code Present” is displayed on Subaru Select Monitor, the system is operating properly.

## Read Diagnostic Trouble Code (DTC)

OCCUPANT DETECTION SYSTEM (DIAGNOSTICS)

---

### 8. Read Diagnostic Trouble Code (DTC)

#### A: OPERATION

For details on reading DTCs, refer to “Airbag System (Diagnosis) Subaru Select Monitor”. <Ref. to AB(diag)-22, Subaru Select Monitor.>



## 9. Inspection Mode

### A: PROCEDURE

Recreate the circumstance by referring to the conditions described in the checklist.

## Clear Memory Mode

OCCUPANT DETECTION SYSTEM (DIAGNOSTICS)

---

### 10. Clear Memory Mode

#### A: OPERATION

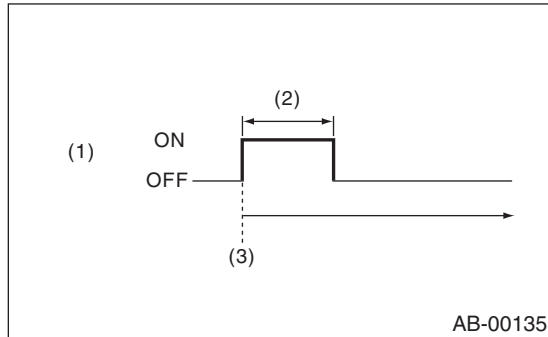
Clear the memory in the following steps after the malfunction is repaired.

For details to clear the DTC, refer to "Airbag System (Diagnosis) Subaru Select Monitor". <Ref. to AB(diag)-22, Subaru Select Monitor.>

## 11. Airbag Warning Light Illumination Pattern

### A: INSPECTION

Turn the ignition switch to ON, and confirm that the airbag warning light remains on for approx. 6 seconds then go off afterwards.



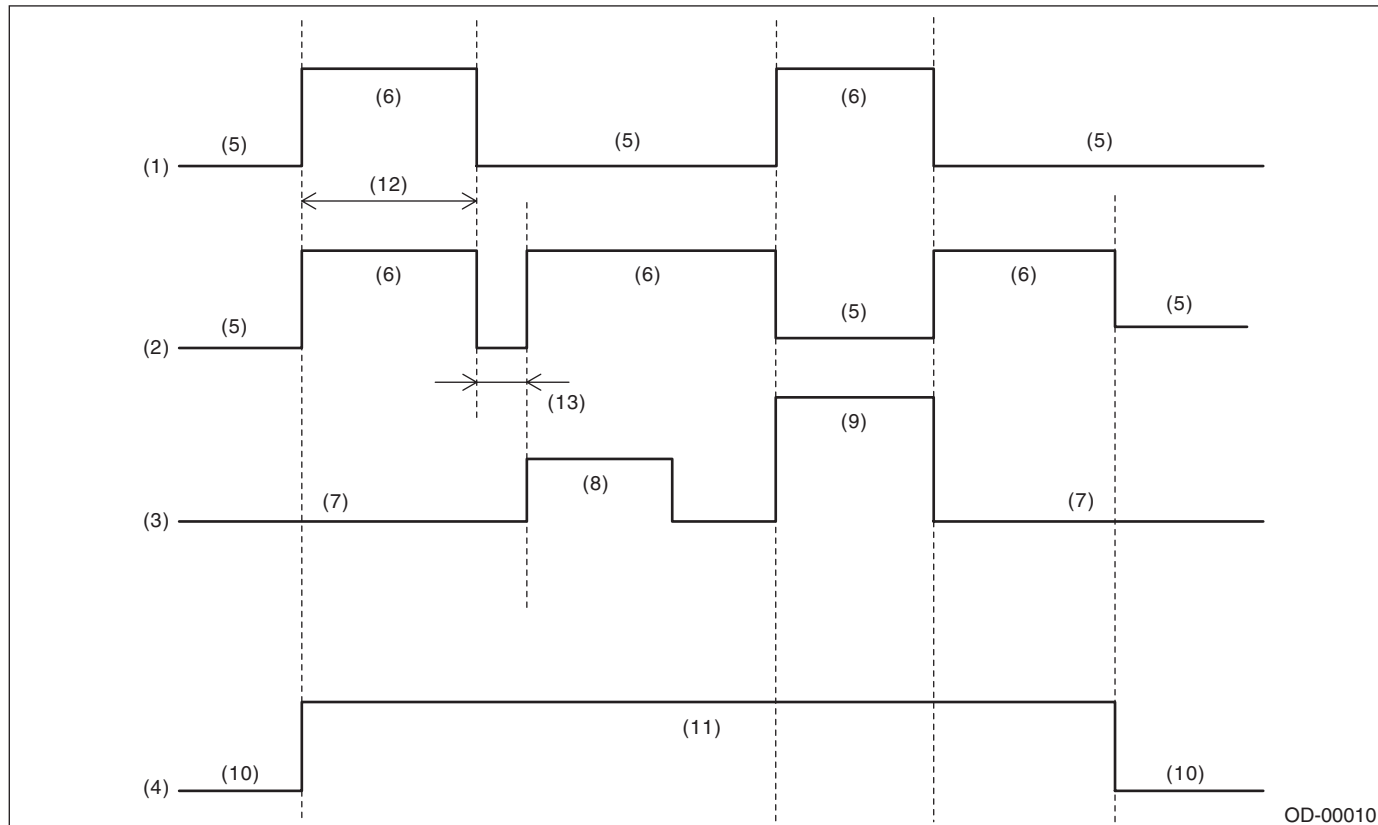
- (1) Airbag warning light
- (2) Approx. 6 sec.
- (3) Ignition switch ON

# Passenger's Airbag ON/OFF Indicator Light Illumination Pattern

OCCUPANT DETECTION SYSTEM (DIAGNOSTICS)

## 12. Passenger's Airbag ON/OFF Indicator Light Illumination Pattern

### A: INSPECTION



OD-00010

- |  |              |                     |
|--|--------------|---------------------|
| (1) Passenger's airbag ON indicator light  | (6) Light ON | (10) OFF            |
| (2) Passenger's airbag OFF indicator light | (7) Empty    | (11) ON             |
| (3) Occupant seating                       | (8) Child    | (12) Approx. 6 sec. |
| (4) Ignition switch                        | (9) Adult    | (13) Approx. 2 sec. |
| (5) Light OFF                              |              |                     |

# List of Diagnostic Trouble Code (DTC)

OCCUPANT DETECTION SYSTEM (DIAGNOSTICS)

## 13. List of Diagnostic Trouble Code (DTC)

### A: LIST

DTC	Item	Content of diagnosis	Reference
2A	ODS Calibration error	System calibration (Rezeroing) was not completed normally.	<Ref. to OD(diag)-22, DTC 2A ODS CALIBRATION ERROR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
2B	ODS System wrong parts	<ul style="list-style-type: none"> <li>• Wrong airbag control module is installed.</li> <li>• Wrong occupant detection system is installed.</li> <li>• Occupant detection system is faulty.</li> </ul>	<Ref. to OD(diag)-22, DTC 2B ODS SYSTEM WRONG PARTS, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
2C	Belt tension Sensor failure	<ul style="list-style-type: none"> <li>• Passenger's seat belt tension sensor is faulty.</li> <li>• Airbag rear harness circuit is open or shorted.</li> <li>• Occupant detection system is faulty.</li> <li>• Occupant detection harness is faulty.</li> </ul>	<Ref. to OD(diag)-23, DTC 2C BELT TENSION SENSOR FAILURE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
27	ODS Communication error	<ul style="list-style-type: none"> <li>• Occupant detection control module and airbag control module communication is faulty.</li> <li>• Airbag rear harness circuit is open, shorted, shorted to ground or shorted to power supply.</li> <li>• Occupant detection harness is faulty.</li> <li>• Occupant detection system is faulty.</li> <li>• Airbag control module is faulty.</li> </ul>	<Ref. to OD(diag)-24, DTC 27 ODS COMMUNICATION ERROR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
29	ODS failure	<ul style="list-style-type: none"> <li>• Occupant detection sensor is faulty.</li> <li>• Occupant detection control module is faulty.</li> <li>• Occupant detection harness is faulty.</li> <li>• Fuse No. 25 (in joint box) is blown.</li> </ul>	<Ref. to OD(diag)-25, DTC 29 ODS FAILURE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
37	Buckle Switch RH failure	<ul style="list-style-type: none"> <li>• Passenger's buckle switch circuit is open, shorted or shorted to ground.</li> <li>• Occupant detection system is faulty.</li> <li>• Occupant detection harness is faulty.</li> </ul>	<Ref. to OD(diag)-26, DTC 37 BUCKLE SWITCH RH FAILURE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

OCCUPANT DETECTION SYSTEM (DIAGNOSTICS)

## 14. Diagnostic Procedure with Diagnostic Trouble Code (DTC)

### A: DTC 2A ODS CALIBRATION ERROR

#### DTC DETECTING CONDITION:

System calibration (Rezeroing) was not completed normally.

	Step	Check	Yes	No
1	<b>PERFORM RE-ZEROING.</b> Perform the system calibration using Subaru Select Monitor. <Ref. to OD(diag)-14, SYSTEM CALIBRATION (REZEROING), OPERATION, Subaru Select Monitor.>	Is the system calibration completed normally?	Finish the diagnosis.	Follow the system calibration procedures. <Ref. to OD(diag)-14, SYSTEM CALIBRATION (REZEROING), OPERATION, Subaru Select Monitor.>

### B: DTC 2B ODS SYSTEM WRONG PARTS

#### DTC DETECTING CONDITION:

- Wrong airbag control module is installed.
- Wrong occupant detection system is installed.

	Step	Check	Yes	No
1	<b>CHECK OCCUPANT DETECTION SYSTEM.</b> 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait for 60 seconds or more. 2) Replace the passenger's seat frame assembly. <Ref. to SE-7, REMOVAL, Front Seat.> <Ref. to SE-11, PASSENGER'S SEAT, DISASSEMBLY, Front Seat.> 3) Connect the ground cable to battery. 4) Connect Subaru Select Monitor to the vehicle and perform the system calibration. <Ref. to OD(diag)-14, SYSTEM CALIBRATION (REZEROING), OPERATION, Subaru Select Monitor.>	Did the system calibration complete properly?	Finish the diagnosis.	Go to step 2.
2	<b>CHECK AIRBAG CONTROL SYSTEM.</b> 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait for 60 seconds or more. 2) Replace the airbag control module. <Ref. to AB-20, REMOVAL, Airbag Control Module.> 3) Connect the ground cable to battery. 4) Connect Subaru Select Monitor to the vehicle and perform the system calibration. <Ref. to OD(diag)-14, SYSTEM CALIBRATION (REZEROING), OPERATION, Subaru Select Monitor.>	Did the system calibration complete properly?	Finish the diagnosis.	Check between the occupant detection control module and airbag control module.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

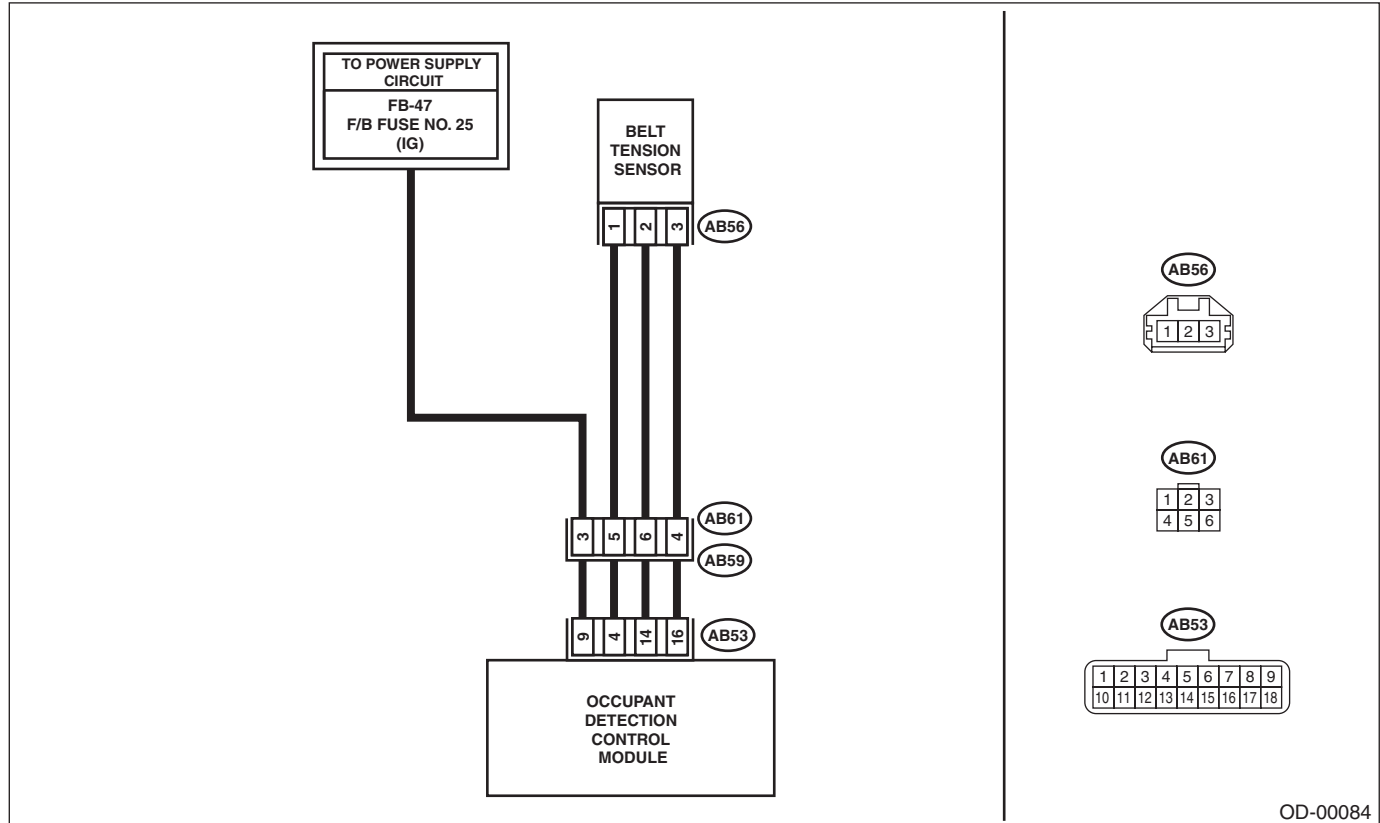
OCCUPANT DETECTION SYSTEM (DIAGNOSTICS)

## C: DTC 2C BELT TENSION SENSOR FAILURE

### DTC DETECTING CONDITION:

- Passenger's seat belt tension sensor is faulty.
- Airbag main harness circuit is open or shorted.
- Occupant detection control module is faulty.

### WIRING DIAGRAM:



Step	Check	Yes	No
<b>1 CHECK POOR CONTACT OF CONNECTORS.</b> Check for poor contact of the connectors between the occupant detection control module and belt tension sensor.	Is there poor contact?	Reconnect the connector. If the fault is not fixed, replace the airbag harness.	Go to step 2.
<b>2 CHECK BELT TENSION SENSOR.</b> 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait for 60 seconds or more. 2) Disconnect the belt tension sensor connector (AB56) from the airbag harness. 3) Connect the test harness AC to the connector (AB56). 4) Connect the battery ground terminal and turn the ignition switch to ON.	Does the airbag warning light illuminate for approximately 6 seconds and go off?	Replace the seat belt outer. <Ref. to SB-18, OUTER SEAT BELT ASSEMBLY, REMOVAL, Front Seat Belt.>	Go to step 3.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## OCCUPANT DETECTION SYSTEM (DIAGNOSTICS)

	Step	Check	Yes	No
3	<p><b>CHECK AIRBAG HARNESS.</b></p> <p>1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait for 60 seconds or more.</p> <p>2) Disconnect the test harness AC from the belt tension sensor connector (AB56).</p> <p>3) Connect the test harness AD (1AD) to the connector (AB56).</p> <p>4) Disconnect the airbag harness connector (AB61), and connect the connector (1AB) in test harness AB.</p> <p>5) Measure the resistance between test harness terminals.</p> <p><b>Connector &amp; terminal</b>  <b>(2AB) No. 5 — (2AD) No. 1:</b>  <b>(2AB) No. 4 — (2AD) No. 3:</b>  <b>(2AB) No. 6 — (2AD) No. 2:</b></p>	Is the resistance less than 10 $\Omega$ ?	Go to step 4.	Replace the airbag harness along with chassis harness.
4	<p><b>CHECK AIRBAG HARNESS.</b></p> <p>Measure the resistance between test harness terminals, and between test harness terminal and chassis ground.</p> <p><b>Connector &amp; terminal</b>  <b>(2AB) No. 4 — (2AD) No. 1:</b>  <b>(2AB) No. 4 — (2AD) No. 2:</b>  <b>(2AB) No. 4 — chassis ground:</b>  <b>(2AB) No. 5 — (2AD) No. 2:</b>  <b>(2AB) No. 5 — chassis ground:</b></p>	Is the resistance 1 M $\Omega$ or more?	Go to step 5.	Replace the airbag harness along with chassis harness.
5	<p><b>CHECK AIRBAG HARNESS.</b></p> <p>1) Connect the battery ground terminal and turn the ignition switch to ON.</p> <p>2) Measure the voltage between test harness and chassis ground.</p> <p><b>Connector &amp; terminal</b>  <b>(2AD) No. 1 (+) — Chassis ground (-):</b>  <b>(2AD) No. 3 (+) — Chassis ground (-):</b></p>	Is the voltage 1 V or less?	Replace the airbag harness along with chassis harness.	Check the seat harness, and if any fault is found, replace the seat harness. If no fault is found in the seat harness, replace the seat cushion frame assembly. <Ref. to SE-11, PASSENGER'S SEAT, DISASSEMBLY, Front Seat.>

### D: DTC 27 ODS COMMUNICATION ERROR

Perform the diagnosis following diagnostic procedure for airbag system. <Ref. to AB(diag)-55, DTC 27 ODS COMMUNICATION ERROR, Diagnostic Chart with Trouble Code.>



# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

OCCUPANT DETECTION SYSTEM (DIAGNOSTICS)

## E: DTC 29 ODS FAILURE

### DTC DETECTING CONDITION:

- Occupant detection sensor is faulty.
- Occupant detection control module is faulty.
- Occupant detection harness is faulty.
- Rear airbag harness is faulty.
- Fuse No. 25 (in joint box) is blown.

	Step	Check	Yes	No
1	<b>CHECK POOR CONTACT OF CONNECTORS.</b> Check for poor contact of the connectors between the occupant detection control module and airbag control module.	Is there poor contact?	Reconnect the connector. If the fault is not fixed, replace the airbag harness.	Go to step 2.
2	<b>CHECK DTC.</b> Read diagnostic trouble code (DTC) for the airbag system.	Is "2C Belt Tension Sensor failure" or "37 Buckle Switch failure" displayed in the diagnostics code?	Perform the diagnosis according to each DTC.	Check the seat harness, and if any fault is found, replace the seat harness. If the fault is not fixed, replace the occupant detection system. <Ref. to SE-11, PASSENGER'S SEAT, DISASSEMBLY, Front Seat.>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

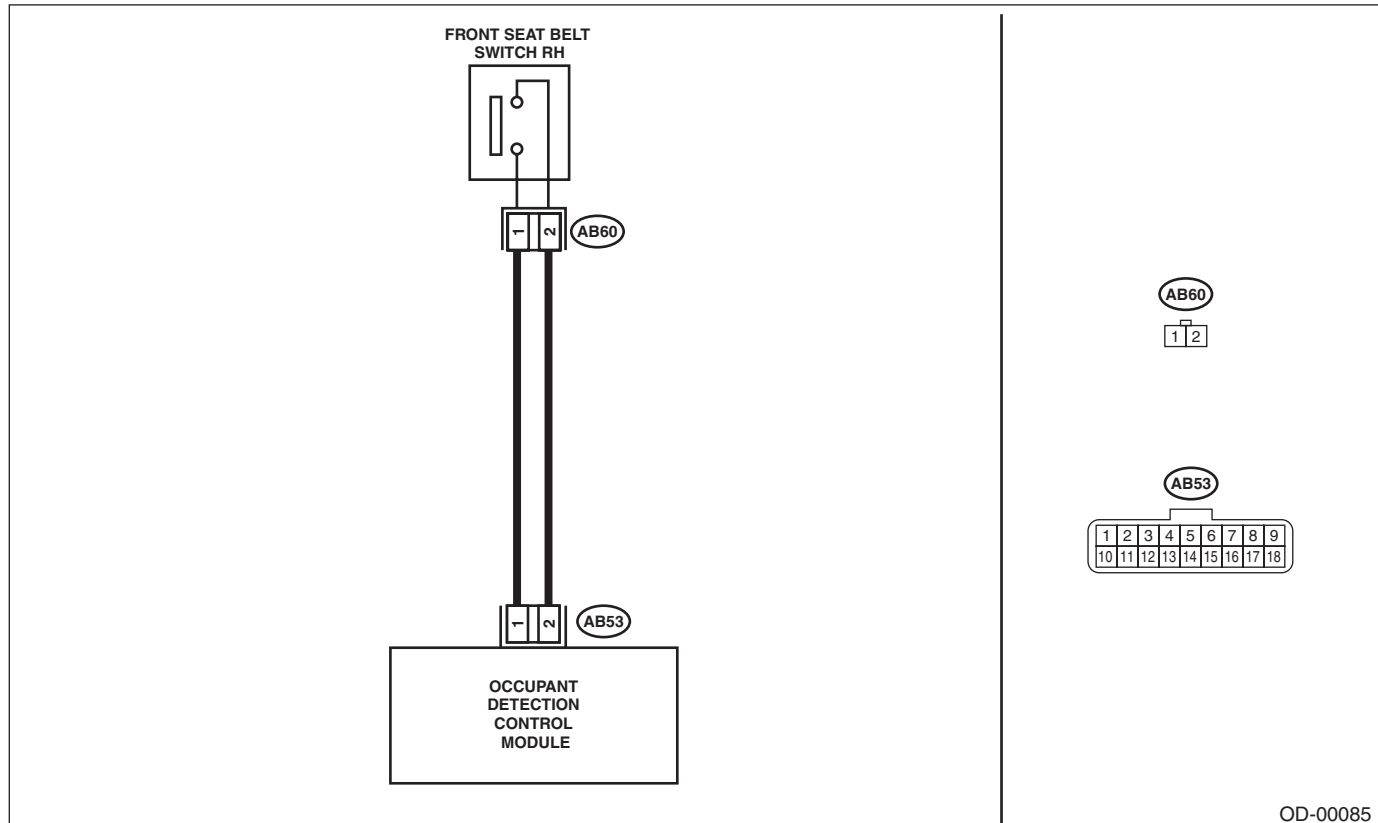
## OCCUPANT DETECTION SYSTEM (DIAGNOSTICS)

### F: DTC 37 BUCKLE SWITCH RH FAILURE

#### DTC DETECTING CONDITION:

- Passenger's buckle switch circuit is open, shorted or shorted to ground.
- Seat harness circuit is open, shorted or shorted to ground.
- Occupant detection control module is faulty.

#### WIRING DIAGRAM:



Step	Check	Yes	No
<b>1 CHECK POOR CONTACT OF CONNECTORS.</b> Check for poor contact of the connectors between the occupant detection control module and buckle switch.	Is there poor contact?	Reconnect the connector. If the fault is not fixed, replace the airbag harness.	Go to step 2.
<b>2 CHECK BUCKLE SWITCH.</b> 1) Turn the ignition switch to OFF, disconnect the battery ground terminal, and wait for 60 seconds. 2) Disconnect the buckle switch connector (AB60). 3) Connect the test harness AE and test harness Y to buckle switch connector (AB60). 4) Connect the battery ground terminal and turn the ignition switch to ON.	Does the airbag warning light illuminate for 6 seconds and go off?	Replace the buckle switch. <Ref. to SB-18, INNER SEAT BELT ASSEMBLY, REMOVAL, Front Seat Belt.>	Check the seat harness, and if any fault is found, replace the seat harness. If the fault is not fixed, replace the occupant detection system.

# SEAT BELT SYSTEM

# SB

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3. Inspection Locations After a Collision .....	13
4. Seat Belt Warning System .....	14
5. Front Seat Belt .....	18
6. Second Seat Belt .....	20
7. Third Seat Belt .....	22

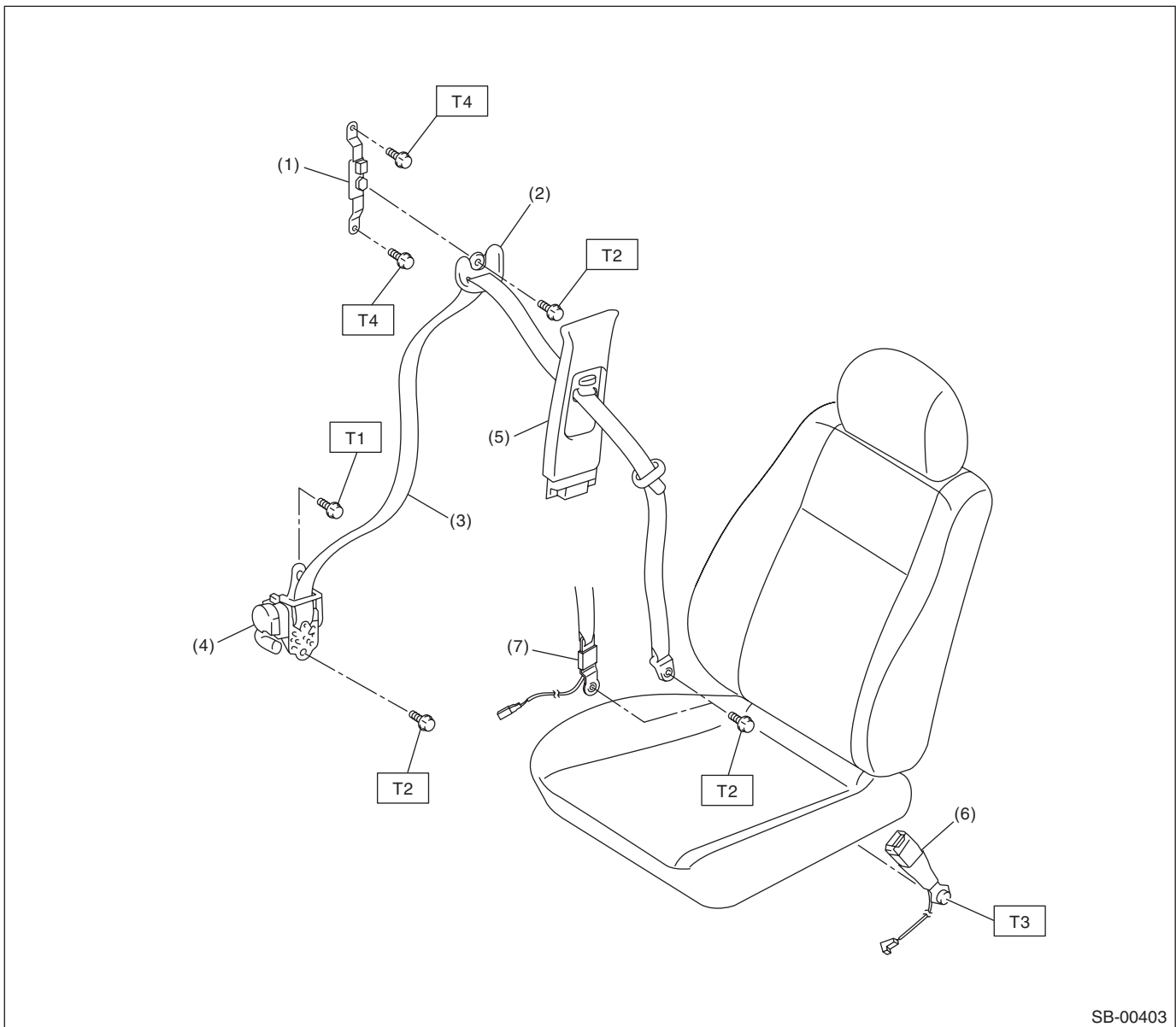
# General Description

## SEAT BELT SYSTEM

### 1. General Description

#### A: COMPONENT

#### 1. FRONT SEAT BELT



(1) Adjustable anchor ASSY

(2) Shoulder anchor

(3) Outer seat belt ASSY

(4) Seat belt retractor

(5) Center pillar upper trim

(6) Inner seat belt ASSY

(7) Belt tension sensor (passenger's side only)

**Tightening torque: N-m (kgf-m, ft-lb)**

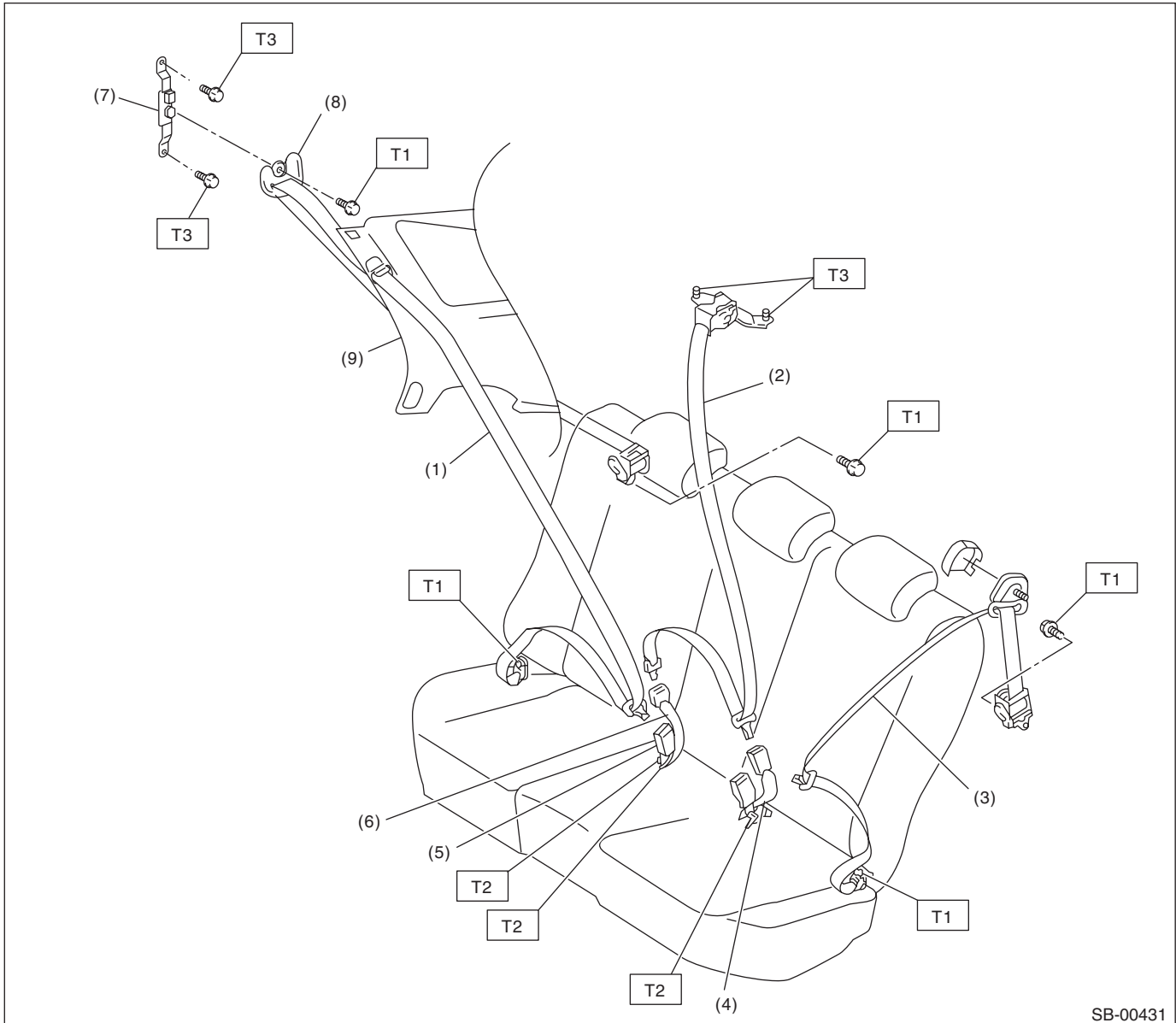
**T1: 7.5 (0.76, 5.5)**

**T2: 30 (3.1, 22)**

**T3: 38 (3.9, 28)**

**T4: 53 (5.4, 39)**

## 2. SECOND SEAT BELT



SB-00431

- |                                    |   |
|------------------------------------|---|
| (1) Outer seat belt RH ASSY        | (6) Shoulder seat belt center buckle ASSY |
| (2) Shoulder seat belt center ASSY | (7) Adjustable anchor ASSY                |
| (3) Outer seat belt LH ASSY        | (8) Shoulder anchor                       |
| (4) Inner seat belt LH ASSY        | (9) Rear quarter upper trim               |
| (5) Inner seat belt RH ASSY        |   |

**Tightening torque: N·m (kgf·m, ft·lb)**

**T1: 30 (3.1, 22)**

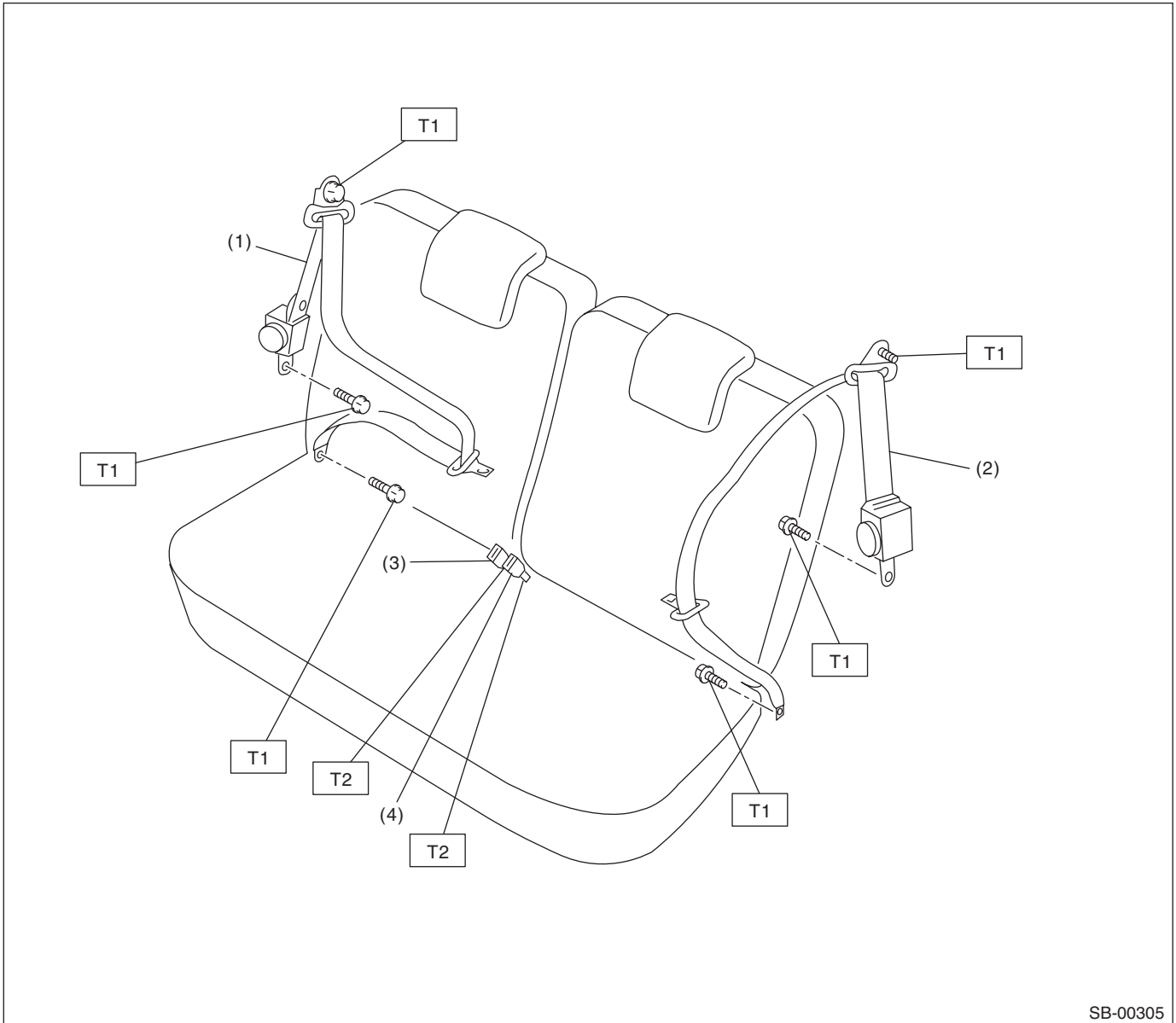
**T2: 38 (3.9, 28)**

**T3: 53 (5.4, 39)**

# General Description

## SEAT BELT SYSTEM

### 3. THIRD SEAT BELT



- (1) Outer seat belt RH ASSY
- (2) Outer seat belt LH ASSY
- (3) Inner seat belt RH ASSY

- (4) Inner seat belt LH ASSY

**Tightening torque: N·m (kgf·m, ft·lb)**

**T1: 30 (3.1, 22)**

**T2: 38 (3.9, 28)**

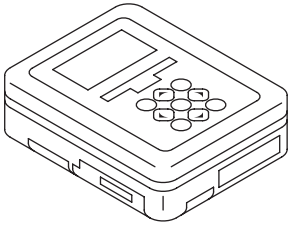
## B: CAUTION

- Before starting the work, turn the ignition switch to OFF, disconnect the battery ground cable and wait for 60 seconds or more.
- The pretensioner system has a back-up power supply. The pretensioner might deploy if you do not wait for 60 seconds or more before starting work.
- 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 allow current to flow through or voltage to reach the pretensioner. Do not use a circuit tester to check resistance of the pretensioner.
- Do not disassemble or attempt to repair the pretensioner. If it is dented, cracked or deformed, replace it with a new part.
- Do not use the airbag or pretensioner parts from other vehicles. Always replace parts with new parts.
- When handling a seat belt with deployed pretensioner, wear gloves and goggles. Wash your hands afterwards.
- Do not reuse a seat belt with deployed pretensioner.
- If material from the airbag enters the eyes or contacts skin during deployment, wash it away with clean water, and then consult a doctor.

## C: PREPARATION TOOL

### 1. SPECIAL TOOL

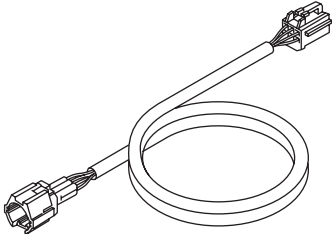
- SUBARU SELECT MONITOR

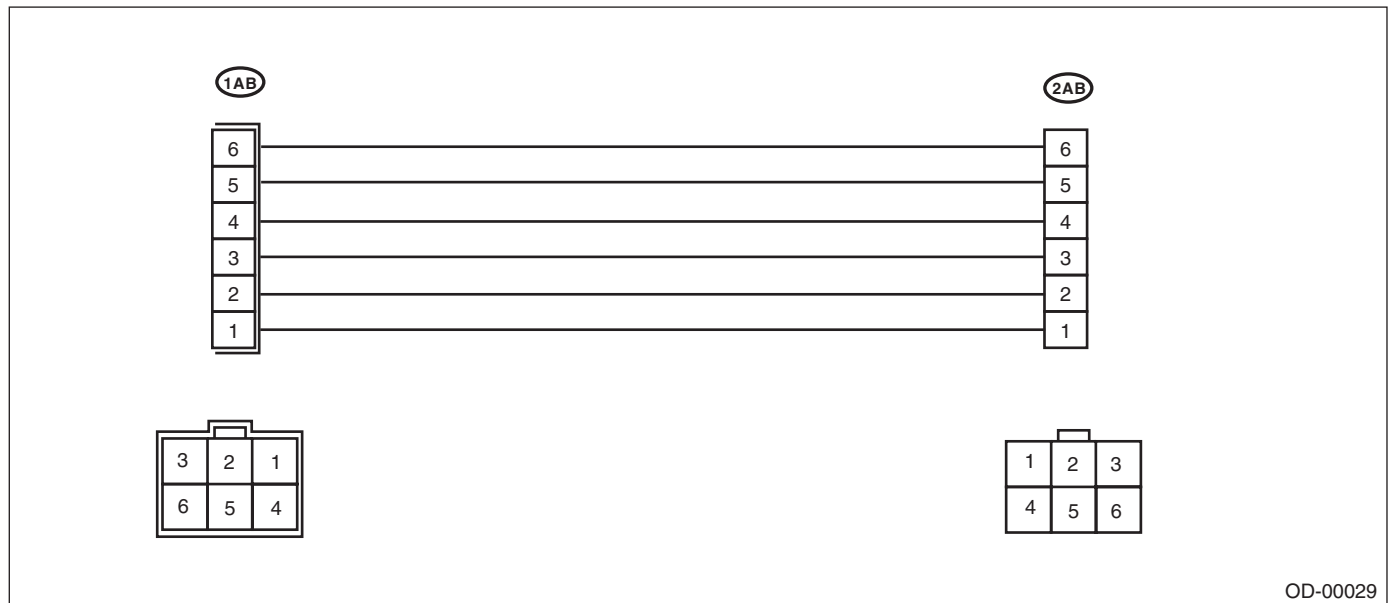
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p style="text-align: center;">ST1B022XU0</p>	1B022XU0	SUBARU SELECT MONITOR III KIT	Used for settings of each function and troubleshooting for electrical system.

# General Description

## SEAT BELT SYSTEM

- TEST HARNESS AB

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>ST98299XA000</p>	98299XA000	TEST HARNESS AB	Used when measuring voltage and resistance of occupant detection system.

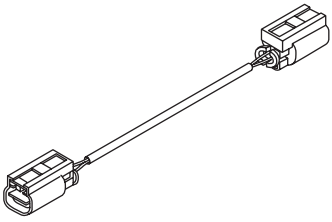


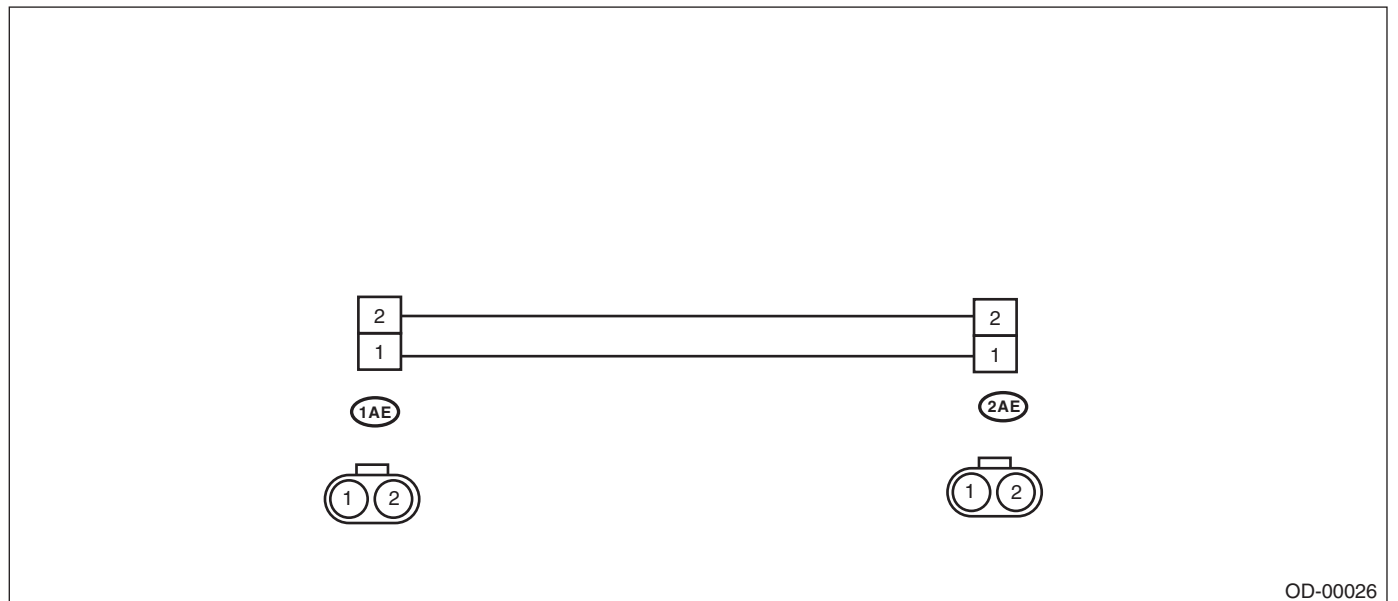


# General Description

SEAT BELT SYSTEM

## • TEST HARNESS AE

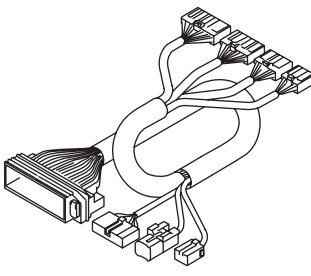
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST98299XA030	98299XA030	TEST HARNESS AE	<ul style="list-style-type: none"><li>• Used for diagnosing seat belt tension sensor.</li><li>• Used together with test harness Y.</li></ul>

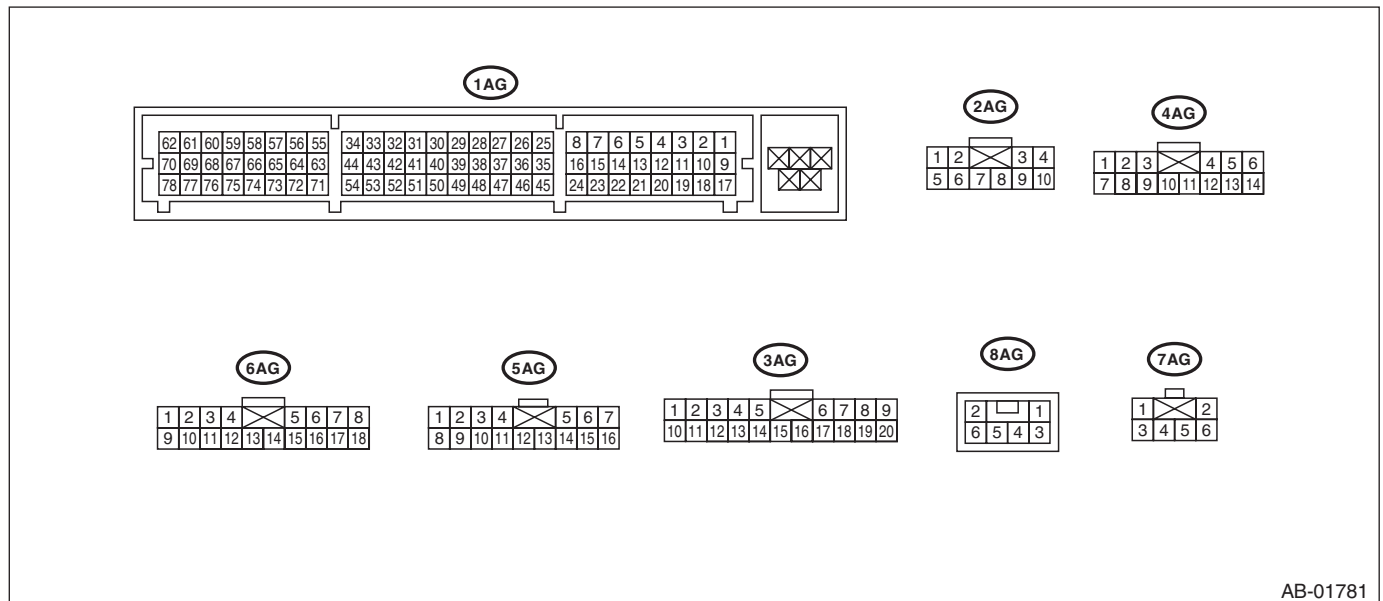


# General Description

## SEAT BELT SYSTEM

### • TEST HARNESS AG

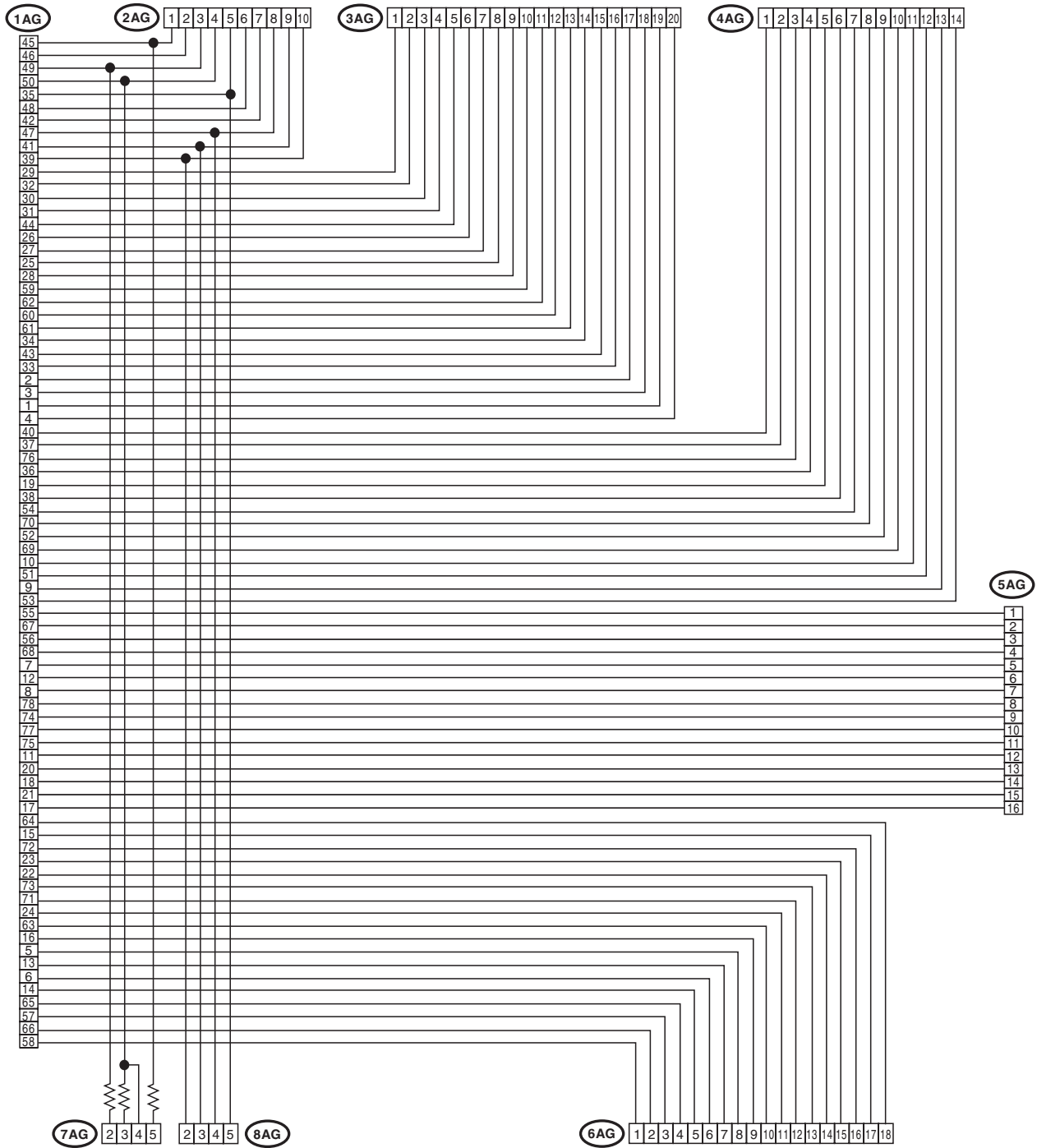
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>ST98299AG070</p>	98299AG070	TEST HARNESS AG	Used when measuring voltage and resistance of airbag control module.



AB-01781

# General Description

## SEAT BELT SYSTEM

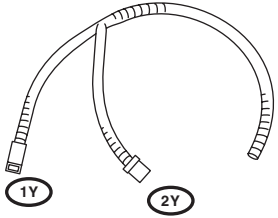


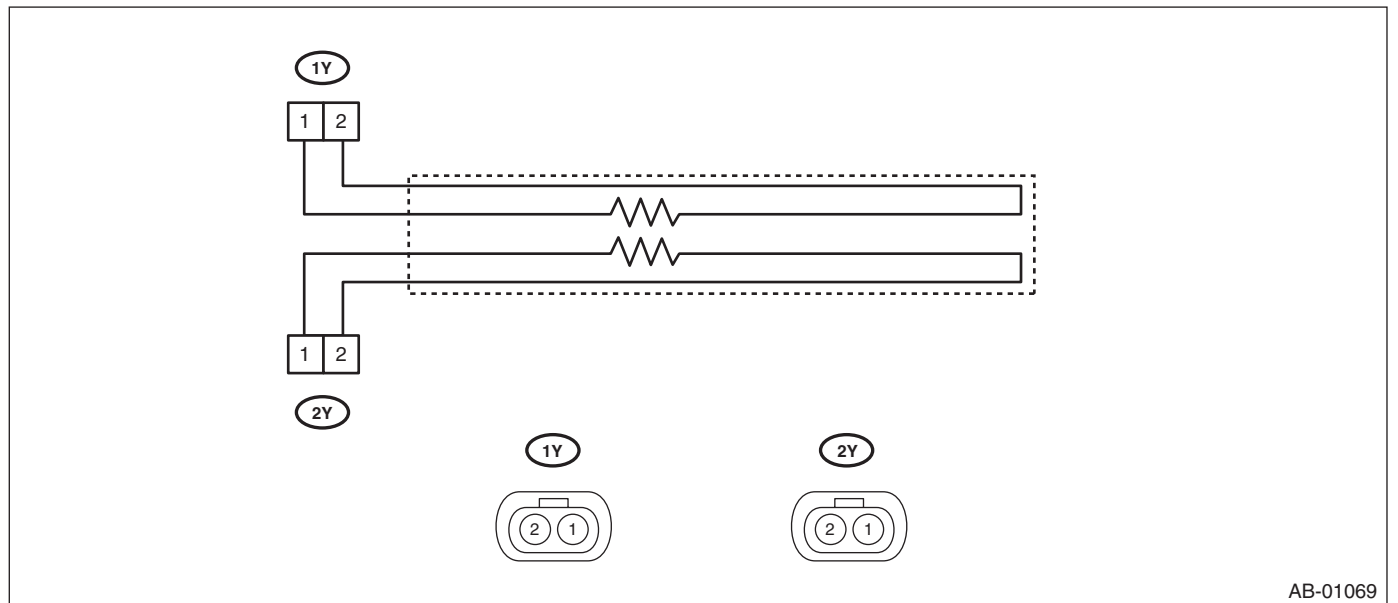
AB-01902

# General Description

## SEAT BELT SYSTEM

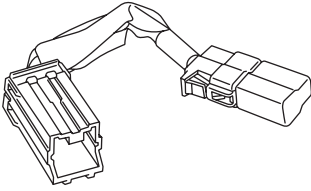
- TEST HARNESS Y

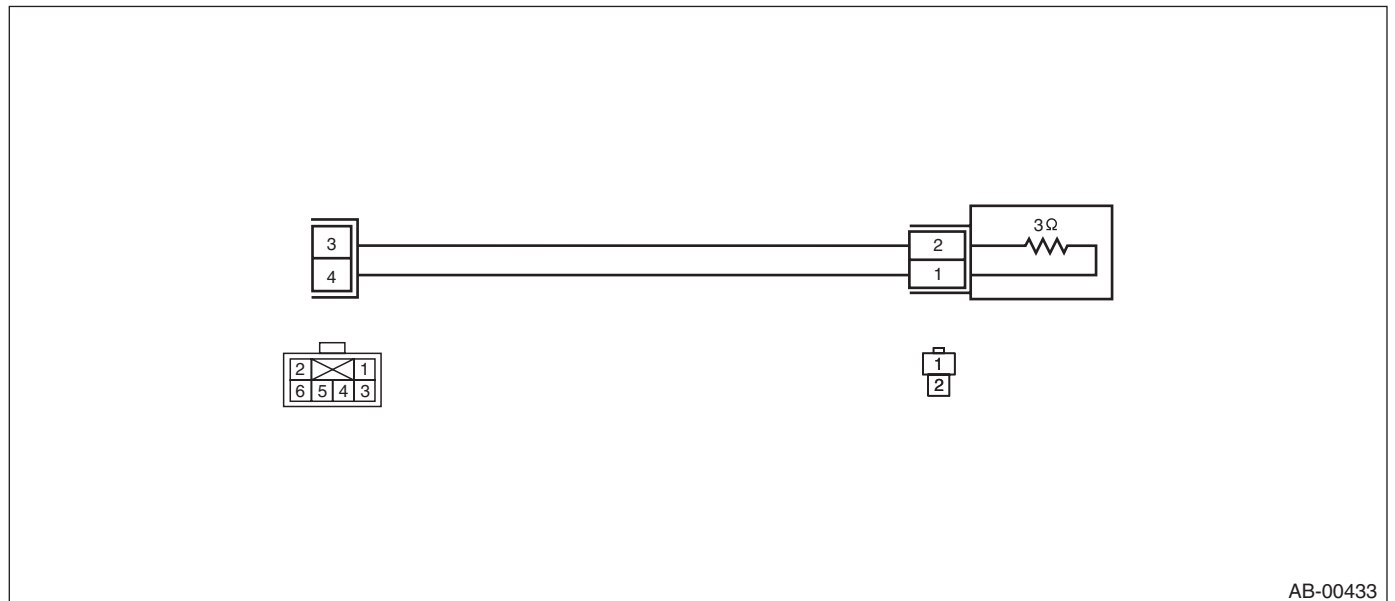
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>ST98299AG040</p>	98299AG040	TEST HARNESS Y	Used for troubleshooting seat belt buckle switch.



# General Description

## • AIRBAG RESISTOR

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>ST98299PA040</p>	98299PA040	AIRBAG RESISTOR	Used in replacement of airbag module for which resistance value is same as airbag module. Two STs are required for diagnosis of two-stage inflator type airbag module.



## 2. GENERAL TOOL

TOOL NAME	REMARKS
Circuit tester	Used for inspecting the seat belt warning system.
TORX® T50	Used for removing and installing the inner seat belt assembly.

## 2. Pretensioner Connector

### A: PROCEDURE

Refer to “Airbag Connector” of Airbag section for the connectors of the seat belt pretensioners and buckle switch RH. <Ref. to AB-8, PROCEDURE, Airbag Connector.>

## 3. Inspection Locations After a Collision

### A: INSPECTION

Check for the following, and replace with new parts if necessary.

- Center pillar lower trim is discolored or cracked.
- Wiring harness and connector are damaged.

# Seat Belt Warning System

SEAT BELT SYSTEM

## 4. Seat Belt Warning System

### A: WIRING DIAGRAM

<Ref. to WI-89, WIRING DIAGRAM, Seat Belt Warning System.>

### B: INSPECTION

#### CAUTION:

- Before diagnosing the airbag system, be sure to turn the ignition switch to OFF, disconnect the ground cable from battery, and wait 60 seconds or more before starting to work.
- When replacing the airbag module, seat belt pretensioner, roll connector, control module and sensor, reconnect each part and check that the warning light operates properly.
- When inspecting the airbag main harness, disconnect the airbag module connectors of the driver's and passenger's seats for safety.
- When inspecting the airbag rear harness, disconnect the side airbag module connector, curtain airbag module connector and seat belt pretensioner connector for safety reasons.

#### TROUBLE SYMPTOM:

- Driver's side seat belt warning light does not illuminate or it remains illuminating.
- Warning buzzer does not beep.

Step	Check	Yes	No
<b>1 CHECK CURRENT SETTINGS.</b> 1) Prepare the Subaru Select Monitor. 2) Turn the ignition switch to ON (engine OFF) and run the "PC application for Subaru Select Monitor". 3) Select the "Current Data Display" and read the data of the "belt warning switch".	Is the belt warning display ON?	Go to step 2.	Turn the belt warning ON with unit customization.
<b>2 CHECK CURRENT DATA.</b> 1) Select the "Current Data Display" and read the data of the "IG power supply voltage". 2) Turn the ignition switch ON ↔ OFF.	Does the voltage change between 10 V or higher ↔ less than 1.5 V, matching the ignition switch ON ↔ OFF operation?	Go to step 3.	Check the ignition switch circuit.
<b>3 CHECK FUNCTION.</b> 1) Sit on the driver's seat and passenger's seat and disconnect the seat belts of the both. 2) Turn the ignition switch to ON (engine OFF). 3) Check the illumination of the driver's seat belt warning light in the combination meter, and the passenger's seat belt warning light in the map light, and the sounding of the buzzer.	Do the driver's warning light and passenger's warning light blink and the buzzer sound while blinking?	Go to step 4.	<ul style="list-style-type: none"> <li>• Malfunction of the driver's seat belt warning light → Go to step 10.</li> <li>• Malfunction of the passenger's seat belt warning light → Go to step 16.</li> <li>• The buzzer does not sound → Go to step 6.</li> </ul>
<b>4 CHECK FUNCTION.</b> 1) Wait until the buzzer stops sounding in step 3. (for approximately six seconds after starting sounding) 2) Connect and disconnect the seat belts of the driver's and passenger's. 3) Check the illumination of the driver's seat belt warning light in the combination meter, and the passenger's seat belt warning light in the map light, and the sounding of the buzzer.	Do the seat belts warning light illuminate ↔ go off according to the operation?	Go to step 5.	<ul style="list-style-type: none"> <li>• Malfunction of the driver's seat belt warning light → Go to step 6.</li> <li>• Malfunction of the passenger's seat belt warning light → Go to step 12.</li> </ul>



# Seat Belt Warning System

SEAT BELT SYSTEM

Step	Check	Yes	No
<b>5 CHECK FUNCTION.</b> 1) Wait until the buzzer stops sounding in step 3. (for approximately six seconds after starting sounding) 2) Start the engine, and set the vehicle speed at 15 km/h (9 MPH) or more. 3) Check the seat belt warning lights of the driver's and the passenger's, and if the warning buzzer sounds.	Do the driver's warning light and passenger's warning light blink and the buzzer sound while blinking?	Seat belt warning system is normal.	Go to step 19.
<b>6 CHECK CURRENT DATA.</b> 1) Select the "Current Data Display" and read the data of the seat belt switch of the driver's. 2) Connect and disconnect the seat belt buckle.	Does the seat belt SW display turn ON ←→ OFF according to the operation?	Go to step 10.	Go to step 7.
<b>7 CHECK HARNESS.</b> 1) Disconnect the negative terminal from the battery, and wait for 60 seconds or more. 2) Disconnect the connector of body integrated unit and the seat belt buckle switch. 3) Check for short circuit to battery, open circuit and short circuit to ground between the body integrated unit and the seat belt buckle switch LH. <b>Connector &amp; terminal</b> <i>(i84) No. 4 — (R8) No. 3:</i>	Is the harness normal?	Go to step 8.	Repair or replace the harness.
<b>8 CHECK HARNESS.</b> Measure the resistance between the seat belt buckle switch LH and chassis ground. <b>Connector &amp; terminal</b> <i>(R8) No. 1 — Chassis ground:</i>	Is the resistance less than 10 Ω?	Go to step 9.	Repair or replace the harness.
<b>9 CHECK SEAT BELT BUCKLE SWITCH LH.</b> Measure the resistance between the connector terminals of the driver's seat belt switch when the driver's seat belt is fastened and detached. <b>Connector &amp; terminal</b> <i>(R8) No. 1 — (R8) No. 3:</i>	Is the resistance when the belt is fastened 1 MΩ or more, and less than 10 Ω when the belt is detached?	Replace the body integrated unit. <Ref. to SL-48, REMOVAL, Body Integrated Unit.>	Replace the inner belt assembly LH. <Ref. to SB-18, INNER SEAT BELT ASSEMBLY, REMOVAL, Front Seat Belt.>
<b>10 CHECK HARNESS.</b> 1) Disconnect the negative terminal from the battery, and wait for 60 seconds or more. 2) Disconnect the connector of the combination meter and the connector of the body integrated unit. 3) Check the harness between the combination meter and body integrated unit. <b>Connector &amp; terminal</b> <i>(i84) No. 20 — (i11) No. 5:</i>	Is the resistance less than 10 Ω?	Go to step 11.	Repair or replace the harness.
<b>11 CHECK COMBINATION METER.</b> 1) Install the connector of the combination meter and the connector of the body integrated unit. 2) Connect the battery. 3) Connect the harness between the combination meter and body integrated unit. <b>Connector &amp; terminal</b> <i>(i11) No. 5 — Chassis ground:</i> or <i>(i84) No. 20 — Chassis ground:</i>	Does the driver's seat belt warning light turn on?	Replace the body integrated unit. <Ref. to SL-48, REMOVAL, Body Integrated Unit.>	Replace the combination meter. <Ref. to IDI-11, REMOVAL, Combination Meter.>

# Seat Belt Warning System

## SEAT BELT SYSTEM

Step	Check	Yes	No
<b>12 CHECK CURRENT DATA.</b> 1) Sit in the passenger's seat. 2) Select "Current Data Display" and display the data of "P seatbelt SW input". 3) Fasten and detach the passenger's side seat belt buckle, and read the data of the seat belt switch. <Ref. to LAN(diag)-29, OPERATION, Read Current Data.>	Does the seat belt switch display turn ON ←→ OFF according to the operation of the seat belt buckle?	Go to step 16.	Go to step 13.
<b>13 CHECK AIRBAG SYSTEM AND OCCUPANT DETECTION SYSTEM.</b> Perform the check in accordance with the diagnostic procedure DTC 27 of the airbag system. <Ref. to AB(diag)-55, DTC 27 ODS COMMUNICATION ERROR, Diagnostic Chart with Trouble Code.>	Is there any problem on the inspection result?	Go to step 14.	Repair or replace the harness.
<b>14 CHECK BUCKLE SWITCH RH.</b> Perform the check in accordance with the diagnostic procedure DTC 37 of the occupant detection system. <Ref. to OD(diag)-26, DTC 37 BUCKLE SWITCH RH FAILURE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Is there any problem on the inspection result?	Go to step 15.	Repair or replace the harness.
<b>15 CHECK AIRBAG CONTROL MODULE AND BODY INTEGRATED UNIT.</b> Check the airbag control module, occupant detection sensor and seat belt buckle switch RH. Perform the check in accordance with the diagnostic procedure DTC 39 of the airbag system. <Ref. to AB(diag)-57, DTC 39 SEAT BELT WARNING FAILURE, Diagnostic Chart with Trouble Code.>	Is there any problem on the inspection result?	Replace the body integrated unit. <Ref. to SL-48, REMOVAL, Body Integrated Unit.>	Repair or replace the harness.
<b>16 CHECK HARNESS.</b> 1) Disconnect the warning light box RH connector. 2) Turn the ignition switch to ON. 3) Measure the voltage between body integrated unit and warning light box RH. <b>Connector &amp; terminal</b> <b>(i116) No. 3 (+) — Chassis ground (-):</b>	Is the voltage 10 V or more?	Go to step 17.	Repair or replace the harness.
<b>17 CHECK HARNESS.</b> 1) Turn the ignition switch to ON. 2) Disconnect the connector of body integrated unit. 3) Check for short circuit to battery, open circuit and short circuit to ground between the body integrated unit and the warning light box RH. <b>Connector &amp; terminal</b> <b>(B280) No. 27 — (i116) No. 9:</b>	Is the harness normal?	Go to step 19.	Repair or replace the harness.
<b>18 CHECK WARNING LIGHT BOX RH.</b> 1) Connect the warning light box RH connector. 2) Turn the ignition switch to ON. 3) Use an appropriate wiring harness to create a short between the body integrated unit and the warning box light RH. <b>Connector &amp; terminal</b> <b>(i116) No. 9 — Chassis ground:</b>	Does passenger's seat belt warning light in the warning box light illuminate?	Replace the body integrated unit. <Ref. to SL-48, REMOVAL, Body Integrated Unit.>	Replace the warning light box RH. <Ref. to IDI-16, REMOVAL, Warning box.>

# Seat Belt Warning System

SEAT BELT SYSTEM

Step	Check	Yes	No
<b>19 CHECK DTC.</b> Read the DTCs for all systems using the Subaru Select Monitor.	Is a DTC detected?	Perform a check according to the DTC.	Go to step 20.
<b>20 CHECK CURRENT DATA.</b> Select "Current Data Display" and read the data of the "Front Wheel Speed". <Ref. to LAN(diag)-29, OPERATION, Read Current Data.>	Does the data display the wheel speed data correctly?	Go to step 11.	Check the following items. <ul style="list-style-type: none"> <li>• LAN system &lt;Ref. to LAN(diag)-62, DTC U1223 CAN-HS VDC/ABS NO-RECEIVE DATA, Diagnostic Procedure with Diagnostic Trouble Code (DTC).&gt;</li> <li>• Check VDC or ABS. VDC &lt;Ref. to VDC(diag)-2, Basic Diagnostic Procedure.&gt;</li> </ul>

# Front Seat Belt

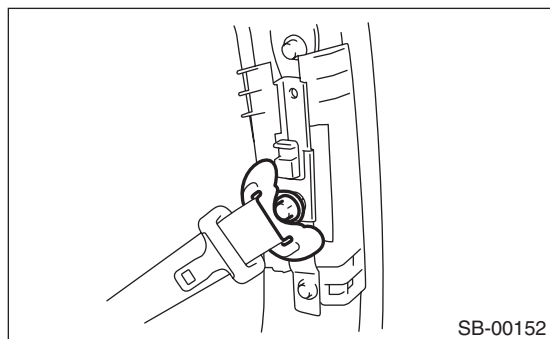
## SEAT BELT SYSTEM

### 5. Front Seat Belt

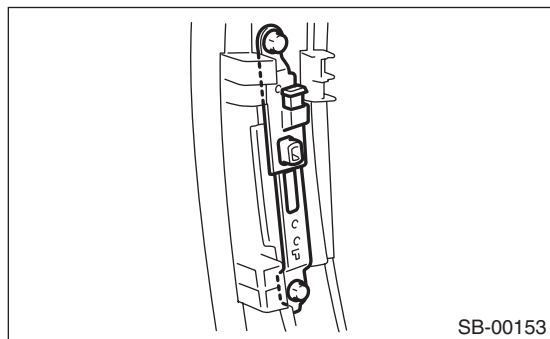
#### A: REMOVAL

##### 1. OUTER SEAT BELT ASSEMBLY

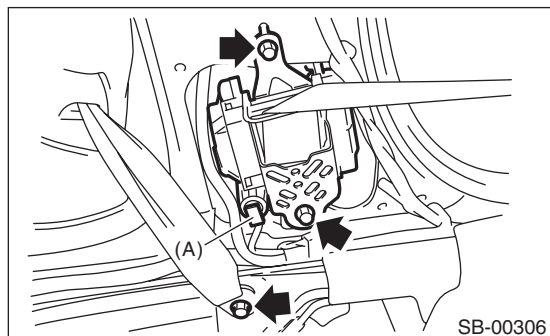
- 1) Fold the backrest all the way forward, and then move the front seat all the way forward.
- 2) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait for 60 seconds or more.
- 3) Remove the center pillar lower trim and center pillar upper trim.
  - Center pillar lower trim <Ref. to EI-45, CENTER PILLAR LOWER TRIM, REMOVAL, Side Trim.>
  - Center pillar upper trim <Ref. to EI-45, CENTER PILLAR UPPER TRIM, REMOVAL, Side Trim.>
- 4) Remove the bolt, and then remove the shoulder anchor.



- 5) Remove the bolts and then remove adjustable anchor assembly.



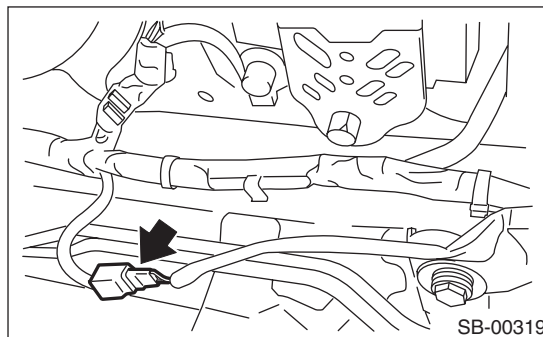
- 6) Disconnect connector (A) of the pretensioner, and remove the lower anchor bolt and seat belt retractor.



- 7) On passenger's side, disconnect the connector of the seat belt tension sensor.

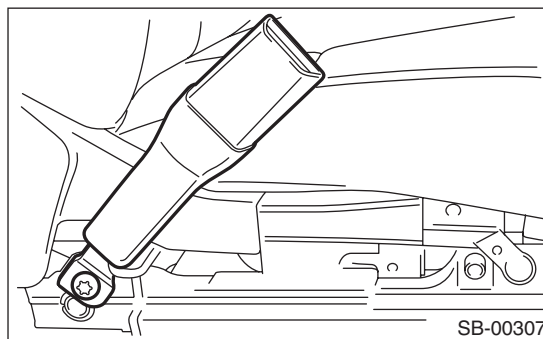
#### CAUTION:

- Do not drop or subject the pretensioner to any impact.
- Since the pretensioner and bracket are integrated as a unit, do not disassemble them.



##### 2. INNER SEAT BELT ASSEMBLY

- 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait for 60 seconds or more.
- 2) Remove the four bolts in the slide rail LH and RH.
- 3) Disconnect the seat belt warning light connector under the seat.
- 4) Remove the harness clips from the back of the seat.
- 5) Remove the TORX® bolt, and then remove the inner seat belt assembly.



#### B: INSTALLATION

##### 1. OUTER SEAT BELT ASSEMBLY

#### CAUTION:

- The parts of driver and passenger sides are not the same. Before installation, make sure that the correct part is used.
- Be careful not to twist the seat belts during installation.

Install in the reverse order of removal.

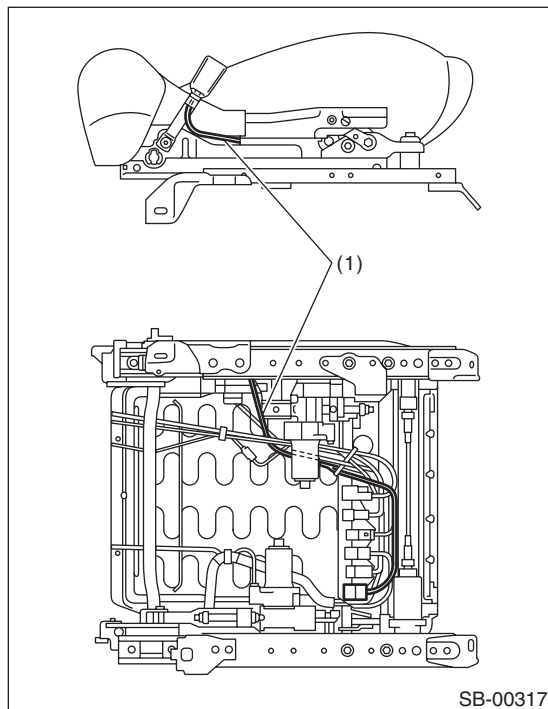
#### Tightening torque:

<Ref. to SB-2, FRONT SEAT BELT, COMPONENT, General Description.>

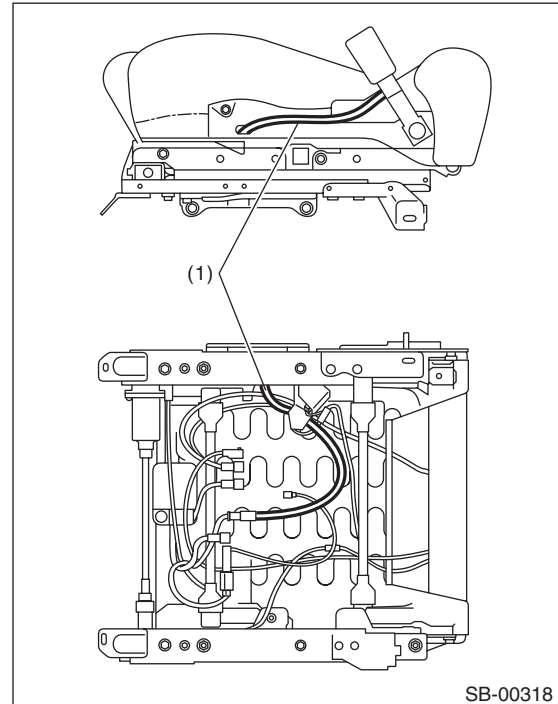
## 2. INNER SEAT BELT ASSEMBLY

### CAUTION:

- After the driver's and passenger's inner seat belt assembly installation, check that the seat belt buckle switch operates normally using the Subaru Select Monitor III in {Status Data} of "Airbag System". <Ref. to AB(diag)-23, DISPLAY OF STATUS INFORMATION, OPERATION, Subaru Select Monitor.> Improper buckle switch operation may cause airbag system malfunction.
- Inner seat belt assembly harness (1) must be routed securely as shown in the figure, as it can affect the performance of the seat position sensor and occupant detection system.
- Driver's seat



- Passenger's seat



Install in the reverse order of removal.

### **Tightening torque:**

<Ref. to SB-2, FRONT SEAT BELT, COMPONENT, General Description.>

## C: INSPECTION

Check for the following, and replace with new parts if necessary.

- Pretensioner is cracked or deformed.
- Belt tension sensor is cracked or deformed.
- Seat belt is slackened, bent or worn. Seat belt is abnormally wound or extended.
- Inner seat belt assembly is deformed or damaged.
- Seat belt buckle cannot be engaged properly.

# Second Seat Belt

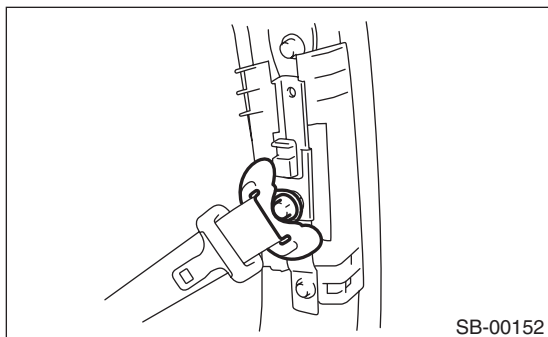
## SEAT BELT SYSTEM

### 6. Second Seat Belt

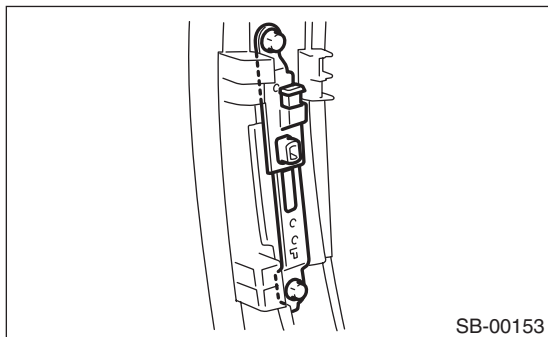
#### A: REMOVAL

##### 1. OUTER SEAT BELT RH ASSEMBLY AND LH ASSEMBLY

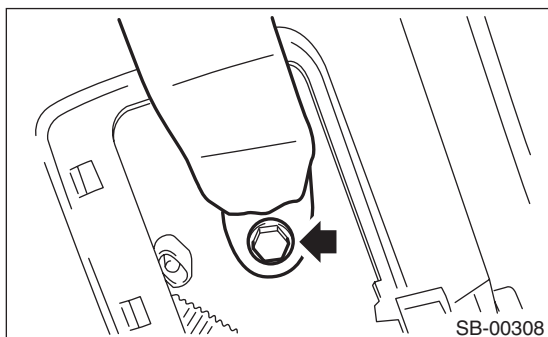
- 1) Remove the second row seats. <Ref. to SE-15, LH&CTR SEAT, REMOVAL, Second Seat.>
- 2) Remove the third-row seats. <Ref. to SE-22, REMOVAL, Third Seat.>
- 3) Remove the rear quarter trim. <Ref. to EI-46, REMOVAL, Rear Quarter Trim.>
- 4) Remove the bolt, and then remove the shoulder anchor.



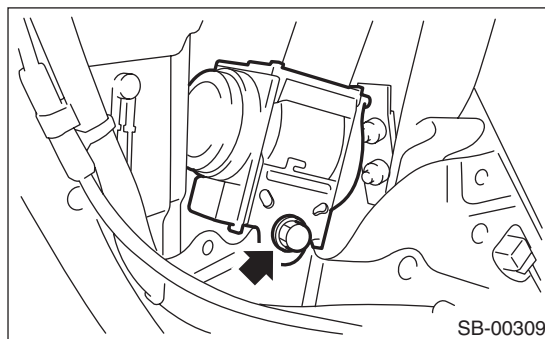
- 5) Remove the bolts and then remove adjustable anchor assembly.



- 6) Remove the lower anchor bolt.

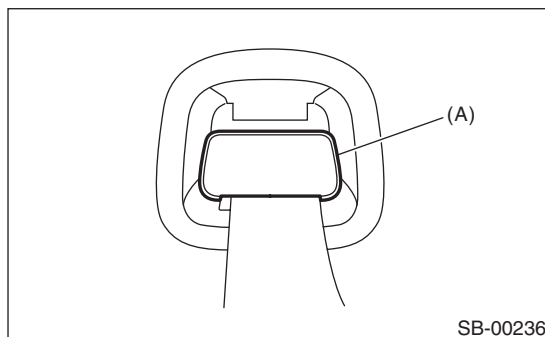


- 7) Remove the bolt to remove outer seat belt retractor.



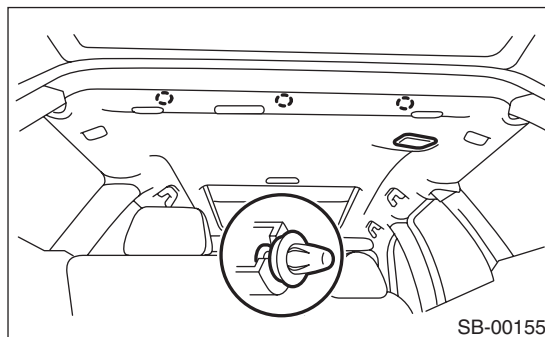
##### 2. SHOULDER SEAT BELT CENTER ASSEMBLY

- 1) Remove the rear quarter trim. <Ref. to EI-46, REMOVAL, Rear Quarter Trim.>
- 2) Remove the cover (A) from roof trim, and then insert it to the inside of roof trim.

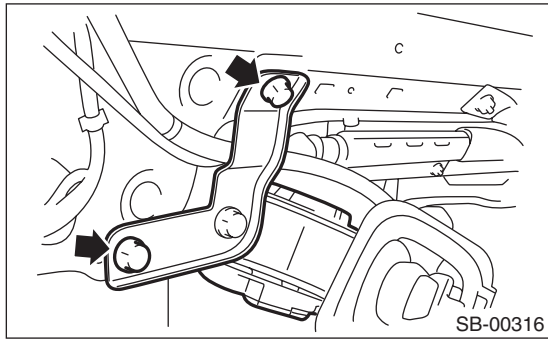


- 3) Remove the clips, and then lower the roof trim end.

**CAUTION:**  
Do not pull the roof trim end backward with excessive force. There is the possibility of the roof trim being damaged.

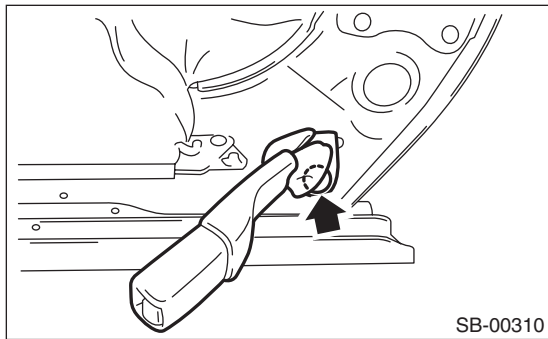


- 4) Remove the bolt to remove the seat belt retractor.



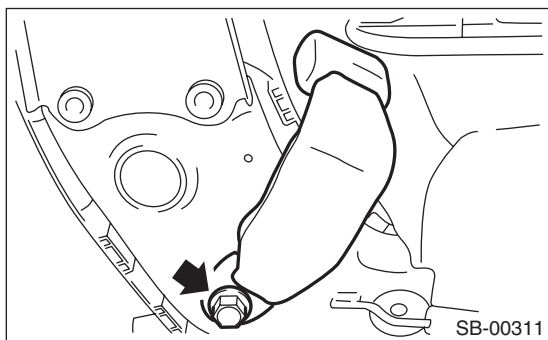
### 3. INNER SEAT BELT RH ASSEMBLY

- 1) Remove the RH second-row seat assembly. <Ref. to SE-15, LH&CTR SEAT, REMOVAL, Second Seat.>
- 2) Remove the LH hinge outer cover.
- 3) Remove the bolt, and then detach the inner belt assembly.



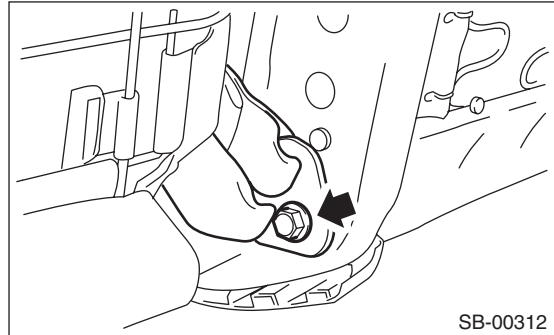
### 4. SHOULDER SEAT BELT CENTER BUCKLE

- 1) Remove the LH second-row seat assembly. <Ref. to SE-15, LH&CTR SEAT, REMOVAL, Second Seat.>
- 2) Remove the RH hinge outer cover.
- 3) Remove the bolt, and then remove the shoulder seat belt center buckle.



### 5. INNER SEAT BELT LH ASSEMBLY

- 1) Remove the LH second-row seat assembly. <Ref. to SE-15, LH&CTR SEAT, REMOVAL, Second Seat.>
- 2) Remove the bolt from the back of the seat cushion, and then detach the inner belt assembly.



### B: INSTALLATION

#### CAUTION:

**When installing, be careful of the routing of the seat belt, and make sure that the belt is not twisted.**

Install in the reverse order of removal.

### C: INSPECTION

Check for the following, and replace with new parts if necessary.

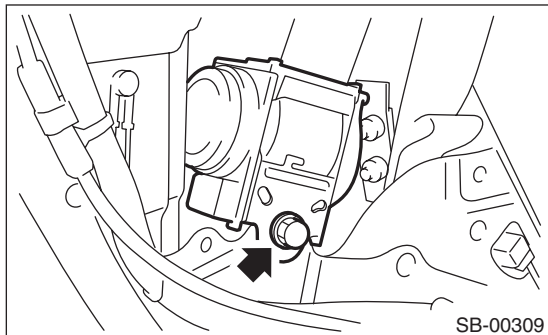
- Seat belt is slackened, bent or worn. Seat belt is abnormally wound or extended.
- Inner belt is deformed or damaged.
- Seat belt buckle cannot be engaged properly.

### 7. Third Seat Belt

#### A: REMOVAL

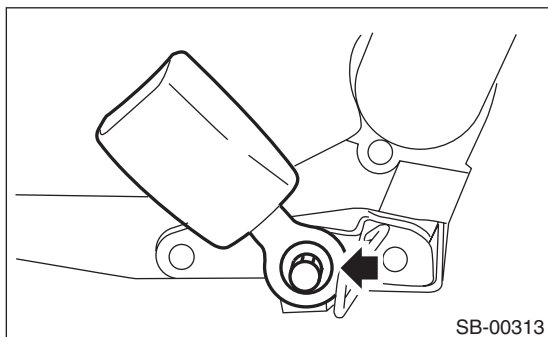
##### 1. OUTER SEAT BELT RH ASSEMBLY AND LH ASSEMBLY

- 1) Remove the third-row seats. <Ref. to SE-22, REMOVAL, Third Seat.>
- 2) Remove the rear quarter trim. <Ref. to EI-46, REMOVAL, Rear Quarter Trim.>
- 3) Remove the bolts, and then detach the outer seat belt assembly.



##### 2. INNER SEAT BELT RH ASSEMBLY AND LH ASSEMBLY

- 1) Remove the third-row seats. <Ref. to SE-22, REMOVAL, Third Seat.>
- 2) Remove the bolt, and then detach the inner seat belt assembly.



#### B: INSTALLATION

##### CAUTION:

**When installing, be careful of the routing of the seat belt, and make sure that the belt is not twisted.**

Install in the reverse order of removal.

#### C: INSPECTION

Check for the following, and replace with new parts if necessary.

- Seat belt is slackened, bent or worn. Seat belt is abnormally wound or extended.
- Inner seat belt assembly is deformed or damaged.
- Seat belt buckle cannot be engaged properly.



# LIGHTING SYSTEM



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# General Description

## LIGHTING SYSTEM

### 1. General Description

#### A: SPECIFICATION

Headlight	Halogen type low beam	12 V — 55 W
	HID type low beam	12 V — 35 W
	Halogen type high beam	12 V — 60 W
Front turn signal, parking		12 V — 28/8 W
Front side marker light		12 V — 5 W
Front fog light		12 V — 55 W
Side turn signal light		12 V — 1.4 W (LED)
Rear combination light	Stop/Tail light/Rear side marker light	12 V — 27/8 W
	Turn signal light	12 V — 27 W
Rear finisher light		12 V — 5 W
Back-up light		12 V — 16 W
License plate light		12 V — 5 W
High-mounted stop light		12 V — 1.2 W (LED)
Room light	12 V — 8 W (Model without rear entertainment system)	
	12 V — 5 W (Model with rear entertainment system)	
Spot map light		12 V — 8 W
Luggage room light		12 V — 13 W
Rear gate light		12 V — 5 W
Glove box light		12 V — 1.4 W
Door step light		12 V — 3 W
Vanity mirror light		12 V — 3 W

#### B: CAUTION

- Before removing or installing parts, always disconnect the battery ground cable from battery. When replacing the audio, control module and other parts provided with memory functions, record the memory contents before disconnecting the battery ground cable. Otherwise, the memory is cleared.
- Reassemble the parts in the reverse order of disassembly procedure unless otherwise indicated.
- Adjust parts to the given specifications.
- Connect the connectors securely during reassembly.
- After reassembly, make sure functional parts operate smoothly.

#### WARNING:

- **The airbag system wiring harness is routed near electrical parts and switches. The airbag system wiring harnesses and connectors are colored yellow. Do not use the electrical test equipment on these circuits.**
- **Be careful not to damage the airbag system wiring harness when servicing electrical parts and switches.**

#### C: PREPARATION TOOL

##### 1. GENERAL TOOL

TOOL NAME	REMARKS
Circuit tester	Used for measuring resistance and voltage.

## 2. Headlight and Tail Light System

### A: WIRING DIAGRAM

#### 1. HALOGEN TYPE HEADLIGHT

<Ref. to WI-91, WIRING DIAGRAM, Headlight System.>

#### 2. HID TYPE HEADLIGHT

<Ref. to WI-91, WIRING DIAGRAM, Headlight System.>

#### 3. CLEARANCE LIGHT AND ILLUMINATION LIGHT

<Ref. to WI-98, WIRING DIAGRAM, Clearance Light and Illumination Light System.>

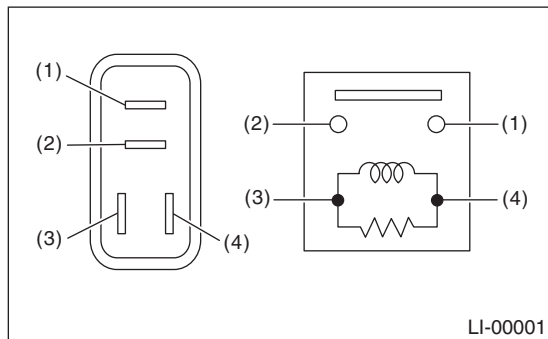
### B: INSPECTION

#### 1. HEADLIGHT SWITCH

Measure the resistance between headlight switch terminals. <Ref. to LI-11, INSPECTION, Combination Switch (Light).>

#### 2. HEADLIGHT RELAY

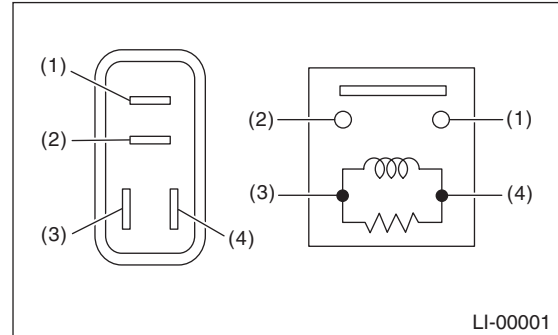
Connect terminal No. 4 to the battery positive terminal and terminal No. 3 to the battery ground terminal, and measure the headlight relay resistance between terminals.



Continuity	Terminal No.	Standard
Yes	1 and 2	Less than 1 Ω
No		1 MΩ or more

### 3. TAIL AND ILLUMINATION RELAY

Connect terminal No. 4 to the battery positive terminal and terminal No. 3 to the battery ground terminal, and measure the resistance between tail and illumination relay terminals.



Continuity	Terminal No.	Standard
Yes	1 and 2	Less than 1 Ω
No		1 MΩ or more

# Day Time Running Light System

## LIGHTING SYSTEM

### 3. Day Time Running Light System

#### A: WIRING DIAGRAM

<Ref. to WI-91, WIRING DIAGRAM, Headlight System.>

#### B: INSPECTION

##### 1. DAYTIME RUNNING LIGHT MODULE CHECK

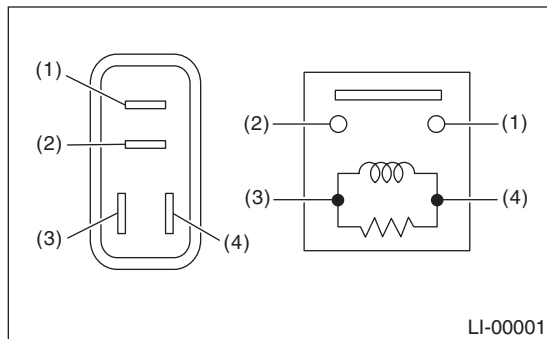
Step	Check	Yes	No
<b>1 CHECK POWER SUPPLY CIRCUIT.</b> 1) Turn the ignition switch to ON. 2) Measure the voltage between the daytime running light module terminal and chassis ground. <b>Connector &amp; terminal</b> <b>(B96) No. 2 (+) — Chassis ground (-):</b> <b>(B242) No. 6 (+) — Chassis ground (-):</b>	Is the voltage battery voltage?	Go to step 2.	Check the fuse and the power supply circuit.
<b>2 CHECK GROUND CIRCUIT.</b> 1) Disconnect the daytime running light module connector. 2) Measure the resistance between the daytime running light module connector and chassis ground. <b>Connector &amp; terminal</b> <b>(B242) No. 10 (+) — Chassis ground (-):</b>	Is the resistance less than 1 $\Omega$ ?	Go to step 3.	Check the ground circuit.
<b>3 CHECK THE PARKING SIGNAL.</b> 1) Connect the daytime running light module connector. 2) Measure the voltage between the terminal and chassis ground when pulling parking brake lever and releasing. <b>Connector &amp; terminal</b> <b>(B96) No. 4 (+) — Chassis ground (-):</b>	Does the voltage change to 0 $\longleftrightarrow$ battery voltage?	Go to step 4.	Check the parking brake switch circuit.
<b>4 CHECK THE STARTER SIGNAL.</b> Turn the ignition switch to ON $\longleftrightarrow$ Starter and measure the voltage of terminal. <b>Connector &amp; terminal</b> <b>(B96) No. 7 (+) — Chassis ground (-):</b>	Does the voltage change to 0 $\longleftrightarrow$ battery voltage?	Go to step 5.	Check the starter switch circuit.
<b>5 CHECK THE HEADLIGHT SWITCH SIGNAL.</b> Turn the headlight switch to LO $\longleftrightarrow$ OFF and measure the voltage of terminal. <b>Connector &amp; terminal</b> <b>(B242) No. 2 (+) — Chassis ground (-):</b>	Does the voltage change to 0 $\longleftrightarrow$ battery voltage?	Go to step 6.	Check the combination switch and the headlight LO circuit.
<b>6 CHECK THE HEADLIGHT SWITCH SIGNAL.</b> Turn the headlight switch to HI $\longleftrightarrow$ OFF and measure the voltage of terminal. <b>Connector &amp; terminal</b> <b>(B96) No. 1 (+) — Chassis ground (-):</b>	Does the voltage change to 0 $\longleftrightarrow$ battery voltage?	Go to step 7.	Check the combination switch and the headlight HI circuit.
<b>7 CHECK THE HEADLIGHT SIGNAL.</b> 1) Turn the ignition switch to ON. 2) Turn the headlight from HI to ON/OFF and measure the voltage of terminal. <b>Connector &amp; terminal</b> <b>(B242) No. 5 (+) — Chassis ground (-):</b> <b>(B96) No. 3 (+) — Chassis ground (-):</b>	Does the voltage change to 0 $\longleftrightarrow$ battery voltage?	Go to step 8.	Check the headlight HI circuit.

# Day Time Running Light System

Step	Check	Yes	No
<b>8 CHECK THE HEADLIGHT SIGNAL.</b> 1) Turn the ignition switch to ON. 2) Measure the voltage of terminal on passing of headlight. <b>Connector &amp; terminal</b> <b>(B242) No. 4 (+) — Chassis ground (-):</b>	Does the voltage change to 0 ←→ battery voltage?	If the above test is OK, replace the daytime running light module.	Check the headlight HI circuit.

## 2. LOW BEAM RELAY

Measure the resistance between the daytime running relay terminals when connecting terminal No. 4 to the battery positive terminal and terminal No. 3 to the battery ground terminal.



Continuity	Terminal No.	Standard
Yes	1 and 2	Less than 1 Ω
No		1 MΩ or more

# Front Fog Light System

LIGHTING SYSTEM

## 4. Front Fog Light System

### A: WIRING DIAGRAM

#### 1. FRONT FOG LIGHT

<Ref. to WI-95, WIRING DIAGRAM, Front Fog Light System.>

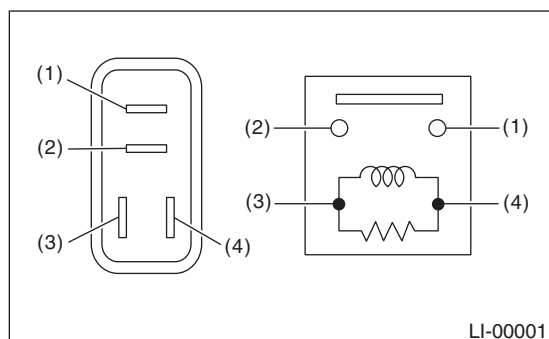
### B: INSPECTION

#### 1. FRONT FOG LIGHT SWITCH

Measure the resistance between front fog light switch terminals. <Ref. to LI-11, INSPECTION, Combination Switch (Light).>

#### 2. FRONT FOG LIGHT RELAY

Connect terminal No. 4 to battery positive terminal and terminal No. 3 to battery ground terminal, and measure the front fog light relay resistance between terminals.



Continuity	Terminal No.	Standard
Yes	1 and 2	Less than 1 $\Omega$
No		1 M $\Omega$ or more

## 5. Turn Signal Light and Hazard Light System

### A: WIRING DIAGRAM

#### 1. TURN SIGNAL LIGHT AND HAZARD LIGHT

<Ref. to WI-103, WIRING DIAGRAM, Turn Signal Light and Hazard Light System.>

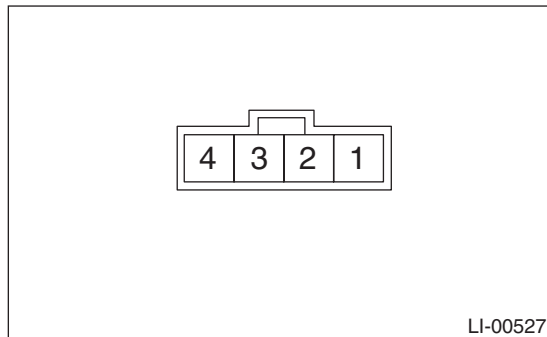
### B: INSPECTION

#### 1. TURN SIGNAL SWITCH

Measure the resistance between turn signal switch terminals. <Ref. to LI-11, INSPECTION, Combination Switch (Light).>

#### 2. HAZARD SWITCH

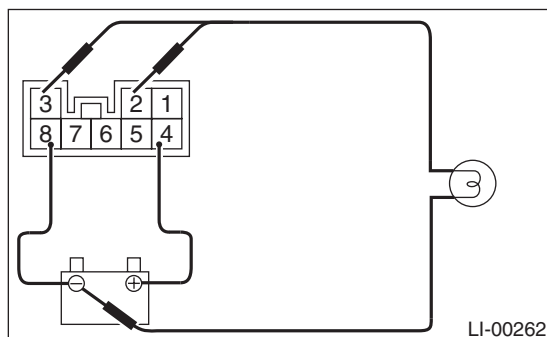
Measure the resistance between hazard switch terminals.



Switch position	Terminal No.	Standard
OFF	2 and 3	1 MΩ or more
ON		Less than 1 Ω

#### 3. TURN SIGNAL AND HAZARD MODULE

Connect the battery and turn signal light bulb to the module. The module is properly functioning if it blinks when power is supplied to the circuit.



# Back-up Light System

LIGHTING SYSTEM

## 6. Back-up Light System

### A: WIRING DIAGRAM

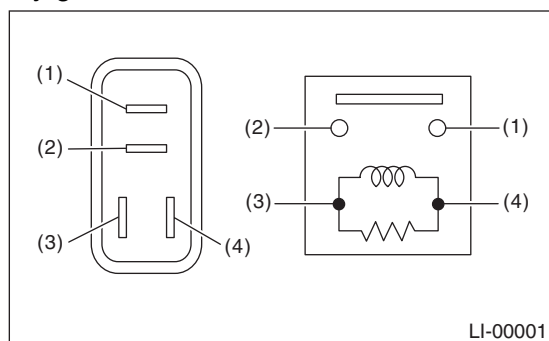
#### 1. BACK-UP LIGHT

<Ref. to WI-96, WIRING DIAGRAM, Back-up Light System.>

### B: INSPECTION

#### 1. BACK-UP LIGHT RELAY

Measure the resistance between headlight relay terminals when connecting terminal No. 4 to the battery positive terminal and terminal No. 3 to the battery ground terminal.



Continuity	Terminal No.	Standard
Yes	1 and 2	Less than 1 $\Omega$
No		1 M $\Omega$ or more



## 7. Stop Light System

### A: WIRING DIAGRAM

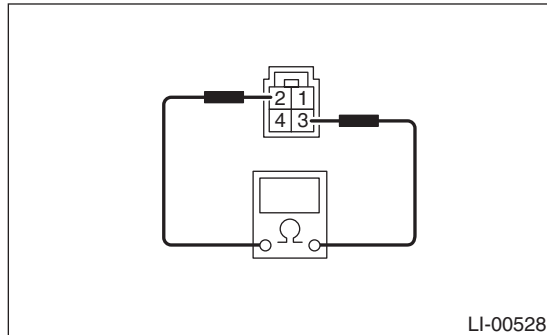
#### 1. STOP LIGHT

<Ref. to WI-97, WIRING DIAGRAM, Stop Light System.>

### B: INSPECTION

#### 1. STOP LIGHT SWITCH

Measure the resistance between stop light switch terminals.



Switch position	Terminal No.	Standard
When brake pedal is depressed	2 and 3	Less than 1 $\Omega$
When brake pedal is released		1 M $\Omega$ or more

## 8. Room Light System

### A: WIRING DIAGRAM

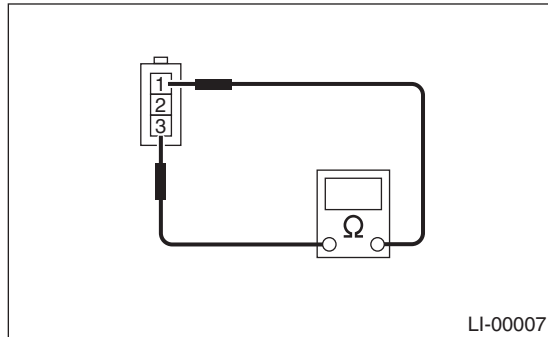
#### 1. ROOM LIGHT

<Ref. to WI-105, WIRING DIAGRAM, Interior Light System.>

### B: INSPECTION

#### 1. DOOR SWITCH

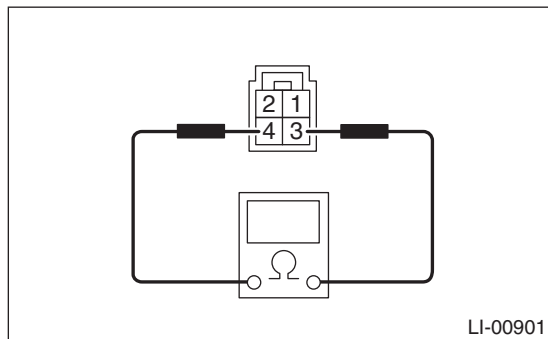
Measure the resistance between door switch terminals.



Switch position	Terminal No.	Standard
When door is opened	1 and 3	Less than 1 $\Omega$
When door is closed		1 M $\Omega$ or more

#### 2. REAR GATE LATCH SWITCH

Measure the resistance between rear gate latch switch terminals.

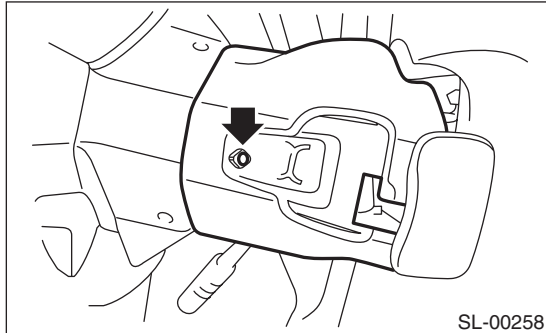


Switch position	Terminal No.	Standard
When rear gate is opened	3 and 4	Less than 1 $\Omega$
When rear gate is closed		1 M $\Omega$ or more

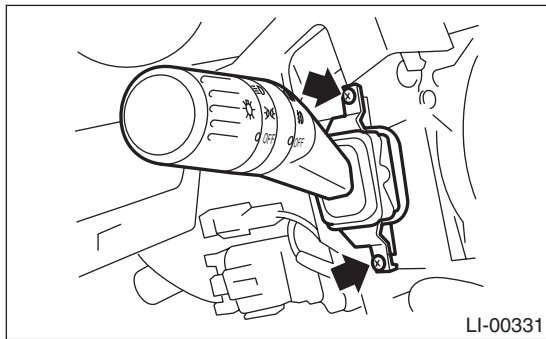
## 9. Combination Switch (Light)

### A: REMOVAL

- 1) Disconnect the ground cable from the battery.
- 2) Remove the screws and remove the steering column covers (upper and lower).



- 3) Disconnect the connector from the combination switch.
- 4) Remove the screws which secure the switch, then remove the combination switch.

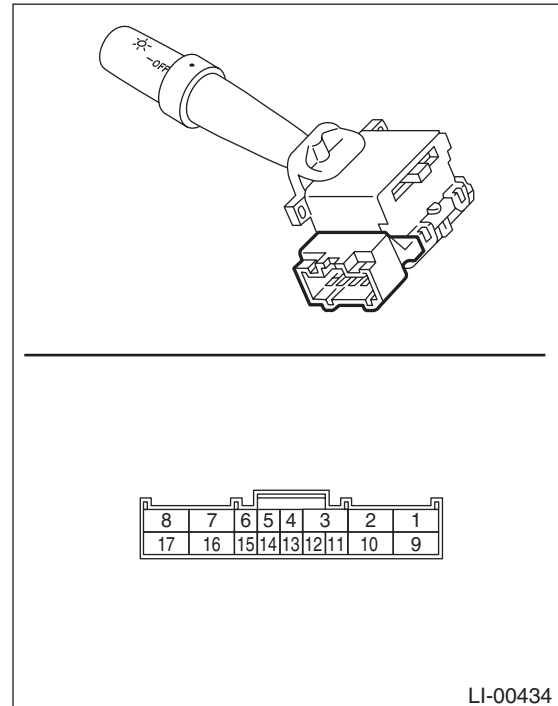


### B: INSTALLATION

Install in the reverse order of removal.

### C: INSPECTION

Measure the resistance between combination switch terminals.



#### 1. LIGHTING SWITCH

Switch position	Terminal No.	Standard
OFF	—	1 MΩ or more
Tail	14 and 16	Less than 1 Ω
Head	13, 14 and 16	Less than 1 Ω

#### 2. DIMMER & PASSING SWITCH

Switch position	Terminal No.	Standard
Passing	7, 8 and 16	Less than 1 Ω
Low beam	17 and 16	Less than 1 Ω
High beam	7 and 16	Less than 1 Ω

#### 3. TURN SIGNAL SWITCH

Switch position	Terminal No.	Standard
Left	1 and 2	Less than 1 Ω
Neutral	—	1 MΩ or more
Right	2 and 3	Less than 1 Ω

#### 4. FRONT FOG LIGHT SWITCH

Switch position	Terminal No.	Standard
OFF	—	1 MΩ or more
ON	10 and 11	Less than 1 Ω

# Headlight Beam Leveler System

LIGHTING SYSTEM

## 10. Headlight Beam Leveler System

### A: WIRING DIAGRAM

#### 1. HEADLIGHT BEAM ADJUSTMENT EQUIPMENT

<Ref. to WI-94, WIRING DIAGRAM, Headlight Beam Leveler System.>

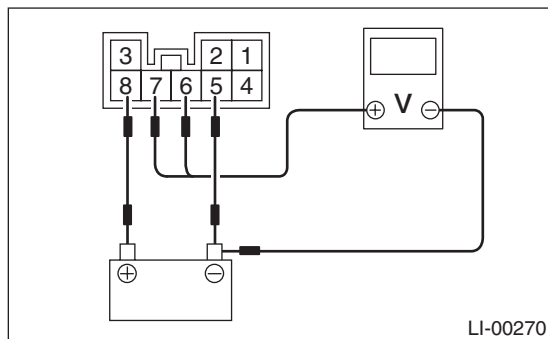
### B: INSPECTION

#### 1. HEADLIGHT BEAM LEVELER ACTUATOR

- 1) Turn on the headlight beam.
- 2) Change the switch position in the order of 0 → 1 → 2 → 3 → 4 → 5, and check that the headlight beam position is lowered.

#### 2. HEADLIGHT BEAM LEVELER SWITCH

Connect the circuit tester to the battery and headlight beam leveler switch connector. Measure the voltage at each switch position.

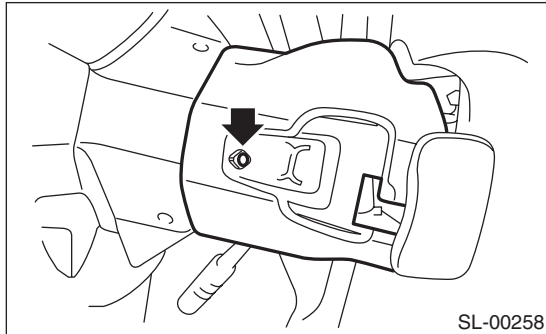


Switch position	Terminal No.	Standard
0	6, 7 (+) and battery (-)	77 — 83% of battery voltage
1		65 — 71% of battery voltage
2		53 — 59% of battery voltage
3		41 — 47% of battery voltage
4		29 — 35% of battery voltage
5		17 — 23% of battery voltage

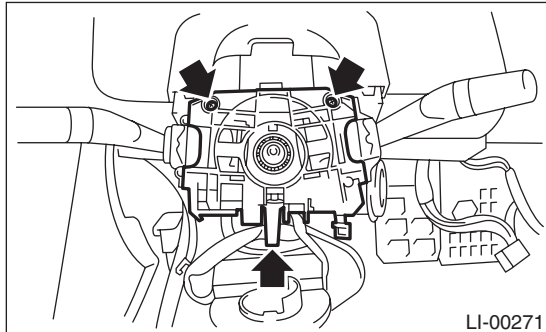
## 11. Combination Base Switch Assembly

### A: REMOVAL

- 1) Remove the driver's airbag module. <Ref. to AB-14, REMOVAL, Driver's Airbag Module.>
- 2) Remove the steering wheel. <Ref. to PS-12, REMOVAL, Steering Wheel.>
- 3) Remove the screws and remove the steering column lower cover.



- 4) Remove the combination switch. <Ref. to LI-11, REMOVAL, Combination Switch (Light).> <Ref. to WW-7, REMOVAL, Combination Switch (Wiper).>
- 5) Remove the four screws and remove the roll connector.
- 6) Remove the three screws.



- 7) Disconnect the connector and remove the combination base switch assembly.

### B: INSTALLATION

- 1) Install in the reverse order of removal.
- 2) Before installing the steering wheel, be sure to adjust the direction of the roll connector to match the steering. <Ref. to AB-24, ADJUSTMENT, Roll Connector.>

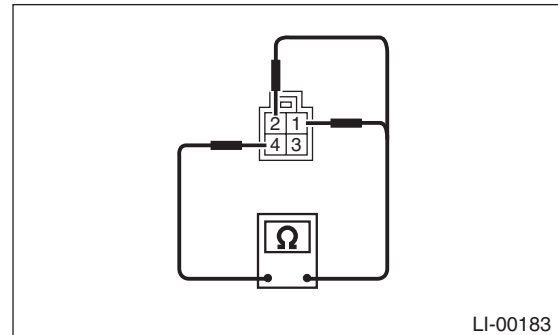
### C: INSPECTION

#### 1. COMBINATION BASE SWITCH ASSEMBLY

Inspect the combination base switch assembly and roll connector for cracks or deformation. If any damage is found, replace with a new part.

#### 2. PARKING SWITCH

Measure the resistance between parking switch terminals.

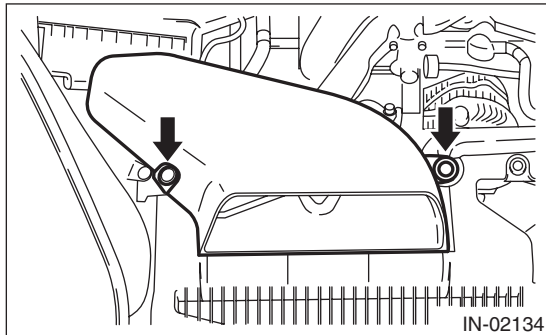


Switch position	Terminal No.	Standard
OFF	2 and 4	Less than 1 Ω
ON	1 and 4	Less than 1 Ω

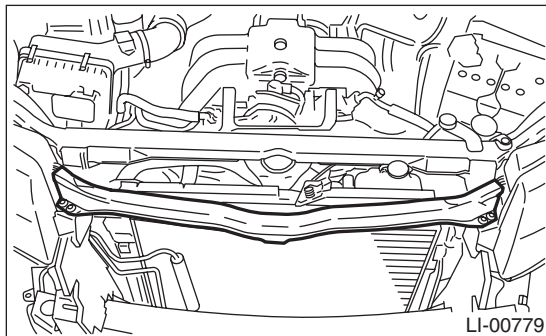
## 12. Headlight Assembly

### A: REMOVAL

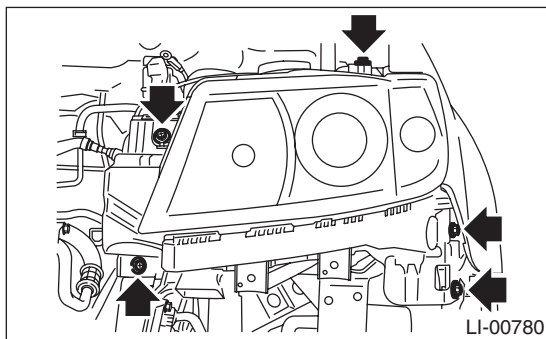
- 1) Disconnect the ground cable from battery.
- 2) Remove the air intake duct.



- 3) Remove the front bumper. <Ref. to EI-22, REMOVAL, Front Bumper.>
- 4) Remove the support plate.



- 5) Remove the five bolts, then remove the headlight assembly.



- 6) Disconnect the connector and then detach the rear headlight assembly.

### B: INSTALLATION

Install in the reverse order of removal.

#### *Tightening torque:*

*7.5 N·m (0.76 kgf·m, 5.5 ft·lb)*

### C: ADJUSTMENT

#### 1. HEADLIGHT AIMING

##### NOTE:

Aiming of this headlight can be adjusted only in the vertical direction. It cannot be adjusted in the horizontal direction.

##### CAUTION:

**Turn off the light before adjusting the headlight beam level. If it is necessary to inspect the beam level, do not keep the light on for two minutes or more.**

##### NOTE:

Before checking the headlight beam level, be sure of the following:

- the area around the headlight has not sustained any scratches, damage or other type of deformation.

- Vehicle is parked on a level surface.
- The inflation pressure of tires is correct.
- Vehicle's fuel tank is fully filled.

1) Bounce the vehicle several times to normalize the suspension.

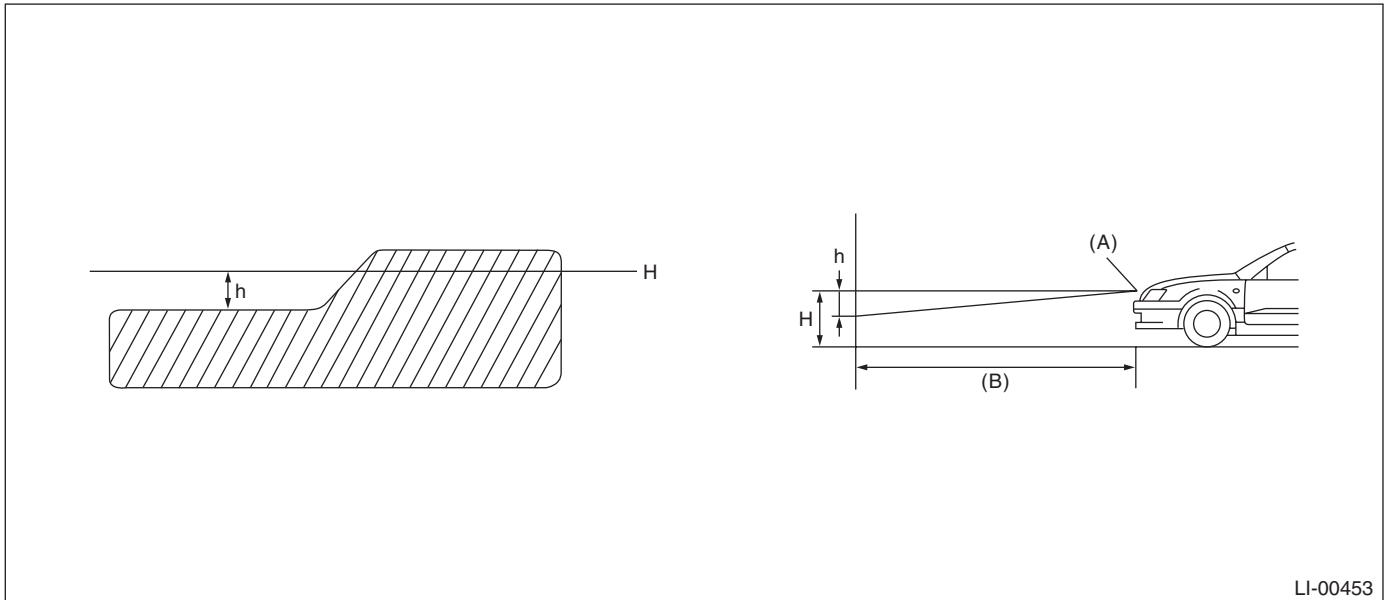
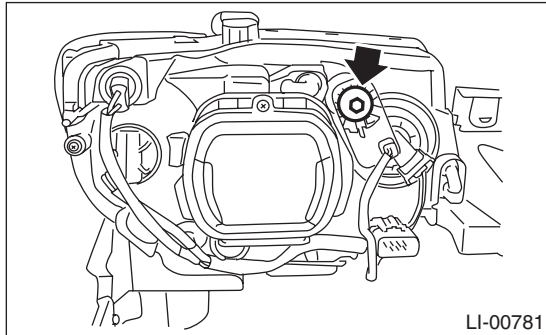
2) Make certain that someone is seated in the driver's seat.

3) Measure the heights of headlights and the distance between the centers of left and right LO beam bulbs.

4) Turn the headlights on and then adjust the low beam pattern.

**NOTE:**

Adjust the headlight beam level by turning the adjusting screw. The adjusting screw can be accessed from a direction described in the figure.

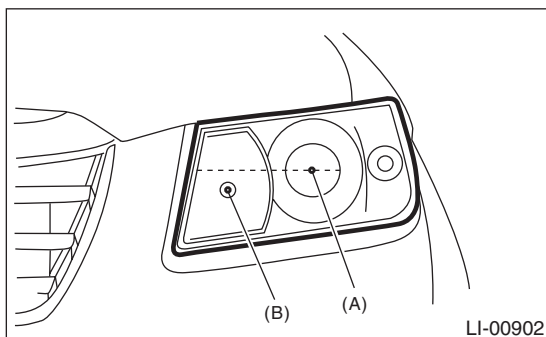


(A) Bulb center marking                      (B) 3 m (10 ft)

h mm (in) at 3 m (10 ft)	21 (0.83)
--------------------------	-----------

**NOTE:**

Check the bulb center mark on the inner side of the lens.



(A) Low beam  
(B) High beam

# Headlight Bulb

## LIGHTING SYSTEM

### 13. Headlight Bulb

#### A: REMOVAL

##### 1. HIGH BEAM AND HALOGEN TYPE LOW BEAM

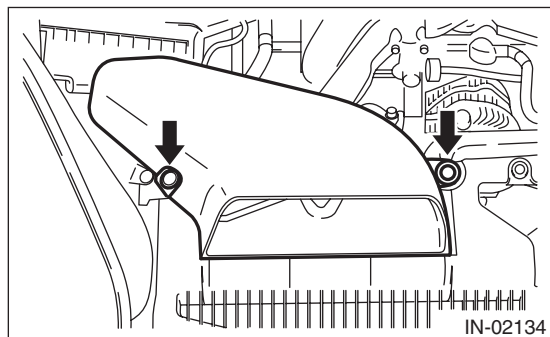
###### CAUTION:

- Because the halogen bulb operates at a high temperature, dirt and oil on the bulb surface reduces the bulb's service life. Hold the flange portion when replacing the bulb. Never touch the glass portion.

- Do not leave the headlight without a bulb for a long time. Dust, moisture, etc. entering the headlight may affect its performance.

1) Disconnect the ground cable from the battery.

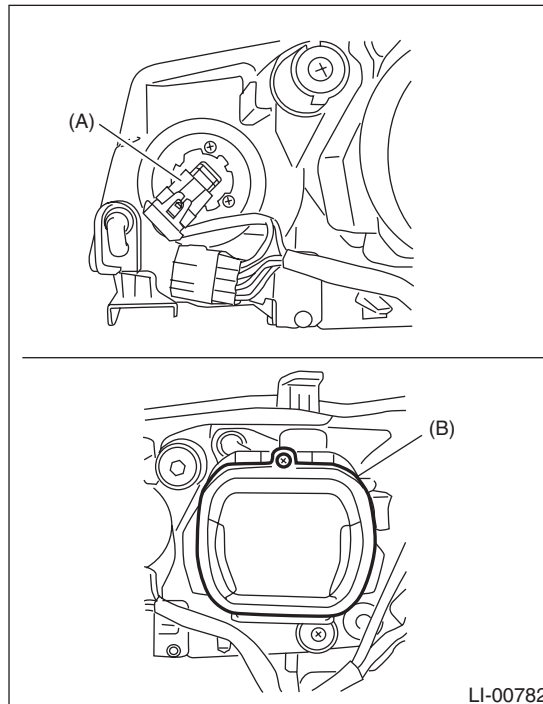
2) Remove the air intake duct. (When removing the headlight bulb RH).



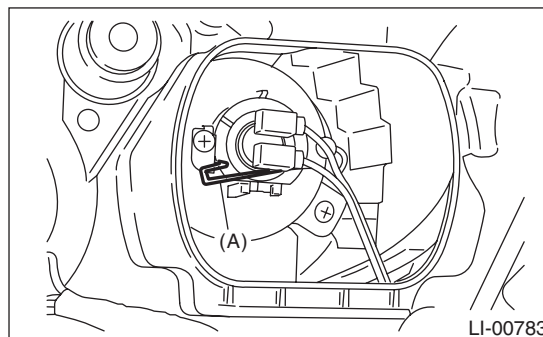
3) Remove the battery. (When removing the headlight bulb LH)

4) Disconnect the harness connector.

5) Remove the bulb assembly (A) then remove the high beam. To remove the low beam, remove the back cover (B), and then go to step 6).



6) Remove the light bulb retaining spring (A) to remove bulb.



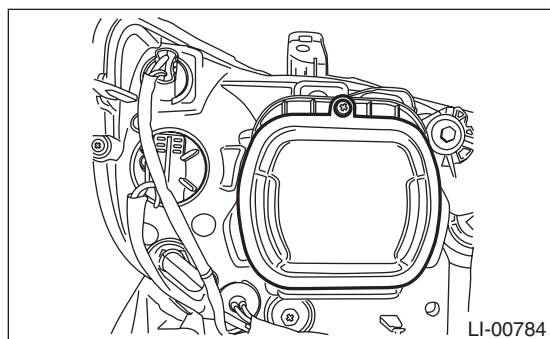


## 2. HID TYPE LOW BEAM

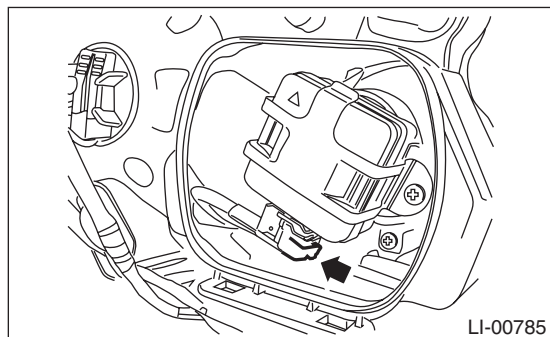
### CAUTION:

- Do not operate with wet hands.
- As the lightening circuit uses high voltage, be sure to confirm that the power supply is turned off before operation.
- When replacing the bulb, hold the flange portion and never touch the glass portion.
- Do not leave the headlight without a bulb for a long time. Dust, moisture, etc. entering the headlight may affect its performance.

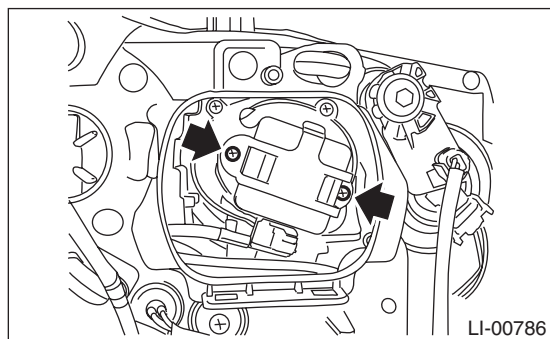
- 1) Disconnect the ground cable from battery.
- 2) Remove the headlight assembly. <Ref. to LI-14, REMOVAL, Headlight Assembly.>
- 3) Remove the back cover.



- 4) Remove the lock, and disconnect the harness connector.



- 5) Remove the screws, and then remove the bulb.



## B: INSTALLATION

Install in the reverse order of removal.

## C: INSPECTION

### 1. HALOGEN TYPE

- 1) Visually check the bulb for blow out.
- 2) Check the bulb specification.  
<Ref. to LI-2, SPECIFICATION, General Description.>
- 3) If NG, replace the bulb with a new part.

### 2. HID TYPE

#### CAUTION:

- Do not operate with wet hands.
- Do not touch the harness, inner headlight, or any metallic portion of the headlight when the light is illuminated (when the lighting switch is turned on).
- When performing a lighting test, make sure that the headlight is mounted on the vehicle, and the power supply is connected to the connector on the vehicle's side.

- 1) Check the bulb specification.  
<Ref. to LI-2, SPECIFICATION, General Description.>
- 2) Install a specified HID bulb for headlight lighting test.
- 3) If the headlight does not illuminate, replace the bulb with a new part.
- 4) Check the HID ballast.

Check the ballast in the following methods and judge if it can be reused or not.

- (1) Perform the cold start (turning on the lights after the headlights is gone off for more than 10 minutes) and hot start (turning on the headlights for more than 15 minutes → turning off the lights for one minute → turning on the lights again) several times and check if the headlights are lit surely.

- (2) Check the lighting condition from immediately after the cold start until the stable condition (approx. 5 min.), to make sure that the unstable condition (flicker etc.) does not occur.

- (3) Attach the two bulbs having been used for the same period of time to the right and left headlights and keep the headlights for approx. 30 minutes lit. Check the difference of brightness between right and left headlights.

- 5) If NG, replace the ballast with a new part.

# Front Turn Signal Light Bulb

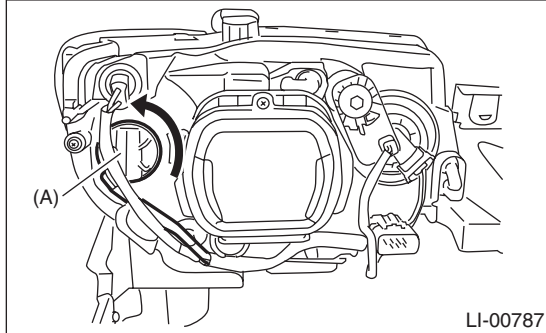
## LIGHTING SYSTEM

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### 14. Front Turn Signal Light Bulb

#### A: REMOVAL

- 1) Open the front hood.
- 2) Turn the socket (A) and remove the front turn signal light bulb.



#### B: INSTALLATION

Install in the reverse order of removal.

#### C: INSPECTION

- 1) Visually check the bulb for blow out.
- 2) Check the bulb specification.  
<Ref. to LI-2, SPECIFICATION, General Description.>
- 3) If NG, replace the bulb with a new part.

## 15. Parking Light Bulb

### A: SPECIFICATION

The parking light bulb is integrated into the front turn signal light bulb as a unit; therefore, refer to “Front Turn Signal Light Bulb” for the removal procedure. <Ref. to LI-18, REMOVAL, Front Turn Signal Light Bulb.>

# Front Side Marker Light Bulb

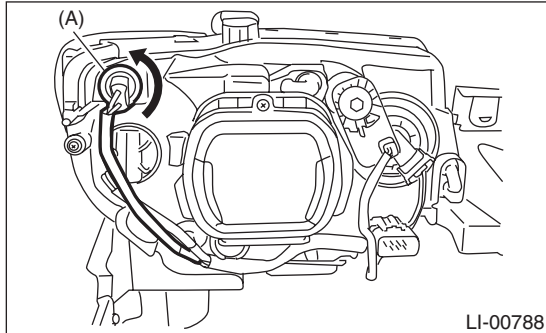
## LIGHTING SYSTEM

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### 16. Front Side Marker Light Bulb

#### A: REMOVAL

- 1) Open the front hood.
- 2) Turn the socket (A) and remove the front turn signal light bulb.



#### B: INSTALLATION

Install in the reverse order of removal.

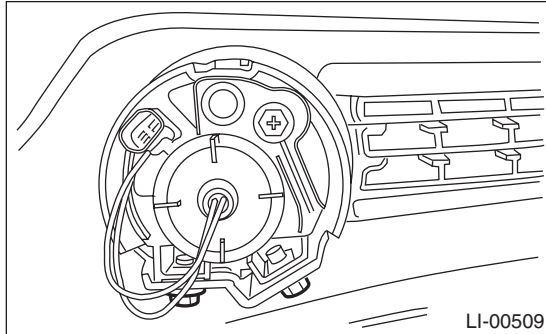
#### C: INSPECTION

- 1) Visually check the bulb for blow out.
- 2) Check the bulb specification.  
<Ref. to LI-2, SPECIFICATION, General Description.>
- 3) If NG, replace the bulb with a new part.

## 17. Front Fog Light Assembly

### A: REMOVAL

- 1) Disconnect the ground cable from the battery.
- 2) Disengage the three clips, and then turn over the lower mud guard.
- 3) Disconnect the harness connector.
- 4) Remove the two mounting bolts, and pull and detach the fog light assembly.



### B: INSTALLATION

Install in the reverse order of removal.

#### ***Tightening torque:***

***7.5 N-m (0.76 kgf-m, 5.5 ft-lb)***

# Front Fog Light Assembly

## LIGHTING SYSTEM

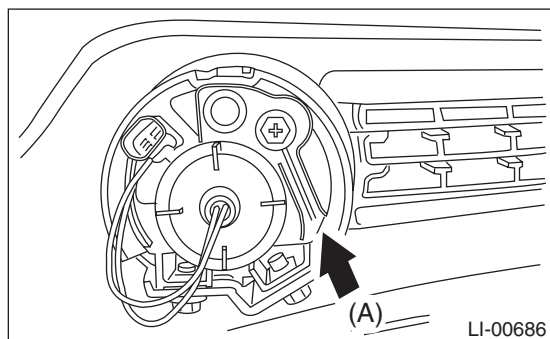
### C: ADJUSTMENT

#### Fog light aiming

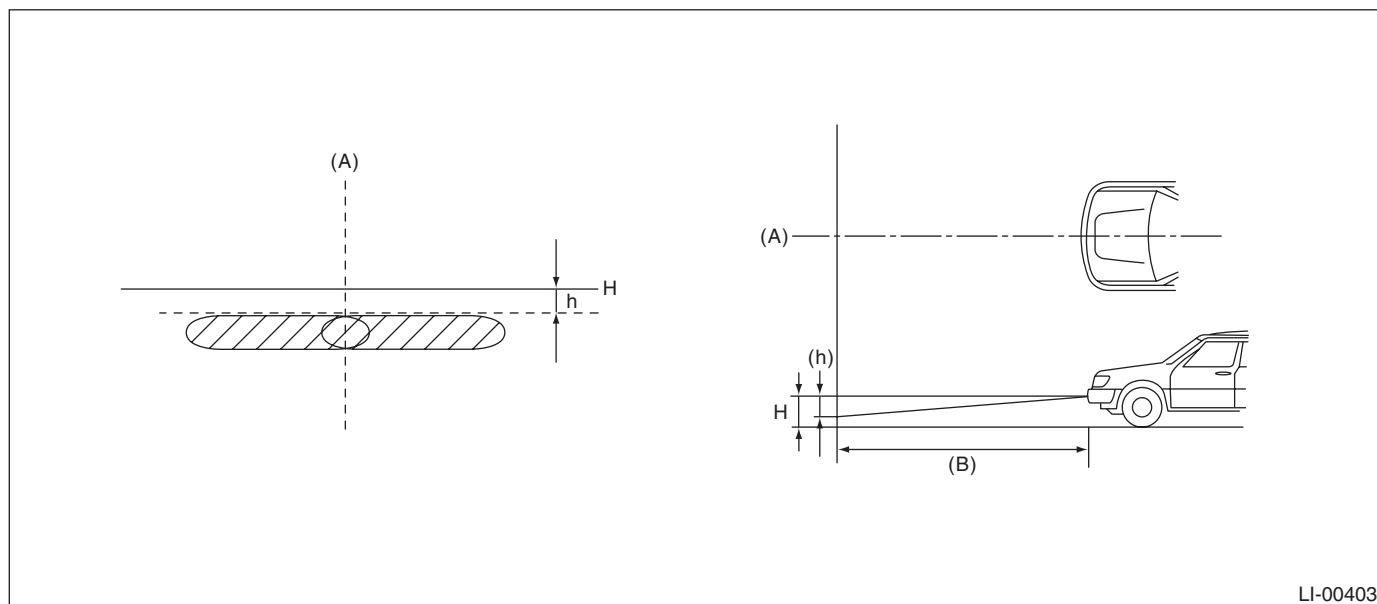
##### NOTE:

Before checking the fog light beam level, be sure of the following:

- Check the area around the fog light for any scratches, damage or other type of deformation.
  - Vehicle is parked on a level surface.
  - The inflation pressure of tires is correct.
  - Vehicle's fuel tank is fully filled.
- 1) Bounce the vehicle several times to normalize the suspension.
  - 2) Make certain that someone is seated in the driver's seat.
  - 3) Measure the height of fog light center.
  - 4) Disengage the three clips, and then turn over the mud guard.
  - 5) Adjust the front fog light pattern by inserting a Phillips screwdriver to the adjusting hole.



(A) Adjusting hole



(A) Vehicle center

(B) 3 m (10 ft)

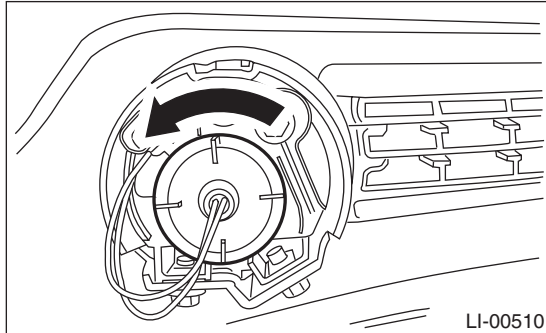
(H) Height of the center of fog light (mm)

h Dimension mm (in)	40 (1.57)
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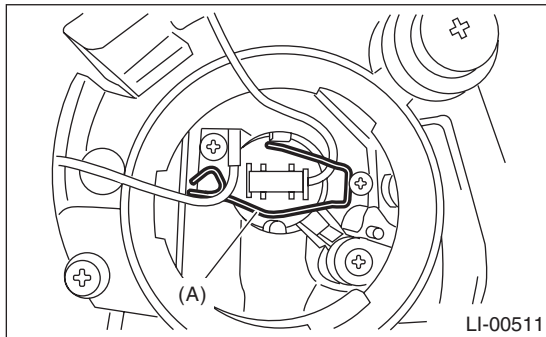
## 18. Front Fog Light Bulb

### A: REMOVAL

- 1) Disconnect the ground cable from the battery.
- 2) Disengage the three clips, and then turn over the lower mud guard.
- 3) Disconnect the harness connector.
- 4) Remove the back cover.



- 5) Remove the spring retainer (A), then detach the fog light bulb.



### B: INSTALLATION

Install in the reverse order of removal.

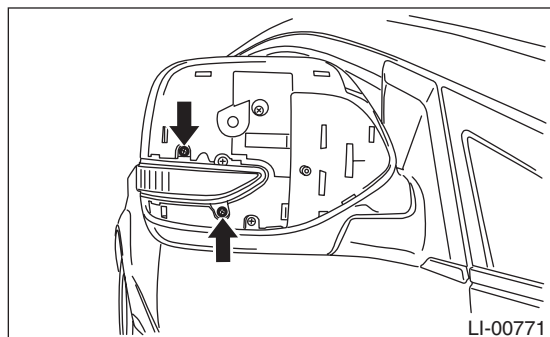
### C: INSPECTION

- 1) Visually check the bulb for blow out.
- 2) Check the bulb specification. <Ref. to LI-2, SPECIFICATION, General Description.>
- 3) If NG, replace the bulb with a new part.

## 19. Side Turn Signal Light Assembly

### A: REMOVAL

- 1) Disconnect the ground cable from battery.
- 2) Remove the mirror. <Ref. to GW-15, REPLACEMENT, Outer Mirror.>
- 3) Remove the scalp cap. <Ref. to GW-13, REPLACEMENT, Scalp Cap.>
- 4) Remove the 2 mounting screws, disconnect the harness connector and then remove the side turn signal light assembly.



### B: INSTALLATION

Install in the reverse order of removal.

#### *Tightening torque:*

**0.8 N·m (0.08 kgf·m, 0.59 ft·lb)**

### C: INSPECTION

- 1) Install the side turn signal light assembly and check that it blinks normally.
- 2) If it does not blink normally, replace the side turn signal light assembly with a new part.

#### NOTE:

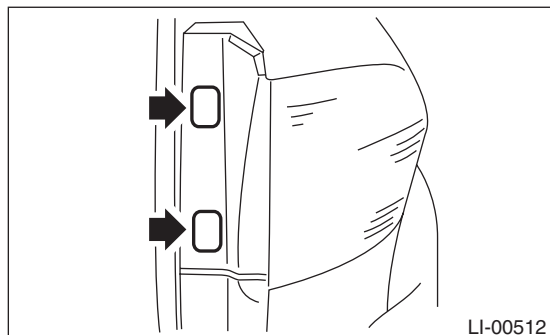
Because a LED (Light Emitting Diode) is used for the side turn signal light, replace the side turn signal light as an assembly if the LED went out.



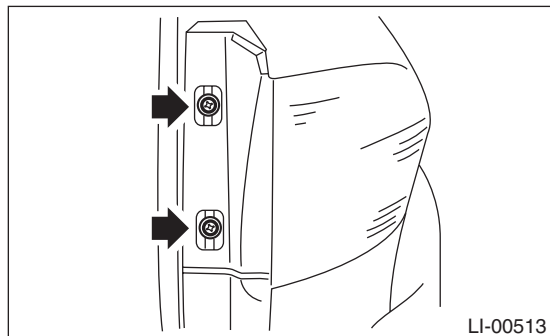
## 20. Rear Combination Light Assembly

### A: REMOVAL

- 1) Disconnect the ground cable from the battery.
- 2) Remove the cover.



- 3) Remove the two bolts, and then detach the rear combination light by pulling it to the rear side of vehicle.



- 4) After turning the sockets of the tail/stop light bulbs and rear turn signal light bulbs, remove the rear combination light.

### B: INSTALLATION

Install in the reverse order of removal.

#### *Tightening torque:*

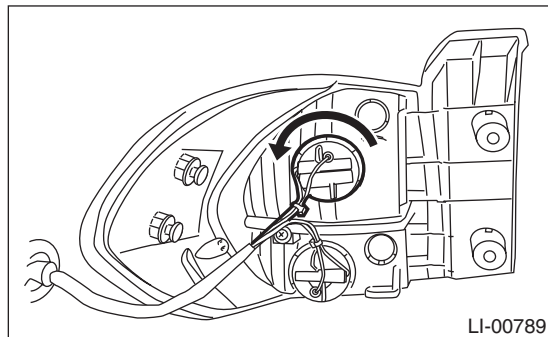
**7.5 N·m (0.76 kgf-m, 5.5 ft-lb)**

## 21. Tail/Stop Light Bulb

### A: REMOVAL

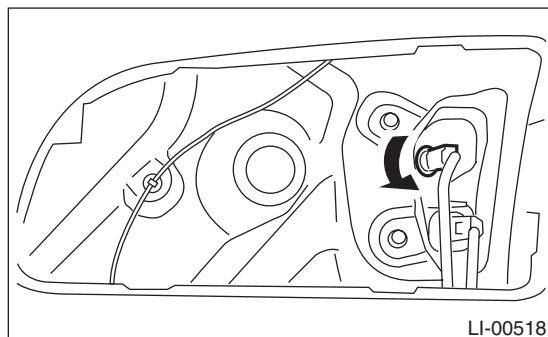
#### 1. COMBINATION LIGHT

- 1) Remove the rear combination light assembly.  
<Ref. to LI-25, REMOVAL, Rear Combination Light Assembly.>
- 2) Turn the socket and remove the bulb.



#### 2. FINISHER LIGHT

- 1) Remove the bulb inspection cover of the rear gate trim.
- 2) Turn the socket and remove the bulb.



### B: INSTALLATION

Install in the reverse order of removal.

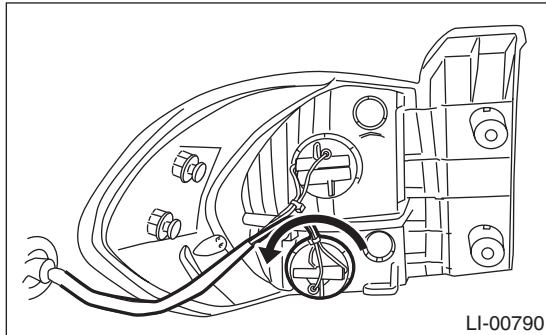
### C: INSPECTION

- 1) Visually check the bulb for blow out.
- 2) Check the bulb specification. <Ref. to LI-2, SPECIFICATION, General Description.>
- 3) If NG, replace the bulb with a new part.

## 22.Rear Turn Signal Light Bulb

### A: REMOVAL

- 1) Remove the rear combination light assembly.  
<Ref. to LI-25, REMOVAL, Rear Combination Light Assembly.>
- 2) Turn the socket and remove the bulb.



### B: INSTALLATION

Install in the reverse order of removal.

### C: INSPECTION

- 1) Visually check the bulb for blow out.
- 2) Check the bulb specification. <Ref. to LI-2, SPECIFICATION, General Description.>
- 3) If NG, replace the bulb with a new part.

### **23.Rear Side Marker Light Bulb**

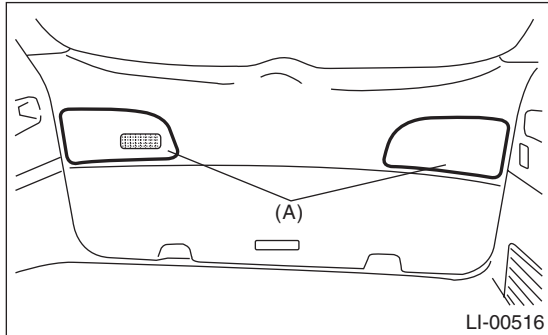
#### **A: SPECIFICATION**

The rear side marker light bulb is integrated into the tail/stop light as a single unit; therefore, refer to the section on tail/stop light bulbs for the removal procedures. <Ref. to LI-26, REMOVAL, Tail/Stop Light Bulb.>

## 24. Rear Finisher Light Assembly

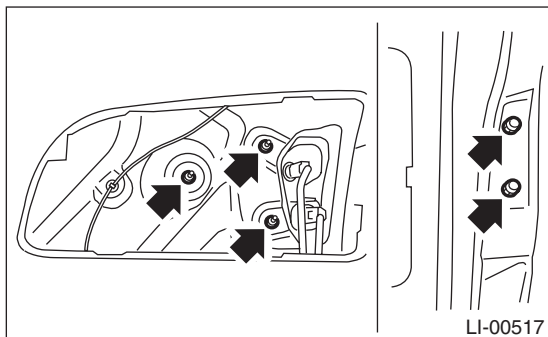
### A: REMOVAL

1) Remove the bulb inspection cover (A) of the rear gate trim.



2) Disconnect the harness connector.

3) Remove the mounting nuts and detach the rear finisher assembly.



### B: INSTALLATION

Install in the reverse order of removal.

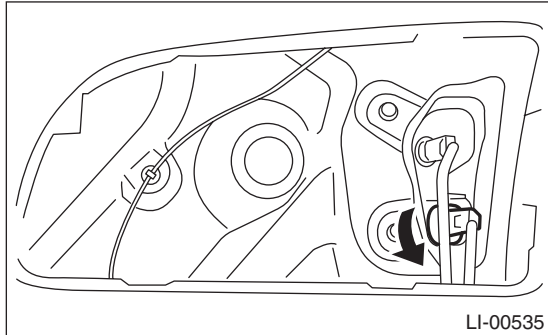
**Tightening torque:**

**4.5 N·m (0.46 kgf·m, 3.3 ft·lb)**

## 25. Back-up Light Bulb

### A: REMOVAL

- 1) Remove the bulb inspection cover of the rear gate trim.
- 2) Turn the socket and remove the bulb.



### B: INSTALLATION

Install in the reverse order of removal.

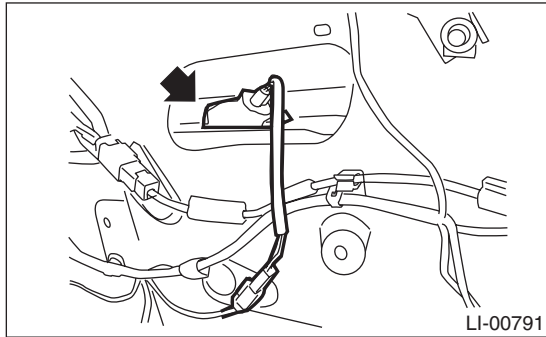
### C: INSPECTION

- 1) Visually check the bulb for blow out.
- 2) Check the bulb specification. <Ref. to LI-2, SPECIFICATION, General Description.>
- 3) If NG, replace the bulb with a new part.

## 26. License Plate Light Assembly

### A: REMOVAL

- 1) Remove the rear gate trim. <Ref. to EI-52, REMOVAL, Rear Gate Trim.>
- 2) Disengage the claws, and disconnect the connectors, and then detach the license plate light assembly.



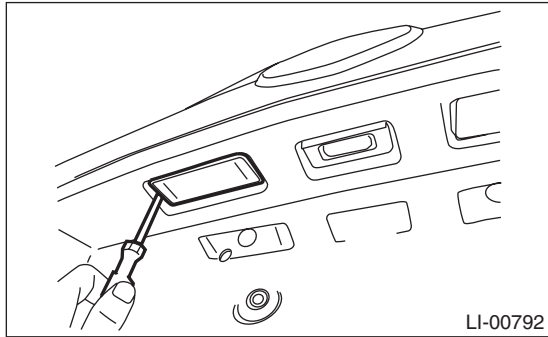
### B: INSTALLATION

Install in the reverse order of removal.

## 27. License Plate Light

### A: REMOVAL

- 1) Remove the license plate light body.



- 2) Remove the bulb.

### B: INSTALLATION

Install in the reverse order of removal.

### C: INSPECTION

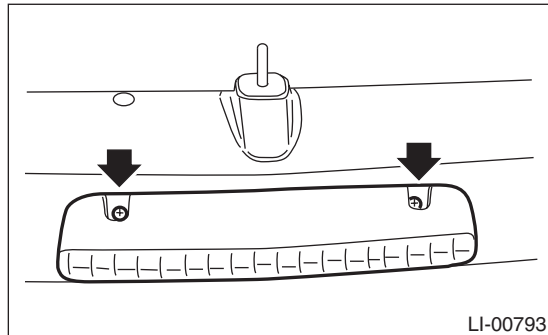
- 1) Visually check the bulb for blow out.
- 2) Check the bulb specification. <Ref. to LI-2, SPECIFICATION, General Description.>
- 3) If NG, replace the bulb with a new part.



## 28.High-mounted Stop Light

### A: REMOVAL

- 1) Disconnect the ground cable from battery.
- 2) Remove the roof spoiler. <Ref. to EI-31, REMOVAL, Roof Spoiler.>
- 3) Remove the cap and screws, then detach the high-mounted stop light.



### B: INSTALLATION

Install in the reverse order of removal.

#### *Tightening torque:*

**1.5 N·m (0.15 kgf·m, 1.1 ft·lb)**

### C: INSPECTION

- 1) Install the high-mounted stop light to test if it illuminates normally.
- 2) If the high-mounted stop light does not illuminate, replace it with a new one.

#### NOTE:

Because LEDs (Light Emitting Diodes) are used for the high-mounted stop light, replace the high-mounted stop light as an assembly if the LEDs went out.

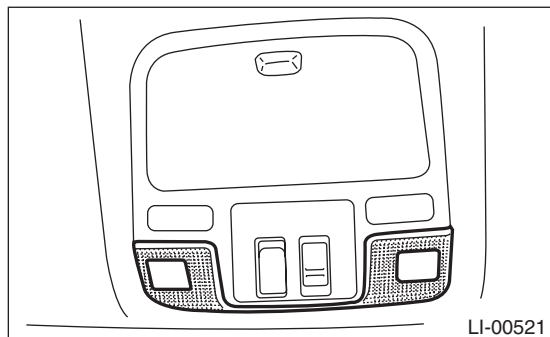
# Spot Map Light

## LIGHTING SYSTEM

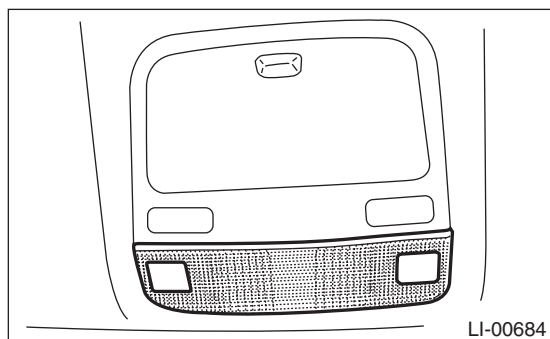
### 29. Spot Map Light

#### A: REMOVAL

- 1) Disconnect the ground cable from battery.
- 2) Remove the lens.
  - Model with sunroof

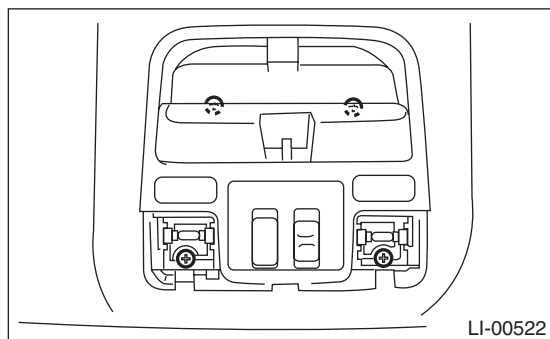


- Model with standard roof

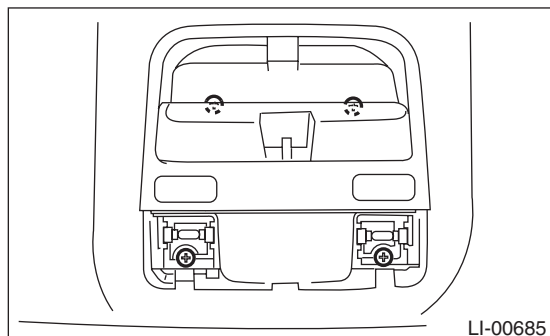


- 3) Remove the four bolts used for mounting the spot map light.

- Model with sunroof



- Model with standard roof



- 4) Disconnect the harness connectors and remove the spot map light.

#### B: INSTALLATION

Install in the reverse order of removal.

#### C: INSPECTION

##### 1. SPOT MAP LIGHT BULB

- 1) Visually check the bulb for blow out.
- 2) Check the bulb specification. <Ref. to LI-2, SPECIFICATION, General Description.>
- 3) If NG, replace the bulb with a new part.

##### 2. SPOT MAP LIGHT SWITCH

Measure the resistance between spot map light switch terminals.

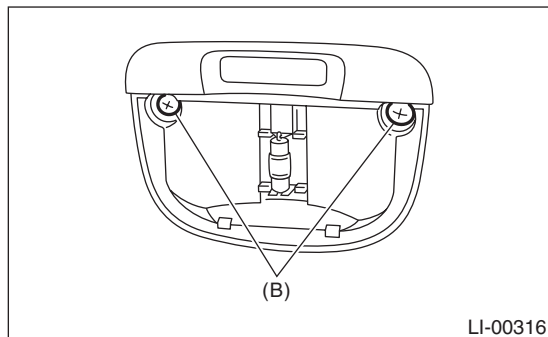
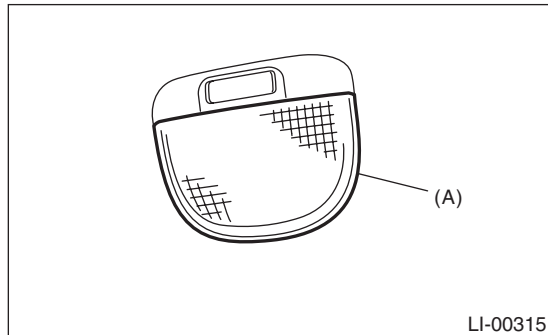
Switch position	Terminal No.	Standard
OFF	—	1 MΩ or more
ON	1 and 2	18±5.4 Ω

## 30.Room Light

### A: REMOVAL

#### 1. MODEL WITHOUT REAR ENTERTAINMENT SYSTEM

- 1) Disconnect the ground cable from the battery.
- 2) Remove the lens (A) and mounting screws (B).



- 3) Disconnect the harness connector and remove the room light.

#### 2. MODEL WITH REAR ENTERTAINMENT SYSTEM

The room light bulb is integrated into the rear entertainment system as a single unit; therefore, refer to Rear Entertainment System for the removal procedure. <Ref. to ET-35, REMOVAL, Rear Entertainment.>

### B: INSTALLATION

Install in the reverse order of removal.

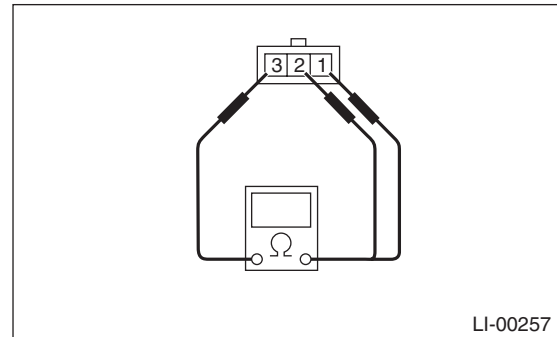
### C: INSPECTION

#### 1. ROOM LIGHT BULB

- 1) Visually check the bulb for blow out.
- 2) Check the bulb specification. <Ref. to LI-2, SPECIFICATION, General Description.>
- 3) If NG, replace the bulb with a new part.

#### 2. ROOM LIGHT SWITCH

Measure the resistance between room light switch terminals.

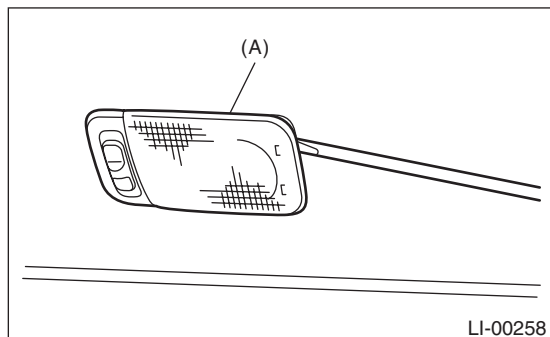


Switch position	Terminal No.	Standard
OFF	—	1 MΩ or more
ON	1 and 3	1.5±0.5 Ω
DOOR	2 and 3	1.5±0.5 Ω

## 31.Luggage Room Light

### A: REMOVAL

- 1) Disconnect the ground cable from the battery.
- 2) Remove the luggage room light body (A).



- 3) Disconnect the harness connector and remove the lens.

### B: INSTALLATION

Install in the reverse order of removal.

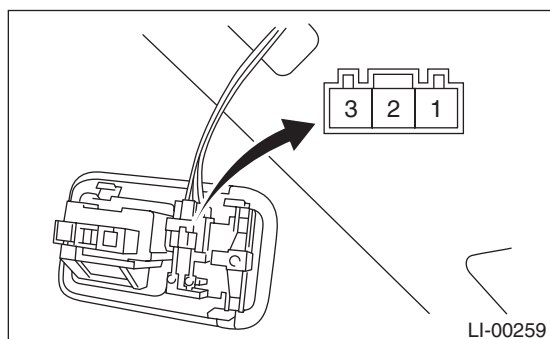
### C: INSPECTION

#### 1. LUGGAGE ROOM LIGHT BULB

- 1) Visually check the bulb for blow out.
- 2) Check the bulb specification. <Ref. to LI-2, SPECIFICATION, General Description.>
- 3) If NG, replace the bulb with a new part.

#### 2. LUGGAGE ROOM LIGHT SWITCH

Measure the resistance between luggage room light switch terminals.

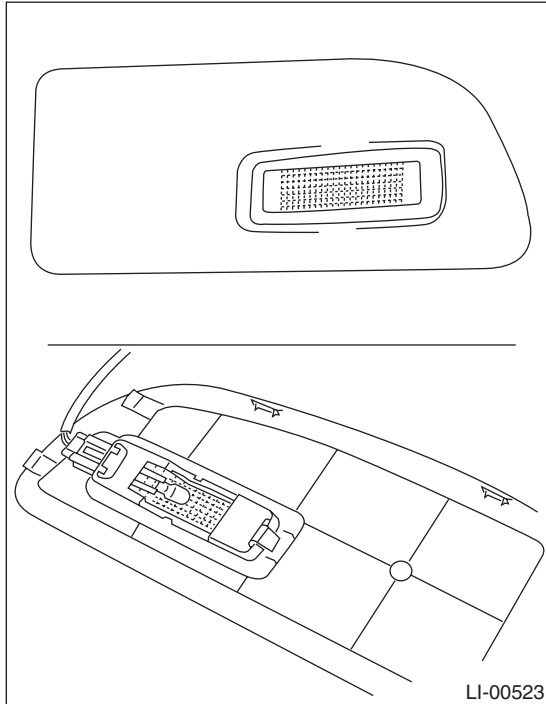


Switch position	Terminal No.	Standard
OFF	—	1 MΩ or more
ON	1 and 2	1.5±0.5 Ω
DOOR	2 and 3	1.5±0.5 Ω

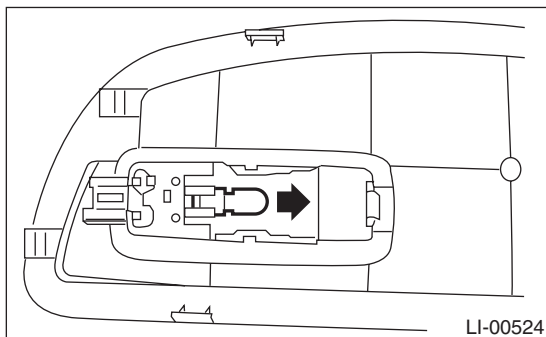
## 32.Rear Gate Light

### A: REMOVAL

- 1) Disconnect the ground cable from the battery.
- 2) Remove the bulb inspection cover of rear gate trim, then disconnect the harness connectors.



- 3) Remove the bulb.



### B: INSTALLATION

Install in the reverse order of removal.

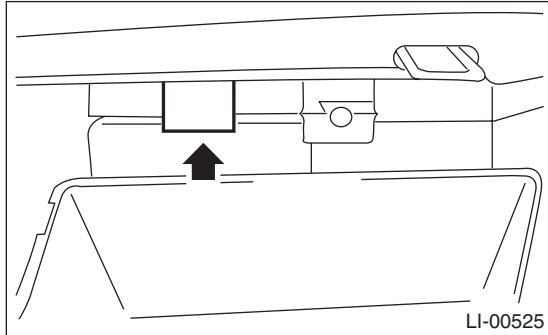
### C: INSPECTION

- 1) Visually check the bulb for blow out.
- 2) Check the bulb specification. <Ref. to LI-2, SPECIFICATION, General Description.>
- 3) If NG, replace the bulb with a new part.

## 33. Glove Box Light

### A: REMOVAL

- 1) Disconnect the ground cable from battery.
- 2) Remove the glove box. <Ref. to EI-38, REMOVAL, Glove Box.>
- 3) Disconnect the harness connector.
- 4) Remove the glove box light.



### B: INSTALLATION

Install in the reverse order of removal.

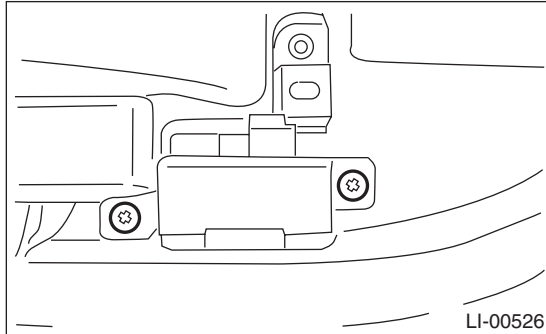
### C: INSPECTION

- 1) Visually check the bulb for blow out.
- 2) Check the bulb specification.  
<Ref. to LI-2, SPECIFICATION, General Description.>
- 3) If NG, replace the bulb with a new part.

## 34. Door Step Light

### A: REMOVAL

- 1) Disconnect the ground cable from battery.
- 2) Remove the front door trim or rear door trim.  
<Ref. to EI-36, REMOVAL, Door Trim.>
- 3) Disconnect the harness connector.
- 4) Remove the mounting screw from the rear side of trim and remove the door step light.



### B: INSTALLATION

Install in the reverse order of removal.

### C: INSPECTION

- 1) Visually check the bulb for blow out.
- 2) Check the bulb specification.  
<Ref. to LI-2, SPECIFICATION, General Description.>
- 3) If NG, replace the bulb with a new part.

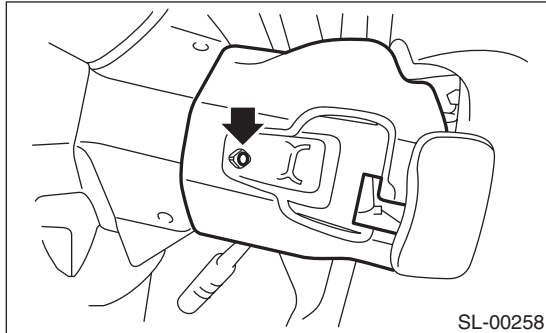
# Ignition Switch Illumination

LIGHTING SYSTEM

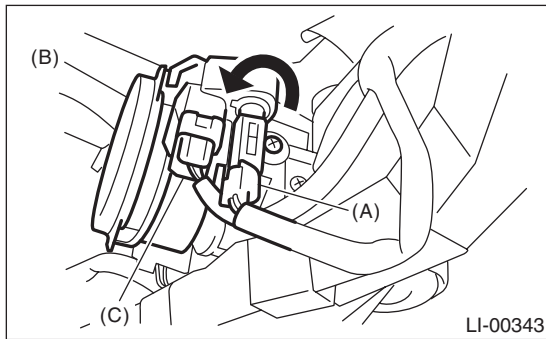
## 35. Ignition Switch Illumination

### A: REMOVAL

- 1) Disconnect the ground cable from the battery.
- 2) Remove the screws, and detach the upper column cover and lower column cover.



- 3) Disconnect the ignition switch illumination connector (A).
- 4) Turn the ignition switch illumination connector to the left and disconnect it.



- (A) Ignition switch illumination connector
- (B) Ignition switch illumination
- (C) Immobilizer antenna connector

### B: INSTALLATION

Install in the reverse order of removal.

### C: INSPECTION

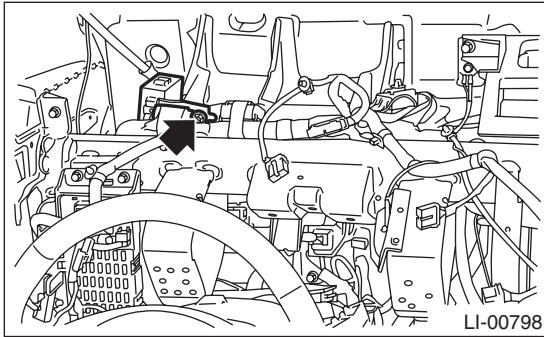
Step	Check	Yes	No
<b>1</b> <b>CHECK THE IGNITION SWITCH ILLUMINATION.</b> Make sure the ignition switch illumination illuminates when driver's side door is open.	Does the ignition switch illumination illuminate?	Ignition switch illumination is normal.	Go to step 2.
<b>2</b> <b>CHECK THE IGNITION SWITCH ILLUMINATION.</b> Make sure the ignition switch illumination blinks when the ignition switch is turned to ON.	Does the ignition switch illumination blink?	Check the function setting of the body integrated unit. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>	Check the ignition switch illumination circuit. <Ref. to SL-22, CHECK IGNITION SWITCH ILLUMINATION, INSPECTION, Keyless Entry System.>



## 36.Day Time Running Light Unit

### A: REMOVAL

- 1) Remove the instrument panel lower cover. <Ref. to EI-37, REMOVAL, Instrument Panel Lower Cover.>
- 2) Remove the fuse box and disconnect the connector.
- 3) Remove the mounting nuts, and detach the day-time running light module.



### B: INSTALLATION

Install in the reverse order of removal.

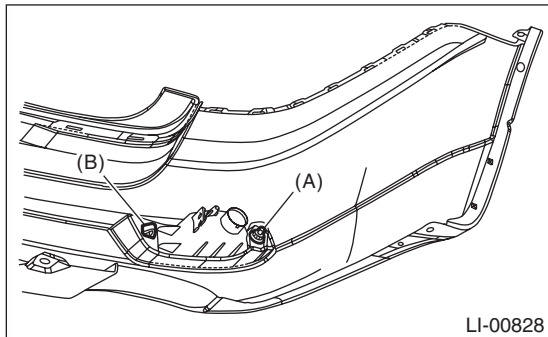
#### ***Tightening torque:***

***7.5 N-m (0.76 kgf-m, 5.5 ft-lb)***

## 37. Reflex Reflector

### A: REMOVAL

- 1) Remove the nut (A) from the back of the rear bumper.
- 2) Remove the reflex reflector by pressing the claw (B) of the reflex reflector.



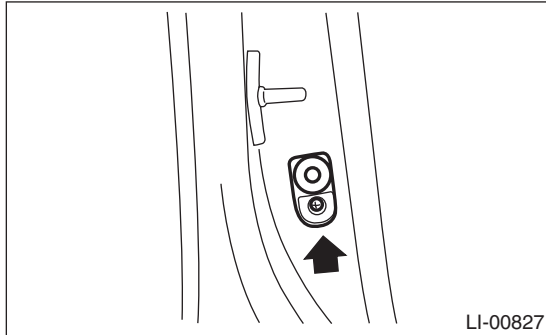
### B: INSTALLATION

Install in the reverse order of removal.

## 38. Door Switch

### A: REMOVAL

- 1) Disconnect the ground cable from battery.
- 2) Remove the screw, and pull out the door switch.



- 3) Disconnect the harness connector.

### B: INSTALLATION

Install in the reverse order of removal.

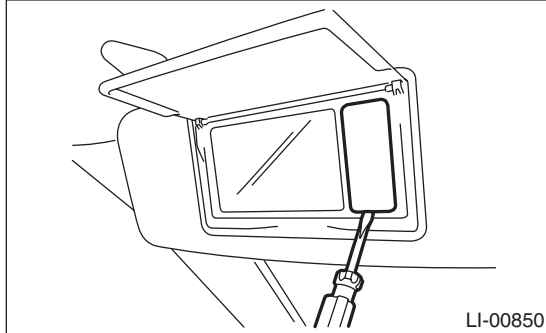
### C: INSPECTION

Refer to the door switch check under the room light system. <Ref. to LI-10, DOOR SWITCH, INSPECTION, Room Light System.>

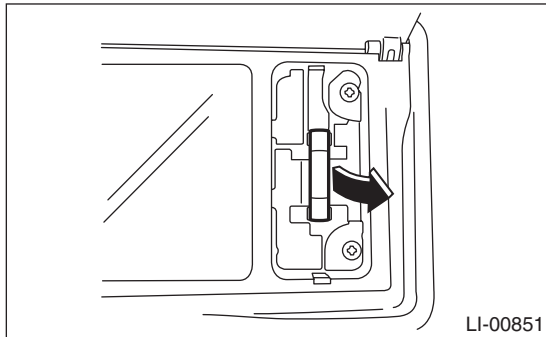
## 39. Vanity Mirror Light

### A: REMOVAL

- 1) Disconnect the ground cable from battery.
- 2) Insert a screwdriver at the edge of the lens, and remove the lens.



- 3) Remove the bulb.



### B: INSTALLATION

Install in the reverse order of removal.

### C: INSPECTION

- 1) Visually check the bulb for blow out.
- 2) Check the bulb specification.  
<Ref. to LI-2, SPECIFICATION, General Description.>
- 3) If NG, replace the bulb with a new part.

# WIPER AND WASHER SYSTEMS



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5. Washer Tank and Motor .....	14
6. Wiper Relay Unit .....	15
7. Front Wiper Arm .....	16
8. Front Wiper Motor and Link .....	17
9. Front Washer Nozzle .....	18
10. Rear Wiper Arm .....	19
11. Rear Wiper Motor .....	20
12. Rear Washer .....	21

# General Description

## WIPER AND WASHER SYSTEMS

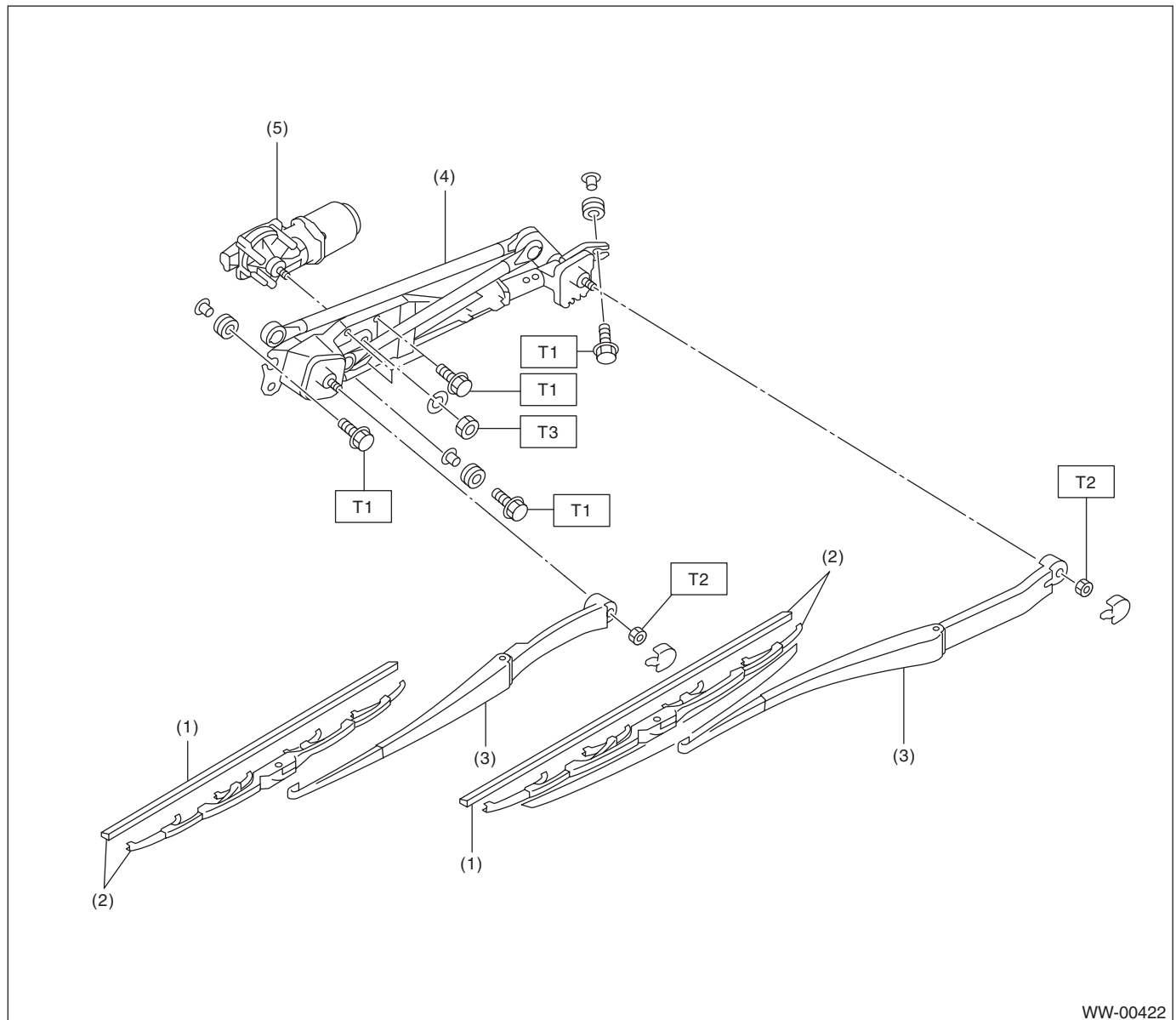
### 1. General Description

#### A: SPECIFICATION

Front wiper motor	Input	12 V — 72 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

##### 1. FRONT WIPER



WW-00422

- |                      |                          |
|----------------------|--------------------------|
| (1) Wiper rubber     | (4) Wiper link ASSY      |
| (2) Wiper blade ASSY | (5) Wiper motor assembly |
| (3) Wiper arm        |                          |

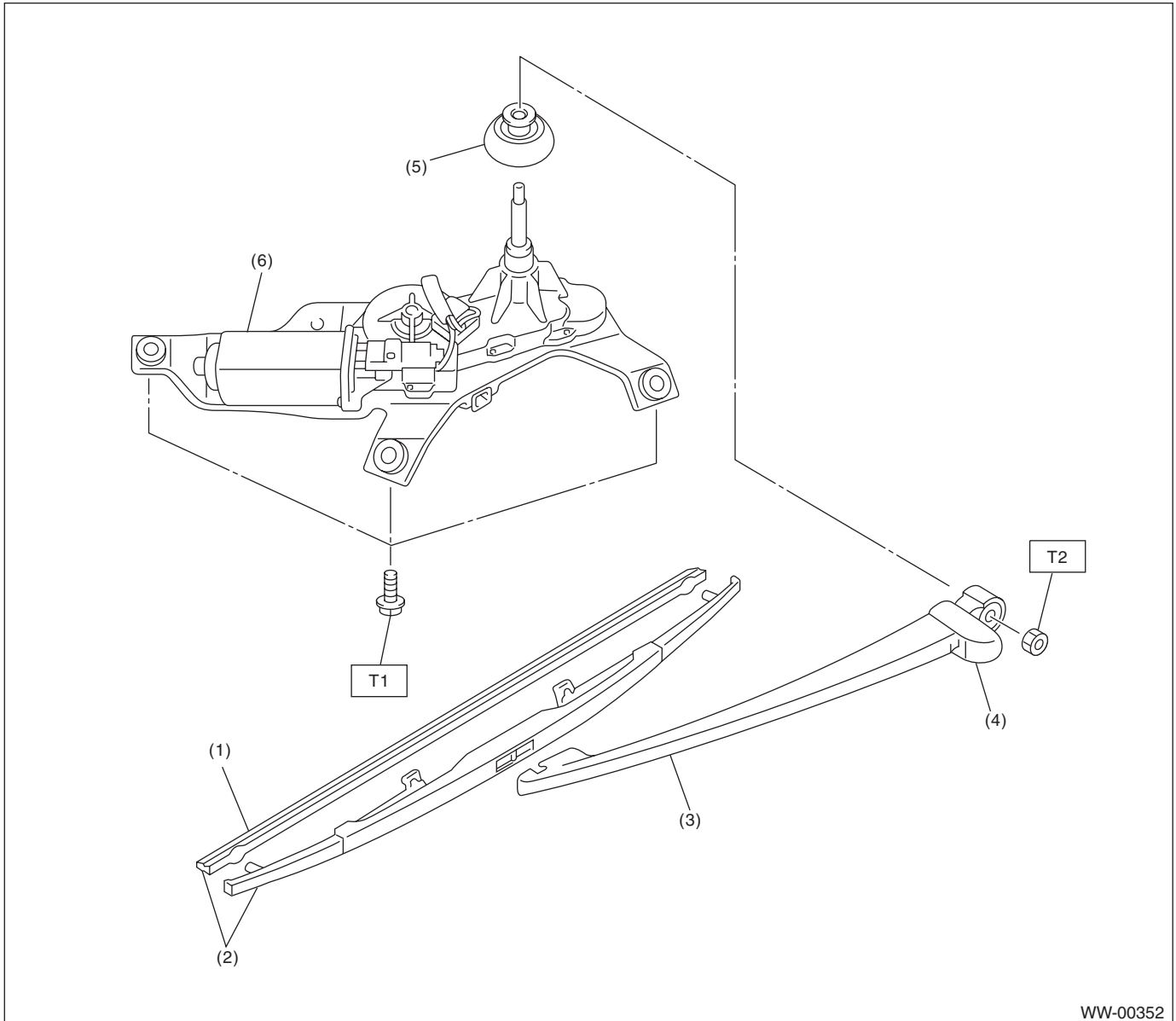
**Tightening torque: N·m (kgf·m, ft·lb)**

**T1: 6.0 (0.61, 4.4)**

**T2: 22 (2.2, 16.2)**

**T3: 31 (3.2, 22.9)**

## 2. REAR WIPER



WW-00352

- |                      |                      |
|----------------------|----------------------|
| (1) Wiper rubber     | (4) Wiper arm cover  |
| (2) Wiper blade ASSY | (5) Cap              |
| (3) Wiper arm        | (6) Wiper motor ASSY |

**Tightening torque: N·m (kgf·m, ft·lb)**

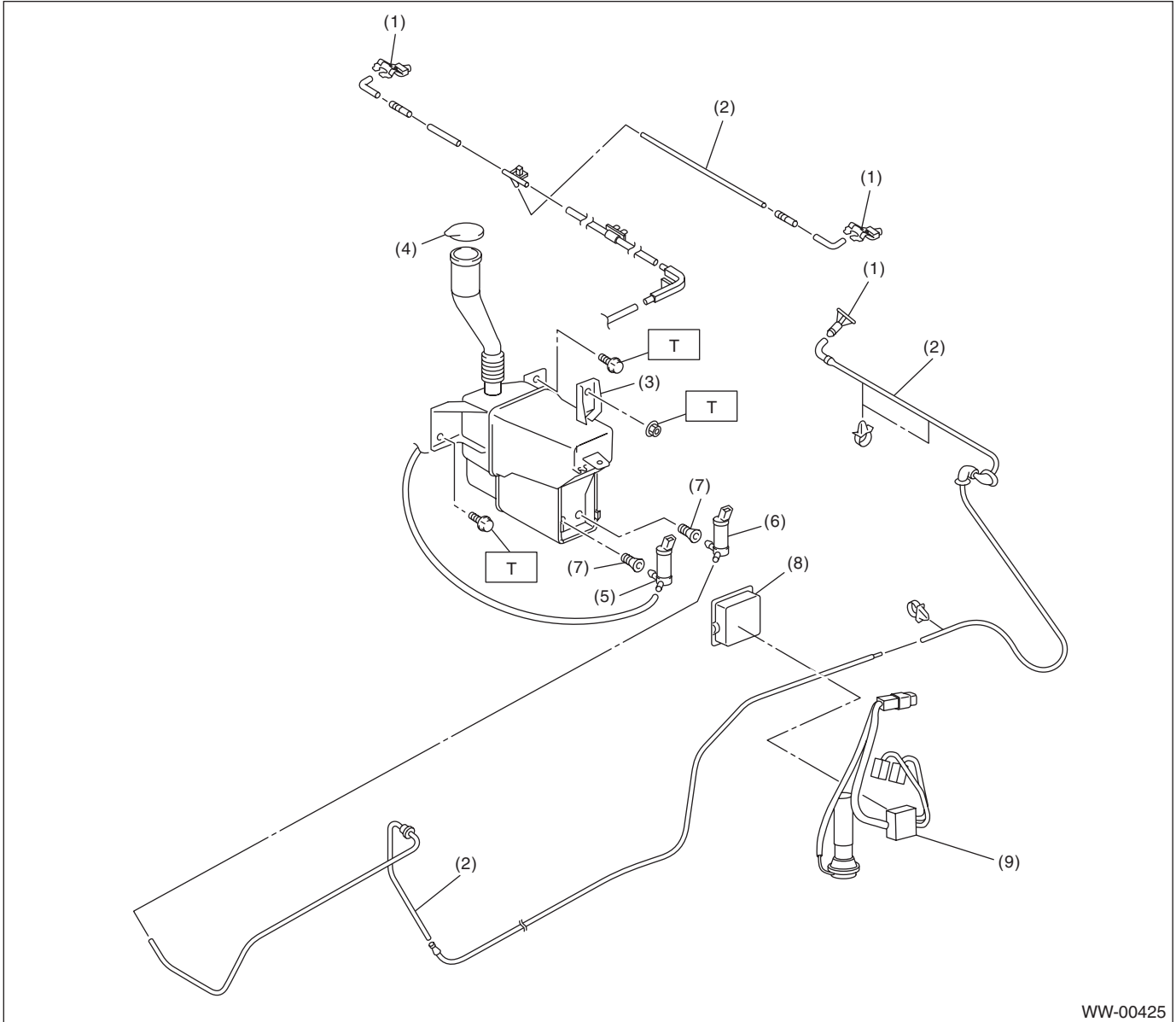
**T1: 7.0 (0.71, 5.2)**

**T2: 8.0 (0.82, 5.9)**

# General Description

## WIPER AND WASHER SYSTEMS

### 3. WASHER TANK



WW-00425

- |                        |  |
|------------------------|--|
| (1) Washer nozzle      | (6) Rear washer motor                        |
| (2) Washer hose        | (7) Grommet                                  |
| (3) Washer tank        | (8) Washer motor cover                       |
| (4) Washer tank cap    | (9) Washer fluid level indicator sensor ASSY |
| (5) Front washer motor |  |

**Tightening torque: N·m (kgf·m, ft·lb)**

**T: 6.0 (0.61, 4.4)**

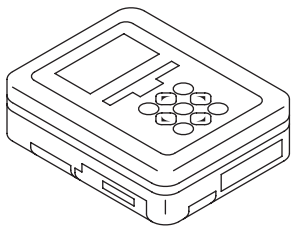


## C: CAUTION

- Connect the connectors and hoses securely during reassembly.
- After reassembly, make sure functional parts operate smoothly.
- Be careful with the airbag system wiring harness which passes near electrical parts and switches.
- All airbag system wiring harness and connectors are colored yellow. Do not use a tester equipment on these circuits.
- Care must be taken when connecting the hoses to pipes so that there are no bends or blockage.
- If even a small amount of silicon oil or grease enters tank and washer fluid passages, an oil film will be formed on the glass and will cause the wiper to chatter and judder. Make sure that no oil comes into contact with the system.

## D: PREPARATION TOOL

### 1. SPECIAL TOOL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
  ST1B022XU0	1B022XU0	SUBARU SELECT MONITOR III KIT	Used for settings of each function and troubleshooting for electrical system.

### 2. GENERAL TOOL

TOOL NAME	REMARKS
Circuit tester	Used for checking voltage and continuity.

# Wiper and Washer System

## WIPER AND WASHER SYSTEMS

## 2. Wiper and Washer System

### A: WIRING DIAGRAM

#### 1. WIPER AND WASHER (FRONT)

<Ref. to WI-111, WIRING DIAGRAM, Front Wiper and Washer System.>

#### 2. WIPER AND WASHER (REAR)

<Ref. to WI-112, WIRING DIAGRAM, Rear Wiper and Washer System.>

### B: INSPECTION

Symptoms	Repair order
Wiper and washers do not operate.	<ol style="list-style-type: none"><li>1. Wiper fuse</li><li>2. Combination switch</li><li>3. Wiper motor assembly</li><li>4. Wiring harness</li><li>5. Wiper relay unit</li><li>6. Body integrated unit (rear wiper only)</li></ol>
Wipers do not operate in LO or HI.	<ol style="list-style-type: none"><li>1. Combination switch</li><li>2. Wiper motor assembly</li><li>3. Wiring harness</li><li>4. Wiper relay unit</li></ol>
Wipers do not operate in INT.	<ol style="list-style-type: none"><li>1. Combination switch</li><li>2. Wiper motor assembly</li><li>3. Wiring harness</li><li>4. Body integrated unit (rear wiper only)</li></ol>
Washer motor does not operate.	<ol style="list-style-type: none"><li>1. Combination switch (washer switch)</li><li>2. Washer motor</li><li>3. Wiring harness</li></ol>
Wipers do not operate when washer switch is ON.	<ol style="list-style-type: none"><li>1. Wiper motor assembly</li><li>2. Wiring harness</li></ol>
Washer fluid spray does not operate properly.	<ol style="list-style-type: none"><li>1. Washer motor</li><li>2. Washer hose and nozzle</li></ol>

### C: NOTE

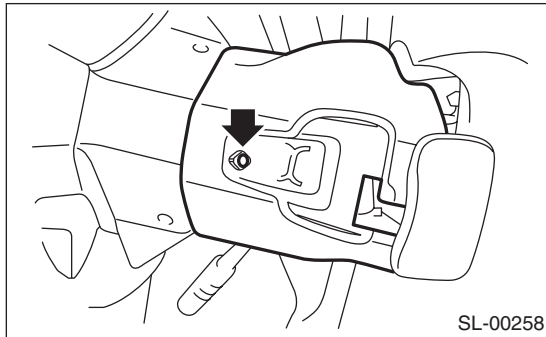
For the wiper and washer system component parts, refer to the corresponding section for each component.

- Combination Switch (Wiper) <Ref. to WW-7, Combination Switch (Wiper).>
- Wiper blade <Ref. to WW-12, Wiper Blade.>
- Front wiper arm <Ref. to WW-16, Front Wiper Arm.>
- Front wiper motor and link <Ref. to WW-17, Front Wiper Motor and Link.>
- Rear wiper arm <Ref. to WW-19, Rear Wiper Arm.>
- Rear wiper motor <Ref. to WW-20, Rear Wiper Motor.>
- Washer tank and motor <Ref. to WW-14, Washer Tank and Motor.>
- Front washer nozzle <Ref. to WW-18, Front Washer Nozzle.>
- Rear washer nozzle <Ref. to WW-21, Rear Washer.>

## 3. Combination Switch (Wiper)

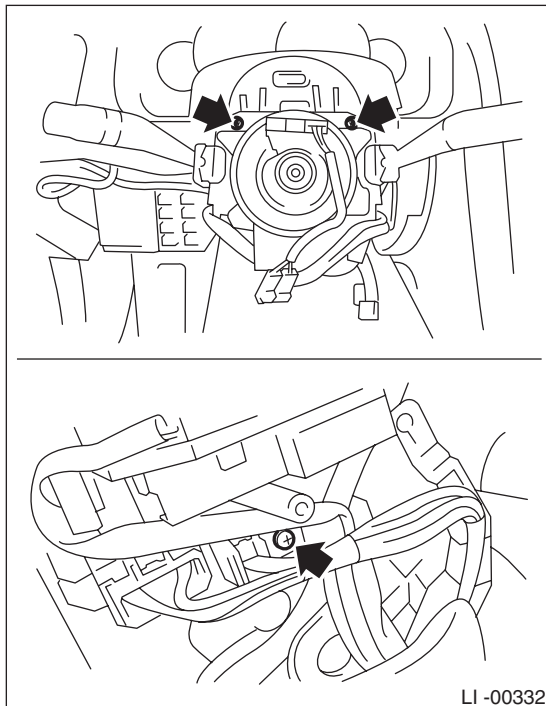
### A: REMOVAL

- 1) Disconnect the ground cable from battery.
- 2) Remove the driver's airbag module. <Ref. to AB-14, REMOVAL, Driver's Airbag Module.>
- 3) Remove the steering wheel. <Ref. to PS-12, REMOVAL, Steering Wheel.>
- 4) Remove the screws and remove the steering column covers (upper & lower).



- 5) Disconnect the connector from the combination switch.

- 6) Remove three screws and pull out the combination base switch assembly.



- 7) Remove the screws which secure the switch, then remove the combination switch.

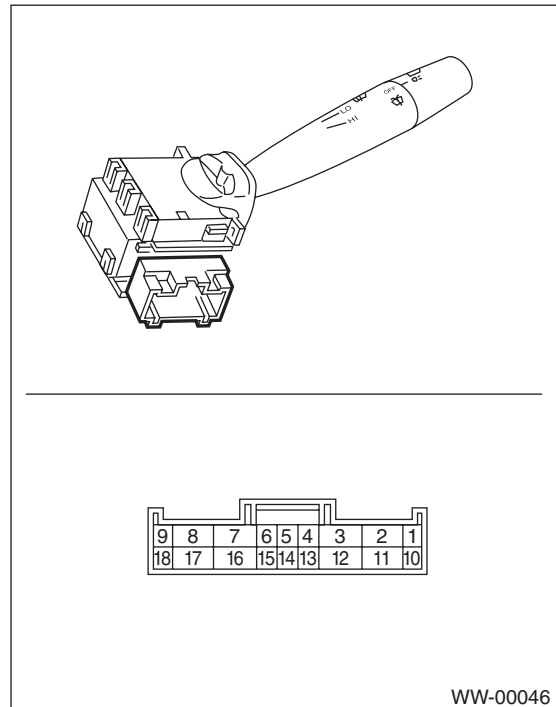
### B: INSTALLATION

Install in the reverse order of removal.

## C: INSPECTION

### 1. COMBINATION SWITCH

- 1) Inspect the continuity between each connector terminal.



	Switch position	Terminal No.	Standard
Front	LO	7 and 17	Less than 1 Ω
	HI	8 and 17	Less than 1 Ω
	Washer ON	2 and 11	Less than 1 Ω
Rear	Washer ON	2 and 12	Less than 1 Ω
	OFF	2 and 10	1 MΩ or more
		2 and 12	
		2 and 13	
		10 and 12	
10 and 13			
12 and 13			
INT	2 and 13	Less than 1 Ω	
ON	2 and 10	Less than 1 Ω	
Washer ON	2 and 12	Less than 1 Ω	
	12 and 10		
	2 and 10		

- 2) If continuity is not as specified, replace the switch.

# Combination Switch (Wiper)

## WIPER AND WASHER SYSTEMS

### 2. FRONT WIPER

#### 1) Check with Subaru Select Monitor

When the front wiper switch is operated, check the input signal using the Subaru Select Monitor.

(1) Prepare the Subaru Select Monitor kit. <Ref. to GW-6, PREPARATION TOOL, General Description.>

(2) Turn the ignition switch to ON (engine OFF) and run the "PC application for Subaru Select Monitor".

(3) On «System Selection Menu» display, select {Integ. unit mode}.

(4) Select the {Current Data Display & Save}.

(5) Check the input signal when the front wiper switch is set to LO or HI.

Check	Yes	No
Is the input signal normal?	Finish the diagnosis.	Inspect the harness. If there are no problems, replace the body integrated unit. <Ref. to SL-48, Body Integrated Unit.>

#### 2) Check the intermittent operation (inspection of the wiper switch alone)

(1) Set the voltage meter between connector terminal No. 7 (+) and No. 2 (-).

(2) Connect the battery between connector terminal No. 7 (+) and No. 2 (-).

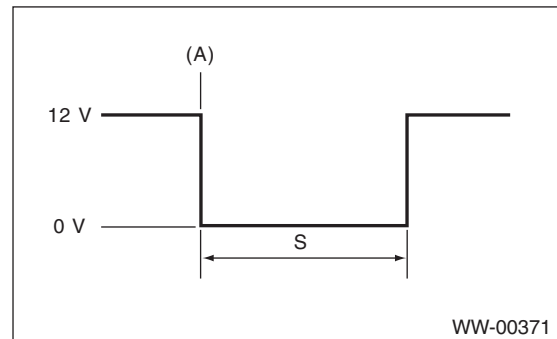
(3) Turn the wiper switch to INT.

(4) Connect the battery ground terminal to the connector terminal No. 16 for five seconds.

(5) After connecting the battery ground terminal for five seconds in step (4), connect the battery positive terminal to the connector terminal No. 16 for five seconds.

(6) After connecting the battery ground terminal and the battery positive terminal to the connector terminal No. 16 for five seconds each in step (4) and (5), connect the ground terminal to the connector terminal No. 16 again.

(7) Perform the step (1) to (6) above at MIN and MAX position of the intermittent control switch. If operation is not as specification, replace the wiper switch assembly.



S: Intermittent down-time (sec.)

(A): Connect battery terminal to No. 16 in step (4).

Intermittent stationary time specification

MIN: Approx. 4 seconds

MAX: Approx. 21 seconds

#### 3) Inspect the vehicle speed response (with the wiper switch installed on the vehicle)

##### (1) Operational check

Position the front wiper switch to INT, then measure the intermittent stationary time at each vehicle speed.

Switch position	Vehicle speed (km/h (MPH))	Intermittent stationary time (sec.)
MIN.	0 (0)	Approx. 4
	30 (19)	Approx. 1.5
	60 (37)	Approx. 1
MAX.	0 (0)	Approx. 21
	30 (19)	Approx. 19.5
	60 (37)	Approx. 18

If operation is not as specified, replace the switch.

##### (2) Check vehicle speed signal

Raise the vehicle speed to 10 km/h (6 MPH) or more, then measure the voltage between the wiper switch connector and the chassis ground.

### Terminals

#### No. 15 (+) — Chassis ground (-):

Check	Yes	No
Does the voltage repeat 12 V and 0 V?	Vehicle speed signal is normal.	Replace the wiper switch.

# Combination Switch (Wiper)

(3) Check of vehicle speed signal harness  
Measure the resistance between the wiper switch connector and the VDC control module.

### Terminals

**Wiper switch connector No. 15 — VDC control module No. 10:**

Check	Yes	No
Is the resistance 0 $\Omega$ ?	Replace the wiper switch.	Repair the harness.

## 3. REAR WIPER

Step	Check	Yes	No
<b>1 CHECK INPUT OF BODY INTEGRATED UNIT.</b> Check the input signal when the rear wiper switch is operated using Subaru Select Monitor. 1) Turn the ignition switch to ACC. 2) Operate the rear wiper switch to each position of ON, INT and Washer ON.	Does the input signal change corresponding to the switch operation?	Go to step 4.	Go to step 2.
<b>2 CHECK HARNESS.</b> 1) Turn the ignition switch to OFF and disconnect the ground cable from the battery. 2) Disconnect the connector of body integrated unit and wiper switch. 3) Measure the resistance between body integrated unit and wiper switch. <b>Connector &amp; terminal</b> (B281) No. 6 — (B70) No. 10: (B281) No. 18 — (B70) No. 13: (B281) No. 27 — (B70) No. 12:	Is the resistance less than 10 $\Omega$ ?	Go to step 3.	Repair the harness between the body integrated unit and wiper switch.
<b>3 CHECK HARNESS.</b> 1) Turn the ignition switch to OFF and disconnect the ground cable from the battery. 2) Disconnect the connector from wiper switch. 3) Measure the resistance between the wiper switch and chassis ground. <b>Connector &amp; terminal</b> (B70) No. 2 (+) — Chassis ground (-):	Is the resistance less than 10 $\Omega$ ?	Check the combination switch (wiper). <Ref. to WW-7, INSPECTION, Combination Switch (Wiper).> If there is no problem, replace the body integrated unit.	Repair the harness between the body integrated unit and wiper switch.
<b>4 CHECK INPUT VOLTAGE OF BODY INTEGRATED UNIT.</b> 1) Connect the ground cable to battery. 2) Turn the ignition switch to ACC and check the input voltage of the body integrated unit. <b>Connector &amp; terminal</b> (B280) No. 21 (+) — Chassis ground (-): (i84) No. 24 (+) — Chassis ground (-):	Is the voltage 10 V or more?	Go to step 5.	Check the harness and fuse.
<b>5 CHECK OUTPUT OF BODY INTEGRATED UNIT 1.</b> When the rear wiper switch is operated, check the output using the Subaru Select Monitor. 1) Turn the ignition switch to ON. 2) Operate the rear wiper switch to ON and Washer ON. 3) Check the output signal of the body integrated unit when the operation in step 2) is performed.	When the rear wiper switch is set to ON, is ON output continuous? Also, when the washer is set to ON, is ON output?	Go to step 6.	Replace the body integrated unit. <Ref. to SL-48, Body Integrated Unit.>

# Combination Switch (Wiper)

## WIPER AND WASHER SYSTEMS

Step	Check	Yes	No
<b>6 CHECK OUTPUT OF BODY INTEGRATED UNIT 2.</b> When the rear wiper switch is operated, check the output using the Subaru Select Monitor. 1) Turn the ignition switch to ON. 2) Operate the rear wiper switch to INT and check the output of the body integrated unit.	When the rear wiper switch is set to INT, is ON/OFF output repeated? (INT OFF time (when vehicle parked): 12 seconds)	Go to step 7.	Replace the body integrated unit. <Ref. to SL-48, Body Integrated Unit.>
<b>7 CHECK HARNESS BETWEEN BODY INTEGRATED UNIT AND REAR WIPER MOTOR.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the harness connector of body integrated unit. 3) Disconnect the harness connector of the rear wiper motor. 4) Measure the resistance between the harness connector terminals of the body integrated unit and rear wiper motor. <b>Connector &amp; terminal</b> <b>(B280) No. 1 — (D43) No. 2:</b>	Is the resistance less than 10 $\Omega$ ?	Go to step 8.	Repair the open circuit of the harness between body integrated unit and rear wiper motor.
<b>8 CHECK HARNESS BETWEEN BODY INTEGRATED UNIT AND REAR WIPER MOTOR.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the harness connector of body integrated unit. 3) Disconnect the harness connector of the rear wiper motor. 4) Measure the resistance between the harness connector terminals of the body integrated unit and rear wiper motor. <b>Connector &amp; terminal</b> <b>(B280) No. 8 — (D43) No. 4:</b>	Is the resistance less than 10 $\Omega$ ?	Go to step 9.	Repair the open circuit of the harness between body integrated unit and rear wiper motor.
<b>9 CHECK POWER SUPPLY CIRCUIT OF THE REAR WIPER MOTOR.</b> 1) Disconnect the harness connector of the rear wiper motor. 2) Turn the ignition switch to ON. 3) Measure the voltage between the rear wiper motor harness connector terminal and chassis ground. <b>Connector &amp; terminal</b> <b>(D43) No. 1 (+) — Chassis ground (-):</b>	Is the voltage 10 V or more?	Go to step 10.	Check the fuse (No. 23 in main fuse box).
<b>10 CHECK GROUND CIRCUIT OF REAR WIPER MOTOR.</b> 1) Turn the ignition switch to OFF. 2) Measure the resistance between the rear wiper motor harness connector terminal and chassis ground. <b>Connector &amp; terminal</b> <b>(D43) No. 3 (+) — Chassis ground (-):</b>	Is the resistance less than 10 $\Omega$ ?	Go to step 11.	Repair the open circuit of the rear wiper motor ground circuit.
<b>11 Check stop position circuit of the rear wiper motor</b> 1) Disconnect the harness connector of the rear wiper motor. 2) Check the continuity of the circuit of rear wiper motor stop position. <b>Connector &amp; terminal</b> <b>(D43) No. 1 (+) — (D43) No. 4 (-):</b>	Is there continuity?	Go to step 12.	Replace the rear wiper motor.

# Combination Switch (Wiper)

## WIPER AND WASHER SYSTEMS

Step	Check	Yes	No
<b>12 CHECK OUTPUT OF BODY INTEGRATED UNIT.</b> 1) Connect the harness connector of body integrated unit. 2) Disconnect the connector of the rear wiper motor. 3) Turn the ignition switch to ACC. 4) Measure the voltage between rear wiper motor connector and chassis ground. <b>Connector &amp; terminal</b> <b>(D43) No. 2 (+) — Chassis ground (-):</b>	Is the voltage less than 1.0 V when the rear wiper switch is OFF, and is the voltage 9 V or more when the rear wiper switch is ON?	Go to step 13.	Replace the body integrated unit. <Ref. to SL-48, Body Integrated Unit.>
<b>13 CHECK OPERATION OF REAR WIPER MOTOR.</b> 1) Remove the rear wiper motor. 2) Check the rear wiper motor. <Ref. to WW-20, INSPECTION, Rear Wiper Motor.>	Does the rear wiper motor rotate normally?	System is normal.	Replace the rear wiper motor.

### 4. Wiper Blade

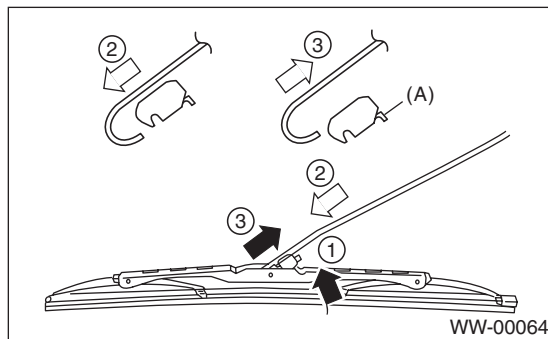
#### A: REMOVAL

##### CAUTION:

When replacing the wiper blade, if standing up the wiper arm, be sure to stand up the driver's side wiper arm first, and then passenger's side wiper arm next. Also, when putting the wiper arms back, be sure to start with passenger's side first, then driver's side next. Doing this in the reverse order may result in the driver's side wiper blade hitting the passenger's side wiper arm and causing damage.

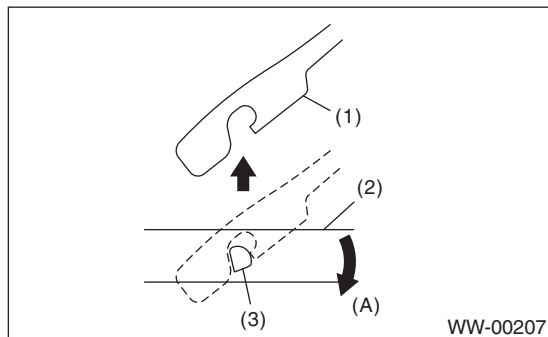
#### 1. FRONT

While pushing the locking clip upward to the direction of the arrow, remove the blade from the arm by pulling to the direction of the arrow.



#### 2. REAR

Turn the blade in the direction of arrow (A) and remove it from arm.



- (A) Turn the wiper blade.
- (1) Wiper arm
- (2) Wiper blade
- (3) Wiper blade attachment section

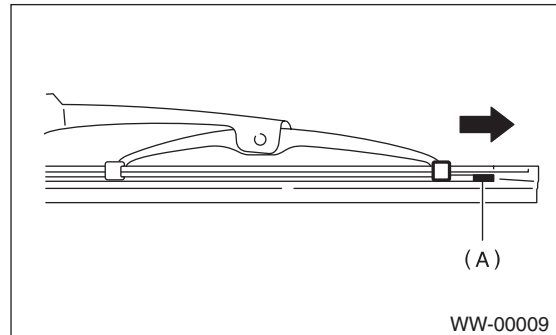
#### B: INSTALLATION

- 1) Install in the reverse order of removal.
- 2) Confirm that the clip is locked securely.

#### C: DISASSEMBLY

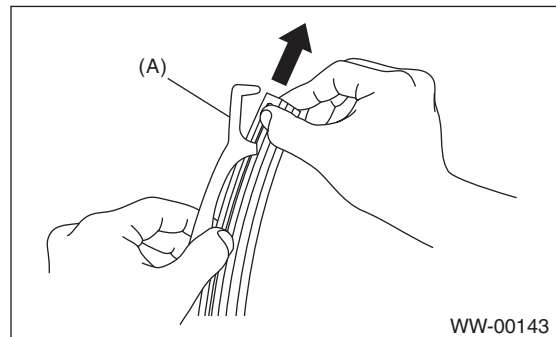
##### 1. FRONT

Pull side (A) of the wiper rubber stopper and remove the rubber from the blade assembly.



##### 2. REAR

Pull the wiper rubber top slightly from stopper (A) and pull out completely.

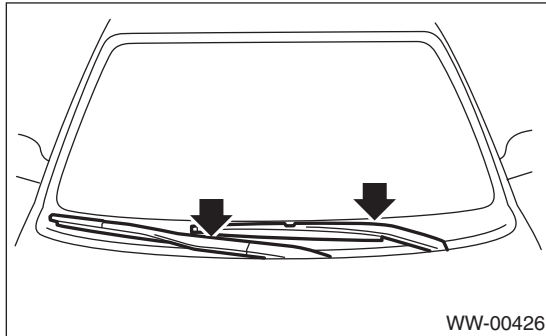




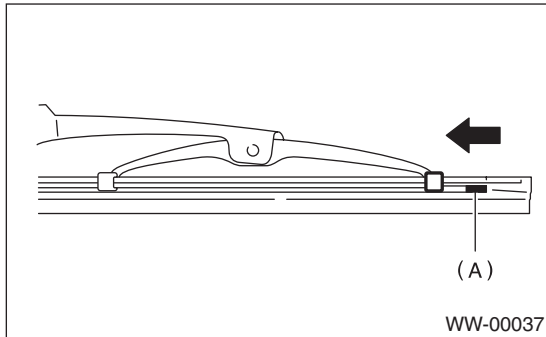
### D: ASSEMBLY

#### 1. FRONT

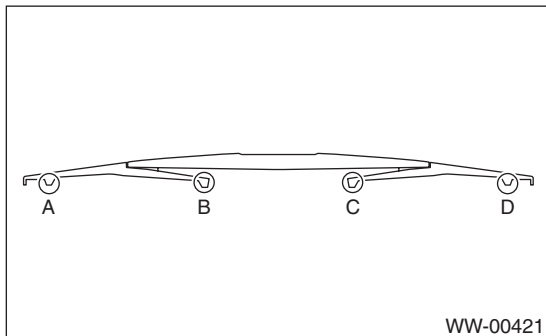
1) Insert the wiper rubber onto the blade so that the stopper is in the position shown in the figure.



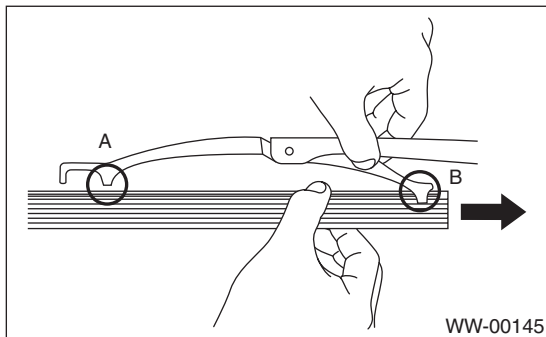
2) Make sure the wiper rubber is securely fastened to pull stopper (A).



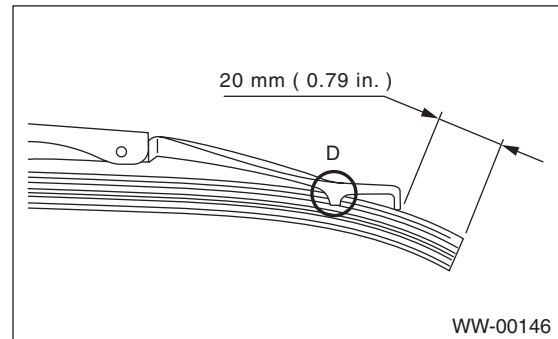
#### 2. REAR



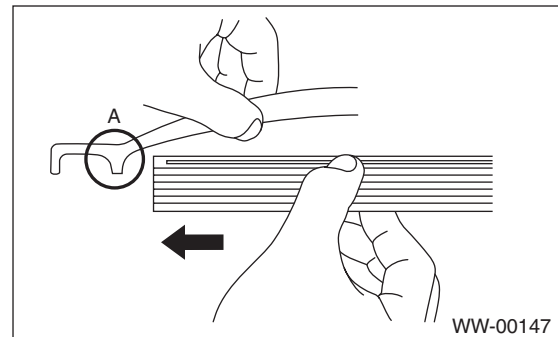
1) Insert the wiper rubber into claw B.



2) Insert the wiper rubber until its top end protrudes approx. 20 mm (0.79 in.) from stopper D.



3) Insert the wiper rubber into claw A.



### E: INSPECTION

1) When the wiper does not operate properly, inspect the following item.

- Make sure the movable part of wiper blade assembly moves smoothly.
- Make sure the wiper rubber is not deformed or damaged.

2) If damaged, replace with a new part.

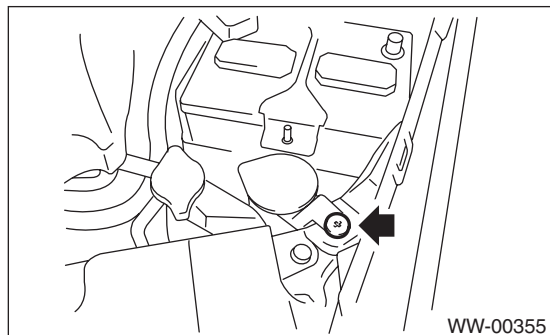
# Washer Tank and Motor

## WIPER AND WASHER SYSTEMS

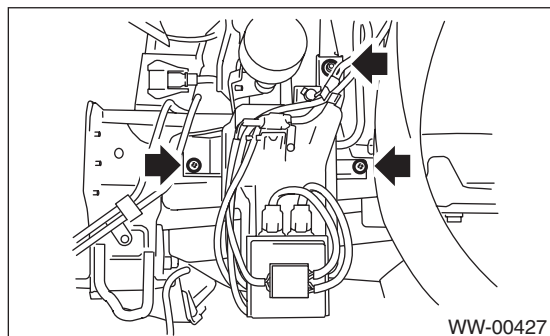
### 5. Washer Tank and Motor

#### A: REMOVAL

- 1) Open the front hood.
- 2) Disconnect the ground cable from battery.
- 3) Remove the front bumper. <Ref. to EI-22, REMOVAL, Front Bumper.>
- 4) Remove the clip holding washer water supply tap.



- 5) Remove the two bolts and one nut, hose, connector and washer motor cover, and then remove the washer tank.



#### B: INSTALLATION

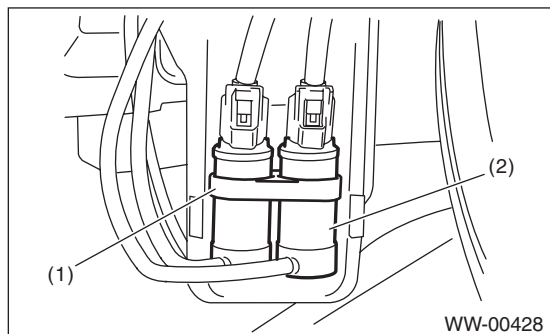
Install in the reverse order of removal.

#### Tightening torque:

**6.0 N·m (0.61 kgf·m, 4.4 ft·lb)**

#### C: DISASSEMBLY

- 1) Slide the washer motor holder (1) upward to remove it.
- 2) Pull out the washer motor (2) from the tank.

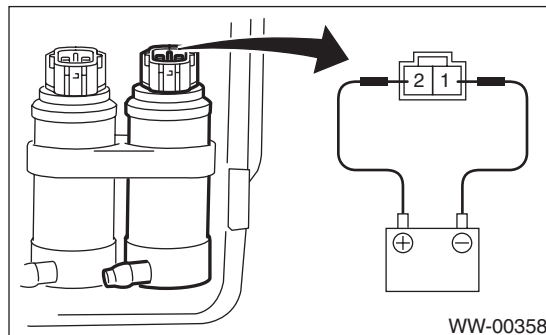


#### D: ASSEMBLY

- 1) Assemble in the reverse order of disassembly.
- 2) Confirm that water does not leak from installation area of motor.

#### E: INSPECTION

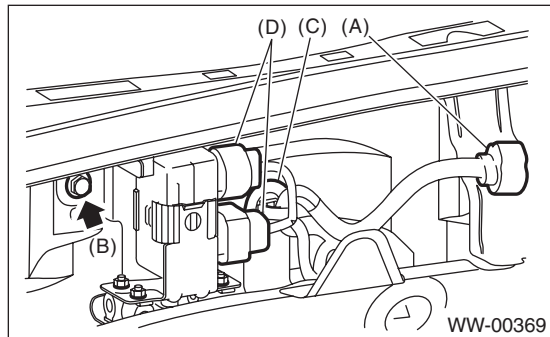
Apply battery voltage to the connector terminal of the washer motor and make sure the motor operates.



## 6. Wiper Relay Unit

### A: REMOVAL

- 1) Disconnect the ground cable from the battery.
- 2) Remove the wiper arm. <Ref. to WW-16, REMOVAL, Front Wiper Arm.>
- 3) Remove the cowl panel. <Ref. to EI-30, REMOVAL, Cowl Panel.>
- 4) Disconnect connector (A) of the wiper motor assembly.
- 5) Remove bolt (B) and clip (C).
- 6) Disconnect connector (D) of the wiper relay unit.



#### NOTE:

Unit body, bracket, and rubber mount is an assembly component and cannot be disassembled.

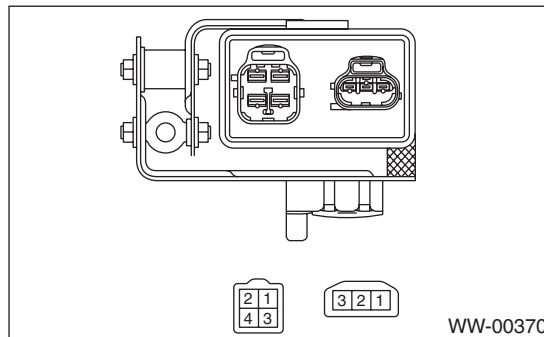
### B: INSTALLATION

#### CAUTION:

- Do not reuse the clips. Always replace them with new parts.
- Make sure the connector connection and clip insertion is secure, and confirm the contact.

Install in the reverse order of removal.

### C: INSPECTION



- 1) Inspect the continuity of 4 pole connector.

Terminal No.	Specification
1 and 2	Less than 1 Ω

- 2) Connect the battery to the 3 pole connector and measure the continuity of 4 pole connector.

Terminal No.		Specification
3 pole connector	4 pole connector	
2 and 3	1 and 4	Less than 1 Ω
1 and 2	3 and 4	Less than 1 Ω

- 3) When measurement value is different from the specification, replace the wiper relay unit.

# Front Wiper Arm

## WIPER AND WASHER SYSTEMS

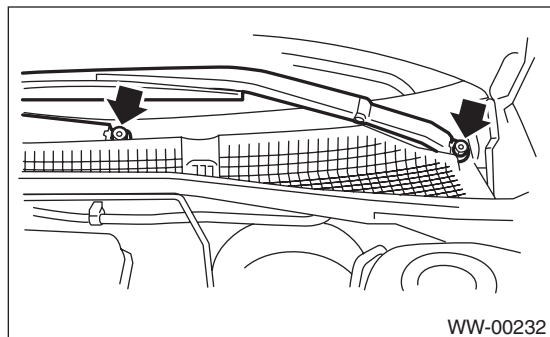
### 7. Front Wiper Arm

#### A: REMOVAL

##### CAUTION:

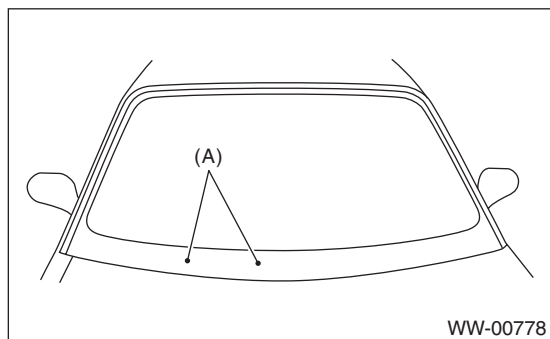
When standing up the wiper arm, be sure to stand up the driver's side wiper arm first, and then passenger's side wiper arm next. Also, when putting the wiper arms back, be sure to start with passenger's side first, then driver's side next. Doing this in the reverse order may cause the driver's side wiper blade to hit the passenger's side wiper arm and cause damage.

- 1) Remove the cap.
- 2) Remove the nut and remove the wiper arm.



#### B: INSTALLATION

- 1) Install in the reverse order of removal.
- 2) Operate the wiper once.
- 3) Align the wiper blade to ceramic print point mark (A) of front window panel.

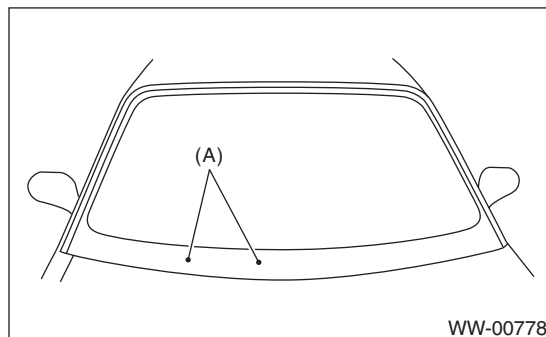


##### Tightening torque:

Refer to "COMPONENT" of "General Description". <Ref. to WW-2, FRONT WIPER, COMPONENT, General Description.>

#### C: ADJUSTMENT

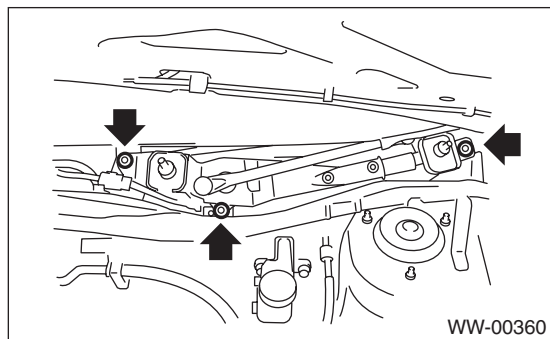
Operate the wiper once. Align the wiper blade to ceramic print point mark (A) of front window panel.



## 8. Front Wiper Motor and Link

### A: REMOVAL

- 1) Disconnect the ground cable from battery.
- 2) Remove the cowl panel. <Ref. to EI-30, REMOVAL, Cowl Panel.>
- 3) Remove the bolt, and then remove the wiper assembly.
- 4) Disconnect the connector of wiper motor assembly.



**NOTE:**

The wiper motor and wiper link is an assembly part and is not to be disassembled.

### B: INSTALLATION

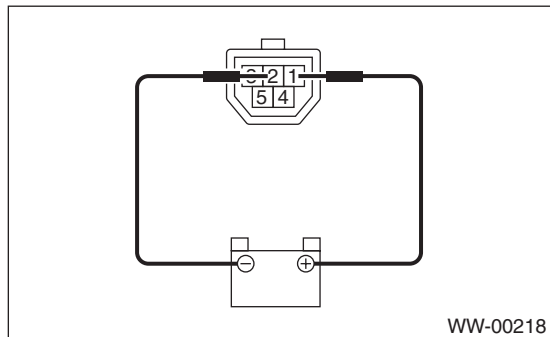
Install in the reverse order of removal.

**Tightening torque:**

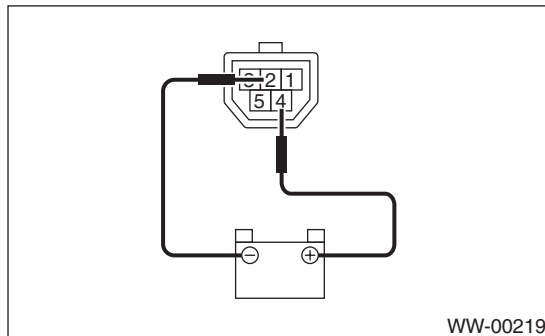
Refer to "COMPONENT" of "General Description". <Ref. to WW-2, FRONT WIPER, COMPONENT, General Description.>

### C: INSPECTION

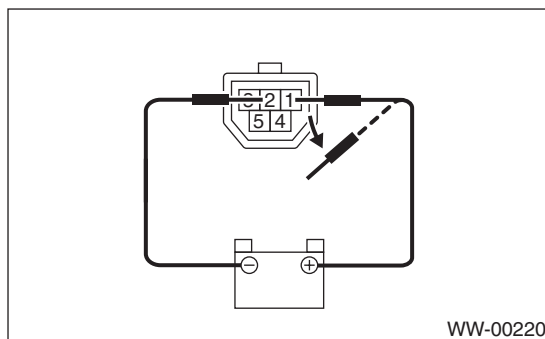
- 1) When the battery is connected to the terminal of connectors, confirm that the wiper motor operates at low speed.



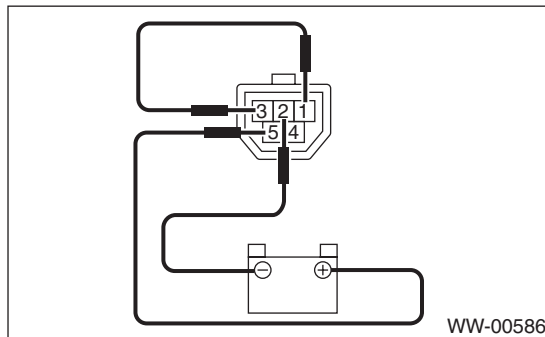
- 2) When the battery is connected to the terminal of connectors, confirm that the wiper motor operates at high speed.



- 3) Connect the battery to terminals of the connector, and remove the terminal connection with wiper motor rotating at low speed, and stop the wiper motor in mid-operation.



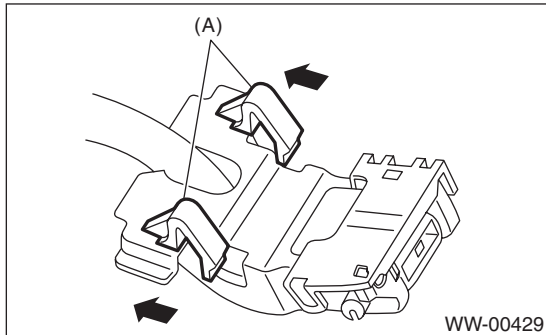
- 4) Connect the battery and confirm that the wiper motor stops at the automatic stop position after the wiper motor operates at low speed again.



### 9. Front Washer Nozzle

#### A: REMOVAL

- 1) Remove the front hood insulator. <Ref. to EB-12, FRONT HOOD INSULATOR, REMOVAL, Front Hood.>
- 2) Hold the claw (A) of the washer nozzle towards the direction of the arrow, and remove the washer nozzle.



- 3) Remove the washer hose from the washer nozzle.

#### B: INSTALLATION

Install in the reverse order of removal.

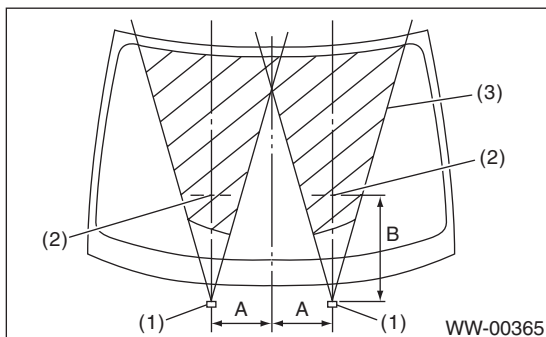
#### C: INSPECTION

- Make sure the nozzle and hose are not clogged.
- Make sure the hose is not bent.
- While the vehicle is at a standstill and the wiper switch is turned OFF, make sure that the washer injection position is as shown in the figure.

#### Spray position:

**A: 250 mm (9.84 in)**

**B: 433 mm (17.05 in)**

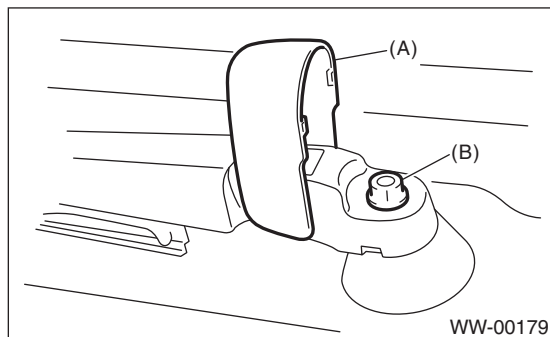


- (1) Nozzle
- (2) Spray center aiming position
- (3) Spray area (shaded area)

## 10.Rear Wiper Arm

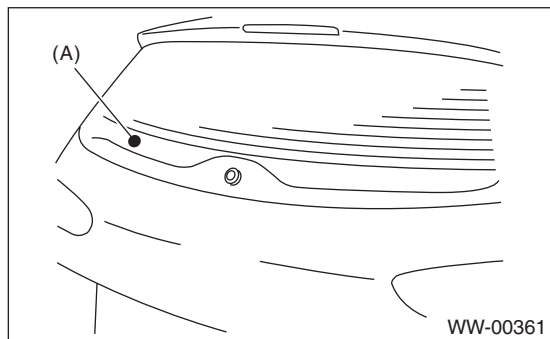
### A: REMOVAL

- 1) Detach the wiper arm cover (A).
- 2) Remove the nut (B) to remove the wiper arm.



### B: INSTALLATION

- 1) Install in the reverse order of removal.
- 2) Operate the rear wiper once.
- 3) Align the blade with the marking (A) of the glass.

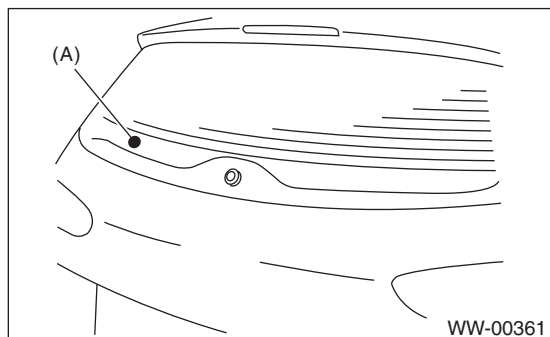


#### **Tightening torque:**

Refer to “COMPONENT” of “General Description”. <Ref. to WW-3, REAR WIPER, COMPONENT, General Description.>

### C: ADJUSTMENT

- 1) Operate the rear wiper once.
- 2) Align the blade with the marking (A) of the glass.



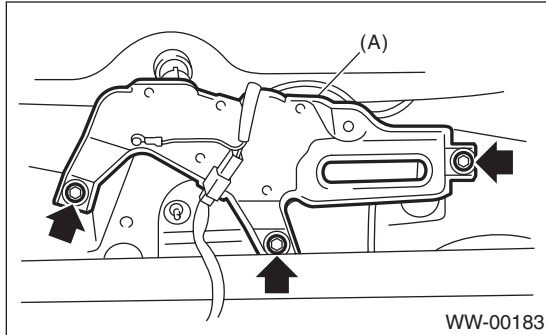
# Rear Wiper Motor

## WIPER AND WASHER SYSTEMS

### 11.Rear Wiper Motor

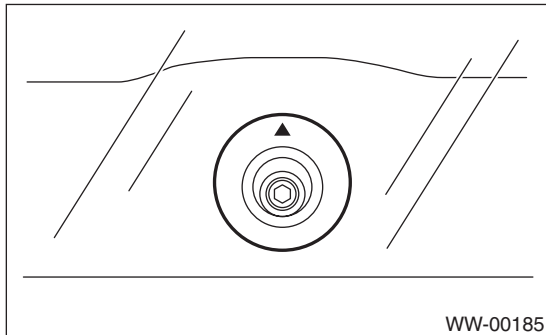
#### A: REMOVAL

- 1) Disconnect the ground cable from battery.
- 2) Remove the rear wiper arm. <Ref. to WW-19, REMOVAL, Rear Wiper Arm.>
- 3) Remove the rear gate lower trim. <Ref. to EI-52, REMOVAL, Rear Gate Trim.>
- 4) Disconnect the harness connector of wiper motor assembly.
- 5) Remove the bolts to remove wiper motor assembly (A).



#### B: INSTALLATION

- 1) Install in the reverse order of removal.
- 2) Be sure that the pivot cap with the arrow mark facing up, as shown in the figure.

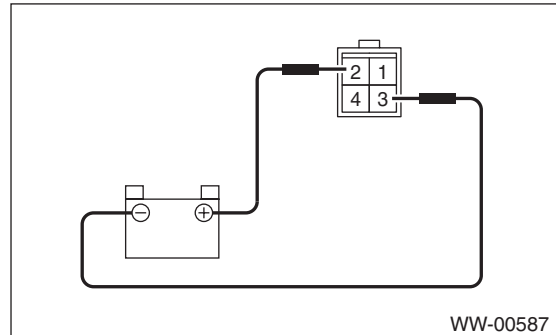


#### Tightening torque:

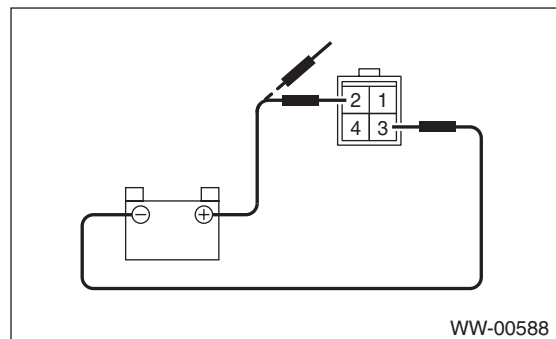
Refer to "COMPONENT" of "General Description". <Ref. to WW-3, REAR WIPER, COMPONENT, General Description.>

#### C: INSPECTION

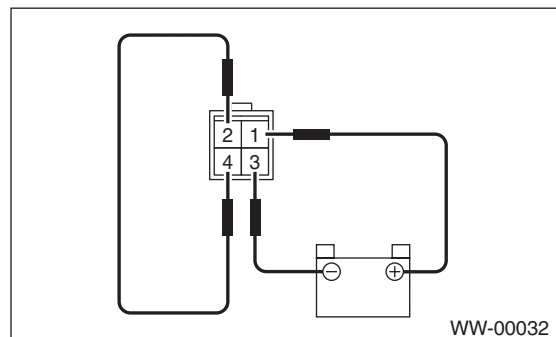
- 1) Connect the battery to the wiper motor connector and confirm that wiper motor operates.



- 2) Connect the battery to terminals of the connector, and remove the terminal connection with wiper motor rotating, and stop the wiper motor in mid-operation.



- 3) Connect the battery and confirm that the wiper motor stops at the automatic stop position after the wiper motor operates at low speed again.

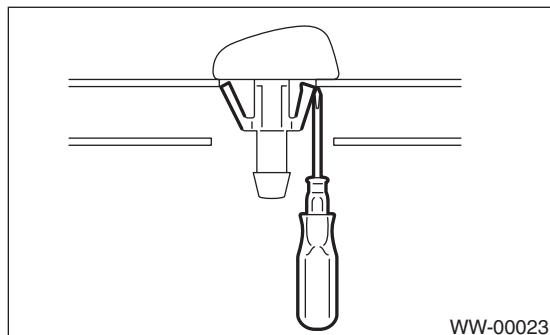




## 12.Rear Washer

### A: REMOVAL

- 1) Remove the rear gate upper trim. <Ref. to EI-52, REMOVAL, Rear Gate Trim.>
- 2) Remove the washer hose from washer nozzle.
- 3) Push the claw of the nozzle from the backside of rear gate panel with a flat tip screwdriver or equivalent, and remove the washer nozzle.



### B: INSTALLATION

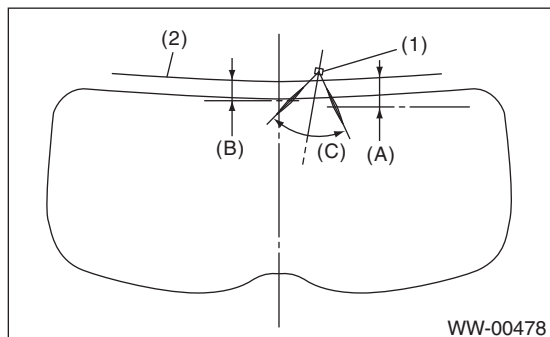
Install in the reverse order of removal.

### C: INSPECTION

- Make sure the nozzle and hose are not clogged.
- Make sure the hose is not bent.
- While the vehicle is at a standstill, make sure that the washer injection position is as shown in the figure.

#### NOTE:

Washer injection position can not be adjusted.



- (1) Nozzle
- (2) Upper edge of the rear gate glass
- (A) From rear gate glass upper end to center of washer fluid spraying: 71 mm (2.8 in)
- (B) From rear gate glass upper end to center of washer fluid spraying: 56 mm (2.2 in)
- (C) 72°

# Rear Washer

WIPER AND WASHER SYSTEMS

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# ENTERTAINMENT

# ET

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## 1. General Description

### A: CAUTION

- Before disassembling or reassembling parts, always disconnect the battery ground cable from battery.
- When replacing the audio, control module and other parts provided with memory functions, record the memory contents before disconnecting the battery ground cable. Otherwise, the memory is cleared.
- Reassemble the parts in the reverse order of disassembly procedure unless otherwise indicated.
- Adjust parts to the given specifications.
- Connect the connectors securely during reassembly.
- After reassembly, make sure functional parts operate smoothly.

### B: PREPARATION TOOL

#### 1. GENERAL TOOL

TOOL NAME	REMARKS
Circuit tester	Used for measuring resistance and voltage.
Conductive silver composition (DUPONT No. 4817 or equivalent)	Used for repairing antenna wire.

## 2. Audio System

### A: WIRING DIAGRAM

<Ref. to WI-115, WIRING DIAGRAM, Audio System.>

### B: INSPECTION

Symptom	Repair order
No power coming in. (No display and no sound from speakers)	<ol style="list-style-type: none"> <li>1. Check the fuse and power supply for audio.</li> <li>2. Check the audio ground.</li> <li>3. Remove the audio and repair them.</li> </ol>
A specific speaker does not operate.	<ol style="list-style-type: none"> <li>1. Check the speaker.</li> <li>2. Check the output circuit between audio and speaker.</li> </ol>
Audio generates noise with engine is running.	<ol style="list-style-type: none"> <li>1. Check the audio ground.</li> <li>2. Check the generator.</li> <li>3. Check the ignition coil.</li> <li>4. Remove the audio and repair them.</li> </ol>
Volume is low in AM and FM modes or interference noise occurs.	<ol style="list-style-type: none"> <li>1. Check the antenna.</li> <li>2. Check the rear window defogger.</li> <li>3. Check the antenna amplifier.</li> <li>4. Check the noise suppressor.</li> <li>5. Check the audio ground.</li> <li>6. Remove the audio and repair them.</li> </ol>
Noise occurs at the rear window defogger operation.	<ol style="list-style-type: none"> <li>1. Check the rear window defogger.</li> </ol>

### C: NOTE

For removal of each component of the audio system, refer to the respective section.

- Audio unit <Ref. to ET-13, Audio.>
- Control panel <Ref. to ET-9, Control Panel.>
- Front speaker <Ref. to ET-14, Front Speaker.>
- Center speaker <Ref. to ET-15, Center Speaker .>
- Tweeter <Ref. to ET-16, Tweeter.>
- Rear speaker <Ref. to ET-17, Rear Speaker.>
- Woofer <Ref. to ET-18, Woofer.>
- Antenna <Ref. to ET-20, Antenna.>

## 3. Navigation System

### A: WIRING DIAGRAM

<Ref. to WI-127, WIRING DIAGRAM, Navigation System.>

### B: INSPECTION

#### 1. CHECK THE OPERATION OF THE NAVIGATION

Start the engine, and then inspect that the opening screen is displayed.

Standard value: The opening screen should be displayed.

OK: Normal

NG: When not displayed, check the signal line connector and the audio connector. If there are no problems in the connecting lines or the lines were repaired, check that the opening screen is displayed.

At this point, if the display is not viewable, the unit is defective.

#### 2. CHECK THE DVD-ROM

An opening screen is displayed, then it switches to the map screen after a while.

When a screen other than the opening screen is displayed, press the «MAP» key.

Standard value: The map screen should be displayed.

OK: Normal

NG: If the map screen is not displayed, check whether the DVD-ROM is set in the navigation system, whether the correct side is set, type of the DVD-ROM, the existence of any scratches, etc. If there are no problems on the DVD-ROM, the main body is defective.

#### 3. CHECK EACH CONNECTION

If no problem is found in inspections 1 and 2 above, perform inspection using “<Ref. to WI-127, WIRING DIAGRAM, Navigation System.>” of the navigation system.

#### 4. SWITCHING TO CONNECTION INSPECTION MODE

- 1) Press the menu key.
  - 2) Select navigation setup from the menu screen.
  - 3) Select navigation information from the navigation setup screen.
  - 4) Select the vehicle signal from the navigation information screen.
  - 5) The display will switch to the vehicle signal (for connection inspection) screen.
  - 6) Check that the display changes according to each operation.
- ON: Normal  
NG: Check the circuit when the display does not change.

#### 5. CHECK THE GPS ANTENNA

##### NOTE:

When checking the GPS antenna, perform the check operation outdoors to improve the receiver sensitivity.

Make sure that a value other than “zero” is displayed in the GPS item.

OK: Normal

NG: If “No positioning” is displayed, check the GPS antenna connection.

If the GPS display is red, the main unit could be faulty.

#### 6. CHECK THE BACK SENSOR

##### NOTE:

Before starting inspections, inspect the safety around the rear end of the vehicle.

- 1) Turn the ignition switch to ON.
  - 2) Pull the parking brake and depress the brake, then put the gear in reverse.
  - 3) Make sure that “On” is lit in the back sensor item.
- Standard Value: “On” should be lit.

On: Normal

NG: If “On” does not light, check the signal line connection. If there are no problems, the unit could be faulty.

#### 7. CHECK THE ILLUMINATION

- 1) Turn the lighting switch to level 1.

##### NOTE:

Make sure that the bright switch is not turned ON at this time.

2) Make sure that “On” lights in the illumination item, then the screen fades out.

Standard Value: “On” should be lit.

OK: Normal

NG: If “On” does not light, check the signal line connection. If there are no problems, the unit could be faulty.

## 8. CHECK SPEED SENSOR

NOTE:

- Before starting inspections, inspect the safety around the vehicle.
- Lift up the vehicle as necessary.
- When the diagnostic trouble code is input in the VDCCM, perform the Clear Memory operation.
  - 1) Move the vehicle 2 to 3 meters (6.6 to 9.8 ft).
  - 2) Check that the numbers from the speed sensor are displayed.

Standard value: Vehicle speed is to be shown in numbers.

OK: Normal

NG: If vehicle speed is not displayed, check the signal line connection. If there are no problems, the unit could be faulty.

### C: NOTE

For the removal of navigation system component parts, refer to the corresponding section for each component.

- Navigation unit <Ref. to ET-27, Navigation Body.>
- GPS antenna <Ref. to ET-29, GPS Antenna.>
- Navigation switch <Ref. to ET-28, REMOVAL, Navigation Switch.>

# Rearview Camera System

ENTERTAINMENT

## 4. Rearview Camera System

### A: WIRING DIAGRAM

<Ref. to WI-131, WIRING DIAGRAM, Rearview Camera System.>

### B: INSPECTION

- When the display does not come on  
The screen of rear view camera is not displayed.  
(The navigation screen is displayed normally.)

1. Check the back sensor for each connection:  
Make sure that the back sensor is ON. <Ref. to ET-4, CHECK THE BACK SENSOR, INSPECTION, Navigation System.>
2. Check the rear view camera connection.
3. Check the rear view camera control module.

- When marker does not show

1. Check the rear view camera connection.
2. Check the rear view camera control module.

### C: ADJUSTMENT

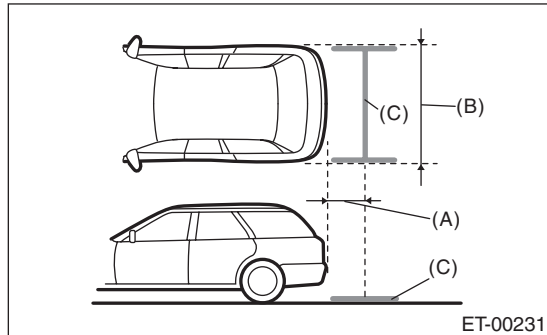
#### 1. MARKER ADJUSTMENT MODE

1) Park vehicle on a level surface with wide space around the vehicle rear side.

2) Adhere tapes on the floor of the vehicle rear side as shown in the figure, as the datum point of markers.

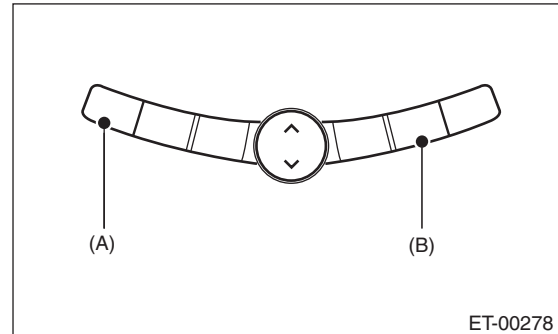
NOTE:

Use a tape of approx. 30 mm width in bright colors as a criterion.



- (A) 500 mm (19.7 in)
- (B) 2,180 mm (85.8 in)
- (C) Tapes as criteria

3) While pressing key (A) and key (B) of navigation switch, turn the ignition switch to ACC to enter the test mode.



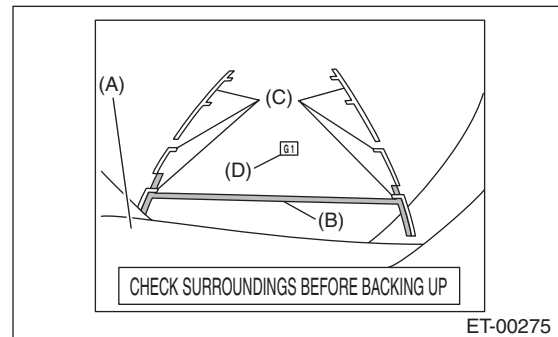
4) Touch REAR CAMERA MODE in the monitor and go to the maker adjustment mode.

**CAUTION:**

**Do not select other than REAR CAMERA MODE; the navigation system or the navigation monitor may not operate normally.**

5) Touch the monitor to change maker pattern.

6) Marker pattern will be stored by turning ignition switch to OFF.



- (A) Rear bumper
- (B) Tapes adhered in step 2)
- (C) Marker
- (D) Marker No.

NOTE:

Adjust the marker so that the marker laps over the tape or is placed outside of the tape.



## 5. Multi-function Display (MFD) System

### A: WIRING DIAGRAM

<Ref. to WI-133, WIRING DIAGRAM, Multi-function Display (MFD) System.>

### B: INSPECTION

Symptoms	Repair order
No power coming in. <ul style="list-style-type: none"> <li>• Light does not illuminate.</li> <li>• Display does not come on.</li> </ul>	<ol style="list-style-type: none"> <li>1. Check the fuse and power supply for the display.</li> <li>2. Check the ground circuit of the display.</li> <li>3. Remove the display to repair.</li> </ol>
A specific light or display does not come on.	<ol style="list-style-type: none"> <li>1. Check the display.</li> <li>2. Check the output circuit between unit and display.</li> </ol>

### 1. MFD ERROR DISPLAY AND FAULT CONTENT

Display contents	Fault cause
CHECK_DISC	<ul style="list-style-type: none"> <li>• During playback, it was not possible to read data from the CD due to scratches on the CD, etc.</li> <li>• Disc inserted upside-down, cannot detect disc.</li> <li>• Because of a focus error, cannot read disc.</li> <li>• An error occurred in the decoder section.</li> <li>• A problem occurred in the internal circuit during playback due to high temperature, etc.</li> </ul>
MECHA_ERROR	<ul style="list-style-type: none"> <li>• During disc loading, a problem occurred in the traverse drive.</li> <li>• Operation became impossible during disc change, loading, or eject.</li> </ul>
NO_FILE	<ul style="list-style-type: none"> <li>• After disc read operation is completed, the number of files was 0.</li> <li>• A disc with no data was inserted.</li> </ul>
	<ul style="list-style-type: none"> <li>• Disc is dirty, or is upside down.</li> <li>• Nothing is recorded.</li> <li>• Is not an audio disc.</li> <li>• There are scratches on the disk.</li> <li>• A disc that cannot be played back was used.</li> </ul>
	A mechanical error/operational error of some sort occurred.
	No disc is inserted.

#### NOTE:

When the above errors are displayed, check the disc, and if no problems can be found, repair or replace the unit.

## 6. Rear Entertainment System

### A: WIRING DIAGRAM

<Ref. to WI-135, WIRING DIAGRAM, Rear Entertainment System.>

### B: INSPECTION

#### 1. CHECK THE DVD-ROM.

Insert a region code 1 DVD-ROM, and check that the images from the DVD are displayed when playing back the media.

**NOTE:**

Region code 1 is a code for North American DVD-ROM discs. DVD-ROM of other region codes cannot be run.

Standard value: Image from DVD should be displayed.

OK: Normal

NG: If the images from the DVD is not displayed, check whether the DVD-ROM is set in the rear entertainment system, whether the correct side is set, type of the DVD-ROM, the existence of any scratches, etc. If there are no problems on the DVD-ROM, the main body is defective.

**NOTE:**

The rear entertainment system is not compatible with MP3 files or DVD-Audio.

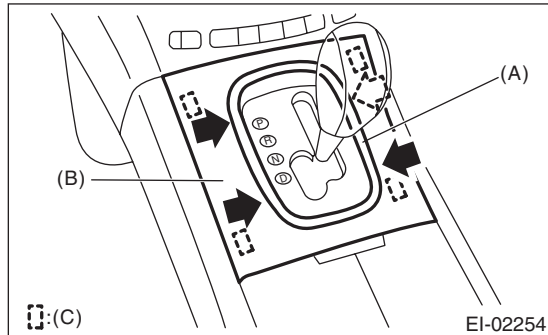
#### 2. ERROR DISPLAY AND CONTENT

Screen display	Trouble contents
INCORRECT CODE	When an incorrect number is entered.
DISC ERROR	When it is not possible to read the disc due to scratches or insertion upside down.
REGION CODE ERROR	When the region code of the disc does not match (is a region code other than 1).
MECHA ERROR	Replace the rear entertainment system.
NO DISC	The DVD switch was pressed when there was no disc inside.

## 7. Control Panel

### A: REMOVAL

- 1) Disconnect the ground cable from battery.
- 2) Remove the ring indicator (A) and console front panel (B).

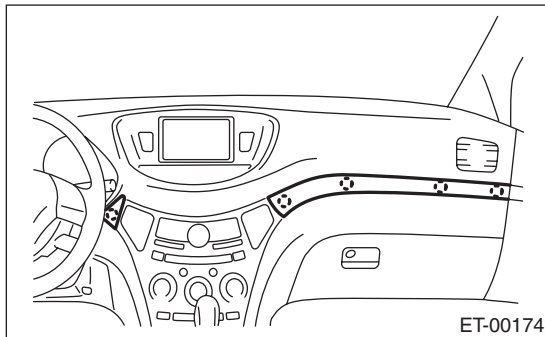


(C) Clip

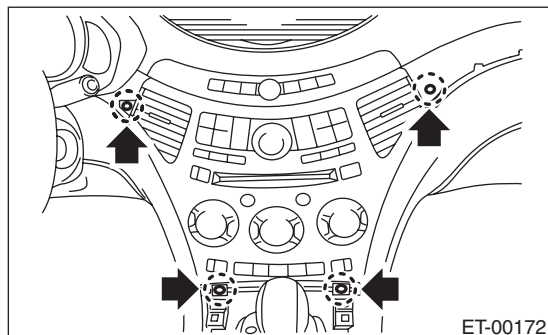
#### NOTE:

The ring indicator can be easily removed by inserting the clip remover or equivalent into the positions indicated by arrows.

- 3) Remove the instrument ornament on passenger's seat and inner panels on driver's seat.



- 4) Remove the screws, and remove the control panel.



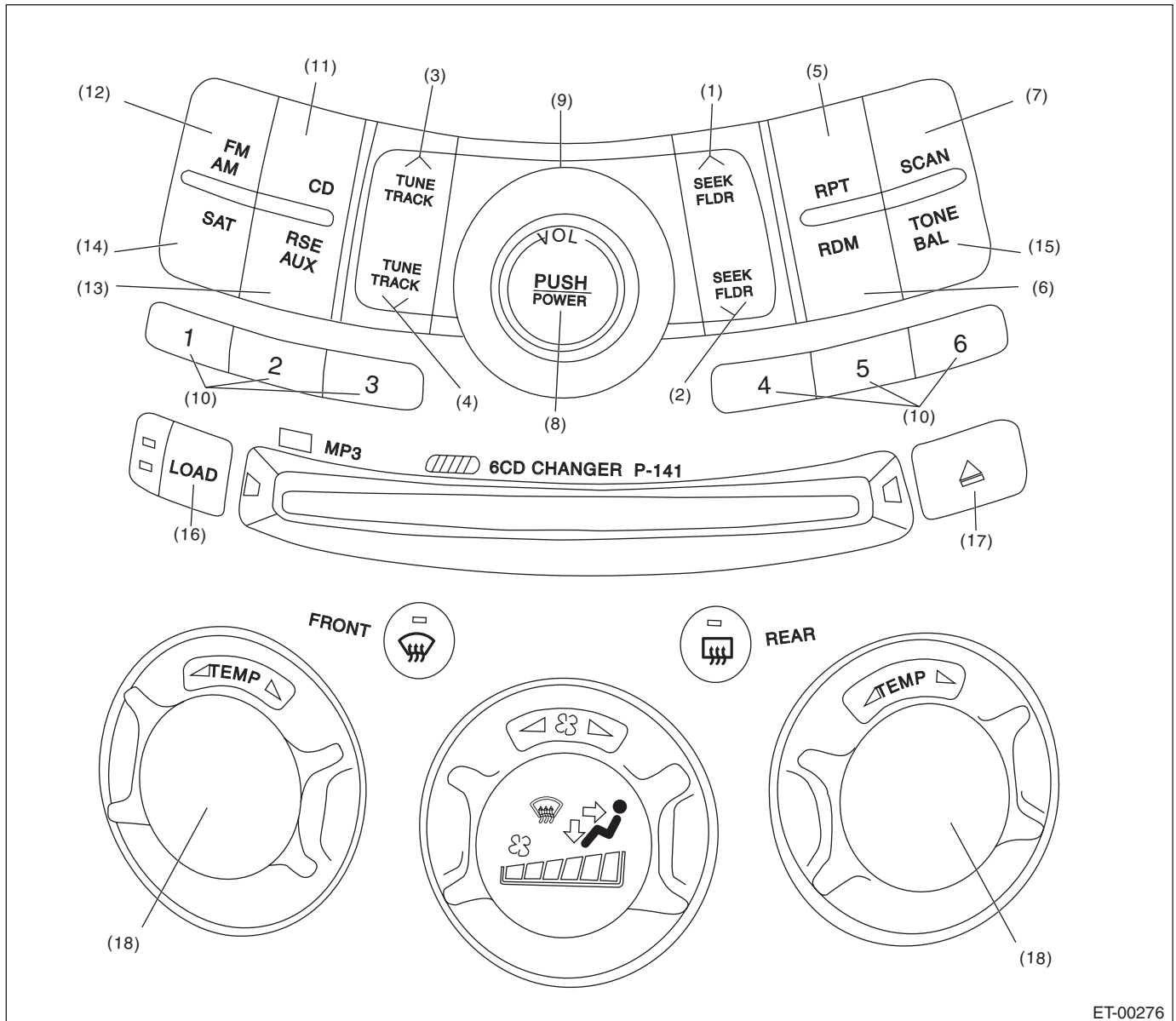
### B: INSTALLATION

Install in the reverse order of removal.

# Control Panel

ENTERTAINMENT

## C: INSPECTION



ET-00276

- |                            |                       |                           |
|----------------------------|-----------------------|---------------------------|
| (1) SEEK/FLDR UP switch    | (7) SCAN switch       | (13) RSE AUX switch       |
| (2) SEEK/FLDR DOWN switch  | (8) PUSH/POWER switch | (14) SAT switch           |
| (3) TUNE TRACK UP switch   | (9) VOLUME            | (15) TONE/BAL switch      |
| (4) TUNE TRACK DOWN switch | (10) Presets 1 — 6    | (16) LOAD switch          |
| (5) RPT switch             | (11) CD switch        | (17) EJECT switch         |
| (6) RDM switch             | (12) FM/AM switch     | (18) TEMP display section |

### NOTE:

- For self diagnosis of the audio system, there is a communications check (communication condition between the audio and the control panel) and a switch check. Perform a communications check first and make sure it is operating normally before proceeding to the inspection of switches.
- Complete operations from when the self diagnosis mode of step 1 operates and the buzzer sounds, to pressing the preset 1 switch in 3, within 15 seconds. If more than 15 seconds pass, a communications error will be displayed.
- During the diagnosis, do not press the “POWER (8), FM/AM (12), SAT (14), CD (11), RSE AUX (13)” switches. Pressing these switches will disengage the self diagnosis mode. However, CD, RSE, AUX and SAT will be canceled only with a disc loaded or unit connected.

## 1. SELF DIAGNOSIS OF THE CONTROL PANEL AND AUDIO

Step	Check	Yes	No
<b>1 SETTING THE SELF-DIAGNOSIS MODE BY OPERATING THE CONTROL PANEL.</b> 1) Turn the audio system OFF with the ignition switch on ACC or ON. 2) With the TUNE UP switch and the SEEK DOWN switch held down, hold the RDM switch down for 2 seconds or more. 3) A buzzer will sound, and the unit will enter the diagnosis mode.	Does the self diagnosis mode of the control panel operate?	Go to step 3.	Go to step 2.
<b>2 CHECK BUZZER.</b>	Did the buzzer sound when going into the diagnosis mode?	Go to step 7.	Check the connection of harness connector, and if there are no problems found, repair or replace the audio unit and control panel. <Ref. to ET-13, REMOVAL, Audio.> <Ref. to AC-32, REMOVAL, Control Panel.>
<b>3 CHECK VFD DISPLAY SECTION.</b>	Does whole VFD display section illuminate?	Go to step 4.	Replace the audio unit. <Ref. to ET-13, REMOVAL, Audio.>
<b>4 CHECK THE COMMUNICATION STATUS.</b> Press the preset 1 switch, and confirm the TEMP display section of the control panel.	When the switch is pressed, is «88.8» displayed at the TEMP display section?	Go to step 5.	Go to step 6.
<b>5 CHECK THE COMMUNICATION STATUS.</b>	Was the display in step 3 on the left side TEMP display section?	Replace the audio unit. <Ref. to ET-13, REMOVAL, Audio.>	Replace the control panel. <Ref. to AC-32, REMOVAL, Control Panel.>
<b>6 CHECK SWITCH.</b> Operate the switches in the following list, and check the display content in the left and right TEMP displays.	Does the switch check list and the operated switches match? <Ref. to ET-12, SWITCH CHECK LIST, INSPECTION, Control Panel.>	Self diagnosis on audio main body is normally operated.	Replace the control panel. <Ref. to AC-32, REMOVAL, Control Panel.>
<b>7 CHECK THE MALFUNCTION DISPLAY.</b> 1) Reconnect the connector between the control panel and the audio. 2) Operate the control panel and switch to the self diagnosis mode.	Did the control panel switch to the malfunction diagnosis mode?	Go to step 4.	Go to step 8.
<b>8 CHECK THE MALFUNCTION DISPLAY.</b>	Did the buzzer sound when going into the self diagnosis mode?	<Ref. to ET-13, REMOVAL, Audio.>	<Ref. to ET-13, REMOVAL, Audio.> <Ref. to AC-32, REMOVAL, Control Panel.>

# Control Panel

ENTERTAINMENT

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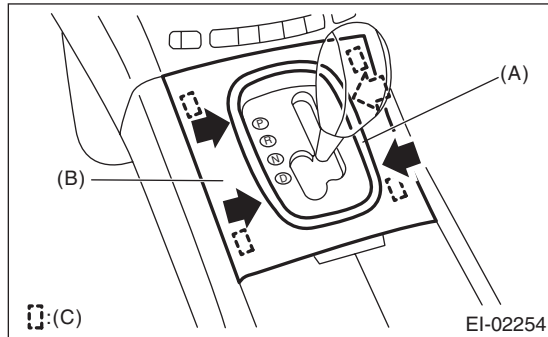
## 2. SWITCH CHECK LIST

Switch	TEMP display LH	TEMP display RH	Switch	TEMP display LH	TEMP display RH
TUNE/TRACK $\wedge$	TR	UP	TONE/BAL	TO	—
TUNE/TRACK $\vee$	TR	DW	1 (Preset)	P1	—
SEEK/FLDR $\wedge$	SK	UP	2 (Preset)	P2	—
SEEK/FLDR $\vee$	SK	DW	3 (Preset)	P3	—
SCAN	SC	—	4 (Preset)	P4	—
RPT	RP	—	5 (Preset)	P5	—
RDM	RD	—	6 (Preset)	P6	—
EJECT	EJ	—	VOL UP	VO	UP
LOAD	LO	—	VOL DOWN	VO	DW

## 8. Audio

### A: REMOVAL

- 1) Disconnect the ground cable from battery.
- 2) Remove the ring indicator (A) and console front panel (B).

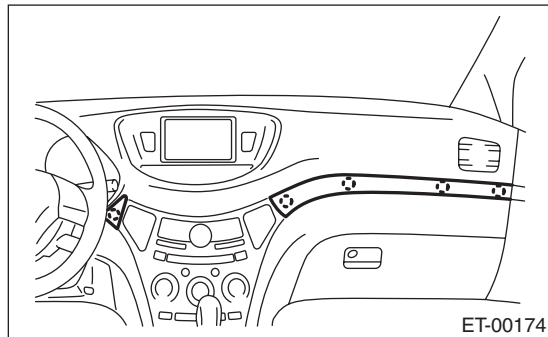


(C) Clip

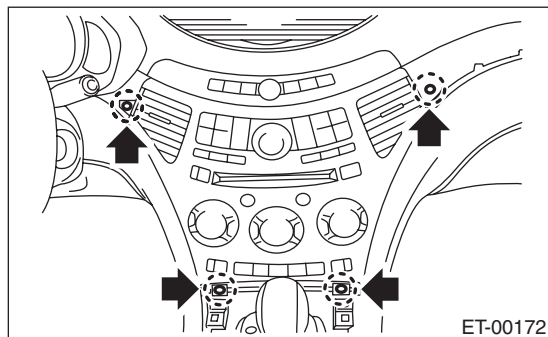
#### NOTE:

The ring indicator can be easily removed by inserting the clip remover or equivalent into the positions indicated by arrows.

- 3) Remove the instrument ornament on passenger's seat and inner panels on driver's seat.

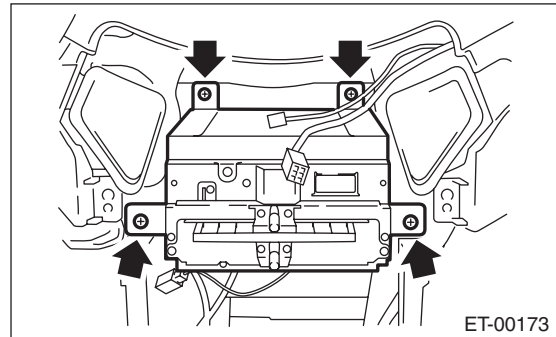


- 4) Remove the screws, and pull out the front control panel.



- 5) Disconnect the harness connectors and remove the front control panel.

- 6) Remove the screws, and partially pull the audio out from center console.



- 7) Disconnect the harness connector and antenna feeder cord, and then remove the audio.

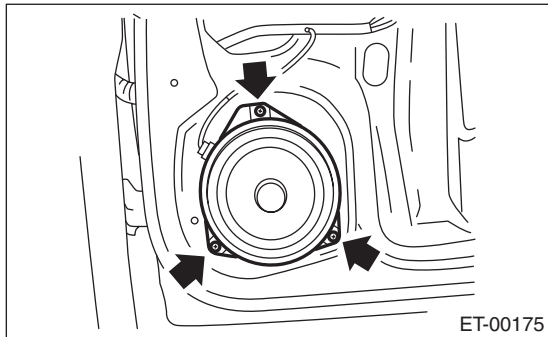
### B: INSTALLATION

Install in the reverse order of removal.

## 9. Front Speaker

### A: REMOVAL

- 1) Disconnect the ground cable from the battery.
- 2) Remove the front door trim. <Ref. to EI-36, REMOVAL, Door Trim.>
- 3) Remove the front speaker mounting screws.



- 4) Disconnect the harness connector and remove the front speaker.

### B: INSTALLATION

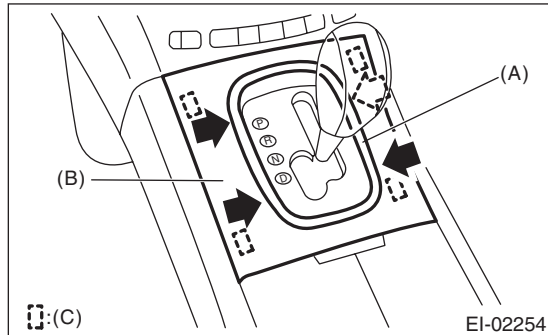
Install in the reverse order of removal.



## 10.Center Speaker

### A: REMOVAL

- 1) Disconnect the ground cable from battery.
- 2) Remove the ring indicator (A) and console front panel (B).

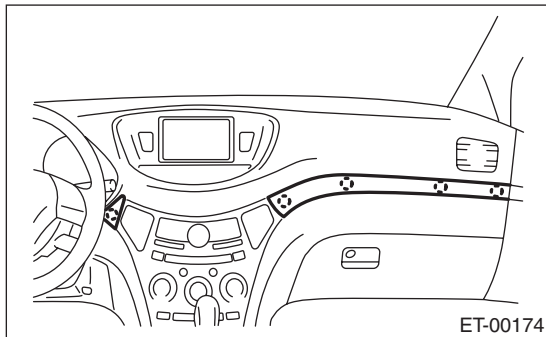


(C) Clip

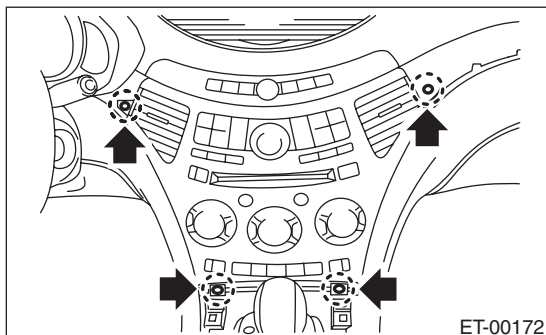
#### NOTE:

The ring indicator can be easily removed by inserting the clip remover or equivalent into the positions indicated by arrows.

- 3) Remove the instrument ornament on passenger's seat and inner panels on driver's seat.

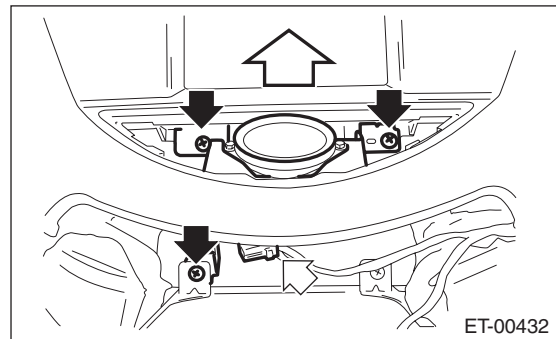


- 4) Remove the screws, and pull out the front control panel.



- 5) Disconnect the harness connectors and remove the front control panel.
- 6) Disconnect the air vent upper grille and disconnect the hazard switch connector.

- 7) Remove the screws and disconnect the harness connector.



- 8) Remove the center speaker.

### B: INSTALLATION

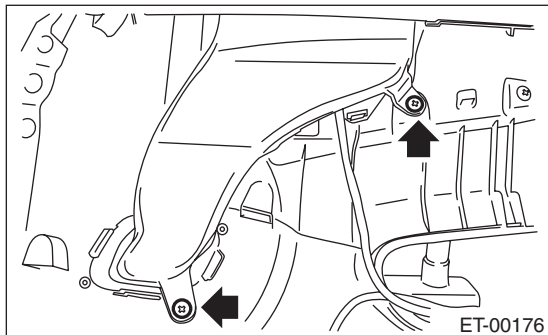
Install in the reverse order of removal.

## 11. Tweeter

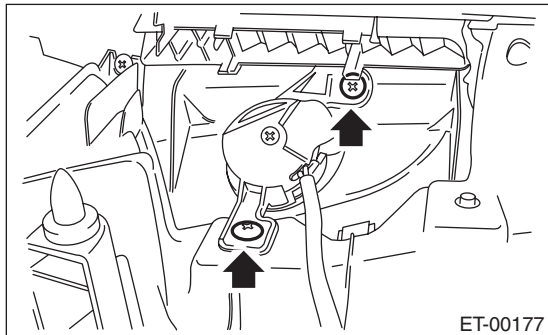
### A: REMOVAL

#### 1. FRONT

- 1) Disconnect the ground cable from the battery.
- 2) Remove the front door trim. <Ref. to EI-36, REMOVAL, Door Trim.>
- 3) Remove the side deflector duct.



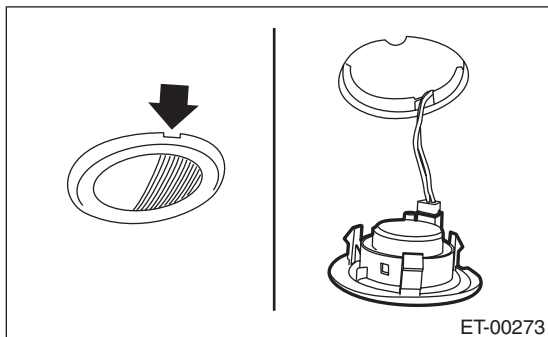
- 4) Remove the tweeter mounting screws.



- 5) Remove the tweeter.

#### 2. REAR

- 1) Disconnect the ground cable from battery.
- 2) Remove the tweeter from the roof trim.



- 3) Disconnect the harness connector.

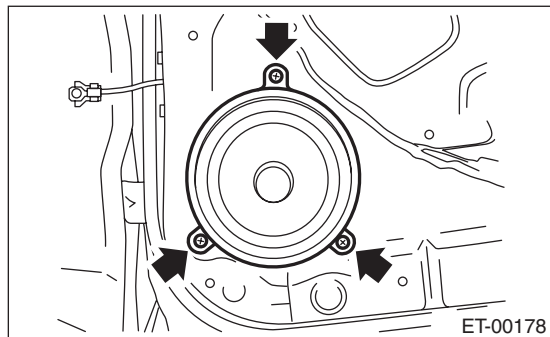
### B: INSTALLATION

Install in the reverse order of removal.

## 12.Rear Speaker

### A: REMOVAL

- 1) Disconnect the ground cable from the battery.
- 2) Remove the rear door trim. <Ref. to EI-36, REMOVAL, Door Trim.>
- 3) Remove the rear speaker mounting screws.



- 4) Disconnect the harness connector and remove the rear speaker.

### B: INSTALLATION

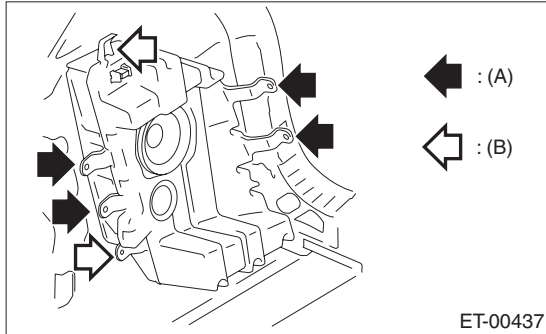
Install in the reverse order of removal.

## 13. Woofers

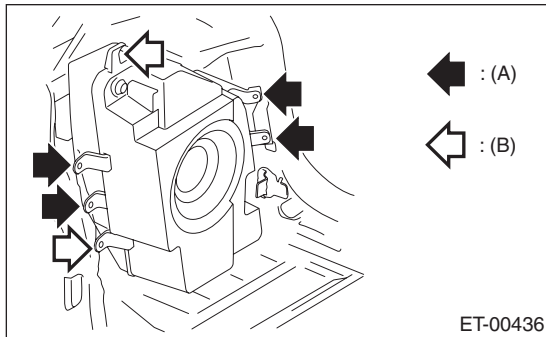
### A: REMOVAL

- 1) Disconnect the ground cable from battery.
- 2) Remove the quarter trim. <Ref. to EI-46, REMOVAL, Rear Quarter Trim.>
- 3) Remove the mounting screws (A) and nuts (B) for the woofer.

For high grade speakers



For harman/kardon speakers



- 4) Disconnect the harness connector and detach the woofers.

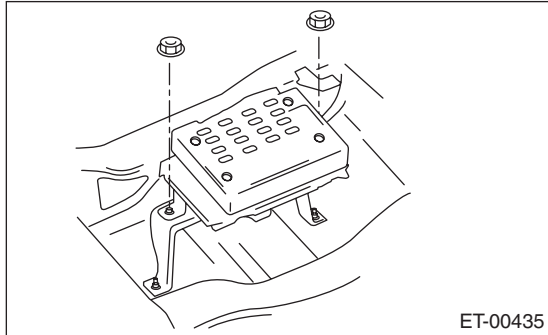
### B: INSTALLATION

Install in the reverse order of removal.

## 14. Power Amplifier

### A: REMOVAL

- 1) Disconnect the ground cable from battery.
- 2) Remove the second row seats. <Ref. to SE-15, REMOVAL, Second Seat.>
- 3) Disconnect the harness connector.
- 4) Remove the nut and remove the power amplifier.



### B: INSTALLATION

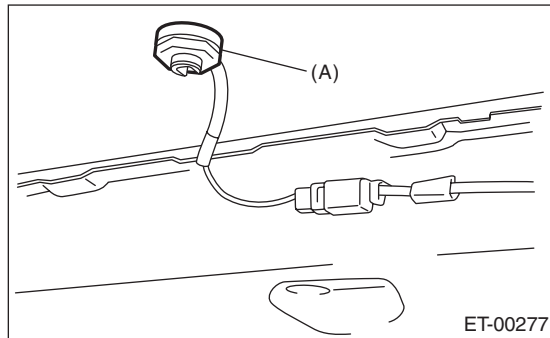
Install in the reverse order of removal.

## 15. Antenna

### A: REMOVAL

#### 1. ROOF ANTENNA (WITH XM SATELLITE RADIO)

- 1) Remove the roof trim. <Ref. to EI-51, REMOVAL, Roof Trim.>
- 2) Disconnect the harness connector and terminal and remove the mounting nut (A).



- 3) Pull the antenna off roof top.

### B: INSTALLATION

Install in the reverse order of removal.

### C: INSPECTION

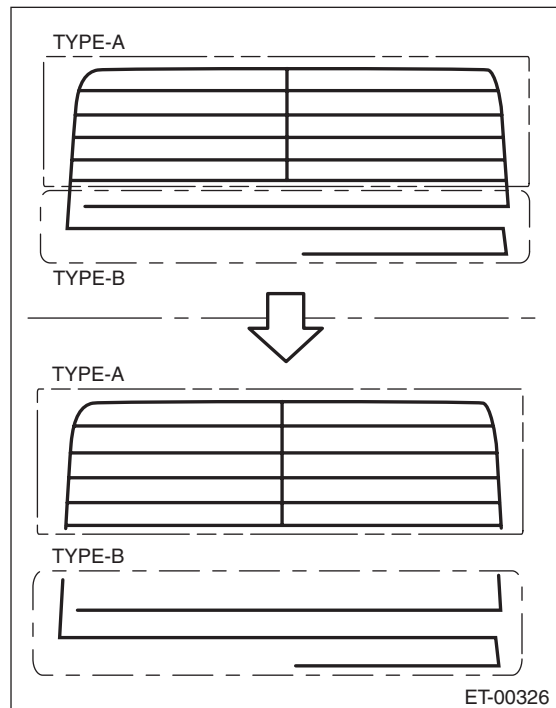
#### 1. GLASS ANTENNA

##### CAUTION:

When wiping dirt off of the glass to avoid heat wire damage, be careful of the following.

- Use a dry and soft cloth.
- Move the cloth along the heat wire.

Inspection method of antenna, it is different from printing pattern of antenna.

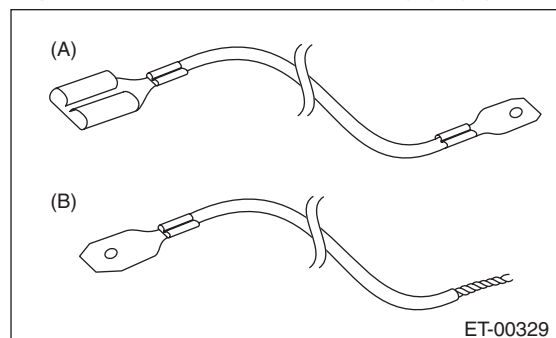


TYPE-A Printing pattern of grid

TYPE-B Printing pattern of straight

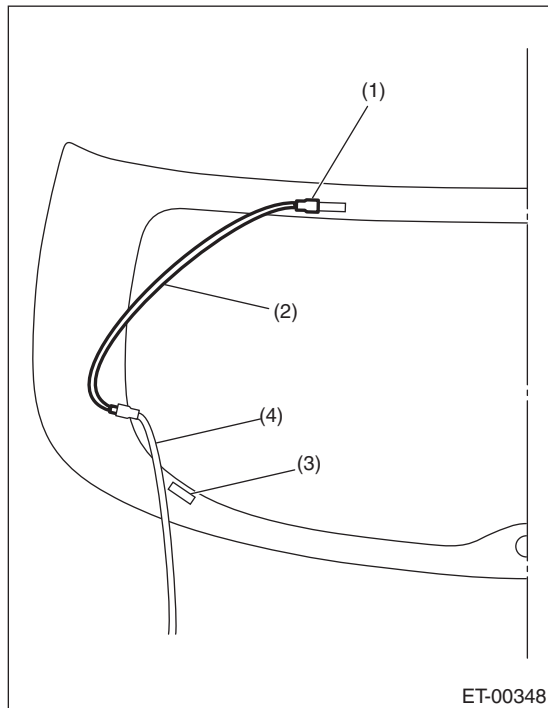
#### Type A

- 1) Disconnect the ground cable from battery.
- 2) Remove the rear gate trim. <Ref. to EI-52, REMOVAL, Rear Gate Trim.>
- 3) Disconnect the antenna harness connector and antenna terminals.
- 4) Prepare the extension harness (A), (B).



- (A) Attach the flat terminals (male and female) to both ends of the harness of 2,000 mm (78.7 in) length (electrical wire unit dimensions approx. 2.0 mm<sup>2</sup> (0.0032 sq in))
- (B) Attach the flat terminal (female) to one side of the harness of 2,000 mm (78.7 in) length (electrical wire unit dimensions approx. 2.0 mm<sup>2</sup> (0.0032 sq in)), and twist the another side of the harness.

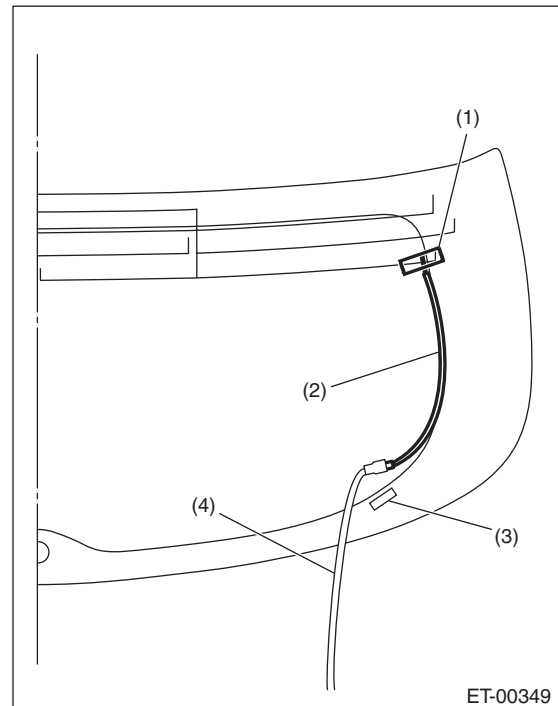
5) Connect the extension harness (A) to rear defogger harness (power supply side) terminal and antenna terminal.



- (1) Antenna terminal
- (2) Extension harness (A)
- (3) Rear defogger terminal
- (4) Rear defogger harness (power supply side - red blue)

6) Connect the extension harness (B) to rear defogger harness (ground side) terminal.

7) Fasten the another side of extension harness (B) to end of antenna pattern of grid with tape.



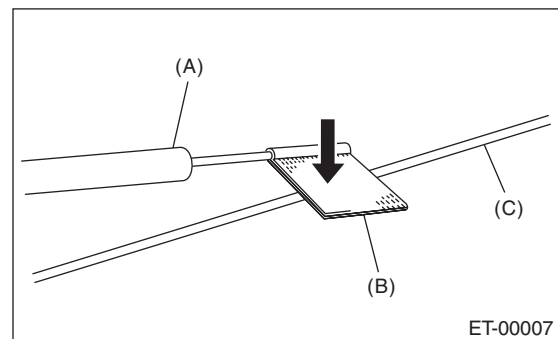
- (1) Tape
- (2) Extension harness (B)
- (3) Rear defogger terminal
- (4) Rear defogger harness (ground side - black)

8) Connect the ground cable to battery.

9) Turn the ignition switch to ON.

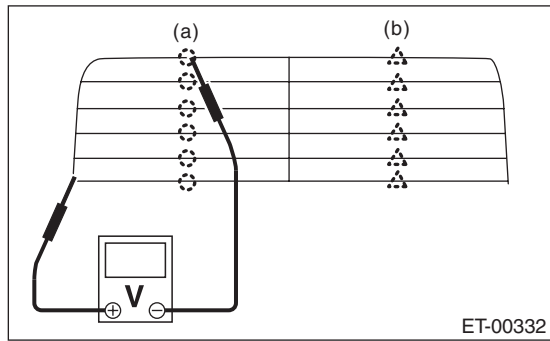
10) Turn the rear defogger switch to ON.

11) Wrap a piece of aluminum foil around the tip of tester probe and press foil against antenna wire with your finger.



- (A) Tester probe
- (B) Aluminum foil
- (C) Antenna wire

12) Measure the voltage around an antenna wire (a) and (b).



	Measured voltage value	Criteria
(a)	Approx. 3 V (standard value)	Normal
	Approx. 6 V or 0 V	Open
(b)	Approx. 9 V (standard value)	Normal
	Approx. 12 V or 6 V	Open

**NOTE:**

Measuring point (a)

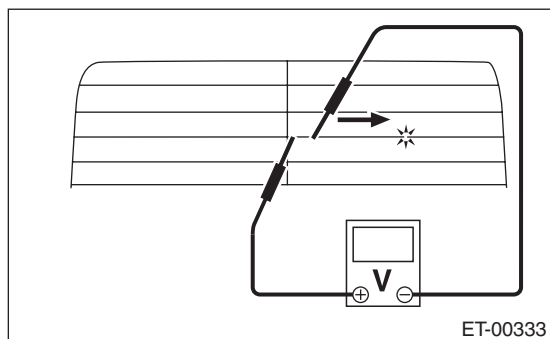
- If the measured value is 6 V, heat wire is open between antenna wire center and positive (+) terminal of probe.
- If it is 0 V, the circuit is open between antenna wire center and ground.

Measuring point (b)

- If the measured value is 12 V, heat wire is open between antenna wire center and positive (+) terminal of probe.
- If it is 6 V, the circuit is open between antenna wire center and ground.

13) Fasten the voltmeter positive (+) side and negative (-) side to end of open harness positive side of step 12).

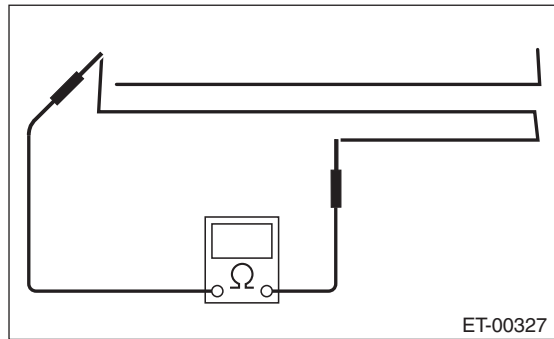
14) Search a point the voltage changes from 0 V, and move the negative (-) probe along antenna wire slowly.



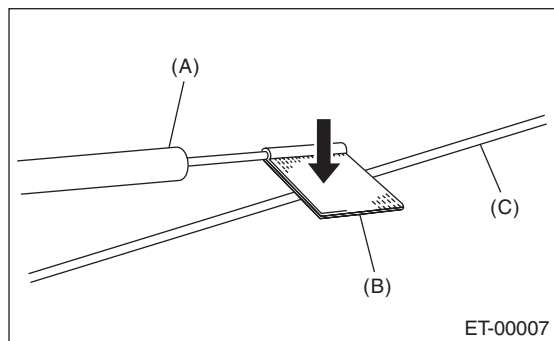
15) Repair the antenna wire if the place of the open circuit is identified. <Ref. to ET-23, REPAIR, Antenna.>

**Type B**

Measure the resistance between the antenna terminal and each antenna wire.

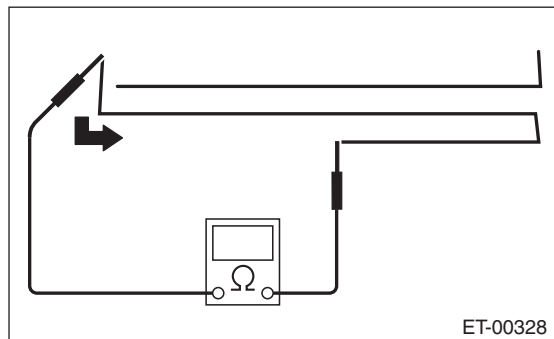


- 1) Disconnect the ground cable from battery.
- 2) Wrap a piece of aluminum foil around the tip of probe and press foil against antenna wire with your finger.



- (A) Tester probe
- (B) Aluminum foil
- (C) Antenna wire

3) To locate the broken point, move the probe along antenna wire.



**NOTE:**

If an antenna wire is OK, resistance will be less than 20 Ω.

If an antenna wire is broken, resistance will be more than 1 MΩ.

4) Repair the antenna wire if the place of the open circuit is identified. <Ref. to ET-23, REPAIR, Antenna.>



## 2. ROOF ANTENNA

Check for cracking or damage.

If any, replace the antenna.

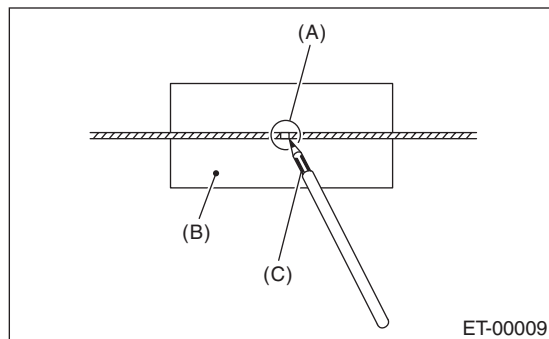
### D: REPAIR

#### 1. GLASS ANTENNA

1) Clean the antenna wire and surrounding area with a cloth dampened by alcohol.

2) Paste a thin masking film on the glass along broken wire.

3) Apply the conductive silver composition (DU-PONT No. 4817) on the broken portion with a drawing pen.



(A) Broken portion

(B) Masking film

(C) Conductive silver composition

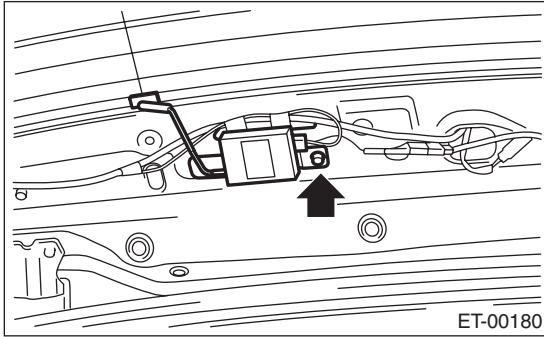
4) Dry out the deposited portion.

5) After repair has been completed, measure the resistance in repaired wire.

## 16. Antenna Amplifier

### A: REMOVAL

- 1) Disconnect the ground cable from the battery.
- 2) Remove the rear gate trim. <Ref. to EI-52, REMOVAL, Rear Gate Trim.>
- 3) Disconnect the harness connectors and terminals.
- 4) Remove the screws and detach the antenna amplifier.

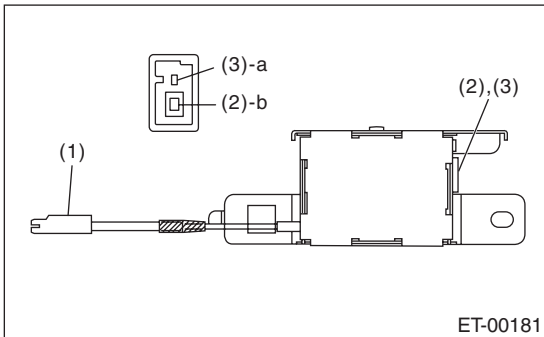


### B: INSTALLATION

Install in the reverse order of removal.

### C: INSPECTION

Measure the resistance of antenna amplifier.

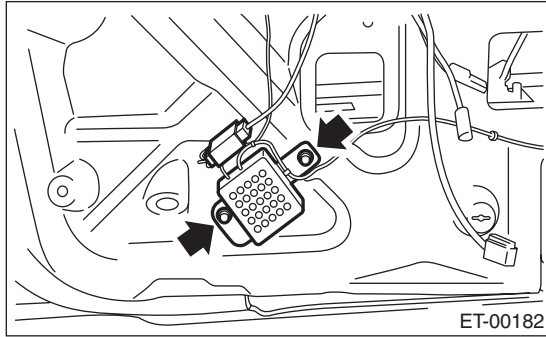


Terminal No.	Standard
(1) and amplifier body	10 kΩ or more
(2)-b and amplifier body	10 kΩ or more
(3)-a and amplifier body	10 kΩ or more

## 17.Noise Suppressor

### A: REMOVAL

- 1) Disconnect the ground cable from the battery.
- 2) Remove the rear gate trim. <Ref. to EI-52, REMOVAL, Rear Gate Trim.>
- 3) Disconnect harness connector from noise suppressor.
- 4) Remove the screws and detach the noise suppressor.



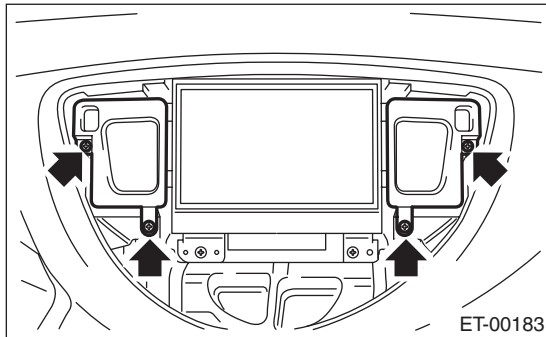
### B: INSTALLATION

Install in the reverse order of removal.

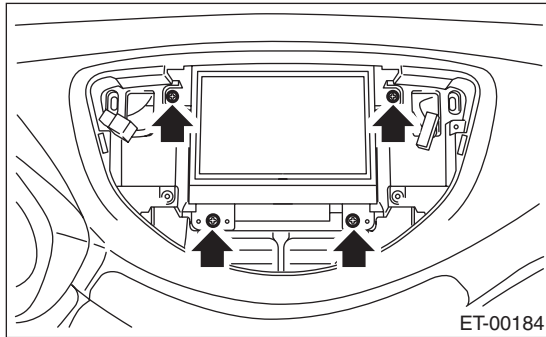
## 18. Navigation Display

### A: REMOVAL

- 1) Disconnect the ground cable from the battery.
- 2) Remove the upper grille. <Ref. to AC-49, UPPER GRILLE, REMOVAL, Air Vent Grille.>
- 3) Remove the warning box.



- 4) Remove the screws and then remove the navigation display.



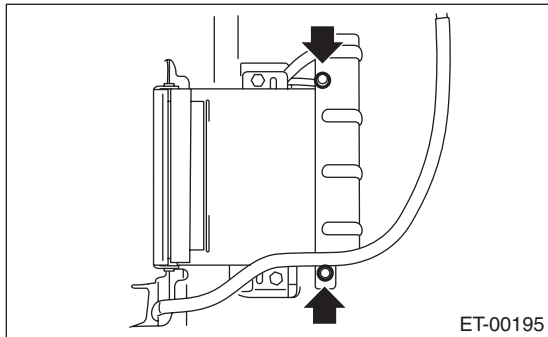
### B: INSTALLATION

Install in the reverse order of removal.

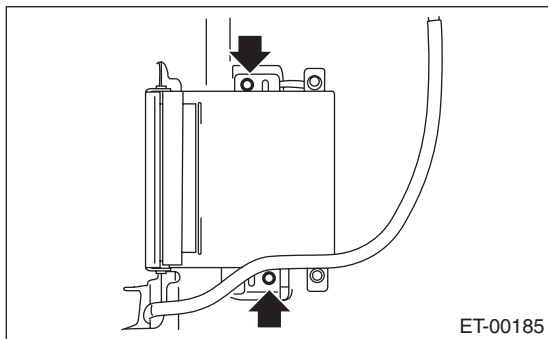
## 19. Navigation Body

### A: REMOVAL

- 1) Disconnect the ground cable from the battery.
- 2) Slide the driver's seat to the forward position.
- 3) Remove the cover attachment bolts, and remove the cover.



- 4) Disconnect the connector.
- 5) Remove the bolts and then remove the navigation unit.



### B: INSTALLATION

Install in the reverse order of removal.

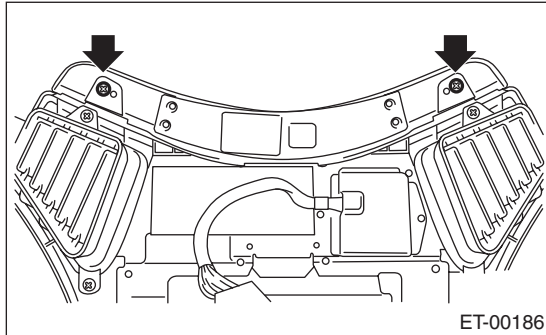
#### **Tightening torque:**

**4.5 N·m (0.46 kgf-m, 3.32 ft-lb)**

## 20. Navigation Switch

### A: REMOVAL

- 1) Disconnect the ground cable from the battery.
- 2) Remove the control panel. <Ref. to ET-9, REMOVAL, Control Panel.>
- 3) Remove the screws and then remove the navigation switch.



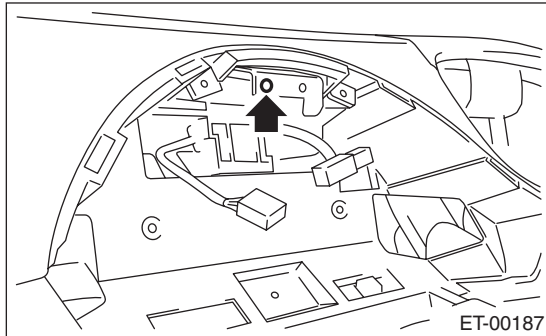
### B: INSTALLATION

Install in the reverse order of removal.

## 21. GPS Antenna

### A: REMOVAL

- 1) Disconnect the ground cable from battery.
- 2) Remove the combination meter. <Ref. to IDI-11, REMOVAL, Combination Meter.>
- 3) Remove the audio. <Ref. to ET-13, REMOVAL, Audio.>
- 4) Remove the navigation display. <Ref. to ET-26, REMOVAL, Navigation Display.>
- 5) Remove the screw to remove the GPS bracket.



- 6) Remove the GPS antenna cord connector from the steering support beam stay (on the driver's side).

### B: INSTALLATION

Install in the reverse order of removal.

### 22.Rearview Mirror (RCD Model)

#### A: NOTE

Refer to the GLASS/WINDOWS/MIRRORS section for the removal and installation of the rearview mirror (RCD model).

- Removal <Ref. to GW-32, REMOVAL, Rearview Mirror (RCD Model).>
- Installation <Ref. to GW-32, INSTALLATION, Rearview Mirror (RCD Model).>



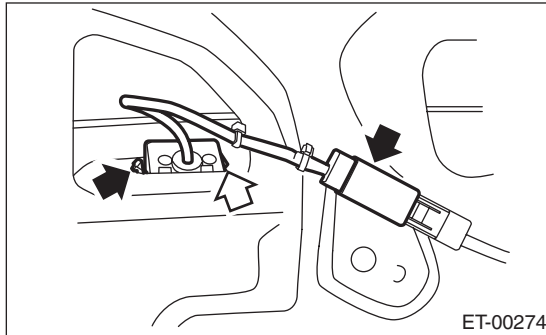
## 23.Rearview Camera

### A: REMOVAL

- 1) Disconnect the ground cable from the battery.
- 2) Remove the rear gate trim and disconnect the rear view camera connector.
- 3) Press the pawls (black arrow side), remove the rear view camera.

#### NOTE:

Pawl indicated by white arrow is fixed. Press the ones indicated by black arrows.



### B: INSTALLATION

Install in the reverse order of removal.

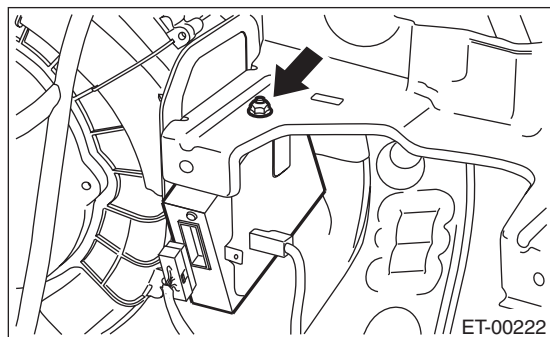
#### NOTE:

Make sure the maker position of the rear view camera after installation. <Ref. to ET-6, ADJUSTMENT, Rearview Camera System.>

## 24. Rearview Camera Control Unit

### A: REMOVAL

- 1) Disconnect the ground cable from the battery.
- 2) Remove the left rear quarter lower trim. <Ref. to EI-46, REMOVAL, Rear Quarter Trim.>
- 3) Remove the nut, disconnect the connector and remove the control unit.



### B: INSTALLATION

Install in the reverse order of removal.

#### NOTE:

Make sure the maker position of the rear view camera after installation. <Ref. to ET-6, ADJUSTMENT, Rearview Camera System.>

## 25. Multi-function Display (MFD)

### A: NOTE

For removal/installation of the multi-function display, refer to the operation procedure for the navigation display. <Ref. to ET-26, Navigation Display.>

## 26. Multi-function Switch

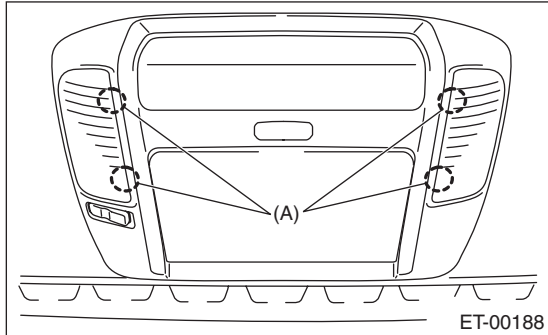
### A: NOTE

For removal/installation of the multi-function switch, refer to the operation procedure for the navigation switch. <Ref. to ET-28, REMOVAL, Navigation Switch.>

## 27.Rear Entertainment

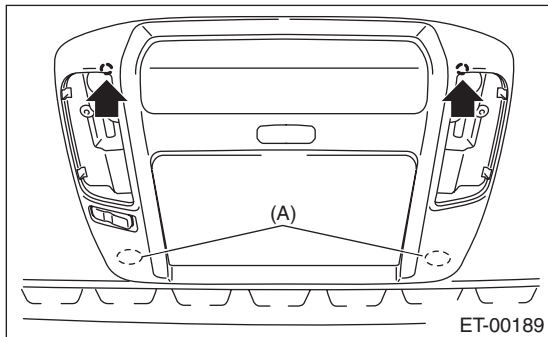
### A: REMOVAL

- 1) Disconnect the ground cable from battery.
- 2) Insert a flat tip screwdriver in the cutout section, and remove the room light lens.



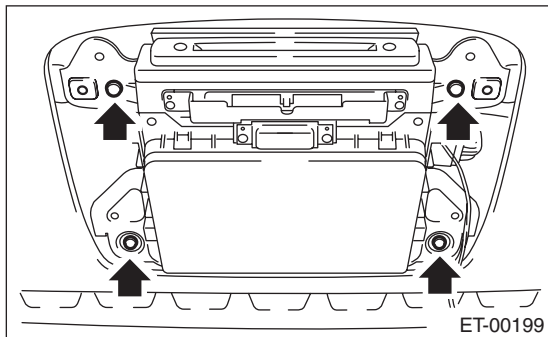
(A) Cutout

- 3) Remove the bolts, and then remove the monitor cover.



(A) Clip

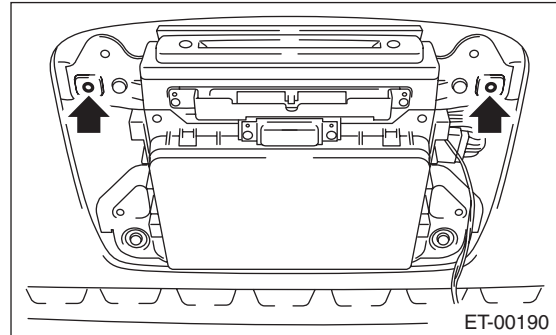
- 4) Remove the 4 mounting bolts.



- 5) Remove the temporary screws and remove the monitor body.

### CAUTION:

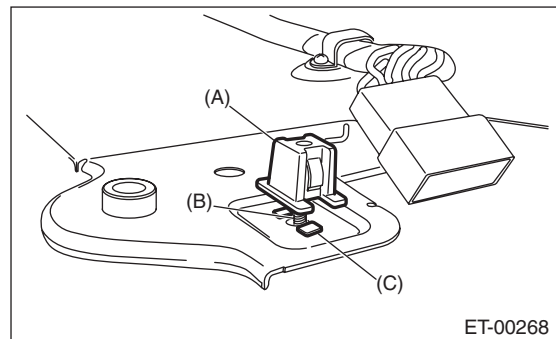
Pay attention not to drop the body at removal.



- 6) Remove the temporary clips from the roof brace.

### B: INSTALLATION

- 1) Align a temporary clip (A) to the protrusion (C) using a temporary screw (B), and attach to the rear entertainment system body.



### NOTE:

When installing a new rear entertainment system, a clip is supplied on the unit, and step 1) can be omitted.

- 2) Place the hook of the rear entertainment unit on the roof brace section.
- 3) Affix the temporary fixture clips on the roof brace.
- 4) Tighten the 4 attachment bolts, and connect the connector.
- 5) Connect the room light connector, attach the cover and affix with the bolts.
- 6) Attach the room light lens from the outside of the vehicle and snap into place.

## 28.AUX Input Terminal

### A: REMOVAL

#### 1. REAR ENTERTAINMENT INPUT TERMINAL

- 1) Disconnect the ground cable from the battery.
- 2) Remove the left rear quarter trim lower. <Ref. to EI-46, REMOVAL, Rear Quarter Trim.>
- 3) Remove the AUX input terminal from the rear quarter trim.

#### 2. AUDIO INPUT TERMINAL

- 1) Disconnect the ground cable from the battery.
- 2) Remove the console box. <Ref. to EI-39, REMOVAL, Console Box.>
- 3) Remove the AUX input terminal from the console box.

### B: INSTALLATION

Install in the reverse order of removal.

## 29. Front Accessory Power Supply Socket

### A: WIRING DIAGRAM

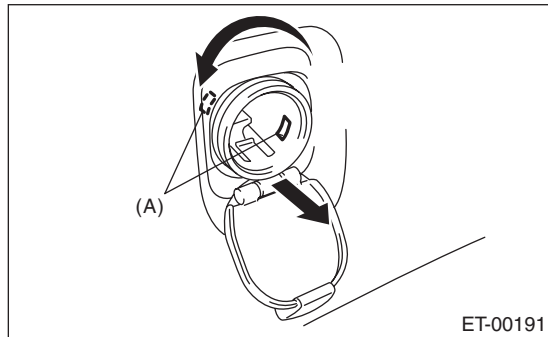
<Ref. to WI-138, WIRING DIAGRAM, Front Accessory Power Supply Socket System.>

### B: REMOVAL

- 1) Disconnect the ground cable from battery.
- 2) Remove the console box. <Ref. to EI-39, REMOVAL, Console Box.>
- 3) Disconnect the harness connector, and remove the accessory power supply socket.

#### NOTE:

The socket can be pulled out by unlocking the accessory socket lock in two locations (A) and turning the socket to the left.



### C: INSTALLATION

Install in the reverse order of removal.

#### NOTE:

Confirm that the accessory socket is locked and can not be pulled out.

## 30.Rear Accessory Power Supply Socket

### A: WIRING DIAGRAM

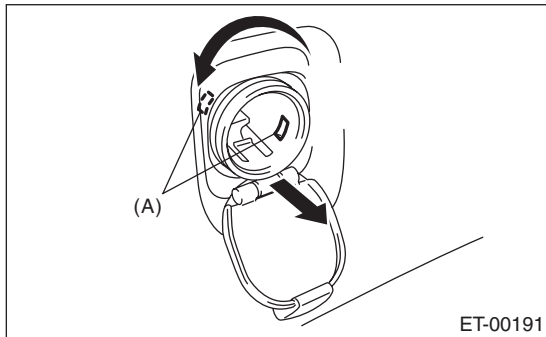
<Ref. to WI-139, WIRING DIAGRAM, Rear Accessory Power Supply Socket System.>

### B: REMOVAL

- 1) Disconnect the ground cable from battery.
- 2) Remove the left rear quarter lower trim. <Ref. to EI-46, REMOVAL, Rear Quarter Trim.>
- 3) Disconnect the harness connector, and remove the accessory power supply socket.

#### NOTE:

The socket can be pulled out by unlocking the accessory socket lock in two locations (A) and turning the socket to the left.



### C: INSTALLATION

Install in the reverse order of removal.

#### NOTE:

Confirm that the accessory socket is locked and can not be pulled out.



## 31. Steering Satellite Switch

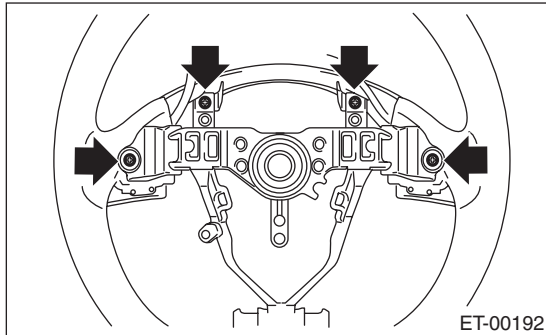
### A: REMOVAL

- 1) Disconnect the ground cable from the battery.
- 2) Set the tire to the straight-ahead position.
- 3) Remove the airbag module. <Ref. to AB-14, REMOVAL, Driver's Airbag Module.>

#### WARNING:

**If there are airbag modules mounted, always refer to "Airbag System" when performing airbag module service. <Ref. to AB-14, INSPECTION, Driver's Airbag Module.>**

- 4) Remove the steering wheel. <Ref. to PS-12, REMOVAL, Steering Wheel.>
- 5) Remove the cover from steering wheel.
- 6) Remove 2 satellite switch mounting screws each from the left and right sides.



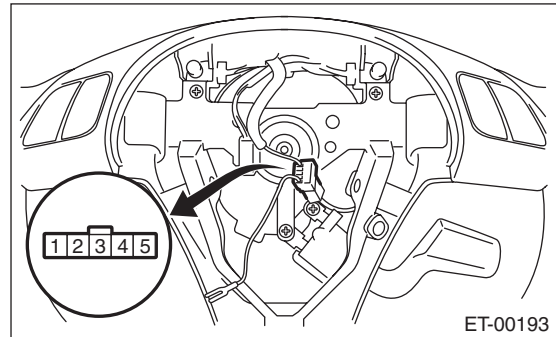
- 7) Remove the satellite switch.

### B: INSTALLATION

Install in the reverse order of removal.

### C: INSPECTION

Measure the resistance between satellite switch connector terminals.



Switch	Area	Terminal No.	Standard
Mute Volume (+) Volume (-) Mode Seek (∧) Seek (∨)	All OFF	1 and 2	Approx. 4.7 kΩ
Mute	ON	1 and 2	Approx. 22 Ω
Volume (+)	ON	1 and 2	Approx. 90 Ω
Volume (-)	ON	1 and 2	Approx. 200 Ω
Mode	ON	1 and 2	Approx. 360 Ω
Seek (∧)	ON	1 and 2	Approx. 690 Ω
Seek (∨)	ON	1 and 2	Approx. 1.5 kΩ

Replace the satellite switch if faulty.

# Steering Satellite Switch

ENTERTAINMENT

---

# COMMUNICATION SYSTEM

# COM

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	<b>Page</b>
1. General Description .....	2
2. Horn System .....	3
3. Horn .....	4
4. Horn Switch .....	5

# General Description

COMMUNICATION SYSTEM

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## 1. General Description

### A: CAUTION

- Before disassembling or reassembling parts, always disconnect the battery ground cable from battery. When replacing the audio, control module and other parts provided with memory functions, record the memory contents before disconnecting the battery ground cable. Otherwise, the memory is cleared.
- Reassemble the parts in the reverse order of disassembly procedure unless otherwise indicated.
- Adjust parts to the given specifications.
- Connect the connectors securely during reassembly.
- After reassembly, make sure functional parts operate smoothly.

### B: PREPARATION TOOL

#### 1. GENERAL TOOL

TOOL NAME	REMARKS
Circuit tester	Used for measuring resistance and voltage.
TORX® bit T30	Used for removing/installing driver's airbag module.

## 2. Horn System

### A: WIRING DIAGRAM

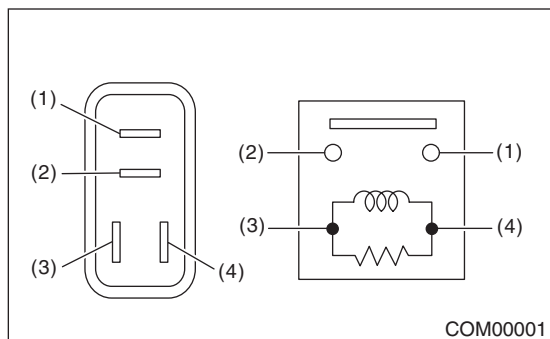
#### 1. HORN

<Ref. to WI-140, WIRING DIAGRAM, Horn System.>

### B: INSPECTION

#### 1. HORN RELAY

Measure the security horn relay resistance between terminals (indicated in the table below) when connecting terminal No. 4 to battery positive terminal and terminal No. 3 to battery ground terminal.

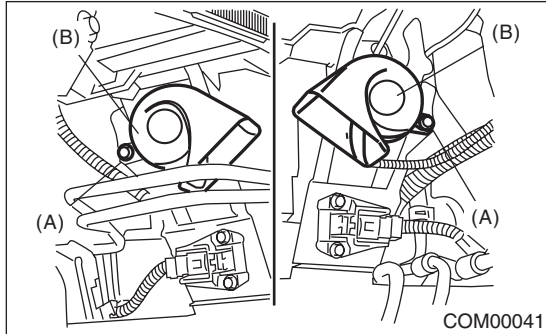


Continuity	Terminal No.	Standard
Yes	1 and 2	Less than 1 $\Omega$
No		1 M $\Omega$ or more

### 3. Horn

#### A: REMOVAL

- 1) Disconnect the ground cable from battery.
- 2) Remove the left and right headlight assemblies.  
<Ref. to LI-14, REMOVAL, Headlight Assembly.>
- 3) Remove the horn bracket mounting bolt (A).
- 4) Disconnect the harness connector and remove the horn assembly (B).



#### B: INSTALLATION

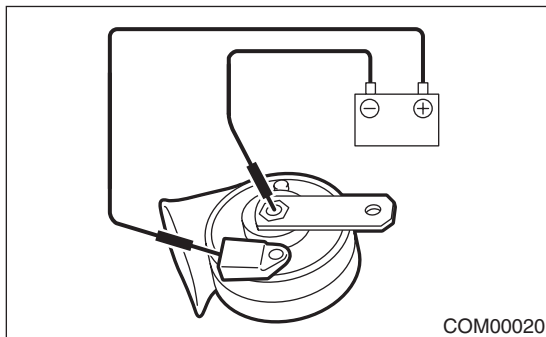
Install in the reverse order of removal.

#### *Tightening torque:*

**18 N·m (1.8 kgf·m, 13.3 ft·lb)**

#### C: INSPECTION

With 12 V direct current supplied between horn terminals, check that the horn sounds properly.



## 4. Horn Switch

### A: REMOVAL

#### CAUTION:

Before servicing, be sure to read the notes in the AB section for proper handling of the driver's airbag module. <Ref. to AB-4, CAUTION, General Description.>

#### NOTE:

Horn switch is a unit with the driver's airbag module.

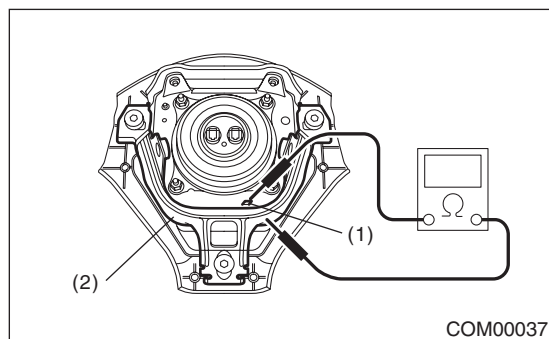
- 1) Disconnect the ground cable from battery.
- 2) Remove the driver's airbag module. <Ref. to AB-14, REMOVAL, Driver's Airbag Module.>

### B: INSTALLATION

Install in the reverse order of removal.

### C: INSPECTION

Measure the resistance between horn switch terminal and airbag module bracket.



- (1) Horn switch terminal
- (2) Airbag module bracket

Switch position	Terminal No.	Resistance
When horn switch is pushed.	Horn switch terminal and airbag module bracket	Less than 1 $\Omega$
When horn switch is not pushed.		1 M $\Omega$ or more

# Horn Switch

COMMUNICATION SYSTEM

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# GLASS/WINDOWS/MIRRORS



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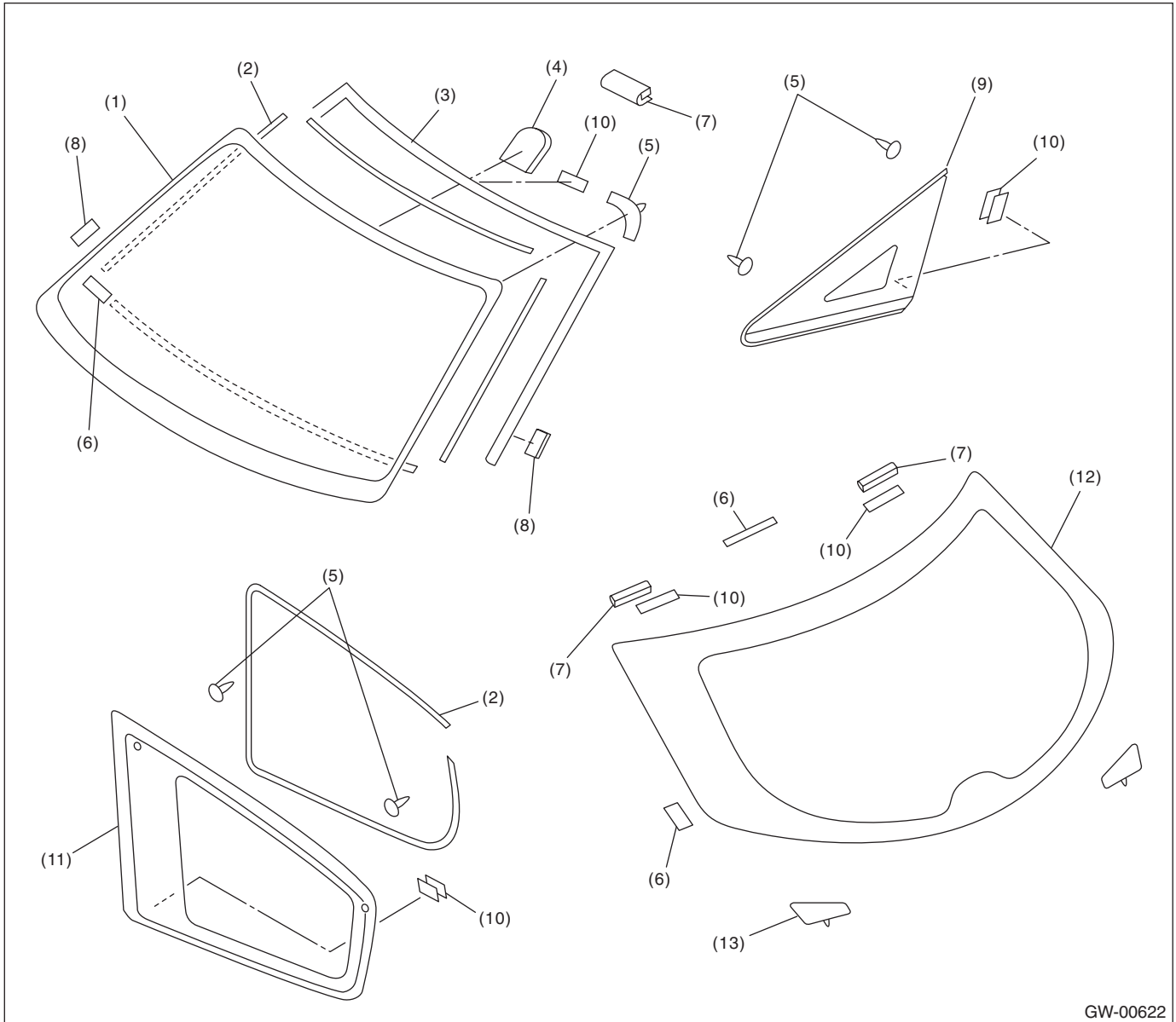
# General Description

GLASS/WINDOWS/MIRRORS

## 1. General Description

### A: COMPONENT

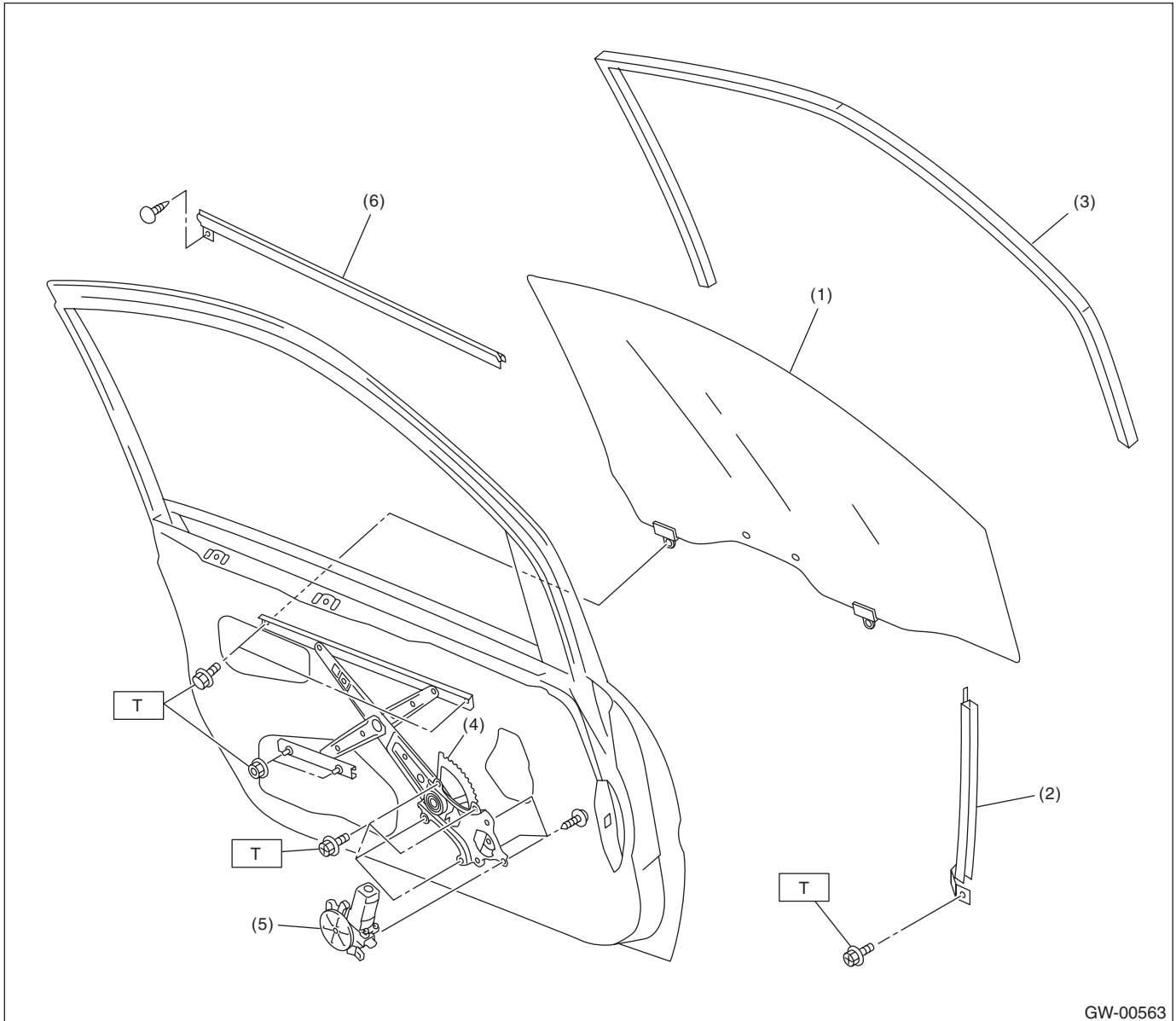
#### 1. FIXED GLASS



GW-00622

- |                           |                         |                         |
|---------------------------|-------------------------|-------------------------|
| (1) Windshield glass      | (6) Spacer              | (10) Fastener           |
| (2) Dam rubber            | (7) Fastener            | (11) Rear quarter glass |
| (3) Molding front         | (8) Seal                | (12) Rear gate glass    |
| (4) Rearview mirror mount | (9) Front quarter glass | (13) Glass clip pin     |
| (5) Locating pin          |                         |                         |

## 2. FRONT DOOR GLASS



GW-00563

- |                      |                    |
|----------------------|--------------------|
| (1) Glass            | (4) Regulator ASSY |
| (2) Door sash        | (5) Motor ASSY     |
| (3) Glass run rubber | (6) Weather strip  |

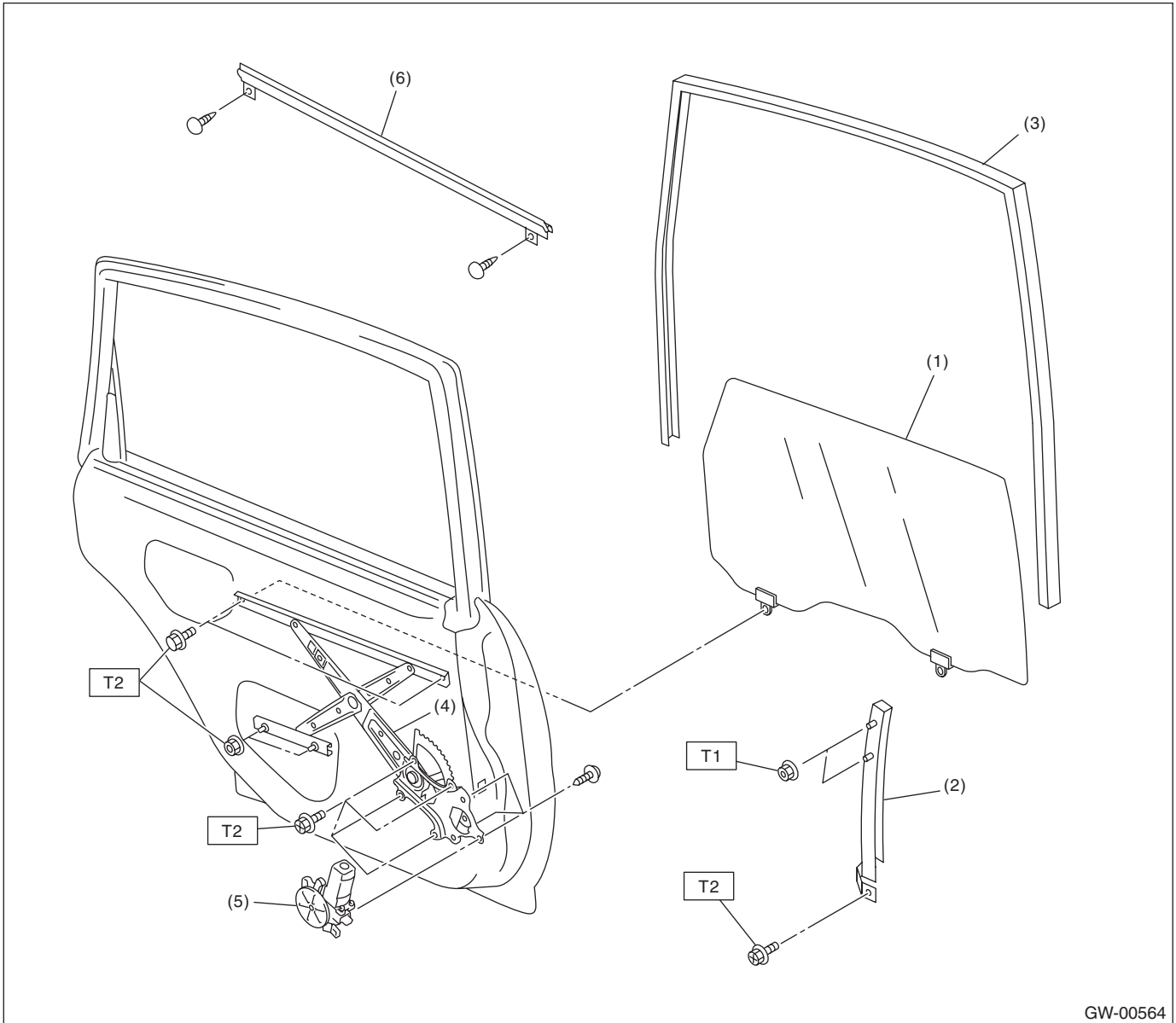
**Tightening torque: N·m (kgf·m, ft·lb)**

**T: 7.5 (0.76, 5.5)**

# General Description

GLASS/WINDOWS/MIRRORS

## 3. REAR DOOR GLASS



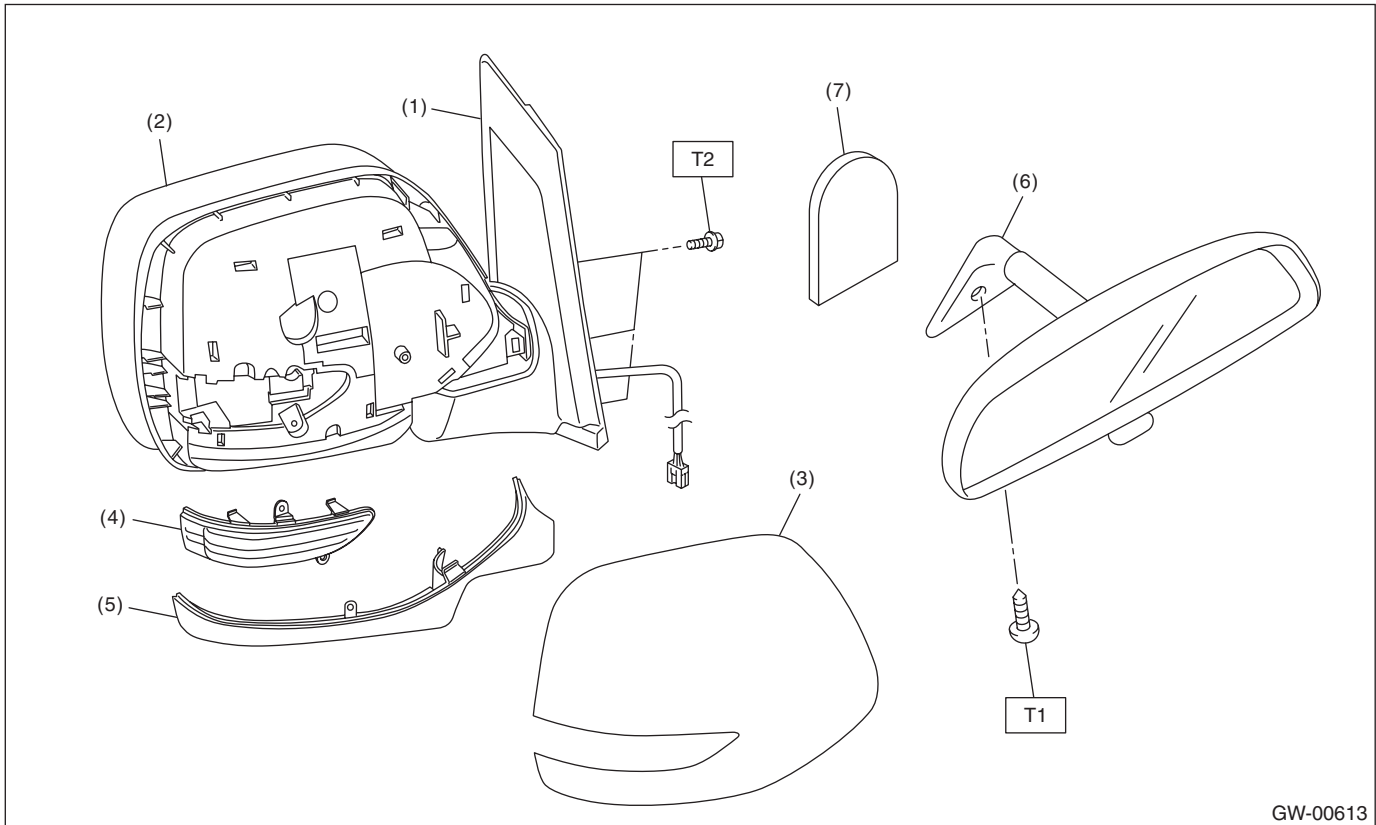
- |                      |                    |
|----------------------|--------------------|
| (1) Glass            | (4) Regulator ASSY |
| (2) Door sash        | (5) Motor ASSY     |
| (3) Glass run rubber | (6) Weather strip  |

**Tightening torque: N·m (kgf·m, ft·lb)**

**T1: 4.4 (0.45, 3.3)**

**T2: 7.4 (0.75, 5.5)**

## 4. MIRROR



GW-00613

- |                            |                       |
|----------------------------|-----------------------|
| (1) Outer mirror           | (5) Mirror body cover |
| (2) Mirror                 | (6) Rearview mirror   |
| (3) Scalp cap              | (7) Mount             |
| (4) Side turn signal light |                       |

**Tightening torque: N·m (kgf·m, ft·lb)**

**T1: 2 (0.2, 1.5)**

**T2: 4.5 (0.46, 3.32)**

### B: CAUTION

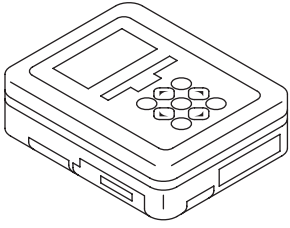
- When electrical connectors are disconnected, always conduct an operational check after connecting them again.
- Avoid impact and damage to the glass.

# General Description

GLASS/WINDOWS/MIRRORS

## C: PREPARATION TOOL

### 1. SPECIAL TOOL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST1B022XU0	1B022XU0	SUBARU SELECT MONITOR III KIT	Used for settings of each function and troubleshooting for electrical system.

### 2. GENERAL TOOL

TOOL NAME	REMARKS
Circuit tester	Used for checking voltage and continuity.
Piano wire	Used for removing the window glass.
Windshield glass knife	Used for removing the window glass.
Cutter knife	Used for removing the window glass.
TORX® T20	Used for removing and installing the rearview mirror.

## 2. Power Window System

### A: WIRING DIAGRAM

<Ref. to WI-141, Power Window System.>

### B: INSPECTION

Symptom	Repair order
All power windows do not operate.	<ol style="list-style-type: none"> <li>1. Fuse (SBF-4)</li> <li>2. Power window circuit breaker</li> <li>3. Power window relay</li> <li>4. Wiring harness</li> <li>5. Body integrated unit</li> </ol>
Particular window does not operate.	<ol style="list-style-type: none"> <li>1. Power window main switch</li> <li>2. Power window sub-switch</li> <li>3. Power window motor</li> <li>4. Wiring harness</li> </ol>
"Window Lock" does not operate.	Power window main switch

### C: NOTE

For the removal of power window system component parts, refer to the corresponding section for each component.

- Power window control switch <Ref. to GW-8, Power Window Control Switch.>
- Front door glass <Ref. to GW-10, Front Door Glass.>
- Front regulator and motor assembly <Ref. to GW-11, Front Regulator and Motor Assembly.>
- Rear door glass <Ref. to GW-17, Rear Door Glass.>
- Rear regulator and motor assembly <Ref. to GW-18, Rear Regulator and Motor Assembly.>

# Power Window Control Switch

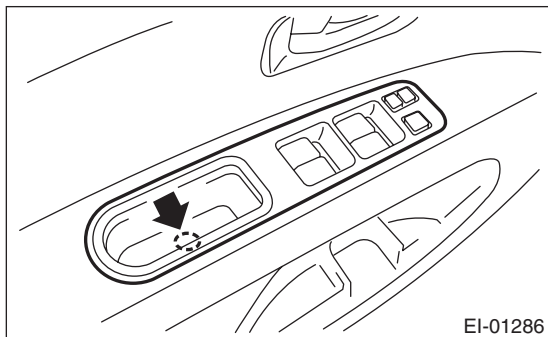
GLASS/WINDOWS/MIRRORS

## 3. Power Window Control Switch

### A: REMOVAL

#### 1. MAIN SWITCH

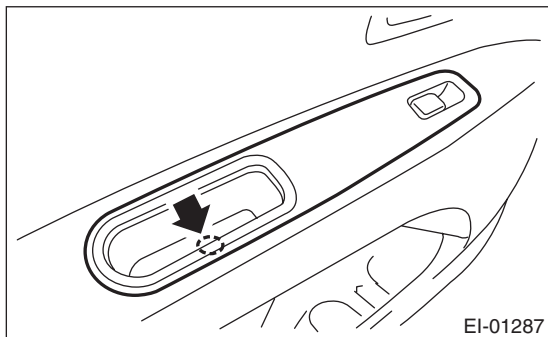
- 1) Disconnect the ground cable from battery.
- 2) Peel the cover inside the hand grip, and remove the screw.
- 3) Remove the power window switch cover assembly.



- 4) Disconnect the harness connector.
- 5) Detach the claw, and remove the power window main switch assembly.

#### 2. SUB-SWITCH

- 1) Disconnect the ground cable from battery.
- 2) Peel the cover inside the hand grip, and remove the screw.
- 3) Remove the power window switch cover assembly.



- 4) Disconnect the connector.
- 5) Detach the claw and remove the power window sub-switch.

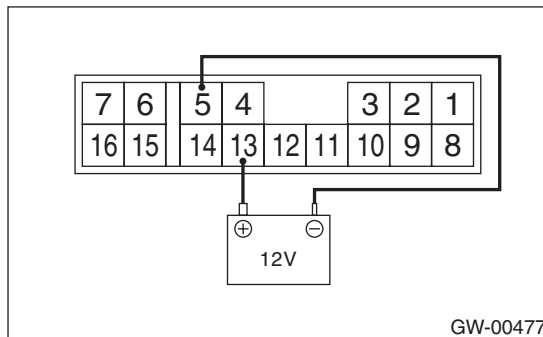
### B: INSTALLATION

Install in the reverse order of removal.

### C: INSPECTION

#### 1. MAIN SWITCH

Measure the switch resistance.



#### NOTE:

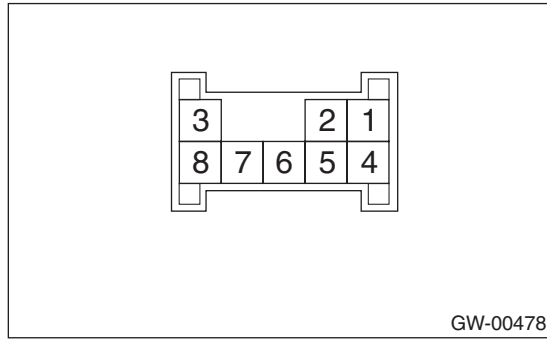
- Make sure the battery voltage is applied to the terminal No. 13 (+) and 5 (-) when measuring resistance, because the main switch is controlled by microcomputer.
- Make sure that the window lock switch is measured in the UNLOCK position.

	Switch position	Terminal No.	Standard
Driver's seat	UP	13 and 2 5 and 1	Less than 1 Ω
	OFF	2 and 5 1 and 5	Less than 1 Ω
	DOWN	13 and 1 5 and 2	Less than 1 Ω
	AUTO DOWN	13 and 1 5 and 2	Less than 1 Ω
Passenger's side	UP	13 and 6 5 and 7	Less than 1 Ω
	OFF	5 and 6 5 and 7	Less than 1 Ω
	DOWN	13 and 7 5 and 6	Less than 1 Ω
Rear RH seat	UP	13 and 16 5 and 15	Less than 1 Ω
	OFF	5 and 16 5 and 15	Less than 1 Ω
	DOWN	13 and 15 5 and 16	Less than 1 Ω
Rear LH seat	UP	13 and 11 5 and 10	Less than 1 Ω
	OFF	5 and 11 5 and 10	Less than 1 Ω
	DOWN	13 and 10 5 and 11	Less than 1 Ω



## 2. SUB-SWITCH

Measure the switch resistance.



	Switch position	Terminal No.	Standard
Passenger's seat and rear seat	UP	5 and 8 7 and 4	Less than 1 $\Omega$
	OFF	6 and 5 7 and 4	Less than 1 $\Omega$
	DOWN	8 and 7 6 and 5	Less than 1 $\Omega$

Replace the sub-switch if faulty.

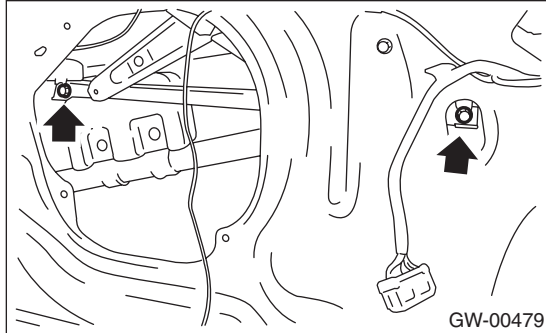
# Front Door Glass

GLASS/WINDOWS/MIRRORS

## 4. Front Door Glass

### A: REMOVAL

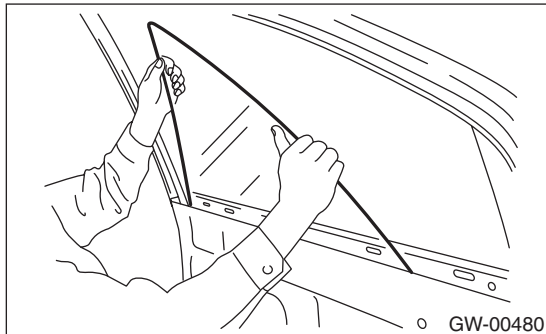
- 1) Remove the front door trim. <Ref. to EI-36, REMOVAL, Door Trim.>
- 2) Remove the sealing cover. <Ref. to EB-17, REMOVAL, Front Sealing Cover.>
- 3) Connect the battery ground cable and power window switch connector.
- 4) Operate the power window switch to move the glass to the position shown in the figure, and then remove the two bolts through service holes.



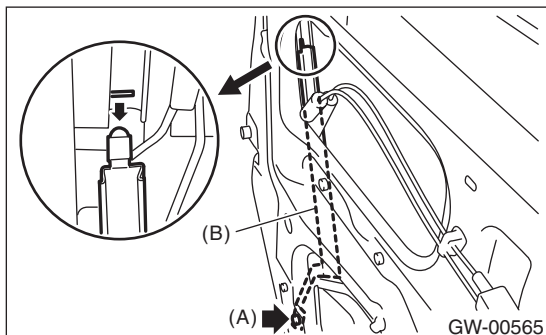
- 5) Tilt the door glass forward, then remove the door glass from the glass run rubber.
- 6) Remove the door glass.

### CAUTION:

- Since the gear may be disengaged, do not turn regulator in the closing direction after removing glass.
- Avoid impact and damage to the glass.



- 7) Remove the bolt (A), and then remove the door sash (B).



### B: INSTALLATION

#### CAUTION:

Make sure that the glass run rubber is placed securely in door frame and sash.

Install in the reverse order of removal.

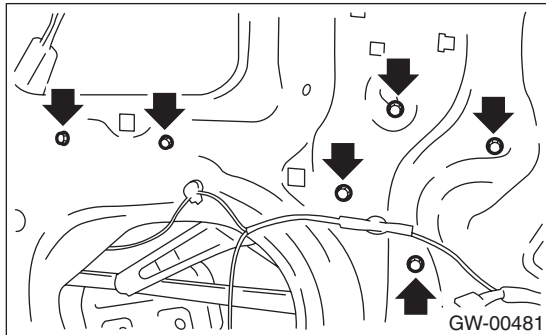
#### Tightening torque:

Refer to "COMPONENT" of "General Description". <Ref. to GW-3, FRONT DOOR GLASS, COMPONENT, General Description.>

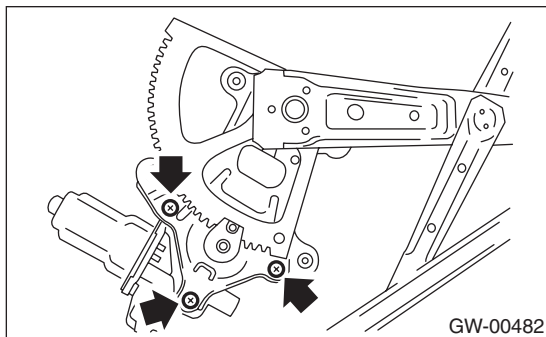
## 5. Front Regulator and Motor Assembly

### A: REMOVAL

- 1) Remove the door glass. <Ref. to GW-10, REMOVAL, Front Door Glass.>
- 2) Disconnect the motor connector.
- 3) Remove the four bolts and two nuts to remove regulator assembly.



- 4) Remove the screws to remove motor assembly.



#### NOTE:

When removing the motor assembly, secure the arm correctly. Otherwise the regulator arm moves with the force of balancing spring.

### B: INSTALLATION

Install in the reverse order of removal.

#### **Tightening torque:**

**Refer to "COMPONENT" of "General Description".** <Ref. to GW-3, FRONT DOOR GLASS, COMPONENT, General Description.>

### C: INSPECTION

- 1) Make sure that the power window motor rotates properly when the battery voltage is applied to the terminals of motor connector.
- 2) Change polarity of battery connection to terminals to ensure that the motor rotates in reverse direction.

## 6. Remote Control Mirror System

### A: WIRING DIAGRAM

<Ref. to WI-146, Remote Control Mirror System.>

### B: INSPECTION

Symptom	Repair order
All function does not operate.	1. Fuse (F/B No. 6) 2. Mirror switch 3. Wiring harness
One side of the mirror motor does not operate.	1. Mirror switch 2. Mirror motor 3. Wiring harness
Mirror heater does not operate.	1. Mirror switch 2. Mirror heater 3. Wiring harness

### C: NOTE

For the removal of remote control mirror system component parts, refer to the corresponding section for each component.

- Scalp cap <Ref. to GW-13, Scalp Cap.>
- Outer mirror assembly <Ref. to GW-14, Outer Mirror Assembly.>
- Outer mirror <Ref. to GW-15, Outer Mirror.>
- Remote control mirror switch <Ref. to GW-16, Remote Control Mirror Switch.>

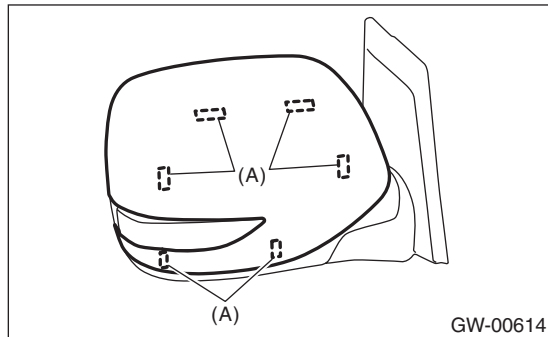
## 7. Scalp Cap

### A: REPLACEMENT

**CAUTION:**

**Do not remove caps such as scalp cap forcibly. The lower hooks may be damaged.**

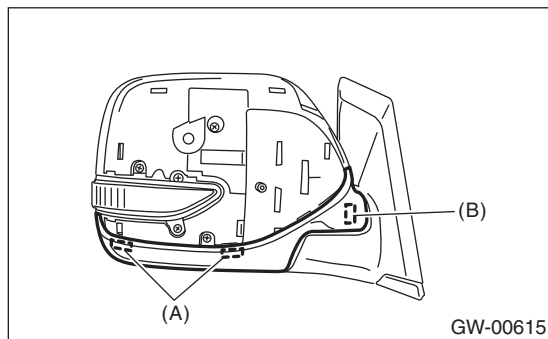
- 1) Remove the outer mirror. <Ref. to GW-15, REPLACEMENT, Outer Mirror.>
- 2) Disengage the claws (A) from inside of the outer mirror, and remove the scalp cap.



- 3) Disengage the claws (A) and (B) from inside of the outer mirror, and remove the mirror body cover.

**CAUTION:**

**Claw (B) cannot be disengaged from the inside of the outer mirror. When removing, be careful not to damage the parts.**



- 4) Install the scalp cap and mirror body cover clips (A) securely.

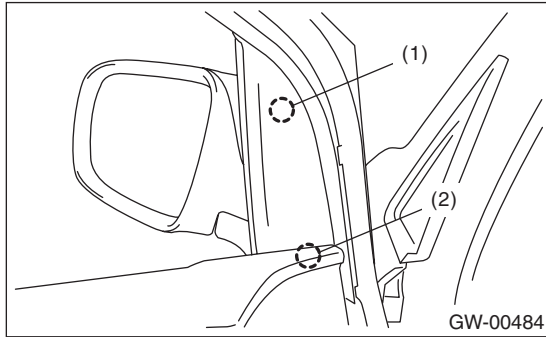
# Outer Mirror Assembly

GLASS/WINDOWS/MIRRORS

## 8. Outer Mirror Assembly

### A: REMOVAL

1) Remove the mirror gusset cover.

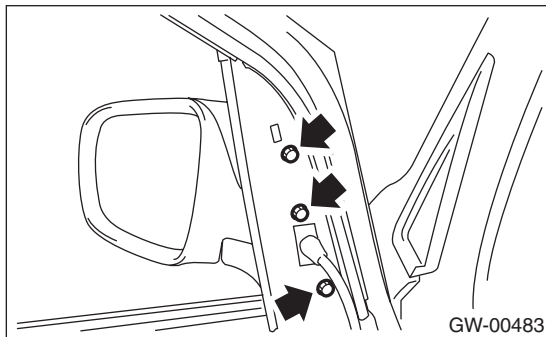


- (1) Clip
- (2) Hook

2) Remove the door trim. <Ref. to EI-36, REMOVAL, Door Trim.>

3) Disconnect the mirror connector.

4) Remove the screws to remove outer mirror assembly.

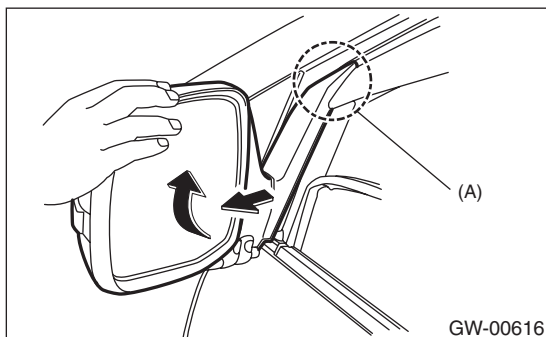


5) Remove the outer mirror assembly. (Model without door visor)

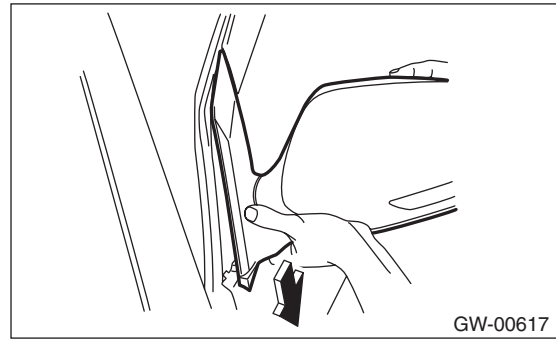
6) Using the upper part (A) of the mirror assembly as a supporting point, pull it upward while drawing the lower part. (Model with door visor)

### CAUTION:

- Do not remove forcibly, otherwise door visor may be damaged.
- Apply protective tape as necessary in order to avoid scratching the door visor and mirror assembly.



7) Pull the mirror assembly downward to remove from the vehicle body. (Model with door visor)



### B: INSTALLATION

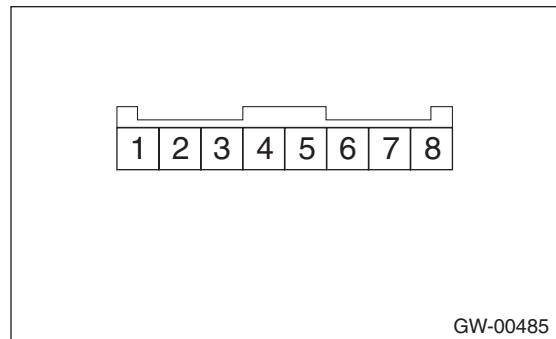
Install in the reverse order of removal.

#### Tightening torque:

Refer to "COMPONENT" of "General Description". <Ref. to GW-5, MIRROR, COMPONENT, General Description.>

### C: INSPECTION

Check that the rearview mirror moves properly when the battery voltage is applied to terminals.



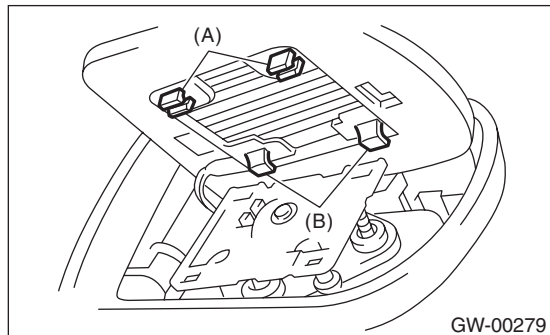
Mirror movement	Terminal No.
OFF	—
UP	5 (+) and 6 (-)
DOWN	6 (+) or 5 (-)
LEFT	8 (+) and 7 (-)
RIGHT	7 (+) or 8 (-)

Replace the outer mirror assembly if defective.

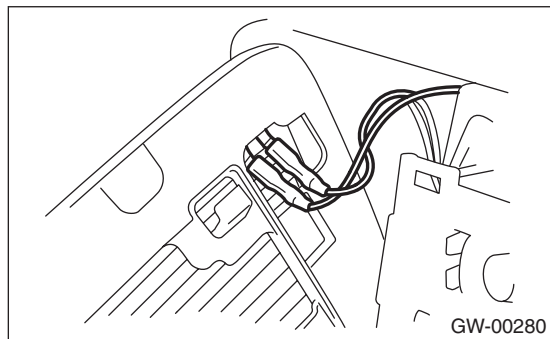
## 9. Outer Mirror

### A: REPLACEMENT

- 1) Face the mirror upward.
- 2) Disconnect the ground cable from battery. (Model with mirror heater)
- 3) Use a flat tip screwdriver to remove clip (A).
- 4) Lift the lower mirror up to remove hooks (B).



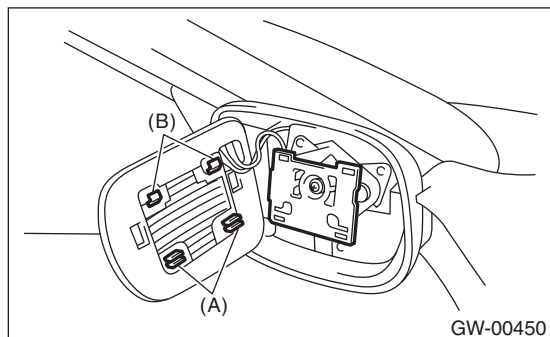
- 5) Disconnect the mirror heater connector from side of the mirror. (Model with mirror heater)



- 6) Catch the hooks (B) and install clips (A).

#### CAUTION:

- When removing the mirror, be careful not to damage the back surface of mirror with a flat tip screwdriver.
- When installing the mirror, insert the hook and clip securely.



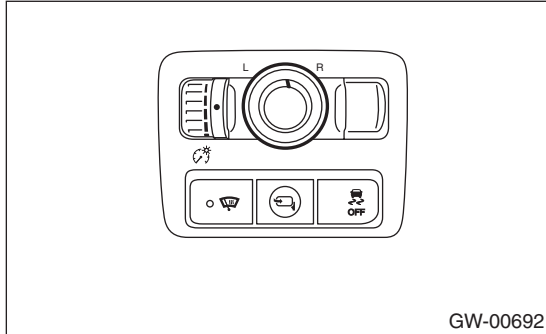
# Remote Control Mirror Switch

GLASS/WINDOWS/MIRRORS

## 10. Remote Control Mirror Switch

### A: REMOVAL

- 1) Remove the instrument panel lower cover. <Ref. to EI-37, REMOVAL, Instrument Panel Lower Cover.>
- 2) Disconnect the connector.



- 3) Remove the remote control mirror switch from instrument panel lower cover.

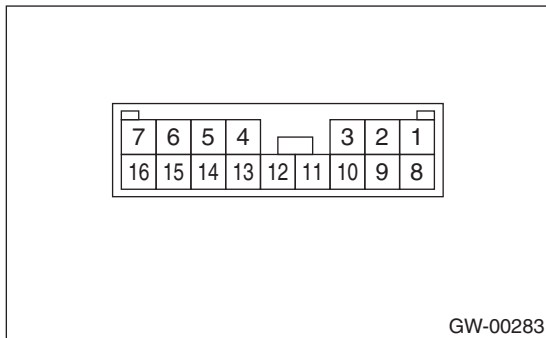
### B: INSTALLATION

Install in the reverse order of removal.

### C: INSPECTION

#### 1. REMOTE CONTROL MIRROR SWITCH

Move the remote control mirror switch to each position and check continuity between terminals.



- Change over switch R

Switch position	Terminal No.	Standard
OFF	—	1 MΩ or more
UP	10 and 12 15 and 14	Less than 1 Ω
DOWN	10 and 15 12 and 14	Less than 1 Ω
LEFT	10 and 11 15 and 14	Less than 1 Ω
RIGHT	10 and 15 11 and 14	Less than 1 Ω

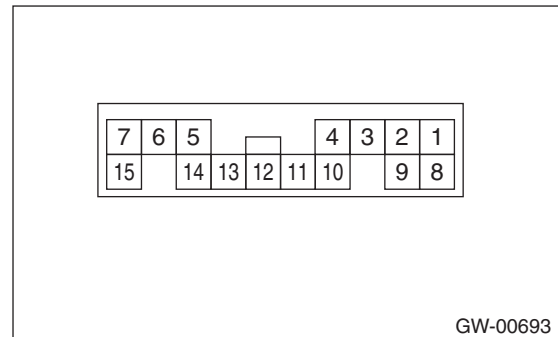
- Change over switch L

Switch position	Terminal No.	Standard
OFF	—	1 MΩ or more
UP	10 and 8 15 and 14	Less than 1 Ω
DOWN	10 and 15 8 and 14	Less than 1 Ω
LEFT	10 and 9 15 and 14	Less than 1 Ω
RIGHT	10 and 15 9 and 14	Less than 1 Ω

Replace the remote control mirror switch if defective.

#### 2. ELECTRIC FOLDING SWITCH

Press the switch and check for continuity between the terminals.



Switch position	Terminal No.	Standard
Folding	11 and 4 12 and 13	Less than 1 Ω
Unfolding	11 and 13 12 and 4	Less than 1 Ω

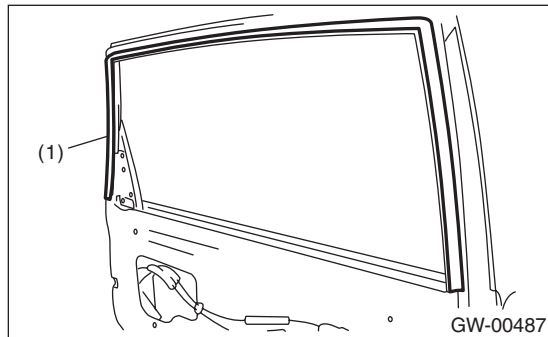
If NG, replace the switch.



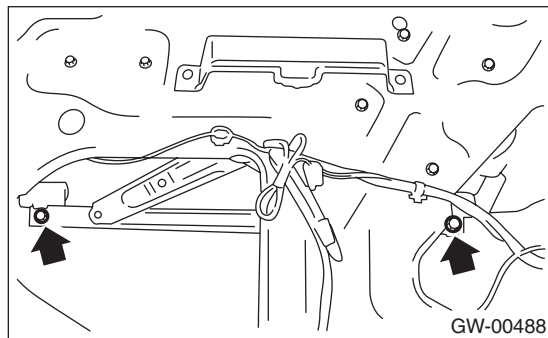
## 11. Rear Door Glass

### A: REMOVAL

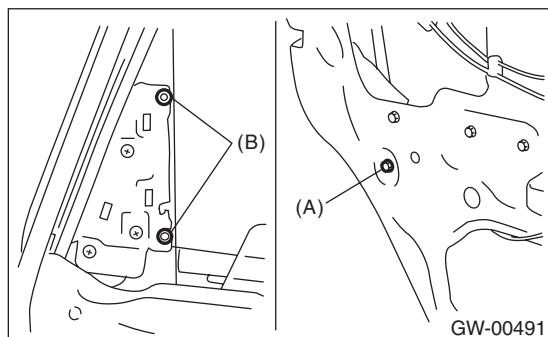
- 1) Remove the rear door trim. <Ref. to EI-36, REMOVAL, Door Trim.>
- 2) Remove the sealing cover. <Ref. to EB-20, NOTE, Rear Sealing Cover.>
- 3) Apply the protective tape (1) to the areas as shown in the figure.



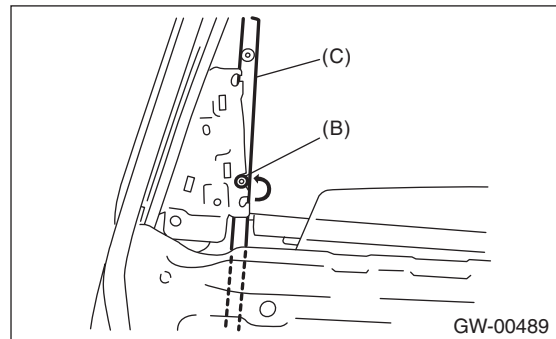
- 4) Connect the ground cable to battery and power window switch connector.
- 5) Operate the power window switch to move the glass to the position shown in the figure, and then remove the two bolts through service holes.



- 6) Remove the sash retaining bolt (A), and loosen the retaining nuts (B).



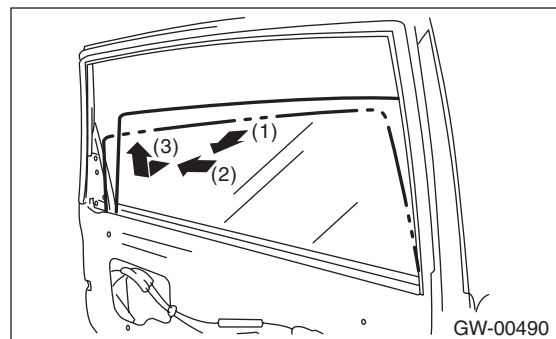
- 7) Move the sash (C) upward, and move the nut (B) to the position on rear door as shown in the figure.



- 8) Detach the rear part of door glass from sash (1), and move it backward (2). Tilt the door glass inward, and move it upward to remove (3).

### CAUTION:

- Since the gear may be disengaged, do not turn regulator in the closing direction after removing glass.
- Avoid impact and damage to the glass.



- 9) Remove the glass run rubber.
- 10) Remove the door sash.

### B: INSTALLATION

### CAUTION:

- Make sure that the glass run rubber is placed securely in door frame and sash. Install in the reverse order of removal.

### Tightening torque:

Refer to "COMPONENT" of "General Description". <Ref. to GW-4, REAR DOOR GLASS, COMPONENT, General Description.>

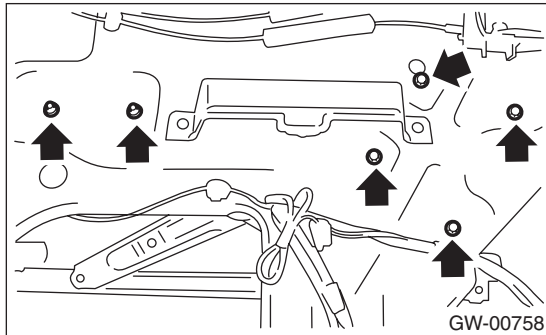
# Rear Regulator and Motor Assembly

GLASS/WINDOWS/MIRRORS

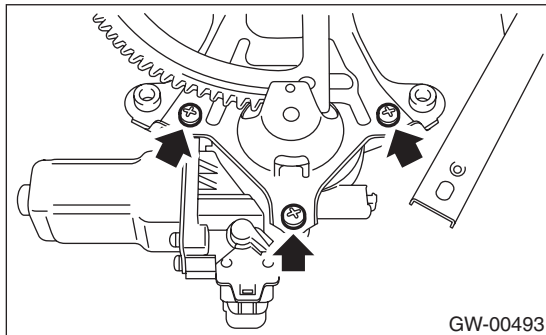
## 12. Rear Regulator and Motor Assembly

### A: REMOVAL

- 1) Remove the rear door glass. <Ref. to GW-17, REMOVAL, Rear Door Glass.>
- 2) Disconnect the motor connector.
- 3) Remove the four bolts and two nuts to remove the regulator assembly.



- 4) Remove the screws to remove the motor assembly.



### B: INSTALLATION

Install in the reverse order of removal.

#### **Tightening torque:**

**Refer to "COMPONENT" of "General Description". <Ref. to GW-4, REAR DOOR GLASS, COMPONENT, General Description.>**

### C: INSPECTION

- 1) Make sure that the power window motor rotates properly when the battery voltage is applied to the terminals of motor connector.
- 2) Change polarity of battery connection to terminals to ensure that the motor rotates in reverse direction.

## 13. Windshield Glass

### A: REMOVAL

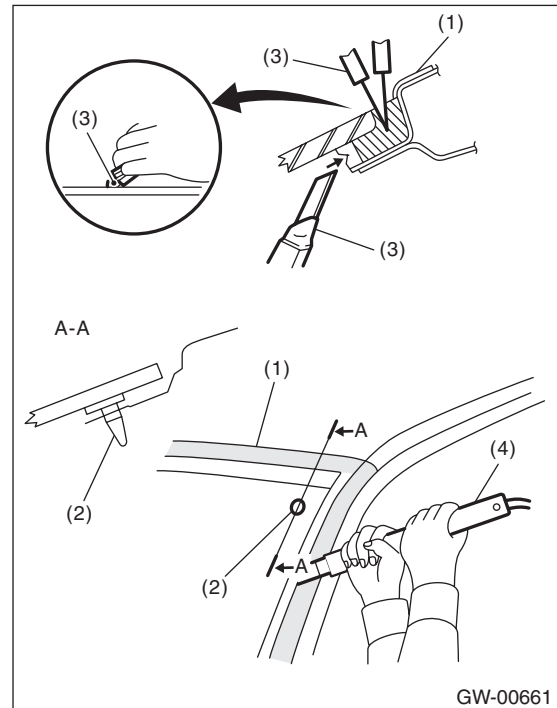
#### 1. WHEN USING THE WINDSHIELD GLASS KNIFE

- 1) Remove the front pillar trim (passenger side) and disconnect the wiper deicer connector. (Models with wiper deicer)
- 2) Remove the cowl panel. <Ref. to EI-30, REMOVAL, Cowl Panel.>
- 3) Remove the molding front.
- 4) Tape the body side of the circumference of windshield glass for protection.
- 5) Apply sufficient amount of soapy water to the adhesive part.
- 6) Make a cut in the adhesive part using a cutter blade so that windshield glass knife can be inserted easily.
- 7) Insert the windshield glass knife into adhesive part.

8) While holding the knife edge and windshield glass edge at a right angle, move the windshield glass knife in parallel to the windshield glass edge along the surface and edge of windshield glass to cut the adhesive part.

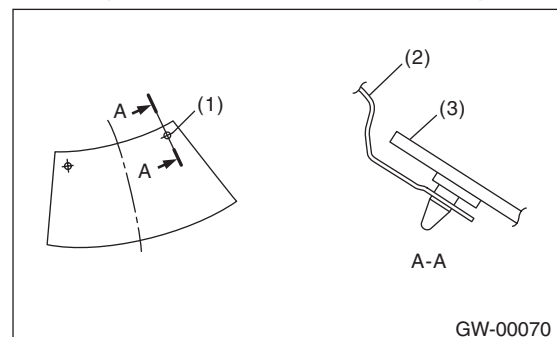
#### NOTE:

- Do not twist the windshield glass knife.
- Cutting of adhesive part shall be started with wider gap between windshield glass and body.



- (1) Tape for protection
- (2) Locating pin
- (3) Cutter knife
- (4) Windshield glass knife

- The locating pins are bonded to the corners of glass. Use piano wire to disconnect the pins.



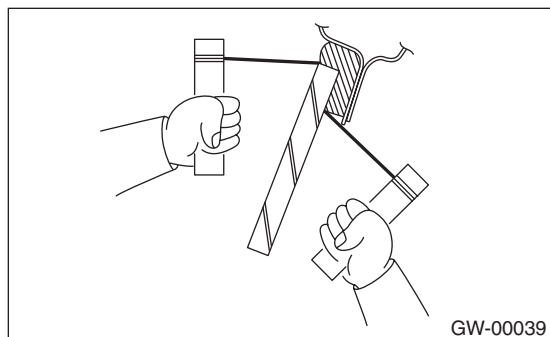
- (1) Locating pin
- (2) Body panel
- (3) Windshield glass

# Windshield Glass

## GLASS/WINDOWS/MIRRORS

### 2. USING PIANO WIRE

- 1) Remove the front pillar trim (passenger' side) and disconnect the wiper deicer connector. (Model with wiper deicer)
- 2) Remove the cowl panel. <Ref. to EI-30, REMOVAL, Cowl Panel.>
- 3) Remove the molding front.
- 4) Apply protective tape to the body panel side to enclose the windshield glass.
- 5) Make a hole in the adhesive part using drill or knife.
- 6) Pass the piano wire through the hole, and attach both the wire ends securely to pieces of wood.



- 7) Pull the wire ends alternately to cut off the adhesive part.

#### CAUTION:

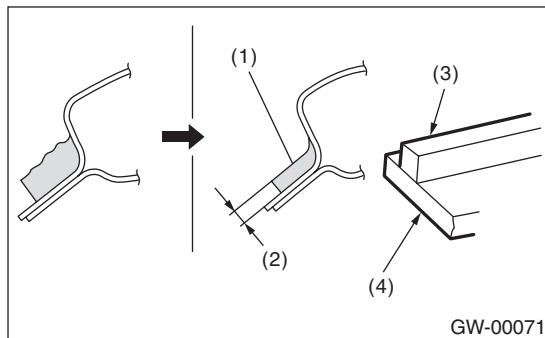
- Do not tightly pull the piano wire against the windshield glass edge.
- Be careful not to damage interior and exterior parts.
- When removal is made with area close to instrument panel, place a protection plate over it. Pay particular attention to the removal.
- Do not cross piano wires. Otherwise they may be cut.

### B: INSTALLATION

- 1) Clean the external circumference of windshield glass with alcohol or white gasoline.
- 2) Remove the adhesive layer on the body using cutter knife to obtain smooth face of 2 mm (0.08 in) thick.

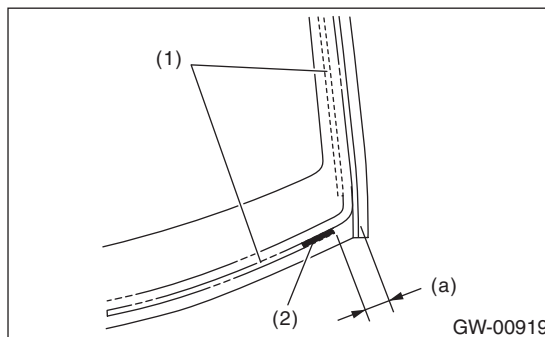
#### CAUTION:

Be careful not to damage the body and paint surface.



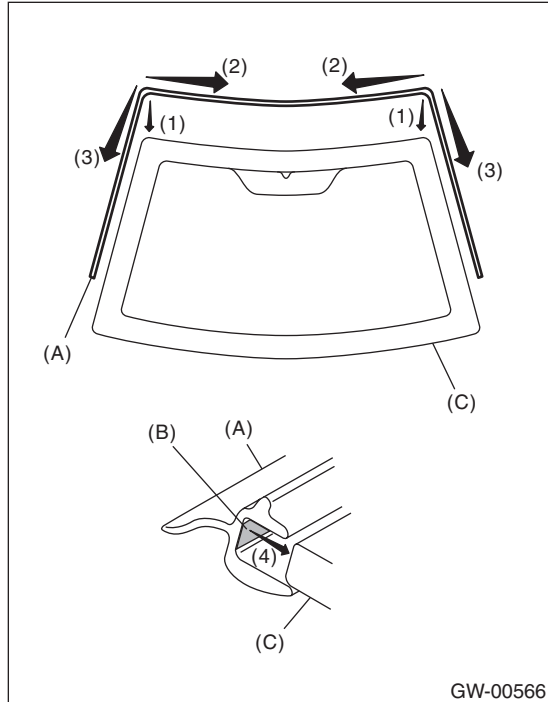
- (1) Adhesive
- (2) 2 mm (0.08 in)
- (3) Dam rubber
- (4) Glass

- 3) Clean the body with alcohol or white gasoline to eliminate cutting powder, dust and dirt completely from body.
- 4) Attach the dam rubber to the backside of the glass.
- 5) Attach the spacer to the lower end of the glass on passenger's side only.



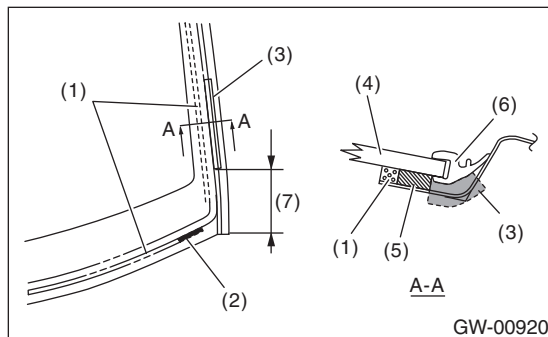
- (a) 15 mm (0.59 in)
- (1) Dam rubber
- (2) Spacer

6) Install the molding to the glass.



GW-00566

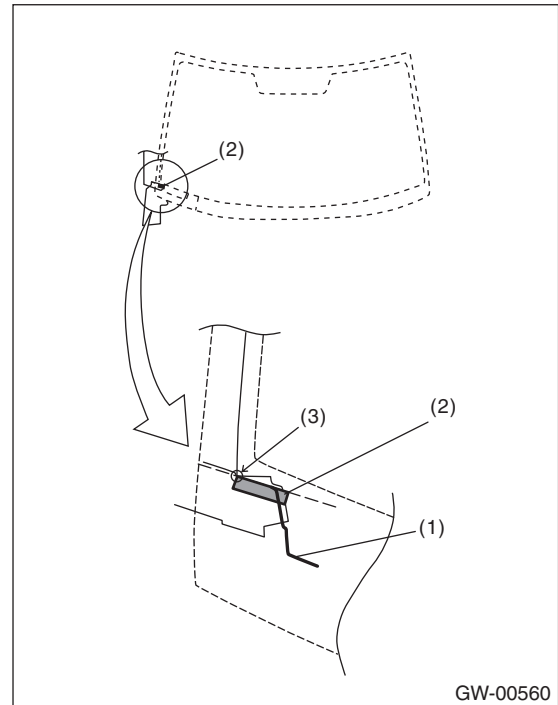
- (1) Align the molding (A) with both ends of the upper edge of the windshield glass (C).
- (2) Install the molding from both corners of the upper edge toward the center.
- (3) Install the molding from both corners of the upper edge toward the lower side.
- (4) Apply the double-sided tapes (B) uniformly on both sides of the glass.
- (5) Attach the seal A (3) to the backside of the molding.



GW-00920

- (1) Dam rubber
- (2) Spacer
- (3) Seal A
- (4) Glass
- (5) Adhesive
- (6) Molding
- (7) 86.4 mm (3.4 in)

7) Apply the seal B (2) to terminal section of front reinforce side panel (1) and the intersection point (3) of front reinforce side panel and front pillar out panel.



GW-00560

- (1) Front reinforce side panel
- (2) Seal B
- (3) Intersection point of front reinforce side panel and front pillar out panel

8) Apply two types of primers to the adhesive layer of glass using sponge.

**Glass primer:**  
**Dow Automotive's**  
**ESSEX U-401, U-402**

# Windshield Glass

## GLASS/WINDOWS/MIRRORS

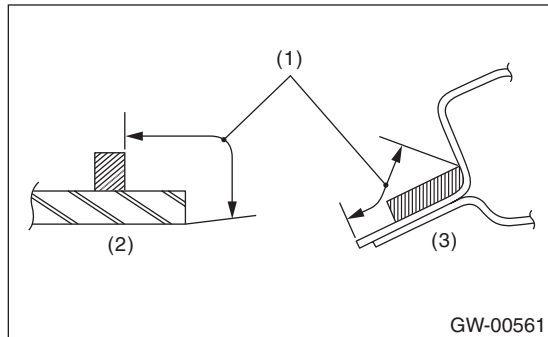
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9) Apply the primer to the adhesive layer of body.

**Painted surface primer:**  
**Dow Automotive's**  
**ESSEX U-413**

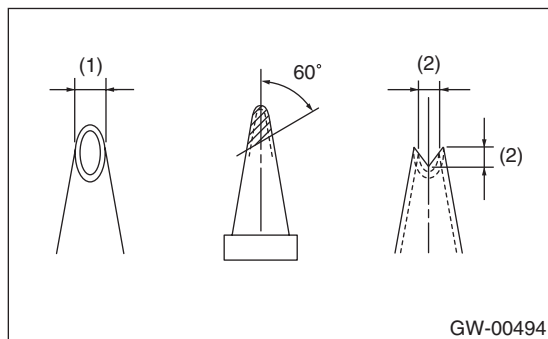
NOTE:

- Primer once attached to the painted surface of the body and internal trim is hard to wipe off. Mask the circumference of such area.
- Let primer dry for about ten minutes before installing the glass.
- Do not touch the surface coated with primer.



- (1) Application of primer  
(2) Glass side  
(3) Body side

10) Cut off the cartridge nozzle tip as shown and set it in sealant gun.

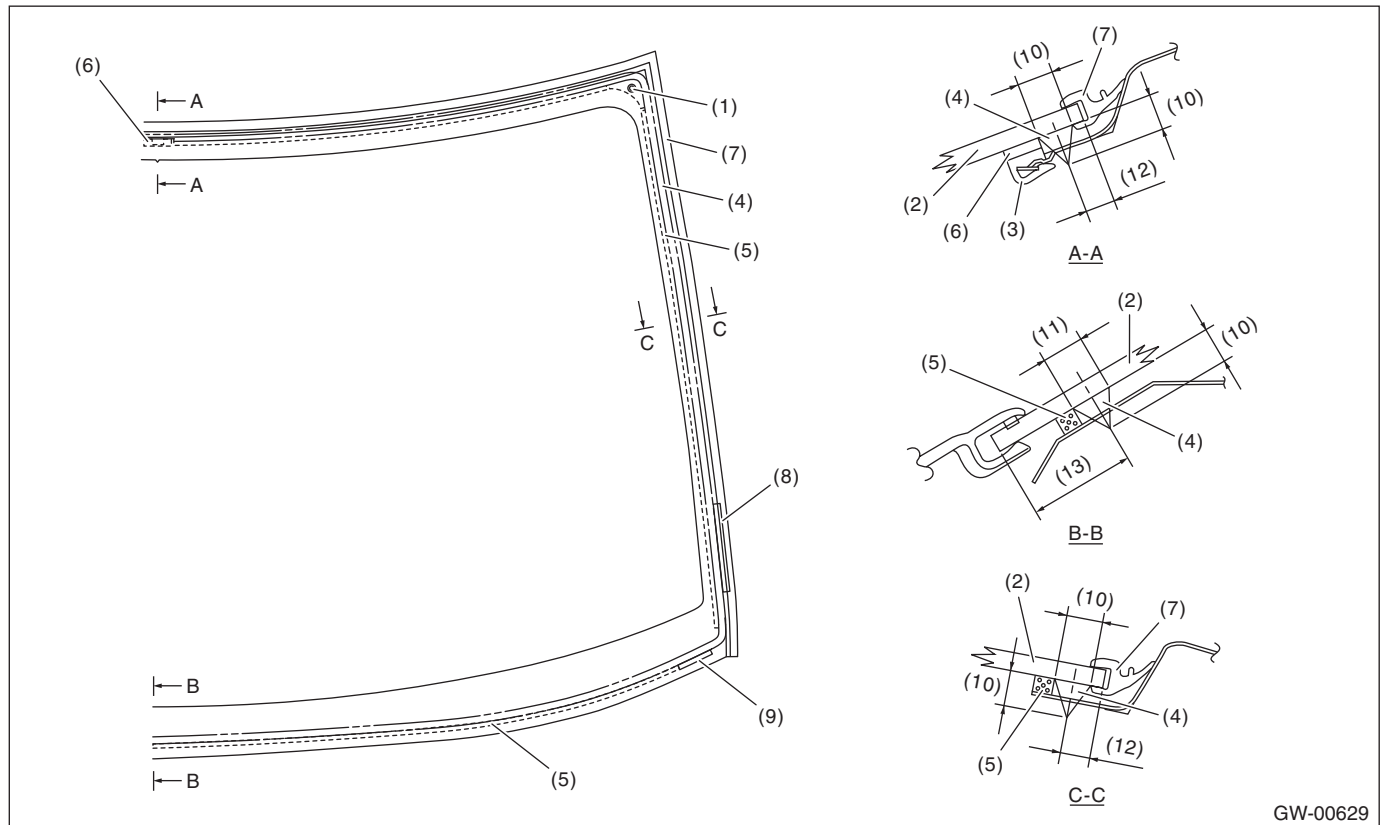


- (1) 10 mm (0.39 in)  
(2) 9 mm (0.35 in)

11) Apply adhesive to the glass end surface as shown.

**Adhesive:**

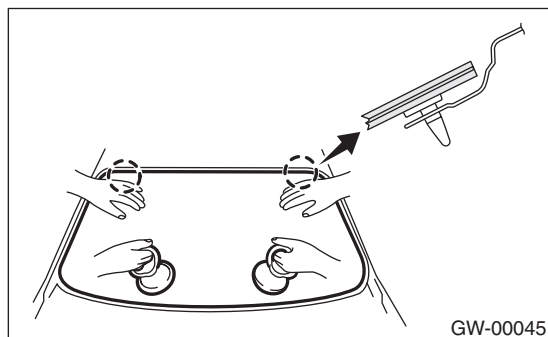
**Dow Automotive's  
ESSEX U-400HV or equivalent**



GW-00629

- |                  |                   |                       |
|------------------|-------------------|-----------------------|
| (1) Locating pin | (6) Fastener      | (10) 9 mm (0.35 in)   |
| (2) Glass        | (7) Molding front | (11) 10 mm (0.39 in)  |
| (3) Fastener     | (8) Seal A        | (12) 7.5 mm (0.29 in) |
| (4) Adhesive     | (9) Spacer        | (13) 25 mm (0.98 in)  |
| (5) Dam rubber   |                   |                       |

12) Fit the locating pins, and install windshield glass using suction rubber cup.



GW-00045

- 13) Lightly press the windshield glass for tight fit.  
 14) Make flush the adhesive surface juttred out using spatula.  
 15) After completion of all work, allow the vehicle to stand for about 24 hours.

**NOTE:**

- When door is opened/closed after glass is bonded, always lower the door glass first, and then open/close it carefully.
- Move the vehicle slowly.
- For minimum drying time and vehicle standing time before driving after bonding, follow instructions or instruction manual from the adhesive manufacturer.

16) After curing of adhesive, pour the water on external surface of vehicle to check that there are no water leaks.

**NOTE:**

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.

17) Install the cowl panel. <Ref. to EI-30, INSTALLATION, Cowl Panel.>

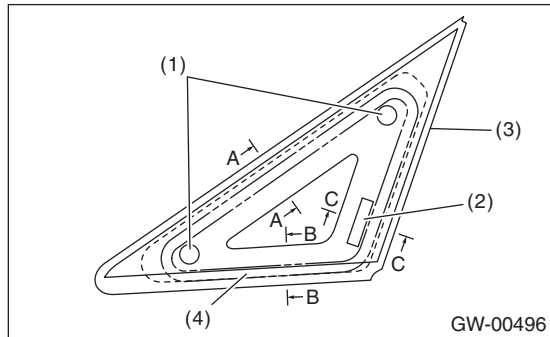
# Front Quarter Glass

GLASS/WINDOWS/MIRRORS

## 14. Front Quarter Glass

### A: REMOVAL

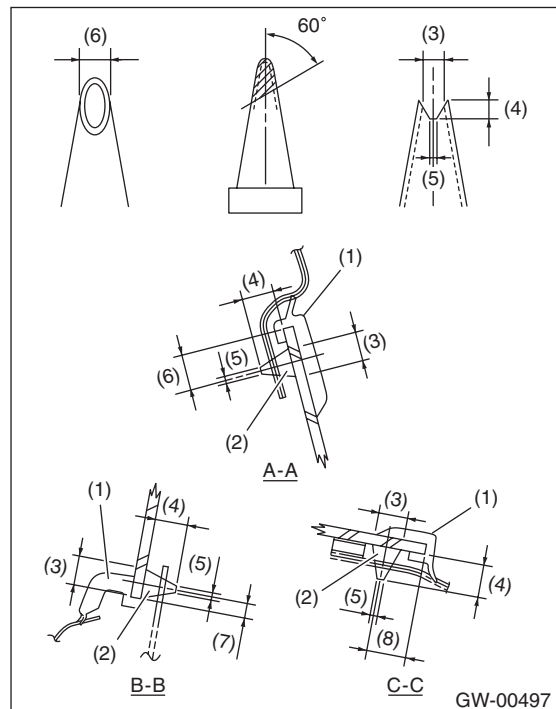
Remove the glass in the same procedure as for windshield glass. <Ref. to GW-19, REMOVAL, Windshield Glass.>



- (1) Locating pin
- (2) Fastener
- (3) Encap molding
- (4) Adhesive

### B: INSTALLATION

1) Cut out the nozzle head and apply adhesive to the glass end surface as shown.



- (1) Encap molding
- (2) Adhesive
- (3) 8 mm (0.31 in)
- (4) 9 mm (0.35 in)
- (5) 2 mm (0.07 in)
- (6) 10 mm (0.39 in)
- (7) 4.5 mm (0.17 in)
- (8) 11 mm (0.43 in)

2) Install the glass in the same procedure as for windshield glass. <Ref. to GW-20, INSTALLATION, Windshield Glass.>

3) After completion of all work, allow the vehicle to stand for about 24 hours.

#### NOTE:

- When door is opened/closed after glass is bonded, always lower the door glass first, and then open/close it carefully.
- Move the vehicle slowly.
- For minimum drying time and vehicle standing time before driving after bonding, follow instructions or instruction manual from the adhesive manufacturer.

4) After curing of adhesive, pour the water on external surface of vehicle to check that there are no water leaks.

#### NOTE:

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.



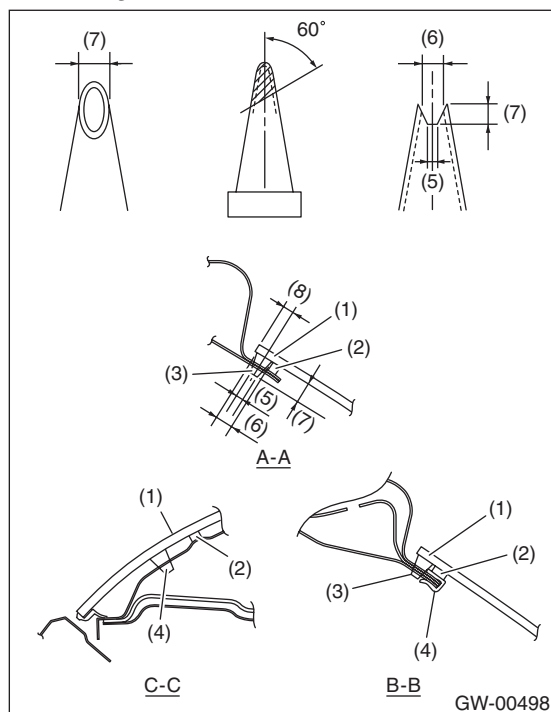
## 15.Rear Gate Glass

### A: REMOVAL

- 1) Remove the rear wiper motor. <Ref. to WW-20, REMOVAL, Rear Wiper Motor.>
- 2) Disconnect the electrical connectors from rear defogger terminal.
- 3) Remove the glass in the same procedure as for windshield glass. <Ref. to GW-19, REMOVAL, Windshield Glass.>

### B: INSTALLATION

- 1) Mount the fastener on the vehicle body.
- 2) Cut off the cartridge nozzle tip as shown and set it in sealant gun.



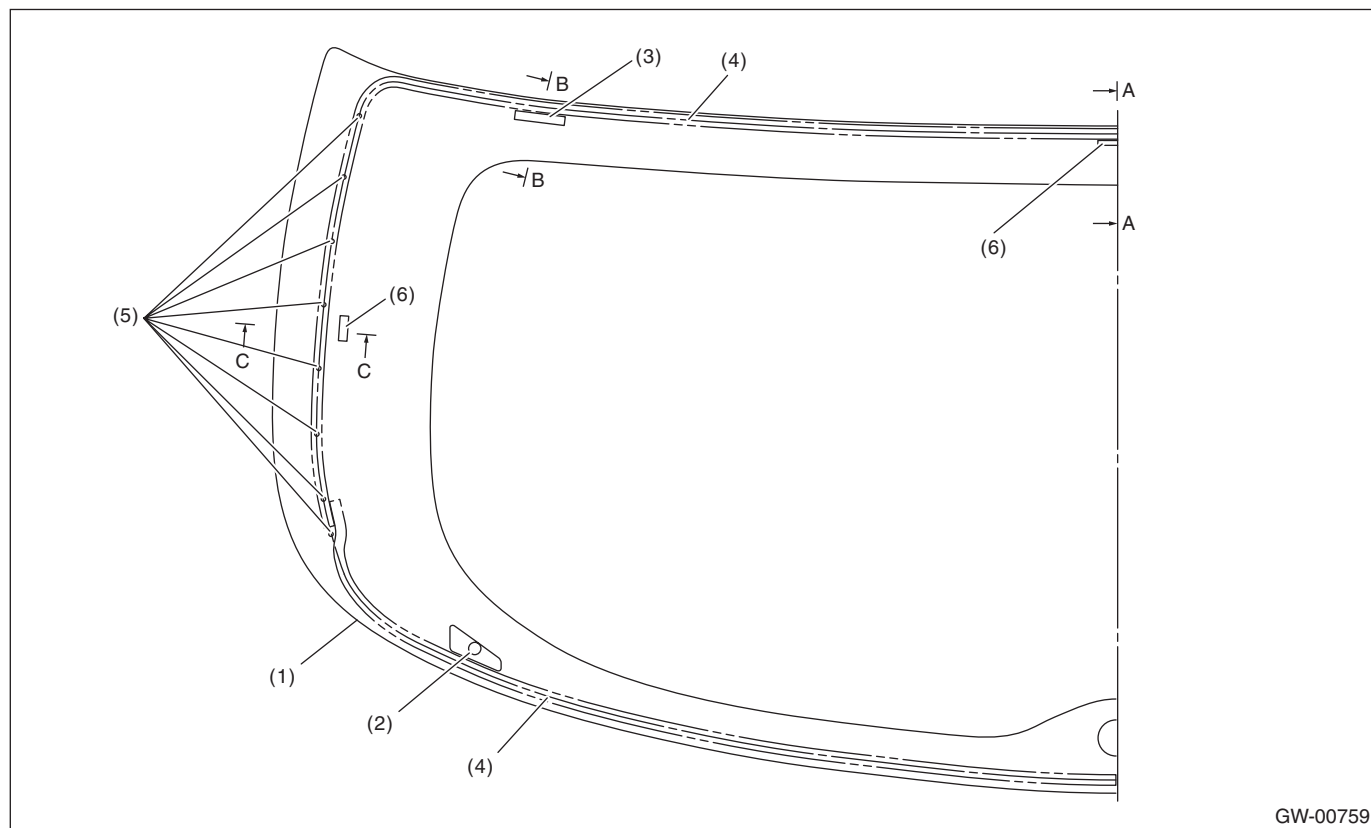
- (1) Glass
- (2) Spacer
- (3) Adhesive
- (4) Fastener
- (5) 4 mm (0.15 in)
- (6) 8 mm (0.31 in)
- (7) 10 mm (0.39 in)
- (8) 10 mm (0.39 in)

- 3) Apply adhesive in the same procedure as for windshield glass. <Ref. to GW-20, INSTALLATION, Windshield Glass.>
- 4) Insert the glass clip pin into rear gate hole, push on the area around the clip pin to secure it, and then push lightly all around the area to seal it.

# Rear Gate Glass

## GLASS/WINDOWS/MIRRORS

5) About one hour after installation, conduct a leak test.



(1) Glass

(2) Glass clip pin

(3) Fastener

(4) Adhesive

(5) Marks for applying the primer

(6) Spacer

6) After completion of all work, allow the vehicle to stand for about 24 hours.

### NOTE:

- When door is opened/closed after glass is bonded, always lower the door glass first, and then open/close it carefully.
- Move the vehicle slowly.
- For minimum drying time and vehicle standing time before driving after bonding, follow instructions or instruction manual from the adhesive manufacturer.
- 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.

7) Connect the rear defogger terminals.

8) Install the rear wiper. <Ref. to WW-20, INSTALLATION, Rear Wiper Motor.>

## 16. Rear Window Defogger System

### A: WIRING DIAGRAM

Refer to “Rear Defogger System” in WI section. <Ref. to WI-145, WIRING DIAGRAM, Rear Defogger System.>

### B: INSPECTION

#### 1. SYSTEM INSPECTION

Symptoms	Repair order
Rear window defogger does not operate.	<ol style="list-style-type: none"> <li>1. Fuse (M/B No. 10)</li> <li>2. Rear defogger relay</li> <li>3. Defogger switch</li> <li>4. Heat wire</li> <li>5. Wiring harness</li> <li>6. Body integrated unit</li> </ol>

**NOTE:**

Rear window defogger system can be customized on the Subaru Select Monitor.

System name	Initial setting	Customize setting
Rear window defogger timer	OFF after 15 min.	Repeat 15 min. operation and 2 min. stop.

#### 2. CHECK WITH SUBARU SELECT MONITOR

**CAUTION:**

**Check that the rear window defogger timer is in initial setting or customize setting before performing inspection.**

1) Check the input signal when the rear window defogger switch is operated using Subaru Select Monitor.

(1) Prepare the Subaru Select Monitor. <Ref. to GW-6, PREPARATION TOOL, General Description.>

(2) Turn the ignition switch to ON (engine OFF) and run the “PC application for Subaru Select Monitor”.

(3) On «System Selection Menu» display, select {Integ. unit mode}.

(4) Select the {Current Data Display & Save}.

(5) Display the data of rear window defogger switch.

2) After rear window defogger switch is set to ON, check whether it turns to OFF in 15 minutes or repeats 15 minutes operation and 2 minutes stop?

3) When it becomes OFF on above 2), it is normal. When it repeats 15 minutes operation and 2 minutes stop, replace body integrated unit.

#### 3. HEAT WIRE INSPECTION

**CAUTION:**

**When wiping off the stain on glass 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.**

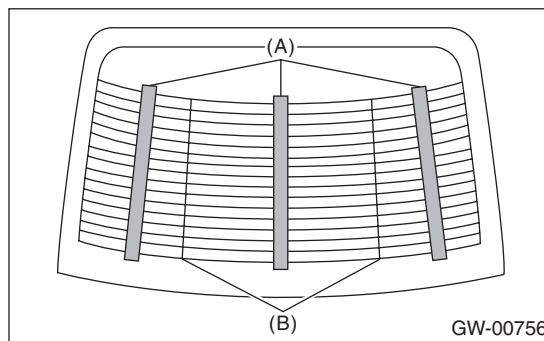
1) Prepare the following checking items.

- Liquid crystal thermograph sheet (Approximate size: 300 × 300 mm (11.8 × 11.8 in) and thermal temperature: 35 — 40°C (95 — 104°F))
- Aluminum foil

2) Turn the ignition switch to ON.

3) Turn the defogger switch to ON.

4) Push the liquid crystal thermograph sheet from the outside of the rear glass.



(A) Liquid crystal thermograph sheet  
(B) Separate line

**NOTE:**

Use the liquid crystal thermograph sheet every range it is separated with the separate line.

5) Determine the faulty heat wire by checking the color of the liquid crystal thermograph sheet.

Liquid crystal thermograph sheet	Criteria
Change occurred (red → blue)	Normal
No change (black)	Open

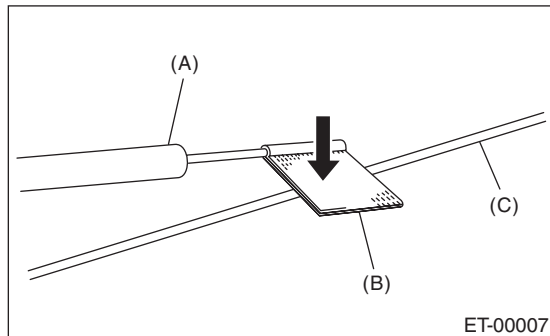
**NOTE:**

- Check from the inside of the glass if the liquid crystal thermograph sheet does not change.
- The time for the color change may differ depends on the surface temperature of the glass.

# Rear Window Defogger System

## GLASS/WINDOWS/MIRRORS

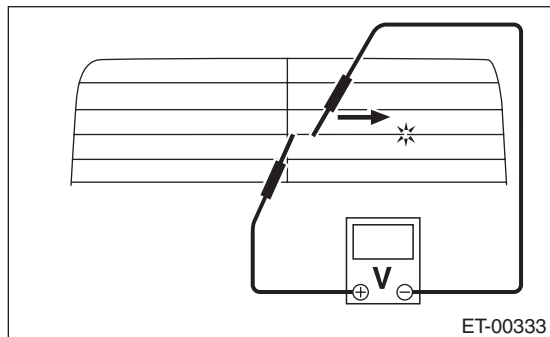
6) Wrap a piece of aluminum foil around the tip of tester probe and press it against the heat wire with your finger.



- (A) Tester probe
- (B) Aluminum foil
- (C) Heat wire

7) Fasten the tester probe on the positive (+) side and negative (-) side to end of positive side of open harness of step 5).

8) Move the tester probe on the negative (-) side slowly along the heat wire. If voltage changes from zero to several volts during movement of tester probe, heat wire is open at the voltage change point.

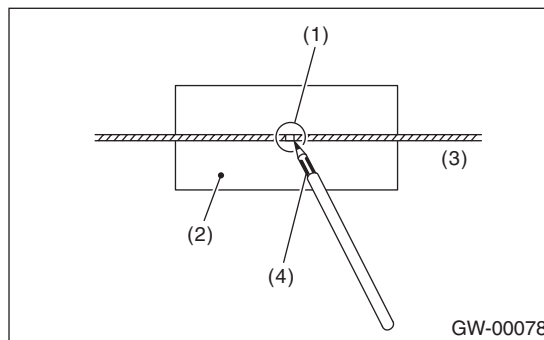


9) Repair the heat wire that determines the place of the open circuit. <Ref. to GW-28, REPAIR, Rear Window Defogger System.>

## C: REPAIR

- 1) Clean the broken portion with alcohol or white gasoline.
- 2) Mask both side of wire with masking tape.
- 3) Apply the conductive silver composition to the broken portion.

**Conductive silver composition:**  
**by Permatex**  
**QUICK GRID**



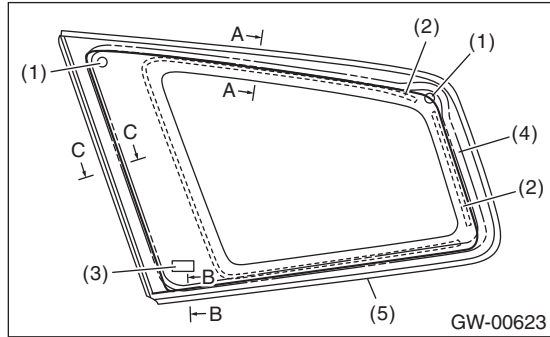
- (1) Broken portion
- (2) Masking tape
- (3) Broken wire
- (4) Conductive silver composition

- 4) Dry using a dryer after applying the composition.
- 5) After repair, check the wire.

## 17.Rear Quarter Glass

### A: REMOVAL

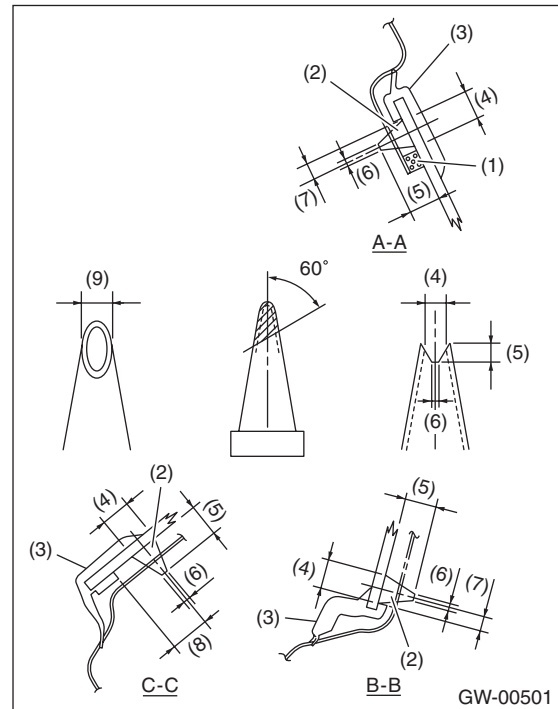
Remove the glass in the same procedure as for windshield glass. <Ref. to GW-19, REMOVAL, Windshield Glass.>



- (1) Locating pin
- (2) Dam rubber
- (3) Fastener
- (4) Adhesive
- (5) Encap molding

### B: INSTALLATION

- 1) Install the dam rubber.
- 2) Cut out the nozzle head and apply adhesive to the glass end surface as shown.



- (1) Dam rubber
- (2) Adhesive
- (3) Encap molding
- (4) 8 mm (0.31 in)
- (5) 9 mm (0.35 in)
- (6) 2 mm (0.07 in)
- (7) 4 mm (0.15 in)
- (8) 11 mm (0.43 in)
- (9) 10 mm (0.39 in)

3) Install the glass in the same procedure as for windshield glass. <Ref. to GW-20, INSTALLATION, Windshield Glass.>

4) After completion of all work, allow the vehicle to stand for about 24 hours.

#### NOTE:

- When door is opened/closed after glass is bonded, always lower the door glass first, and then open/close it carefully.
- Move the vehicle slowly.
- For minimum drying time and vehicle standing time before driving after bonding, follow instructions or instruction manual from the adhesive manufacturer.

5) After curing of adhesive, pour the water on external surface of vehicle to check that there are no water leaks.

#### NOTE:

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.Sunroof Glass

### A: PROCEDURE

For removal, installation and adjustment of the sunroof glass, refer to the sunroof section.

- Removal <Ref. to SR-5, REMOVAL, Glass Lid.>
- Installation <Ref. to SR-5, INSTALLATION, Glass Lid.>
- Adjustment <Ref. to SR-5, ADJUSTMENT, Glass Lid.>

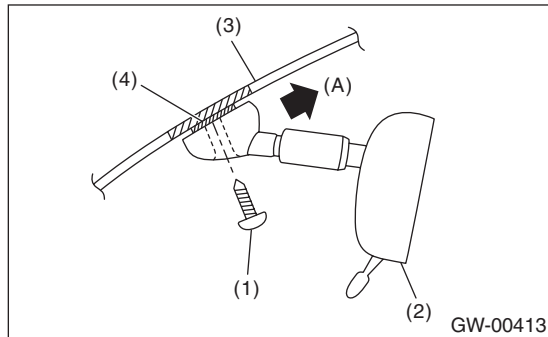
## 19. Rearview Mirror

### A: REMOVAL

- 1) Remove the TORX<sup>®</sup> screw (1).
- 2) Slide the rearview mirror (2) to the upper side (A) of windshield glass (3), and remove the mirror from mount (4).

#### CAUTION:

- Be careful not to damage the mirror surface.
- Be careful not to damage the windshield glass.



### B: INSTALLATION

#### CAUTION:

When tightening the mounting TORX<sup>®</sup> screw, be sure to observe the tightening torque. Otherwise, the mount may be damaged in over-torque conditions.

Install in the reverse order of removal.

#### Tightening torque:

Refer to "COMPONENT" of "General Description". <Ref. to GW-5, MIRROR, COMPONENT, General Description.>

### C: INSPECTION

Check that the mirror is not damaged.

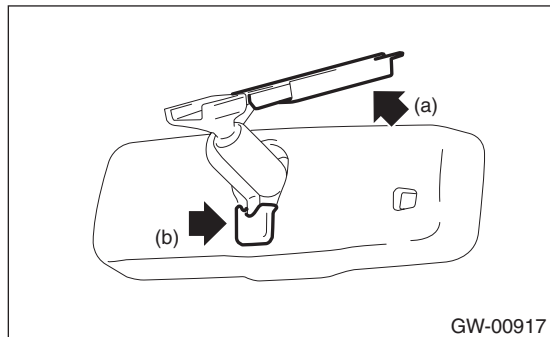
# Rearview Mirror (RCD Model)

GLASS/WINDOWS/MIRRORS

## 20. Rearview Mirror (RCD Model)

### A: REMOVAL

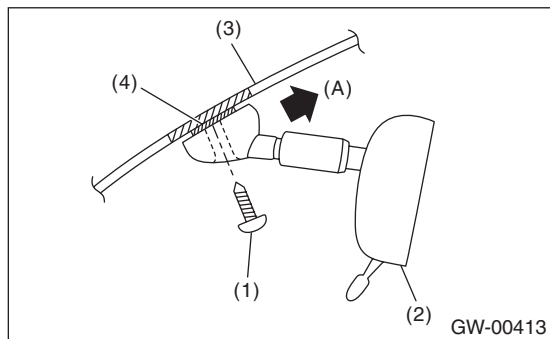
- 1) Disconnect the ground cable from battery.
- 2) Remove the harness cover (a) and connector cap (b).



- 3) Disconnect the harness connector.
- 4) Remove the TORX® screw (1).
- 5) Slide the rearview mirror (2) to the upper side (A) of windshield glass (3), and remove the mirror from mount (4).

### CAUTION:

- Be careful not to damage the mirror surface.
- Be careful not to damage the windshield glass.



### B: INSTALLATION

#### CAUTION:

When tightening the mounting TORX® screw, be sure to observe the tightening torque. Otherwise, the mount may be damaged in over-torque conditions.

Install in the reverse order of removal.

#### Tightening torque:

Refer to "COMPONENT" of "General Description". <Ref. to GW-5, MIRROR, COMPONENT, General Description.>

### C: ADJUSTMENT

#### NOTE:

- When the rearview mirror (RCD model) is removed or replaced, perform calibration and zone setting by following the procedures below.
- The zone setting of the vehicle is set to zone "8" at factory setting.

#### 1. CALIBRATION

- 1) Before performing calibration, check the following items.
  - There is a sufficient distance from a big metal object or a building.
  - Vehicle is parked on a level surface.
  - The switch of unnecessary accessories (defogger, A/C system and light) is turned off.
  - All doors are closed.
- 2) Turn the ignition switch to "ON".
- 3) Hold down the multi-function button for nine to twelve seconds, and change the mode to the calibration mode. "C" is displayed on the screen.
- 4) Drive the vehicle in a circle until the display of "C" goes off. (Approx. two or three times)
- 5) Calibration is completed.
- 6) The mirror may not be able to perform the reading correctly. You can see this phenomenon only when the compass operates only to the specific direction. If you encountered this situation, go back to step 1) to perform adjustment again.

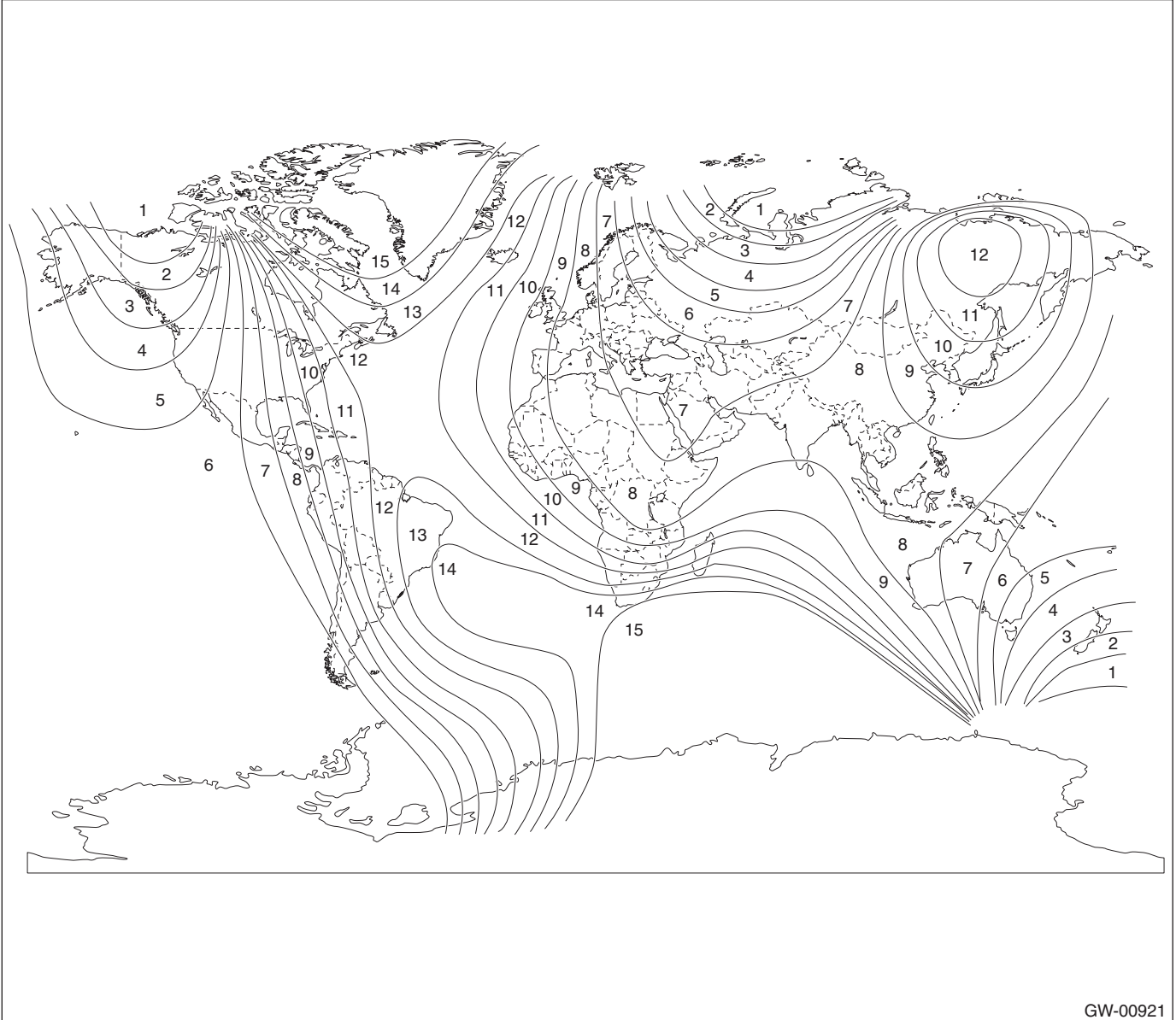
#### 2. ZONE SETTING

- 1) Refer to the compass zone map to check the zone number of area you use the vehicle.
- 2) By holding down the multi-function button for six to nine seconds, the vehicle enters to the zone setting mode. A zone number that is already set is displayed on the screen.
- 3) Push the multi-function button repeatedly until the zone number you want to set is displayed.



# Rearview Mirror (RCD Model)

4) If you leave the multi-function button for three seconds, the zone setting mode is completed.



## 21. Wiper Deicer System

### A: WIRING DIAGRAM

<Ref. to WI-113, Wiper Deicer System.>

### B: INSPECTION

#### 1. SYSTEM INSPECTION

Symptoms	Repair order
Wiper deicer does not operate.	<ol style="list-style-type: none"> <li>1. Fuse (F/B No. 4, 9)</li> <li>2. Wiper deicer relay</li> <li>3. Wiper deicer switch</li> <li>4. Wiring harness</li> <li>5. Body integrated unit</li> </ol>

**NOTE:**

Wiper deicer system can be customized on the Subaru Select Monitor.

System name	Initial setting	Customize setting
Wiper deicer timer	OFF after 15 min.	Continuous operation*

\*: When one of the following conditions occurs, continuous operation is suspended and turned off after 15 minutes.

- Ambient temperature at 5°C (41°F) or more continues for 10 seconds.
- Malfunction occurs on ambient sensor.
- Vehicle speed of 15 km/h (9 MPH) or less continues 15 minutes (OFF when conditions are met)
- Malfunction occurs in CAN communication.
- Battery voltage remains at 10 V or less for 30 seconds.

#### 2. HEAT WIRE INSPECTION

Refer to “HEAT WIRE INSPECTION” of “Rear Window Defogger System”.

<Ref. to GW-27, INSPECTION, Rear Window Defogger System.>

**NOTE:**

For heat wire inspection, removing and installing the instrument panel assembly are required.

### C: REPAIR

Refer to “Rear Window Defogger System”.

<Ref. to GW-28, REPAIR, Rear Window Defogger System.>

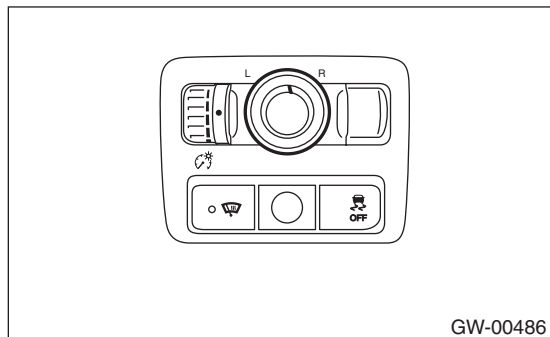
**NOTE:**

For heat wire repair, removing and installing the instrument panel assembly are required.

## 22. Wiper Deicer Switch

### A: REMOVAL

- 1) Remove the instrument panel lower cover. <Ref. to EI-37, REMOVAL, Instrument Panel Lower Cover.>
- 2) Disconnect the harness connector and remove wiper deicer switch.



### B: INSTALLATION

Install in the reverse order of removal.

### C: INSPECTION

#### 1. CHECK WITH SUBARU SELECT MONITOR

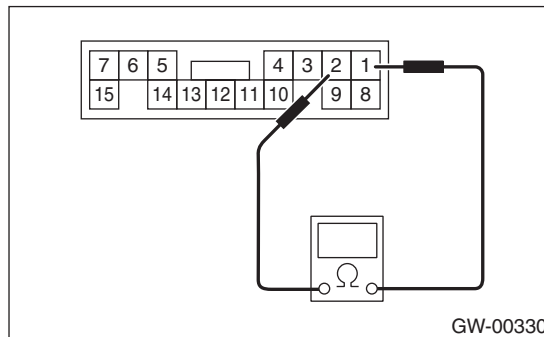
##### CAUTION:

**Check whether the wiper deicer timer is in initial setting or customize setting before performing inspection.**

- 1) Check the input signal when the wiper deicer switch is operated using Subaru Select Monitor.
  - (1) Prepare the Subaru Select Monitor kit. <Ref. to GW-6, PREPARATION TOOL, General Description.>
  - (2) Turn the ignition switch to ON (engine OFF) and run the "PC application for Subaru Select Monitor".
  - (3) On the «System Selection Menu» display screen, select {Integ. Unit mode}.
  - (4) Select the {Current Data Display & Save}.
  - (5) Display the data of the wiper deicer switch.
- 2) When wiper deicer switch is turned to ON, check whether it turns to OFF in 15 minutes, or it operates continuously.
- 3) If it turns to OFF in step 2) above, it is normal. When it operates continuously, replace the body integrated unit.

#### 2. CHECK SWITCH

Remove the wiper deicer switch, and measure the switch resistance.



Switch position	Terminal No.	Standard
OFF	1 and 2	1 MΩ or more
ON		Less than 1 Ω

Replace the wiper deicer switch if faulty.

# Wiper Deicer Switch

GLASS/WINDOWS/MIRRORS

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# BODY STRUCTURE

***BS***

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# General Description

BODY STRUCTURE

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## 1. General Description

### A: SPECIFICATION

Refer to "Body Repair Manual" for general description of body structure, reference points and reference dimensions.

# INSTRUMENTATION/DRIVER INFO



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# General Description

INSTRUMENTATION/DRIVER INFO

## 1. General Description

### A: SPECIFICATION

Combination meter	Speedometer	Stepping motor type
	Tachometer	
	Malfunction indicator light	LED
	Oil pressure warning light	
	ABS warning light	
	Airbag warning light	
	Seat belt warning light	
	Brake fluid and parking brake warning light	
	Fuel level warning light	
	Charge warning light	
	AT OIL TEMP warning light	
	AWD warning light	
	Tire pressure warning light	
	Low washer fluid warning light	
	Rear differential oil temperature warning light	
	Vehicle dynamics control (VDC) warning light / TCS OFF light	
	Vehicle dynamics control (VDC) indicator light	
	Turn signal indicator light	
	HI-beam indicator light	
	Cruise indicator light	
	Cruise set indicator light	
	Front fog light indicator light	
	SPORT indicator light	
	Light illumination indicator light	
	Meter illumination light	
	LCD back light	
	Engine coolant temperature gauge	LCD
Fuel gauge		
AT Select lever position indicator, SPORT shift indicator		
Odo/trip meter		
Warning box	Door open warning light	LED
	Security indicator	
	Passenger's seat airbag indicator	
	Passenger's seat belt warning light	



## B: CAUTION

- Be careful not to damage the meters and instrument panel.
- Be careful not to damage the meter glass.
- Make sure the 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 an excessive force on the printed circuit.
- Do not drop or otherwise apply impact.
- When the combination meter of model with immobilizer has been replaced, be sure to perform the registration of immobilizer.

## C: PREPARATION TOOL

### 1. GENERAL TOOL

TOOL NAME	REMARKS
Circuit tester	Used for measuring resistance and voltage.

# Combination Meter System

INSTRUMENTATION/DRIVER INFO

## 2. Combination Meter System

### A: WIRING DIAGRAM

#### 1. COMBINATION METER

<Ref. to WI-148, WIRING DIAGRAM, Combination Meter System.>

### B: INSPECTION

#### 1. SELF-DIAGNOSIS

The self-diagnosis (checking of each meter, warning light, indicator, illumination, LCD, buzzer sound) of combination meter can be performed in the following procedure.

- 1) Turn the ignition switch to ON while turning the small light to OFF.
- 2) Turn the small light switch to ON within 3 seconds after step 1), then press the odo/trip meter knob three times.
- 3) Turn the small light switch to OFF, and press the odo/trip knob three times.
- 4) Turn the small light switch to ON, and press the odo/trip knob three times.

NOTE:

- Perform the steps described in 2) and 4) within 10 seconds after the ignition switch is turned to ON.
- When pressing the odo/trip meter knob four times, the display changes to DTC display mode (ECM, TCM). <Ref. to IDI-10, DTC DISPLAY MODE, INSPECTION, Combination Meter System.>

When the self-diagnosis function operates, the warning light, indicator, and LCD display checks are performed. After this, operation checks are performed in the order of meter, illumination, and buzzer for each press of the odo/trip meter knob button. <Ref. to IDI-4, LIST OF SELF-DIAGNOSIS MODE OPERATION, INSPECTION, Combination Meter System.>

Turn the ignition switch to OFF to cancel the self-diagnosis function.

- When the engine starts during diagnosis, the self-diagnosis function is not cancelled, however, once the vehicle starts driving, the self-diagnosis function is cancelled automatically for safety.

#### 2. LIST OF SELF-DIAGNOSIS MODE OPERATION

Speedometer, tachometer, fuel gauge, engine coolant temperature gauge	Microcomputer running type warning light, indicator light	AT select lever position indicator light	Odo/trip meter	SPORT shift indicator	Illumination (indicator needle, plate, ring, LCD)	Buzzer (SPORT shift buzzer)
Step 0. Processing to self-diagnosis function						
Operating initial operation	Initial illumination	Normal	Normal	Initial illumination	Initial illumination	Not beep.
Step 1-1. Check each indication after initial operation						
Repeat the sweep operation (After holding on lowest position for one second, reaches to highest position within 5 seconds, and after holding on highest position for one second, reaches to lowest position within 5 seconds).	Light ON	With the highest brightness, illuminate the position sequentially at a cycle of 1.5 seconds. For the illumination order, refer to the illumination order table.	Perform the segment check. For the illumination order, refer to the illumination order table.	Perform the segment check. For the illumination order, refer to the illumination order table.	Light at the highest brightness.	Not beep.
Step 1-2. Press the trip knob (trip knob input is not accepted till the meter indicator needle reaches the highest position): sweep complete, AT select lever position indicator display is set						

# Combination Meter System

INSTRUMENTATION/DRIVER INFO

Speedometer, tachometer, fuel gauge, engine coolant temperature gauge	Microcomputer running type warning light, indicator light	AT select lever position indicator light	Odo/trip meter	SPORT shift indicator	Illumination (indicator needle, plate, ring, LCD)	Buzzer (SPORT shift buzzer)
After completing sweep in step 1-1, back to lowest position.	Light ON	Keep the position indicated when the trip knob is pressed.	Underbar “_” is displayed.	“1” is displayed.	Light at the highest brightness.	Not beep.
Step 2-1. Press the trip knob, and hold it: Check each meter						
All meters are moved simultaneously in every 0.5 sec. from the lowest position to highest position. Speedometer/ Tachometer: Approx. 5 degrees at every movement. Water temperature /Fuel gauge: Moves 1 segment at a time.	Light OFF	Keep the position indicated that set in step 1-2.	Display the current meter directing angle on odometer. Ex.) Displays 135017 when Speedometer/ Tachometer: 135 degrees, Engine coolant temperature gauge/Fuel gauge: 17 segments.	“▼2” is displayed.	Light at the highest brightness.	Not beep.
Step 2-2. Release the trip knob: Specifying the meter directing position						
Stop at directing position when the trip knob is released.	Light OFF	Keep the position indicated that set in step 1-2.	Display the current meter directing angle on odometer.	“2” is displayed.	Light at the highest brightness.	Not beep.
Step 3-1. Press the trip knob, and hold it: Check illumination						
Keep the position that specified at step 2-2.	Light OFF	Varying from the highest brightness (ILL6) to the lowest luminance (ILL1) every second. After reaching at ILL1, repeat it from ILL6.	Illumination brightness is displayed in the trip meter. (From ILL6 to ILL1)	“▼3” is displayed.	Varying from the highest brightness (ILL6) to the lowest luminance (ILL1) every second. After reaching at ILL1, repeat it from ILL6.	Not beep.
Step 3-2. Release the trip knob: Specifying the illumination brightness						
Keep the position that specified at step 2-2.	Light OFF	Keep the brightness at the time when the trip knob is released.	Illumination brightness is displayed in the trip meter.	“3” is displayed.	Keep the brightness at the time when the trip knob is released.	Not beep.
Step 4-1. Press the trip knob: Check the beeping of SPORT shift buzzer (For AT model)						
All meter indicator needle returns to lowest position.	Light OFF	Light at the highest brightness. Keep the position indicated that set in step 1-2.	Illumination brightness is displayed in the trip meter.	“▲▼8” is displayed. Blinks with buzzer.	Light at the highest brightness.	SPORT shift buzzer beeps.
Step 5. Press the trip knob: Complete the self-diagnosis 1 cycle						
All meter indicator needle returns to lowest position, and go back to step 1 after completion.						

# Combination Meter System

## INSTRUMENTATION/DRIVER INFO

- Illuminating order table

Illuminating order	1	2	3	4	5	6	7	8	9	10	11	Go back to 1 and repeat
Trip meter A/B	AB	A	B	A	B	A	B	A	B	A	B	
Odo/trip meter	8888.8 888888	0000.0 000000	1111.1 111111	2222.2 222222	3333.3 333333	4444.4 444444	5555.5 555555	6666.6 666666	7777.7 777777	8888.8 888888	9999.9 999999	
SPORT shift indicator	All lights ON	1	2	3	4	5	E	P	R	N	D	
▲ ▼	▲ ▼	▲	▼	▲	▼	▲	▼	▲	▼	▲	▼	
Display time (sec.)	1	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	

### 3. SYMPTOM CHART

Symptom	Repair order	Note
Combination meter assembly does not operate.	1. Power supply 2. Ground circuit 3. Combination meter	<Ref. to IDI-7, CHECK POWER SUPPLY AND GROUND CIRCUIT, INSPECTION, Combination Meter System.>
Speedometer does not operate.	1. VDCCM 2. Harness 3. Combination meter	<Ref. to IDI-7, CHECK VDCCM, INSPECTION, Combination Meter System.>
Tachometer does not operate.	1. ECM 2. Harness 3. Combination meter	<Ref. to IDI-8, CHECK ENGINE CONTROL MODULE (ECM), INSPECTION, Combination Meter System.>
Fuel gauge does not operate.	1. Communication circuit 2. Fuel level sensor 3. Harness 4. Combination meter	<Ref. to IDI-8, CHECK FUEL LEVEL SENSOR, INSPECTION, Combination Meter System.>
Engine coolant temperature gauge does not operate.	1. Communication circuit 2. Engine coolant temperature sensor 3. Harness 4. Combination meter	<Ref. to IDI-9, CHECK ENGINE COOLANT TEMPERATURE SENSOR, INSPECTION, Combination Meter System.>
Error display is shown on the odo/trip meter.	Communication circuit	<Ref. to IDI-10, COMMUNICATION ERROR DISPLAY, INSPECTION, Combination Meter System.>

#### CAUTION:

When measuring the voltage and resistance of each control module or 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).

# Combination Meter System

INSTRUMENTATION/DRIVER INFO

## 4. CHECK POWER SUPPLY AND GROUND CIRCUIT

Step	Check	Yes	No
<b>1 CHECK POWER SUPPLY FOR COMBINATION METER.</b> 1) Remove the combination meter. <Ref. to IDI-11, REMOVAL, Combination Meter.> 2) Disconnect the combination meter harness connector. 3) Turn the ignition switch to ON. 4) Measure the voltage between combination meter connector and chassis ground. <b>Connector &amp; terminal</b> <b>(i10) No. 3 (+) — Chassis ground (-):</b>	Is the voltage 10 V or more?	Go to step 2.	Check the harness for open or short between the ignition switch and combination meter.
<b>2 CHECK POWER SUPPLY FOR COMBINATION METER.</b> Measure the voltage between combination meter connector and chassis ground. <b>Connector &amp; terminal</b> <b>(i10) No. 1 (+) — Chassis ground (-):</b>	Is the voltage 10 V or more?	Go to step 3.	Check the harness for open or short between the fuse and combination meter.
<b>3 CHECK GROUND CIRCUIT OF COMBINATION METER.</b> 1) Turn the ignition switch to OFF. 2) Measure the resistance of harness between combination meter connector and chassis ground. <b>Connector &amp; terminal</b> <b>(i10) No. 15 — Chassis ground:</b> <b>(i10) No. 16 — Chassis ground:</b>	Is the resistance less than 10 $\Omega$ ?	Replace the meter case assembly.	Repair the wiring harness.

## 5. CHECK VDCCM

Step	Check	Yes	No
<b>1 CHECK VEHICLE SPEED SIGNAL.</b> 1) Lift up the vehicle and support it with rigid racks. 2) Drive the vehicle faster than 10 km/h (6 MPH). <b>WARNING:</b> <b>Be careful not to be dragged in by the rotating wheel.</b> 3) Measure the voltage between combination meter connector and chassis ground. <b>Connector &amp; terminal</b> <b>(i10) No. 27 (+) — Chassis ground (-):</b>	Is the voltage less than 1 V $\longleftrightarrow$ 5 V or more?	Replace the meter case assembly.	Go to step 2.
<b>2 CHECK HARNESS BETWEEN VDCCM AND COMBINATION METER.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connector from VDCCM and combination meter. 3) Measure the resistance between VDCCM harness connector and combination meter harness connector. <b>Connector &amp; terminal</b> <b>(B310) No. 10 — (i10) No. 27:</b>	Is the resistance less than 10 $\Omega$ ?	Check the VDCCM. <Ref. to VDC(diag)-2, Basic Diagnostic Procedure.>	Repair the wiring harness.

# Combination Meter System

INSTRUMENTATION/DRIVER INFO

## 6. CHECK ENGINE CONTROL MODULE (ECM)

Step	Check	Yes	No
<b>1 CHECK ECM SIGNAL.</b> 1) Start the engine. 2) Measure the voltage between ECM connector and chassis ground. <i>Connector &amp; terminal</i> <i>(B136) No. 22 (+) — Chassis ground (-):</i>	Is the voltage 0 ←→ 14 V or more?	Go to step 2.	Inspect the ECM. <Ref. to EN(H6DO)(diag)-2, Basic Diagnostic Procedure.>
<b>2 CHECK HARNESS BETWEEN COMBINATION METER AND ECM.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM and combination meter. 3) Measure the resistance between ECM harness connector and combination meter harness connector. <i>Connector &amp; terminal</i> <i>(B136) No. 22 — (i10) No. 28:</i>	Is the resistance less than 10 Ω?	Replace the meter case assembly.	Repair the wiring harness.

## 7. CHECK FUEL LEVEL SENSOR

Step	Check	Yes	No
<b>1 CHECK COMMUNICATION ERROR DISPLAY.</b> 1) Turn the ignition switch to ON. 2) Check that the error code is displayed in odo/trip meter.	Is the error code “Er xx” displayed on odo/trip meter?	Check the communication circuit. <Ref. to IDI-10, COMMUNICATION ERROR DISPLAY, INSPECTION, Combination Meter System.>	Go to step 2.
<b>2 CHECK FUEL LEVEL SENSOR.</b> 1) Remove the fuel level sensor. <Ref. to FU(H6DO)-68, REMOVAL, Fuel Level Sensor.> 2) Measure the resistance between fuel level sensor terminals when the float is in FULL and EMPTY position. <i>Terminals</i> <i>No. 1 — No. 4:</i>	Is the resistance 1.0 to 3.0 Ω (FULL) and 31 to 33 Ω (EMPTY)?	Go to step 3.	Replace the fuel level sensor.
<b>3 CHECK FUEL SUB LEVEL SENSOR.</b> 1) Remove the fuel sub level sensor. <Ref. to FU(H6DO)-69, REMOVAL, Fuel Sub Level Sensor.> 2) Measure the resistance between fuel sub level sensor terminals when the float is in FULL and EMPTY position. <i>Terminals</i> <i>No. 1 — No. 2:</i>	Is the resistance 1.0 to 3.0 Ω (FULL) and 61 to 63 Ω (EMPTY)?	Go to step 4.	Replace the fuel sub level sensor.
<b>4 CHECK HARNESS BETWEEN FUEL SUB LEVEL SENSOR AND BODY INTEGRATED UNIT.</b> 1) Disconnect the connector from body integrated unit. 2) Measure the resistance between the fuel sub level sensor harness connector terminal and body integrated unit harness connector terminal. <i>Connector &amp; terminal</i> <i>(R59) No. 1 — (B281) No. 19:</i>	Is the resistance less than 10 Ω?	Go to step 5.	Repair the wiring harness.

# Combination Meter System

INSTRUMENTATION/DRIVER INFO

Step	Check	Yes	No
<b>5</b> <b>CHECK HARNESS BETWEEN FUEL LEVEL SENSOR AND FUEL SUB LEVEL SENSOR.</b> Measure the resistance between fuel level sensor harness connector terminal and fuel sub level sensor harness connector terminal. <i>Connector &amp; terminal</i> <i>(R58) No. 1 — (R59) No. 2:</i>	Is the resistance less than 10 $\Omega$ ?	Go to step 6.	Repair the wiring harness.
<b>6</b> <b>CHECK FUEL LEVEL SENSOR GROUND CIRCUIT.</b> Measure the resistance between fuel level sensor harness connector terminal and chassis ground. <i>Connector &amp; terminal</i> <i>(R58) No. 4 — Chassis ground:</i>	Is the resistance less than 10 $\Omega$ ?	Replace the meter case assembly.	Repair the wiring harness.

## 8. CHECK ENGINE COOLANT TEMPERATURE SENSOR

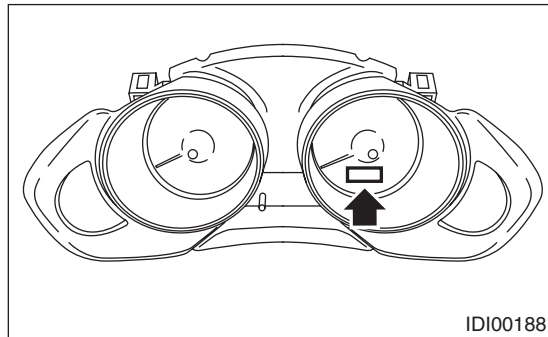
Step	Check	Yes	No
<b>1</b> <b>CHECK COMMUNICATION ERROR DISPLAY.</b> 1) Turn the ignition switch to ON. 2) Check that the error code is displayed in odo/trip meter.	Is the error code "Er xx" displayed on odo/trip meter?	Check the communication circuit. <Ref. to IDI-10, COMMUNICATION ERROR DISPLAY, INSPECTION, Combination Meter System.>	Go to step 2.
<b>2</b> <b>CHECK ENGINE COOLANT TEMPERATURE SENSOR.</b> Check the engine coolant temperature sensor. <Ref. to EN(H6DO)(diag)-2, Basic Diagnostic Procedure.>	Is the engine coolant temperature sensor OK?	Replace the meter case assembly.	Replace the engine coolant temperature sensor.

# Combination Meter System

INSTRUMENTATION/DRIVER INFO

## 9. COMMUNICATION ERROR DISPLAY

When the following error code is displayed in the odo/trip meter, inspect the communication circuit since the communication failure is generated between each control module. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>



Error code	Remarks
Er IU	Malfunction in integrated unit
Er —	Simultaneous malfunction of high/low speed CAN communication
Er HC	High speed CAN communication failure
Er LC	Malfunction of low-speed CAN communication
Er EG	EGL communication failure
Er tC	TCM communication failure
Er Ab	VDCCM communication failure
Er SP	VDCCM DTC information and vehicle speed pulse malfunction
Er SS	Wheel speed data malfunction
Er bb	Vacuum pump system malfunction

## 10.DTC DISPLAY MODE

When DTC display mode is operated, {ECM}, {TCM}, {ABS/VDC} is displayed repeatedly in this order by pressing the trip knob. DTC is displayed in the following table according to type of control module, receiving DTC, DTC detected, No DTC. If CAN communication has some trouble, “-----” is displayed.

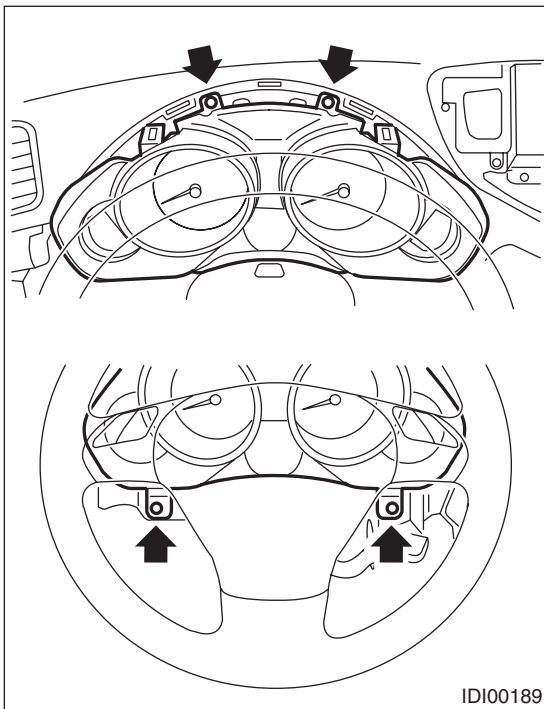
Control module	Condition	Display
ECM	Receiving DTC	Trip “A” + “P (Blink)”
	DTC detected	Trip “A” + “P xxxx”
	No DTC	Trip “A” + “P ----”
TCM	Receiving DTC	Trip “B” + “P (Blink)”
	DTC detected	Trip “B” + “P xxxx”
	No DTC	Trip “B” + “P ----”
ABS/VDCCM	Receiving DTC	Trip “A” + “C (Blink)”
	DTC detected	Trip “A” + “C xxxx”
	No DTC	Trip “A” + “C ----”
When CAN communication error is occurred	—	“-----”



## 3. Combination Meter

### A: REMOVAL

- 1) Disconnect the ground cable from battery.
- 2) Set the tilt steering at the lowest position.
- 3) Remove the console box. <Ref. to EI-39, REMOVAL, Console Box.>
- 4) Remove the control panel. <Ref. to AC-32, REMOVAL, Control Panel.>
- 5) Remove the instrument panel lower cover. <Ref. to EI-37, REMOVAL, Instrument Panel Lower Cover.>
- 6) Remove the console side panel. <Ref. to EI-40, REMOVAL, Center Console.>
- 7) Remove the meter visor.
- 8) Remove the screws of combination meter (two for upper side, two for lower side) and pull the combination meter.



- 9) Disconnect the connector in the rear side of combination meter to remove meter.

#### CAUTION:

- Be careful not to damage the meter or instrument panel.
- Pay particular attention to avoid damaging the meter glass.

### B: INSTALLATION

#### CAUTION:

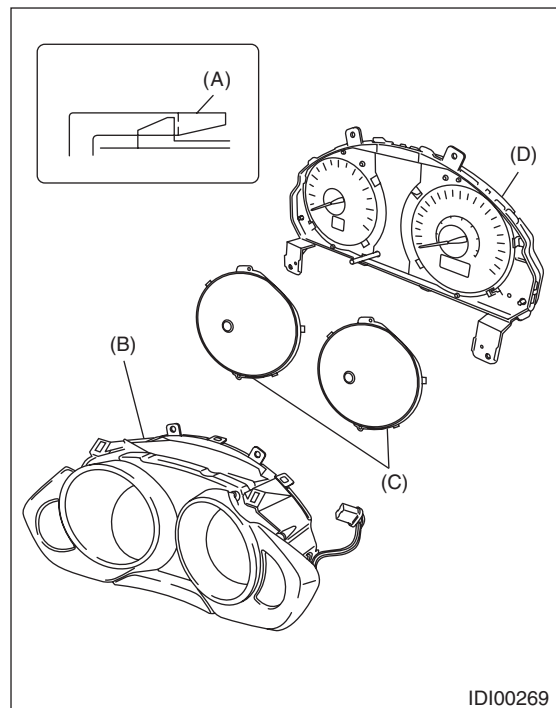
- Make sure the electrical connector is connected securely.
- Make sure that each meter operates normally.
- When the combination meter of model with immobilizer has been replaced, be sure to perform the registration of immobilizer. Install in the reverse order of removal.

### C: DISASSEMBLY

#### CAUTION:

- Use gloves to avoid damage and getting fingerprints on the glass surface and meter surfaces.
- Be careful not to apply excessive force to the trip knob.
- Be sure not to touch the meter indicator needle.

Disengage the claw (A), and remove the visor assembly and meter case cover (B), and cover glass (C) from the meter case assembly (D).



### 1. BULB REPLACEMENT

LEDs are used for all of warning lights and indicator lights of combination meters, replace the meter case assembly if faulty.

### D: ASSEMBLY

Assemble in the reverse order of disassembly.

## 4. Speedometer

### A: SPECIFICATION

Since the meter case assembly cannot be disassembled, do not remove or inspect the speedometer alone. (Do not remove the cover on the back surface.)

## 5. Tachometer

### A: SPECIFICATION

Since the meter case assembly cannot be disassembled, do not remove or inspect the tachometer alone. (Do not remove the cover on the back surface.)

## 6. Fuel Gauge

### A: SPECIFICATION

Since the visor assembly cannot be disassembled, do not remove or inspect the fuel gauge as alone. (Do not remove the cover on the back surface.)

## 7. Engine Coolant Temperature Gauge

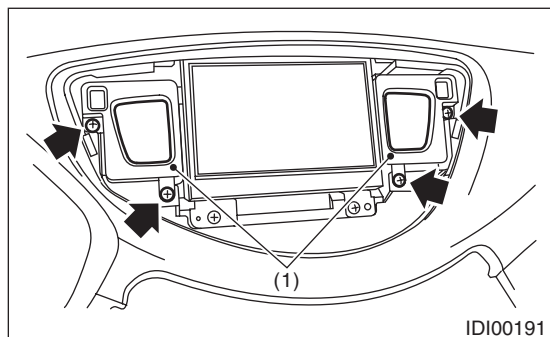
### A: SPECIFICATION

Since the visor assembly cannot be disassembled, do not remove or inspect the temperature gauge alone. (Do not remove the cover on the back surface.)

## 8. Warning box

### A: REMOVAL

- 1) Disconnect the ground cable from the battery.
- 2) Remove the upper grille. <Ref. to AC-49, UPPER GRILLE, REMOVAL, Air Vent Grille.>
- 3) Remove the screws of warning box (1) and pull out the warning box.



- 4) Disconnect the connector in the rear side of warning box to remove the warning box.

### B: INSTALLATION

#### CAUTION:

- Make sure the electrical connector is connected securely.
- Make sure that each indicator operates normally.

Install in the reverse order of removal.

# SEATS

# SE

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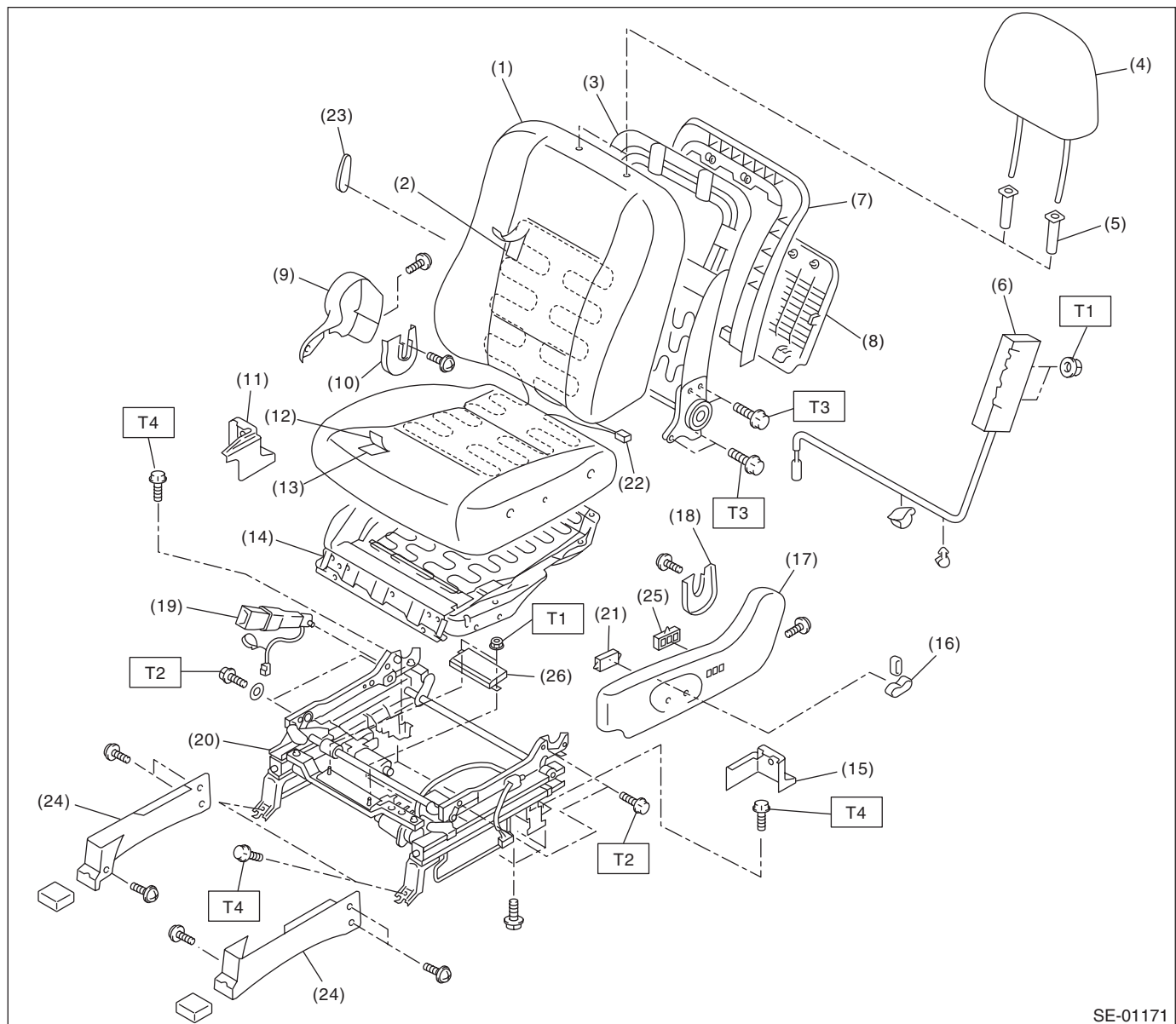
# General Description

SEATS

## 1. General Description

### A: COMPONENT

#### 1. FRONT SEAT (DRIVER'S SEAT)



(1) Backrest cover	(12) Seat cushion cover	(23) Lumber support lever
(2) Backrest pad	(13) Seat cushion pad	(24) Slide rail cover
(3) Backrest frame ASSY	(14) Seat cushion frame ASSY	(25) Memory switch (with memory function)
(4) Headrest ASSY	(15) Rear leg cover outside	(26) Memory unit (with memory function)
(5) Headrest lock bushing	(16) Power seat switch knob	
(6) Side airbag module	(17) Seat side cover outside	
(7) Cover frame	(18) Hinge inner cover LH	
(8) Backrest back cover	(19) Inner seat belt ASSY	
(9) Seat side cover inside	(20) Slide rail ASSY	
(10) Hinge inner cover RH	(21) Power seat switch unit	
(11) Rear leg cover inside	(22) Seat heater unit	

---

**Tightening torque: N·m (kgf·m, ft·lb)**

**T1: 6 (0.61, 4.43)**

**T2: 17.6 (1.79, 12.9)**

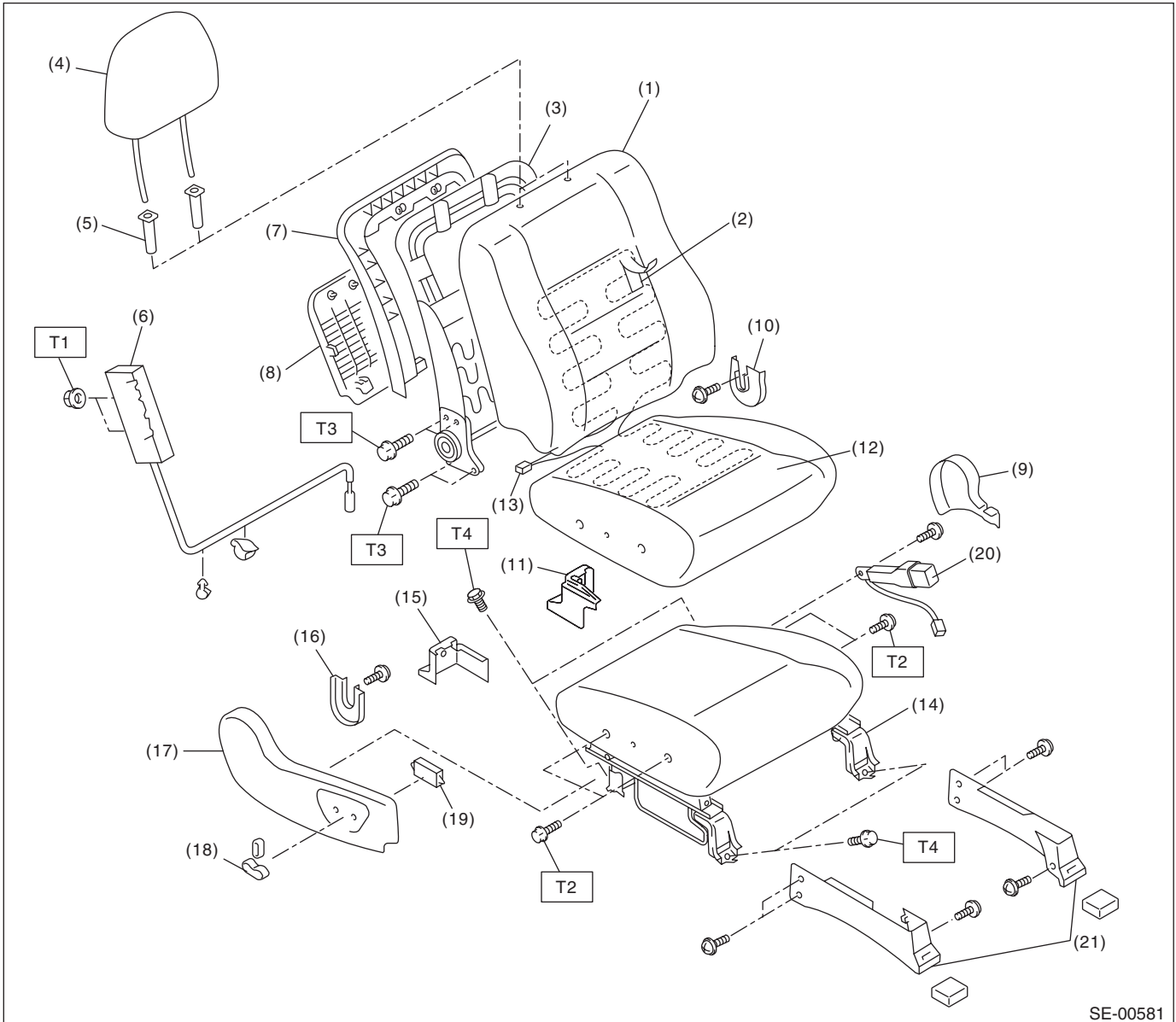
**T3: 52 (5.30, 38.4)**

**T4: 53 (5.40, 39.0)**

---



## 2. FRONT SEAT (PASSENGER'S SEAT)



SE-00581

- |                            |                                      |                             |
|----------------------------|--------------------------------------|-----------------------------|
| (1) Backrest cover         | (10) Hinge inner cover LH            | (19) Power seat switch unit |
| (2) Backrest pad           | (11) Rear leg cover inside           | (20) Inner seat belt ASSY   |
| (3) Backrest frame ASSY    | (12) Seat cushion cover              | (21) Slide rail cover       |
| (4) Headrest ASSY          | (13) Seat heater unit                |                             |
| (5) Headrest lock bushing  | (14) Seat cushion pad and frame ASSY |                             |
| (6) Side airbag module     | (15) Rear leg cover outside          |                             |
| (7) Cover frame            | (16) Hinge inner cover RH            |                             |
| (8) Backrest back cover    | (17) Seat side cover outside         |                             |
| (9) Seat side cover inside | (18) Power seat switch knob          |                             |

**Tightening torque: N·m (kgf·m, ft·lb)**

**T1: 6 (0.61, 4.43)**

**T2: 17.6 (1.79, 12.9)**

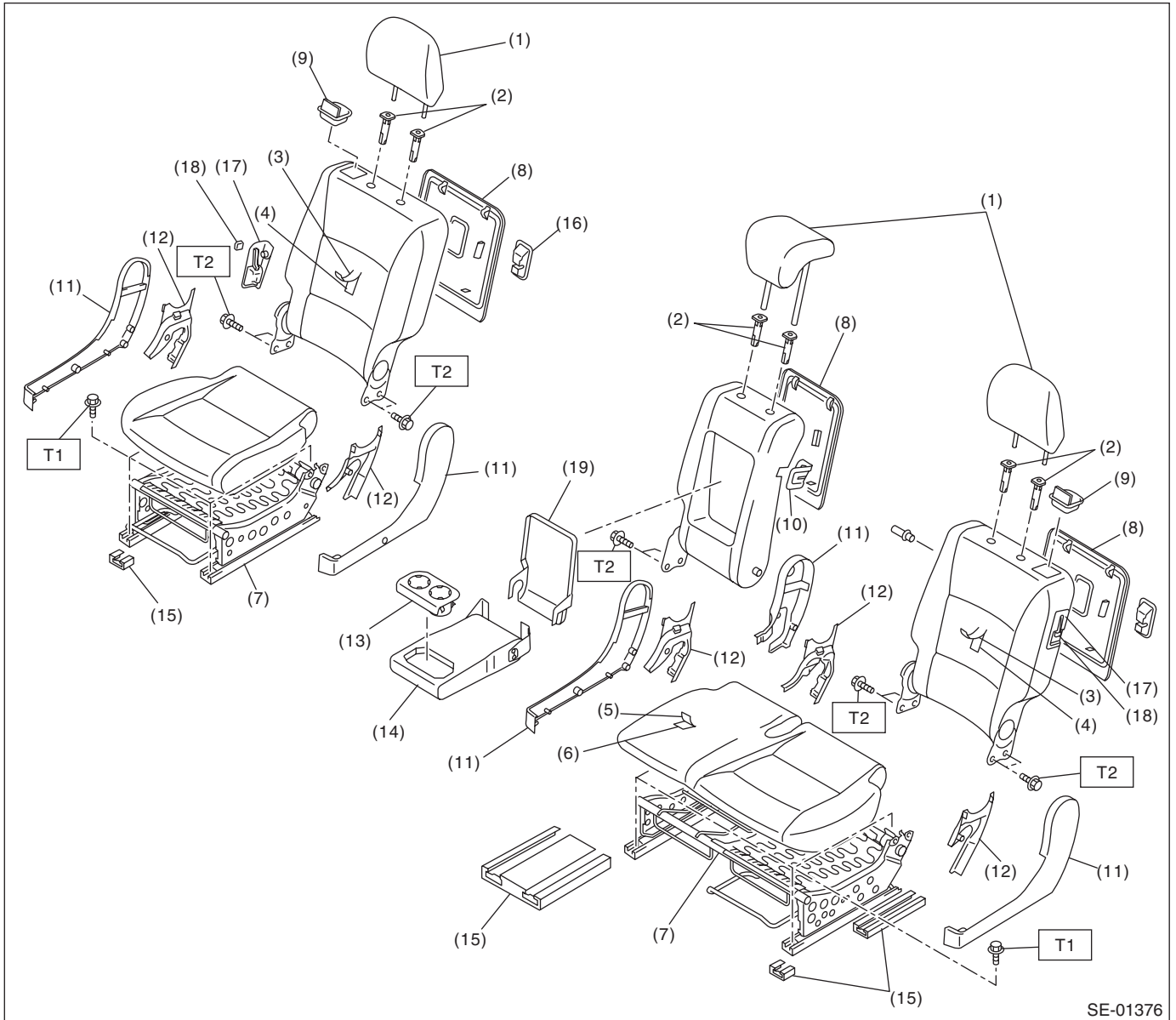
**T3: 52 (5.30, 38.4)**

**T4: 53 (5.40, 39.0)**

# General Description

## SEATS

### 3. SECOND-ROW SEATS



SE-01376

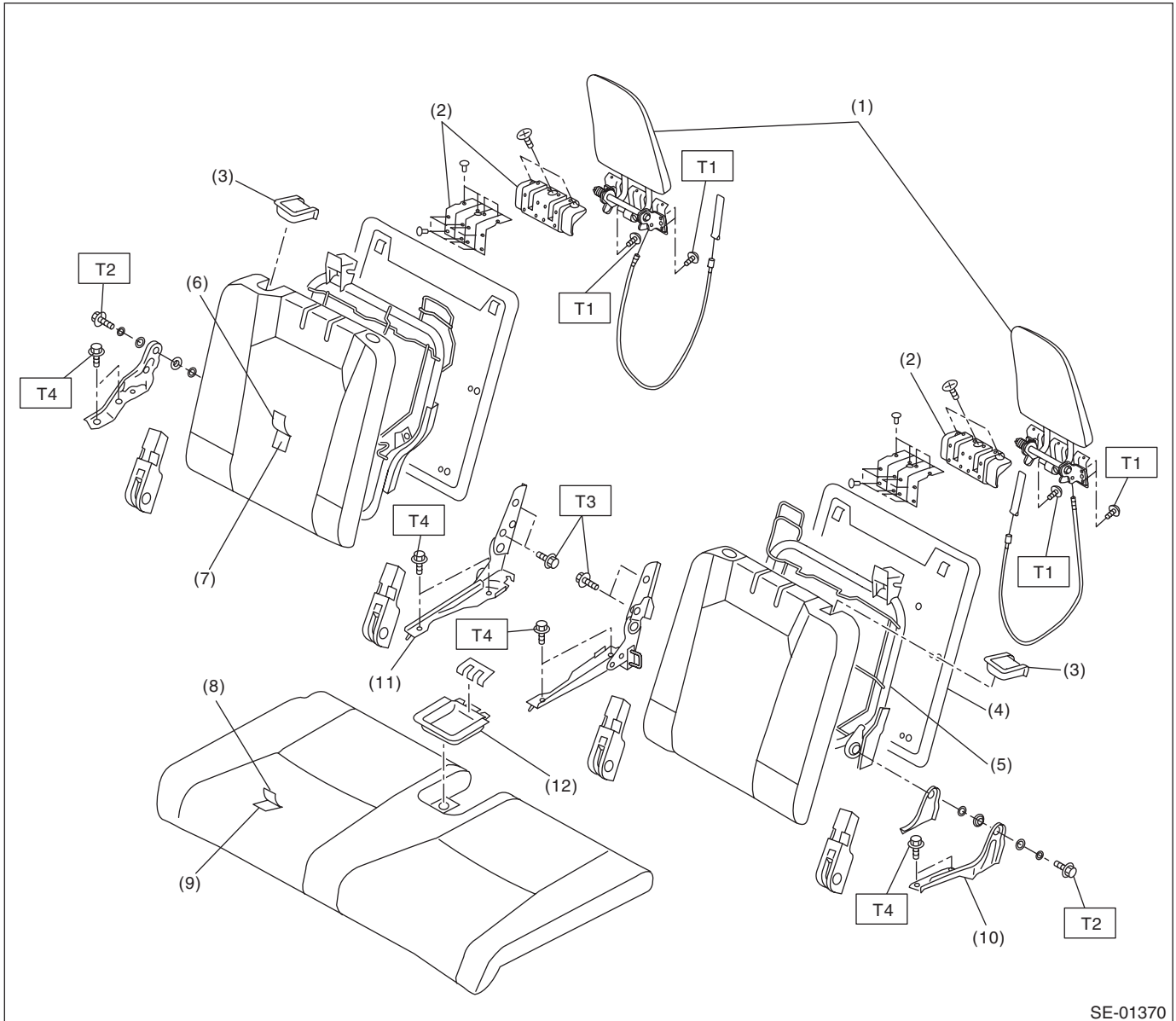
- |                           |                                |                          |
|---------------------------|--------------------------------|--------------------------|
| (1) Headrest              | (9) Holder                     | (17) Walk-in lever cover |
| (2) Headrest lock bushing | (10) Seat backrest latch cover | (18) Walk-in knob        |
| (3) Backrest cover        | (11) Hinge outer cover         | (19) Arm rest board      |
| (4) Backrest pad          | (12) Hinge inner cover         |                          |
| (5) Seat cushion cover    | (13) Cup holder                |                          |
| (6) Seat cushion pad      | (14) Armrest                   |                          |
| (7) Slide rail ASSY       | (15) Slide rail cover          |                          |
| (8) Backrest back cover   | (16) Tether anchor cover       |                          |

**Tightening torque: N·m (kgf·m, ft·lb)**

**T1: 40 (4.08, 29.5)**

**T2: 52 (5.30, 38.4)**

## 4. THIRD-ROW SEATS



SE-01370

- |                          |                        |
|--------------------------|------------------------|
| (1) Headrest             | (7) Backrest pad       |
| (2) Headrest hinge cover | (8) Seat cushion cover |
| (3) Hinge lever ASSY     | (9) Seat cushion pad   |
| (4) Backrest back cover  | (10) Hinge plate       |
| (5) Backrest frame       | (11) Inner hinge ASSY  |
| (6) Backrest cover       | (12) Buckle holder     |

**Tightening torque: N·m (kgf·m, ft·lb)**

**T1: 5.8 (0.59, 4.28)**

**T2: 10 (1.02, 7.38)**

**T3: 52 (5.30, 38.4)**

**T4: 53 (5.40, 39.0)**

# General Description

## SEATS

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### B: CAUTION

- If the seat cushion cover is removed or replaced, make sure to perform passenger detection system adjustment after installing the seat to the vehicle. <Ref. to OD(diag)-14, SYSTEM CALIBRATION (REZEROING), OPERATION, Subaru Select Monitor.>

If system adjustment is not performed, the occupant detection system may not function properly.

- The passenger detection system (passenger seat only) control unit and the passenger detection sensor are fixed to the seat cushion frame. Never remove the passenger detection control unit or the pressure sensor from the seat cushion frame.

- Do not replace the seat cushion pad by itself. Always replace the seat cushion pad and frame assembly as a set. The seat cushion pad and cushion frame are adjusted as a set at the time of manufacture. If cushion pads and cushion frames are combined from those of other vehicles or other sets, the passenger detection system may not operate properly.

- If the seat cushion cover is removed, make sure to replace the wire on the seat cushion side with a new wire.

- When removing the front seat and second-row seat, follow cautions given in the airbag section. <Ref. to AB-4, CAUTION, General Description.>

### C: NOTE

When removing the front seat of memory-equipped power seats, always perform the initialize operation on the memory function after installing the seat to the vehicle. <Ref. to SE-39, ADJUSTMENT, Power Seat System.>

Failure to do so may cause the abnormal operation of the memory function.

### D: PREPARATION TOOL

#### 1. GENERAL TOOL

TOOL NAME	REMARKS
Long nose pliers	Used for removing the hog ring.
Hog ring pliers	Used for installing the hog ring.
Circuit tester	Used for checking power seat and seat heater.
TORX® T50	Used for removing/installing inner seat belt assembly and removing/installing/disassembling second-row seats.

## 2. Front Seat

### A: REMOVAL

#### CAUTION:

The airbag system is fitted with a backup power supply. After disconnecting the battery ground cable, the airbag may deploy if you do not wait for 60 seconds before starting the service of airbag system.

#### NOTE:

If a front seat is power seat with memory function, the memory function must be initialized after installing seat to the vehicle. <Ref. to SE-39, ADJUSTMENT, Power Seat System.>

If it is not initialized, the memory function may not operate properly.

### 1. DRIVER'S SEAT

- 1) Remove the headrest.
- 2) Tilt the backrest forward, and move the seat forward.
- 3) Remove the rear leg cover, and remove the two bolts at the rear side of slide rail.
- 4) Move the seat backward, remove the front leg cover, and then remove the 2 bolts at the front side of the slide rail.
- 5) Disconnect the ground cable from battery, and wait for 60 seconds or more before starting work.
- 6) Disconnect the connector under the seat.
  - Seat belt buckle switch connector
  - Seat position sensor connector
  - Side airbag connector
  - Seat heater connector
  - Power seat connector
- 7) Remove the seat from vehicle.

### 2. PASSENGER'S SEAT

#### CAUTION:

Refer to "CAUTION" of "General Description" before starting the work. <Ref. to SE-6, CAUTION, General Description.>

- 1) Remove the headrest.
- 2) Tilt the backrest forward, and move the seat forward.
- 3) Remove the rear leg cover, and remove the bolt at the rear side of the slide rail.
- 4) Move the seat backward, remove the front leg cover, and then remove the bolt at the front side of the slide rail.
- 5) Disconnect the ground cable from battery, and wait for 60 seconds or more before starting work.
- 6) Disconnect all the connectors of connector holder in the backside of seat cushion.
  - Harness connector of occupant detection control module
  - Side airbag connector
  - Power seat connector
  - Seat heater connector
- 7) Remove the seat from vehicle.

### B: INSTALLATION

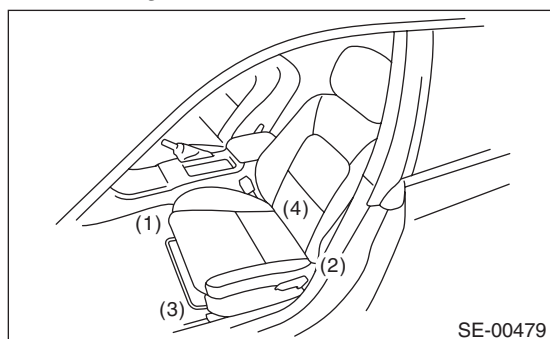
#### CAUTION:

- After installing the driver's seat, use the Subaru Select Monitor to confirm that the seat position sensor LH is operating properly. <Ref. to AB(diag)-23, DISPLAY OF STATUS INFORMATION, OPERATION, Subaru Select Monitor.>
- If a front seat is power seat with memory function, the memory function must be initialized after installing seat to the vehicle. <Ref. to SE-39, ADJUSTMENT, Power Seat System.> If it is not initialized, the memory function may not operate properly.

Install in the reverse order of removal.

#### NOTE:

Tighten the slide rail installing bolt gradually in several steps to the specified torque in the order as shown in the figure.



SE-00479

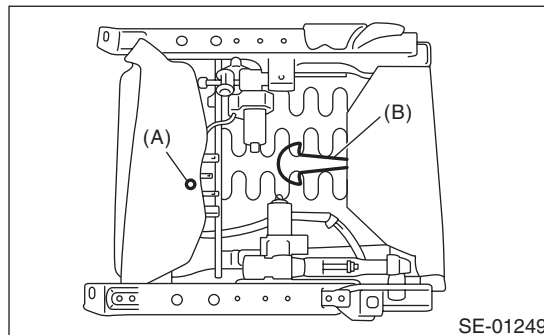
#### Tightening torque:

Refer to "COMPONENT" of "General Description". <Ref. to SE-2, COMPONENT, General Description.>

### C: DISASSEMBLY

#### 1. DRIVER'S SEAT

- 1) Remove the seat from vehicle. <Ref. to SE-7, DRIVER'S SEAT, REMOVAL, Front Seat.>
- 2) Remove the clip (A) and straps (B) on the back of seat cushion.

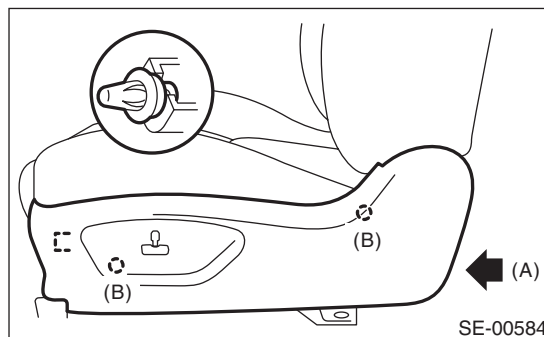


SE-01249

- 3) Disconnect the following connectors from the backside of seat cushion.

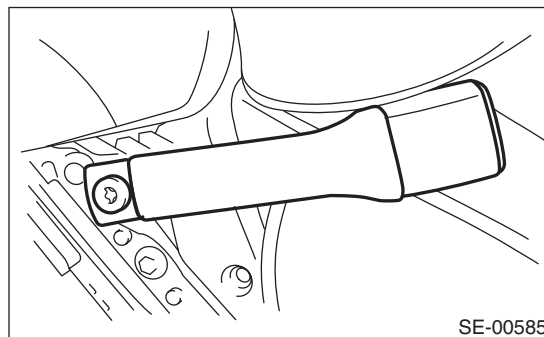
- Side airbag
- Seat position sensor
- Seat heater
- Power seat
- Seat belt

- 4) Remove the screw (A) and clips (B), and then disconnect the seat switch connector to remove seat side cover outside.



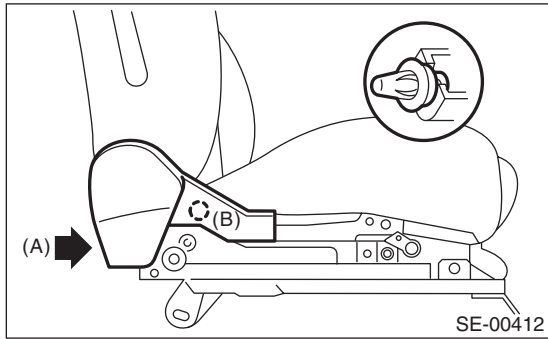
SE-00584

- 5) Remove the TORX® bolt, and then remove the inner seat belt assembly.

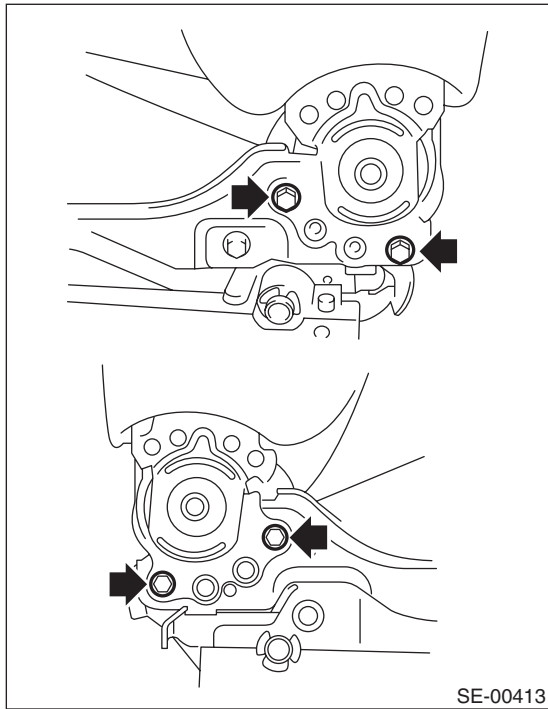


SE-00585

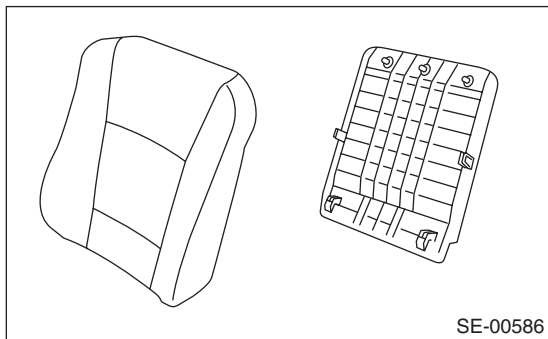
6) Remove the screw (A) and clip (B), and then remove the seat side cover inside.



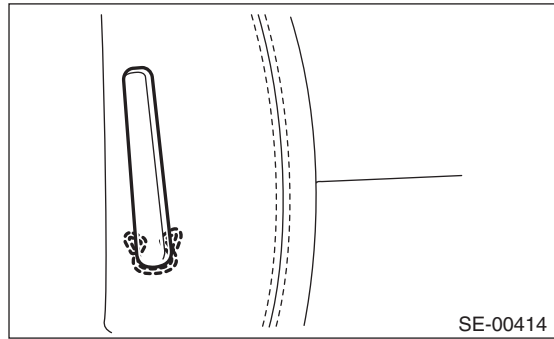
7) Remove the two bolts from the reclining hinge on each left and right side.



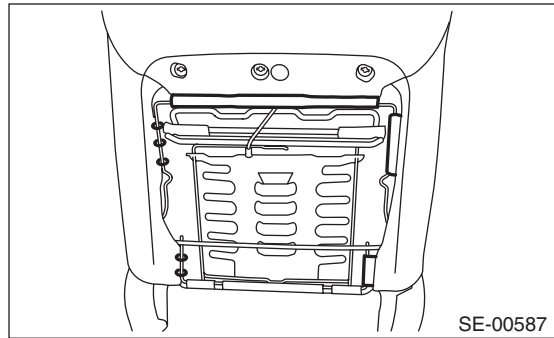
8) Remove the clips and hooks, and then detach the backrest back cover.



9) Remove the lock clip, and then remove the lumbar support lever.

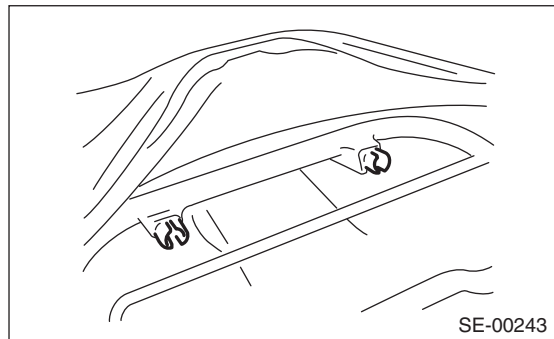


10) Remove the hooks and hog rings at the rear side of backrest.

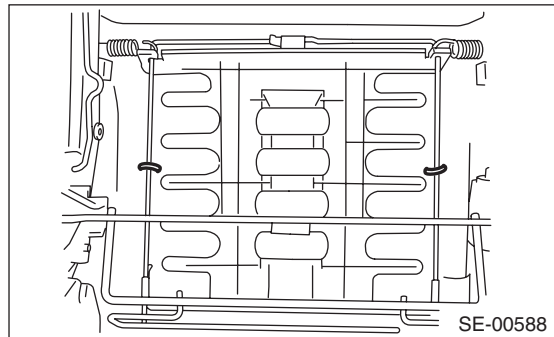


11) Remove the headrest lock bushing.

**NOTE:**  
Push outside to remove it from the inside of seat.



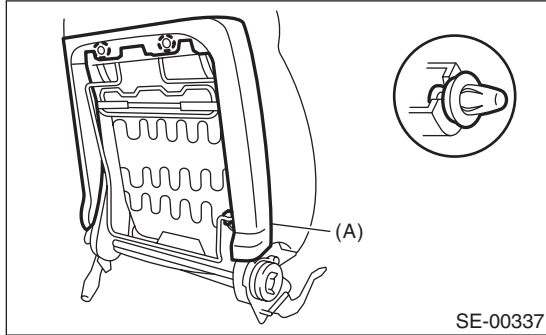
12) Remove the hog ring.



# Front Seat

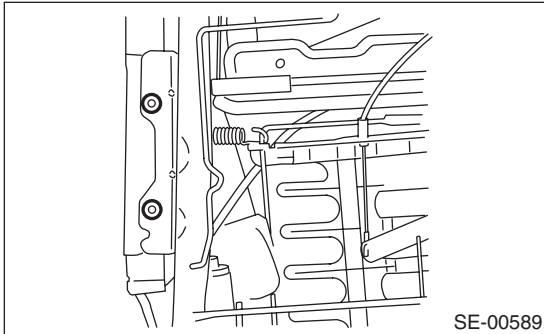
## SEATS

13) Remove the cover frame (A).

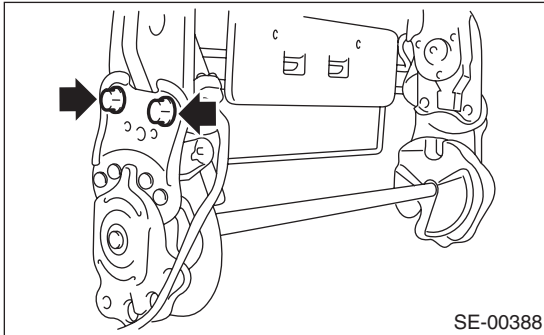


14) Pull out the backrest frame assembly.

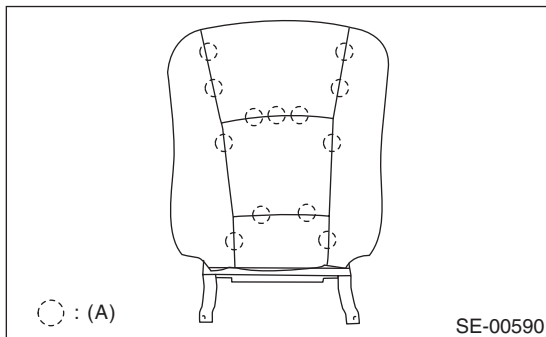
15) Remove the side airbag module.



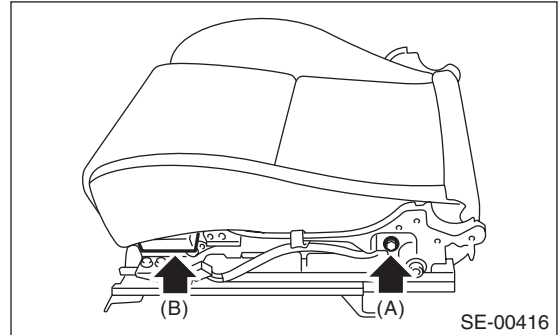
16) Remove the two bolts on each left and right side, and then remove the reclining motor assembly.



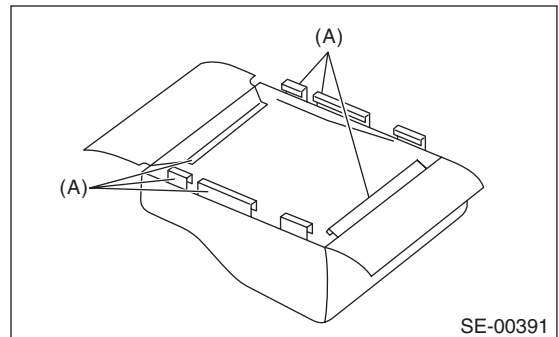
17) Remove the hog rings (A) on the surface side of backrest, and then remove the backrest cover from backrest.



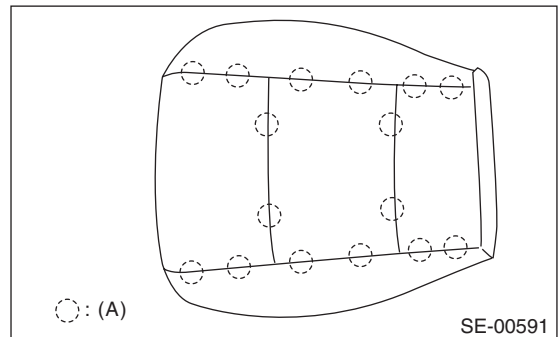
18) Remove the bolt (A) and hook (B) on the left and right side, and then remove the seat cushion frame from seat rail assembly.



19) Remove the hooks (A), and then remove the seat cushion from seat cushion frame.



20) Remove the hog rings (A), and then remove the seat cushion cover from seat cushion pad.





## 2. PASSENGER'S SEAT

### CAUTION:

- If the seat cushion cover is removed or replaced, make sure to perform occupant detection system adjustment after installing the seat. <Ref. to OD(diag)-14, SYSTEM CALIBRATION (REZEROING), OPERATION, Subaru Select Monitor.>

Failure to do so may prevent the passenger's airbag from operating properly.

- The passenger detection system (passenger seat only) control unit, passenger detection sensor, seat cushion pad and seat cushion frame are considered as a single seat cushion pad and frame assembly. Never remove the passenger detection control unit or the pressure sensor from the seat cushion frame.

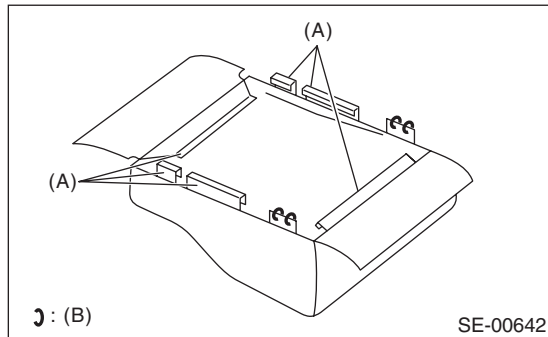
- If the seat cushion cover is removed, make sure to replace the wire on the seat cushion side with a new wire.

1) Remove the seat from vehicle. <Ref. to SE-7, PASSENGER'S SEAT, REMOVAL, Front Seat.>

2) Refer to the disassembly procedures for the driver's seat.

### NOTE:

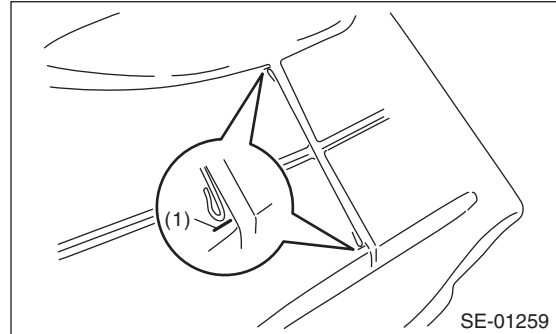
The back side of the seat cushion is affixed by a hook (A) and hog ring (B).



## D: ASSEMBLY

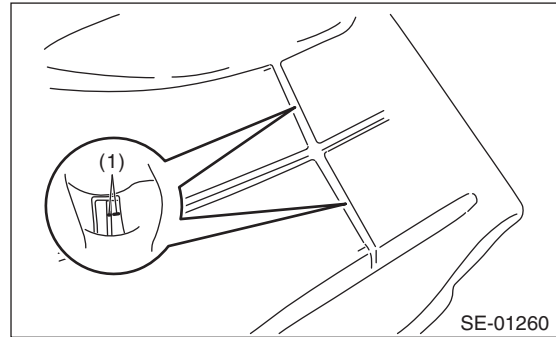
1) Assemble the seat cover.

(1) Adjust so that the left and right clearances between wire and seat pad become equal, and mark the seat pad.



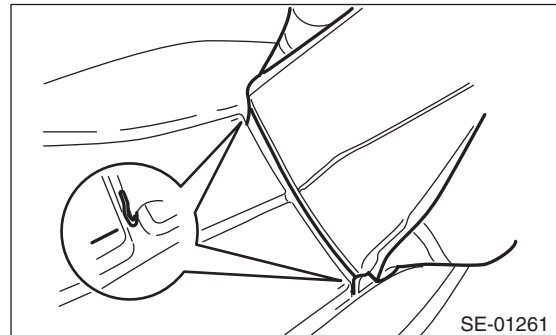
(1) Marking

(2) Mark the center of the wire on the pad side to which the hog ring is attached.



(1) Marking

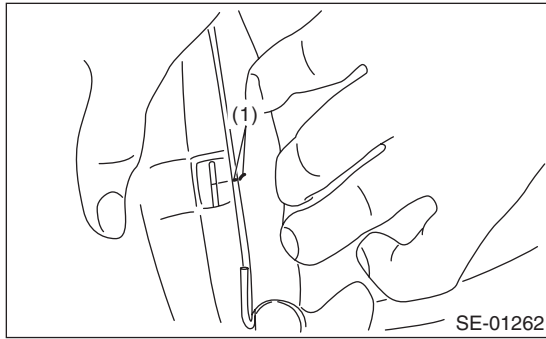
(3) Insert the wire into the seat cover, and align the wire with the position marked in step 1).



# Front Seat

## SEATS

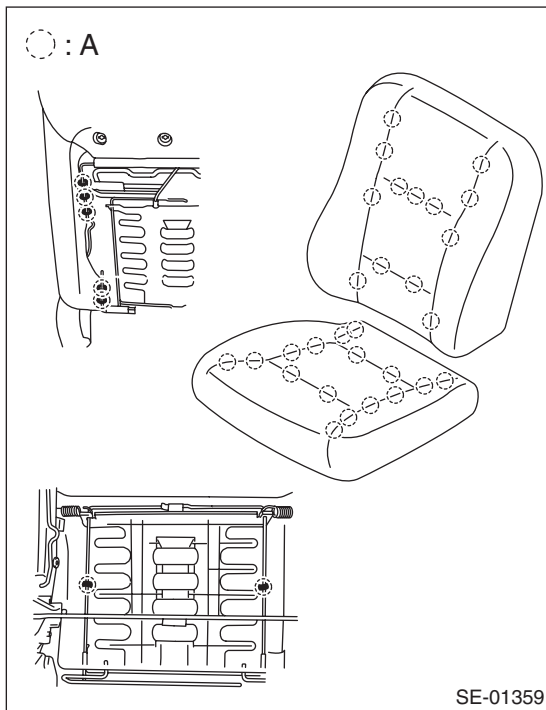
(4) Mark the wire on the seat cover side according to the markings on the seat pad.



(1) Marking

(5) Perform steps 1) — 4) to all sections to which the hog rings are attached.

(6) Make sure that all hog rings (A) are attached securely.



2) Assemble each part in the reverse order of disassembly.

3) If any wrinkles are found after the assembly of the seat cover, finish the seat cover with iron.

(1) Place the wet towel on wrinkles.



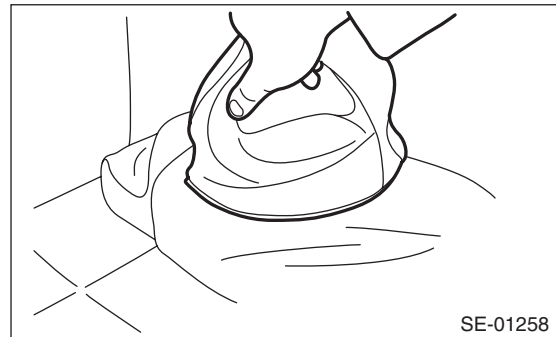
(2) Touch up with warm iron.

### CAUTION:

Keep moving the iron, otherwise the seat cover surface can be damaged.

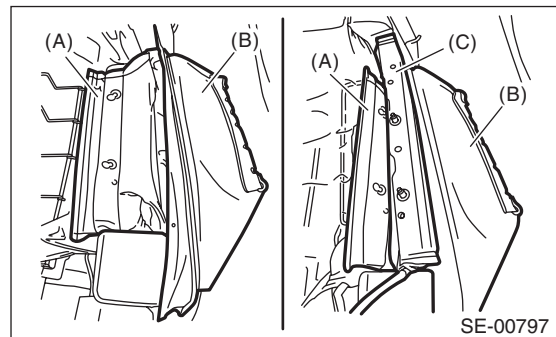
### NOTE:

This method is available for genuine leather, synthetic leather, cloth, etc.

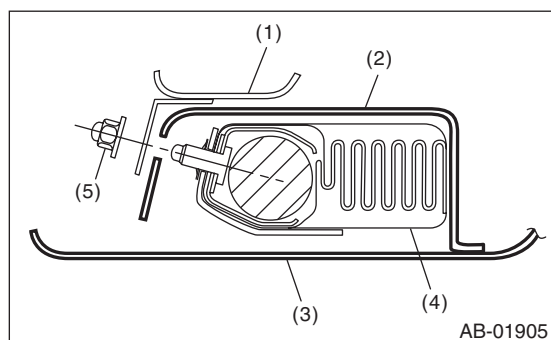


### CAUTION:

- Always refer to “CAUTION” of “General Description” in “AIRBAG SYSTEM” before handling the airbag module. <Ref. to AB-4, CAUTION, General Description.>
- When installing the side airbag module assembly, be sure to put the side airbag module between backrest cover and airbag guide cloth.



- (A) Airbag guide cloth
- (B) Backrest cover
- (C) Side airbag module ASSY



- (1) Backrest frame ASSY
- (2) Airbag guide cloth
- (3) Backrest cover
- (4) Side airbag module ASSY
- (5) Hexagon cap nut

Besides, if the backrest cover is not installed securely, the side airbag module may not be deployed properly, therefore keep strictly to the following procedures.

- Be careful not to stain or damage the backrest cover during assembly.
  - Always use new hog rings.
  - Secure the hog ring using hog ring pliers.
  - Install the hog rings to the specified points securely and make sure that there is no wrinkle or twisting on backrest cover.
- 4) Make sure that there is no foreign matter on side airbag module.
  - 5) Install the side airbag module (A) to backrest frame assembly.

**Tightening torque:**

**6 N·m (0.61 kgf-m, 4.4 ft-lb)**

- 6) Install the side airbag harness to backrest frame assembly.
- 7) Install the backrest cover.
- 8) Install the side airbag harness to the back of the seat cushion assembly.
- 9) Recline the seat or slide it backward and forward, and check there is no contact between the seat backrest assembly, cushion cover assembly and side airbag harness.
- 10) Install the front seat to the vehicle body.

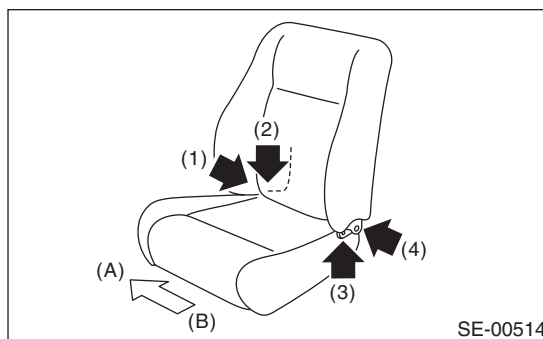
**Tightening torque:**

Refer to "COMPONENT" of "General Description". <Ref. to SE-2, FRONT SEAT (DRIVER'S SEAT), COMPONENT, General Description.>

## 1. DRIVER'S SEAT

**NOTE:**

- When installing the inner seat belt assembly, follow the procedures described in the seat belt section. <Ref. to SB-19, INNER SEAT BELT ASSEMBLY, INSTALLATION, Front Seat Belt.>
- Install the backrest assembly and seat cushion assembly in the following procedure.
  - 1) Temporarily tighten the four reclining hinge bolts.
  - 2) Place the backrest in the most upright position.
  - 3) Tighten the reclining hinge bolts (1) through (4) in order, in two or three steps by gradually increasing the torque until they reach the specified torque.



- (A) Vehicle inside
- (B) Vehicle outside

- 4) Assemble in the reverse order of disassembly.

## 2. PASSENGER'S SEAT

**CAUTION:**

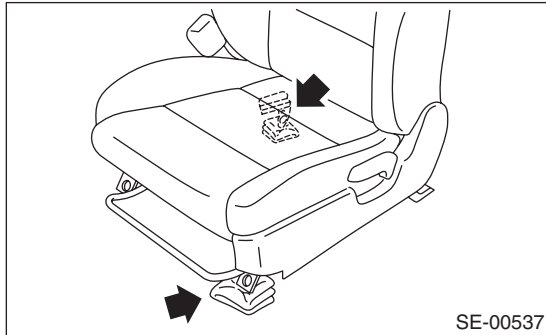
Make sure to adhere to the following rules when assembling the passenger seat. Improper work procedures can cause the passenger detection system to not operate properly.

- If the seat cushion cover is removed or replaced, make sure to perform occupant detection system adjustment after installing the seat. <Ref. to OD(diag)-14, SYSTEM CALIBRATION (REZEROING), OPERATION, Subaru Select Monitor.> Failure to do so may prevent the passenger's airbag from operating properly.
- The passenger detection system (passenger seat only) control unit, passenger detection sensor, seat cushion pad and seat cushion frame are considered as a single seat cushion pad and frame assembly. Never remove the passenger detection control unit or the pressure sensor from the seat cushion frame.
- If the seat cushion cover is removed, make sure to replace the wire on the seat cushion side with a new wire.
- Make sure to install the hog rings/clips to the specified locations. Do not reuse hog rings.

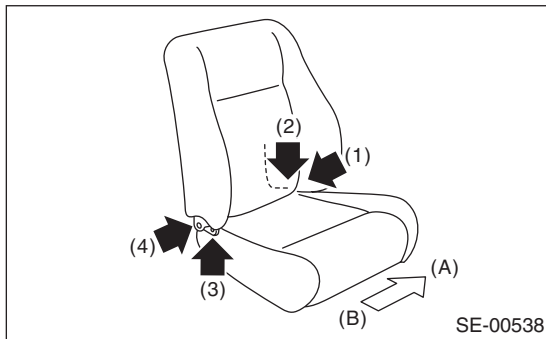
# Front Seat

## SEATS

- 1) Assemble the seat cushion in the reverse order of disassembly.
- 2) Assemble the backrest in the reverse order of disassembly.
- 3) When assembling the backrest assembly to the seat cushion assembly, fill up the gap in the front side of slide rail LH and in the rear side of slide rail RH using cloth etc.



- 4) Temporarily tighten the reclining hinge bolts in the order of (1) through (4) to an extent that the seat backrest assembly is not held securely.



- (A) Vehicle inside  
(B) Vehicle outside

- 5) Hold the seat cushion assembly securely, and tighten the reclining hinge bolts in the order described above until they reach the specified torque.

### CAUTION:

**Do not touch the backrest assembly when tightening the reclining hinge bolts.**

- 6) Assemble each harness, inner belt assembly and each cover in the reverse order of removal.

### Tightening torque:

**Refer to "COMPONENT" of "General Description". <Ref. to SE-2, COMPONENT, General Description.>**

## E: INSPECTION

### CAUTION:

**If there are tears or looseness in the back rest cover or seat cushion covers, do not attempt to repair. Replace with a new cover. Repairing the cover may cause improper operation of the side airbag or the occupant detection system.**

Check that there is no tear or fray on the backrest cover and seat cushion cover.

## 3. Second Seat

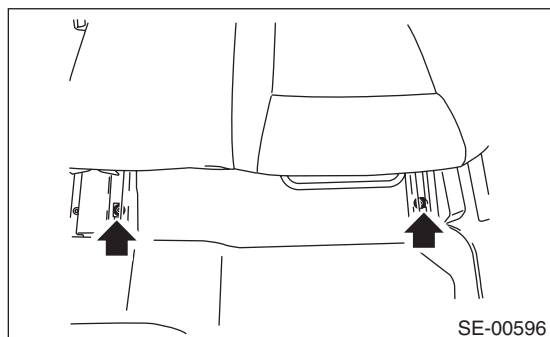
### A: REMOVAL

#### CAUTION:

- Airbag system satellite safing sensor is located in the lower of the second-row seat center. Read the cautions and warnings indicated in the AB section before removing the second-row seat. <Ref. to AB-4, CAUTION, General Description.>
- The airbag system is fitted with a backup power supply. After disconnecting the battery ground cable, the airbag may deploy if you do not wait for 60 seconds before starting the service of airbag system.

#### 1. LH&CTR SEAT

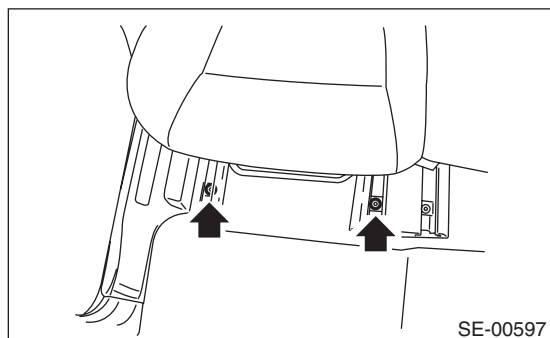
- 1) Tilt the backrest forward, and move the seat forward.
- 2) Remove the slide rail cover at the seat rear side, and remove the two bolts.
- 3) Move the seat to the rear end.
- 4) Remove the slide rail cover at the seat front side, and remove the two bolts.



- 5) Remove the seat from vehicle.

#### 2. RH SEAT

- 1) Tilt the backrest forward, and move the seat forward.
- 2) Remove the slide rail cover at the seat rear side, and remove the two bolts.
- 3) Move the seat to the rear end.
- 4) Remove the slide rail cover at the seat front side, and remove the two bolts.



- 5) Remove the seat from vehicle.

### B: INSTALLATION

Install in the reverse order of removal.

#### Tightening torque:

Refer to "COMPONENT" of "General Description". <Ref. to SE-2, COMPONENT, General Description.>

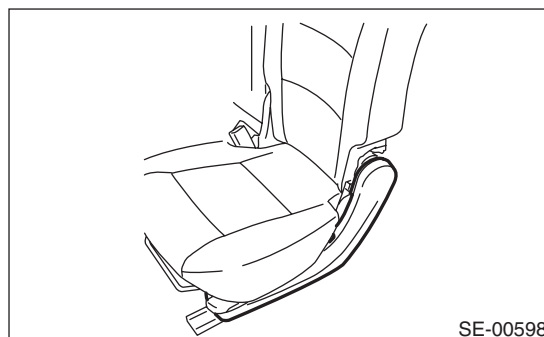
#### NOTE:

Tighten the slide rail bolts diagonally in two or three steps by gradually increasing the torque, until they reach the specified torque.

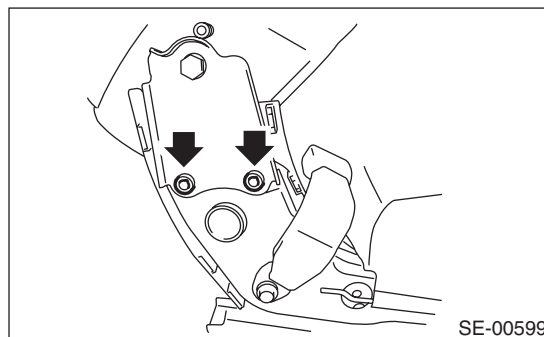
### C: DISASSEMBLY

#### 1. LH SEAT

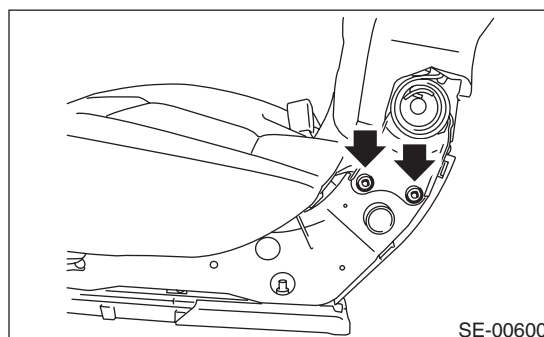
- 1) Remove the seat from vehicle. <Ref. to SE-15, LH&CTR SEAT, REMOVAL, Second Seat.>
- 2) Remove the headrest.
- 3) Remove the hinge outer cover.



- 4) Remove the two reclining hinge bolts of 2nd seat CTR, then remove the seat backrest.



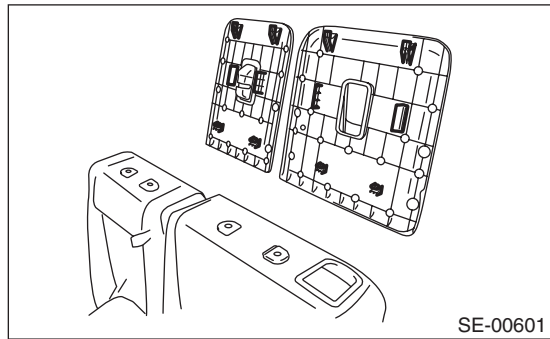
- 5) Remove the two reclining hinge bolts of 2nd seat LH on each of the left and right sides, then remove the seat backrest.



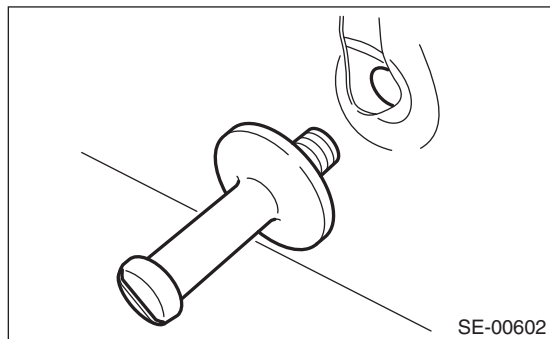
## Second Seat

### SEATS

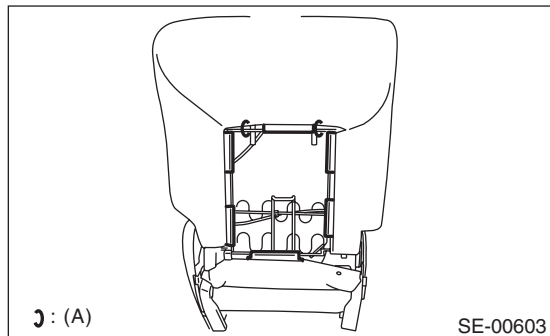
6) Remove the backrest back cover.



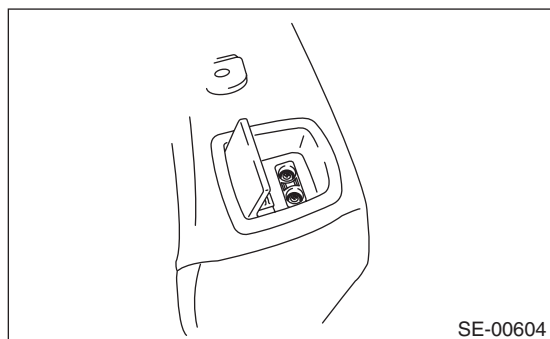
7) Remove the stopper.



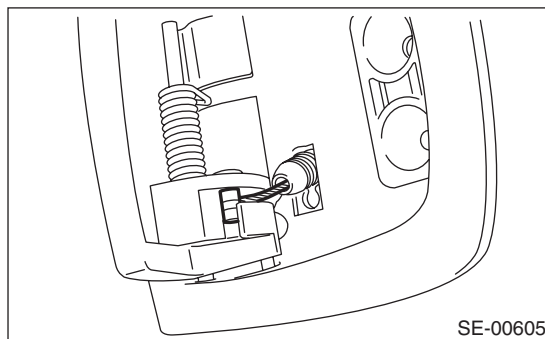
8) Remove the hog rings (A) and hooks at the rear face of the backrest.



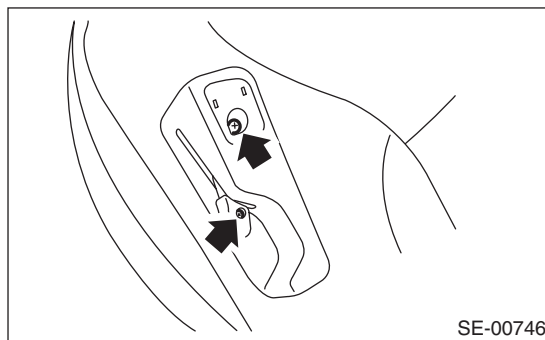
9) Remove the two screws securing the reclining lever.



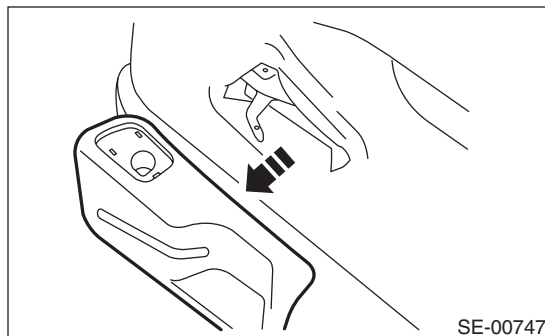
10) Disconnect the wire connected to the reclining lever, then remove the reclining lever.



11) Remove the screws securing the walk-in knob and walk-in lever cover.



12) Remove the walk-in knob and walk-in lever cover.



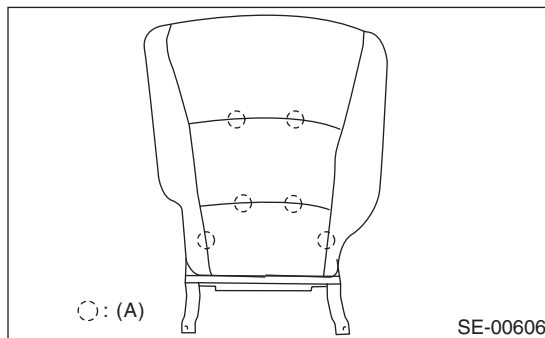
13) Remove the headrest lock bushing.

NOTE:

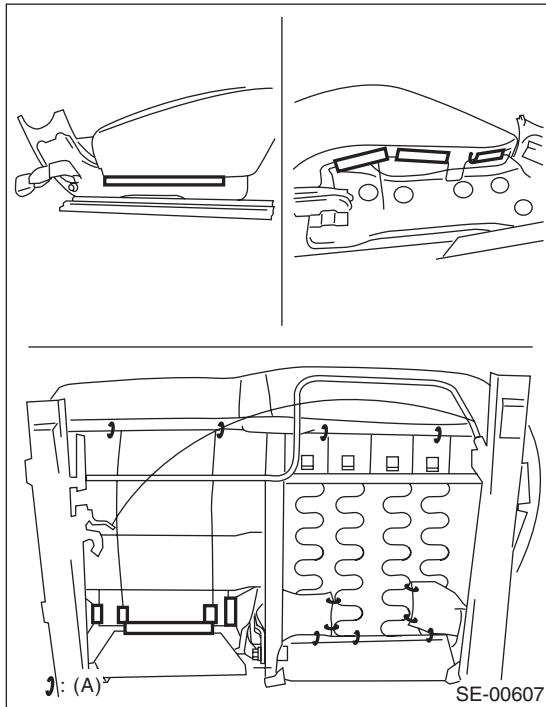
Push outside to remove it from the inside of seat.

14) Pull out the frame from the backrest.

15) Remove the hog rings (A) of backrest, and then remove the backrest cover from backrest.

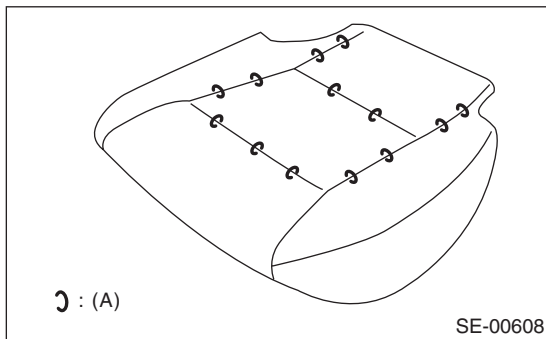


16) Remove the hooks and hog rings (A) from the rear side of seat cushion.



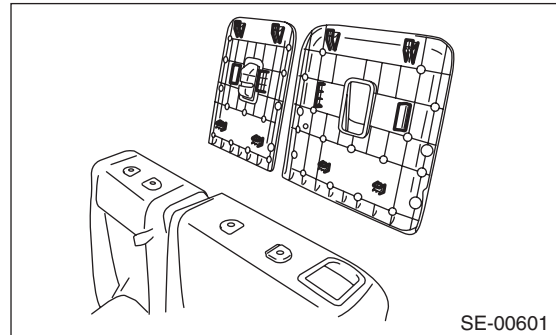
17) Remove the seat cushion from the slide rail assembly.

18) Remove the seat cushion hog rings (A), and then remove the seat cushion cover from seat cushion.

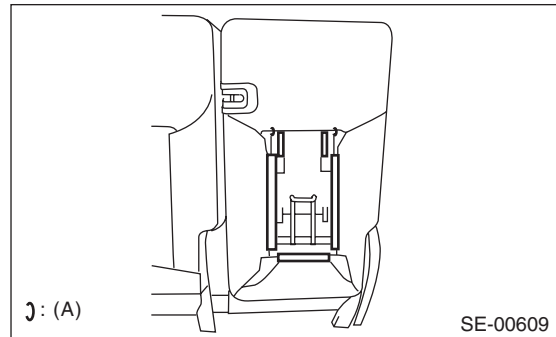


## 2. CTR SEAT

- 1) Remove the seat from vehicle. <Ref. to SE-15, LH&CTR SEAT, REMOVAL, Second Seat.>
- 2) Remove the hinge outer cover.
- 3) Remove the two reclining hinge bolts of 2nd seat CTR, then remove the seat backrest.
- 4) Remove the backrest back cover.

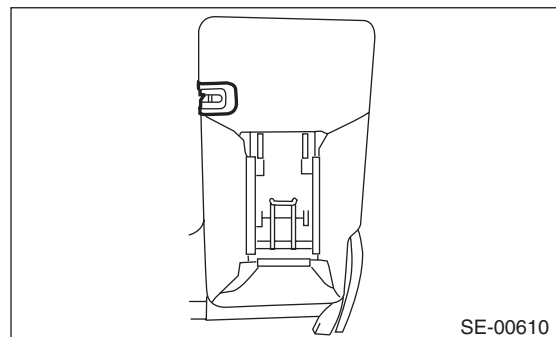


5) Remove the hooks and hog rings (A) at the rear side of backrest.



6) Remove the nut, then remove the armrest and arm rest rear board.

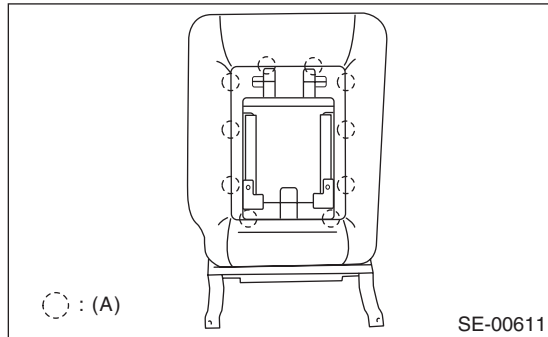
- 7) Remove the four screws securing the arm rest.
- 8) Remove the nut, then remove the armrest rear board and arm rest.
- 9) Remove the seat back latch cover.



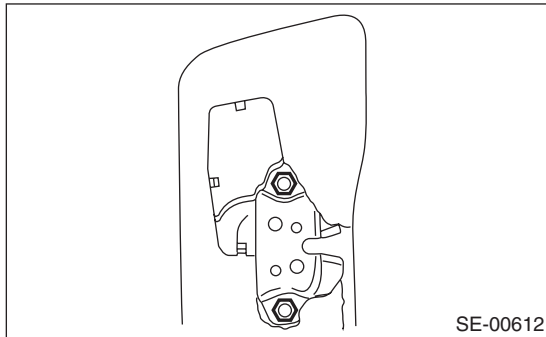
## Second Seat

### SEATS

10) Remove the hog rings (A) on the front face of the backrest, and then remove the backrest cover from the backrest.

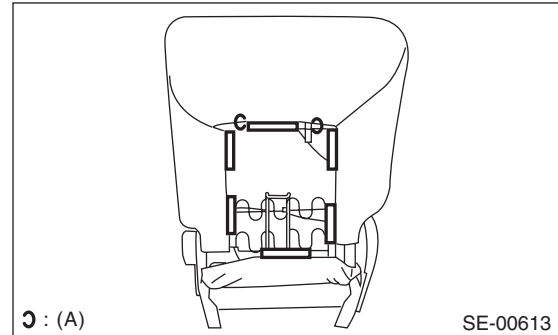


11) Remove the two bolts securing the seat backrest latch, then remove the seat backrest latch.



### 3. RH SEAT

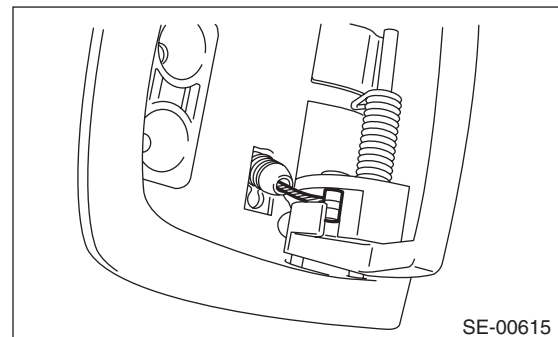
- 1) Remove the seat from vehicle. <Ref. to SE-15, RH SEAT, REMOVAL, Second Seat.>
- 2) Remove the headrest.
- 3) Remove the hinge outer cover.
- 4) Remove the backrest back cover.
- 5) Remove the hog rings (A) and hooks at the rear face of the backrest.



6) Remove the two screws securing the reclining lever.

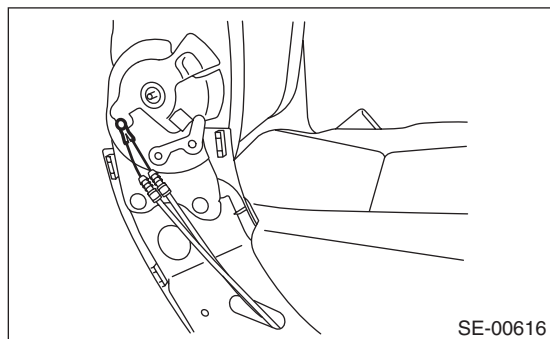


7) Disconnect the wire connected to the reclining lever, then remove the reclining lever.



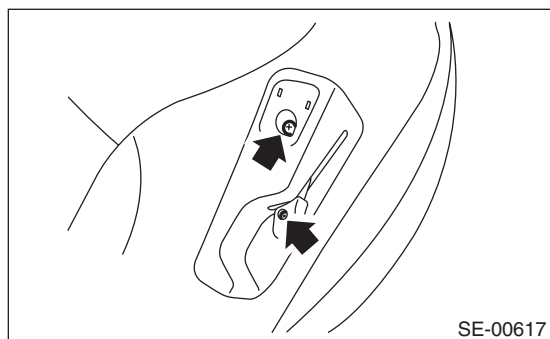


8) Disconnect the wire connected to the reclining hinge.

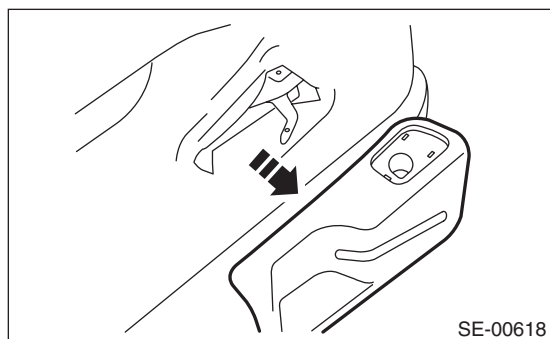


9) Remove the four reclining hinge bolts of 2nd seat RH, then remove the seat backrest.

10) Remove the two screws securing the walk-in knob and walk-in lever cover.



11) Remove the walk-in knob and walk-in lever cover.



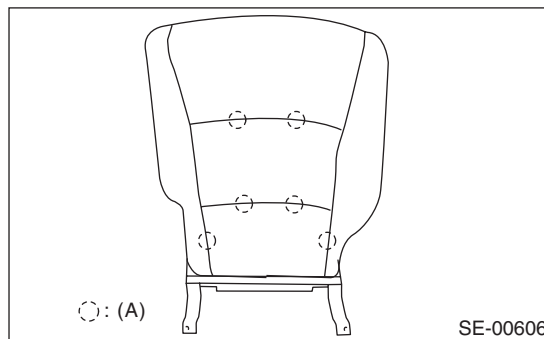
12) Remove the headrest lock bushing.

**NOTE:**

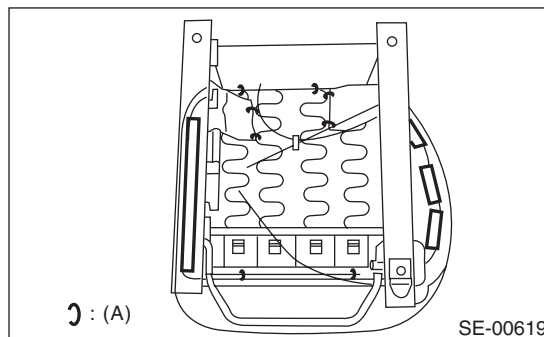
Push outside to remove it from the inside of seat.

13) Pull out the frame from the backrest.

14) Remove the hog rings (A) of backrest, and then remove the backrest cover from backrest.

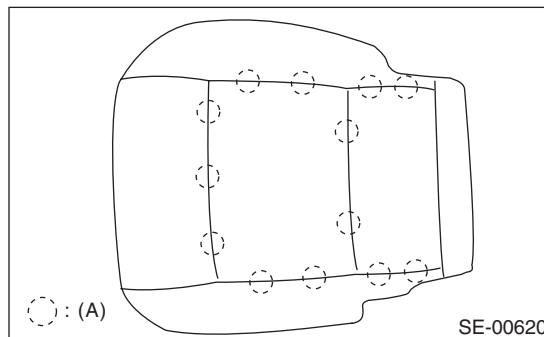


15) Remove the hooks and hog rings (A) from the rear side of seat cushion.



16) Remove the seat cushion from the slide rail assembly.

17) Remove the seat cushion hog rings (A), and then remove the seat cushion cover from seat cushion.



## Second Seat

### SEATS

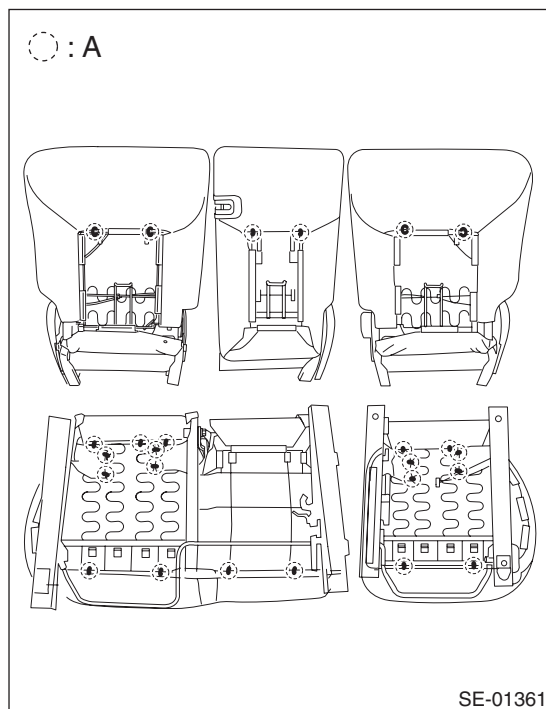
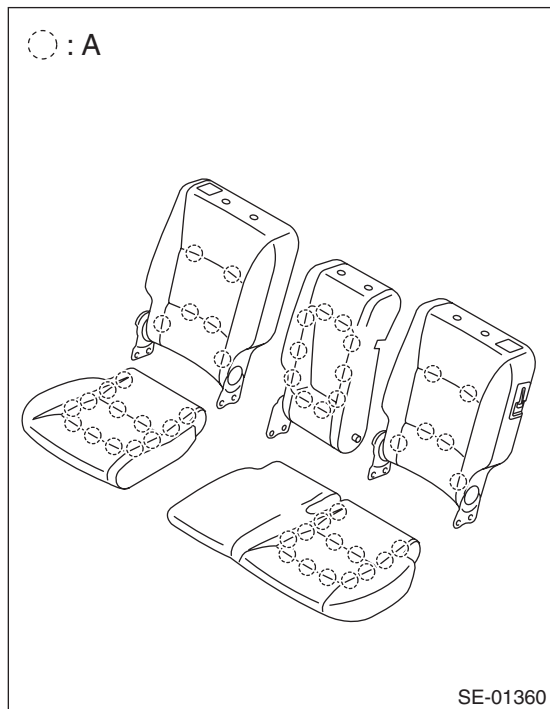
#### D: ASSEMBLY

##### CAUTION:

- Be careful not to stain or damage the backrest cover during assembly.
- Always use new hog rings.
- Secure the hog ring using hog ring pliers.
- Install the hog rings to the specified points securely and make sure that there is no wrinkle or twisting on backrest cover.

1) Assemble the seat cover in the same manner as the front seat. <Ref. to SE-11, ASSEMBLY, Front Seat.>

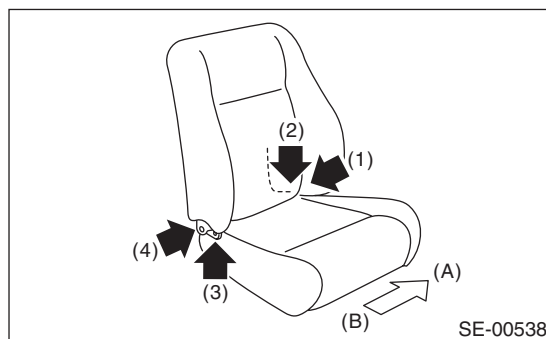
2) Make sure that all hog rings (A) are attached securely.



3) Assemble the seat cushion in the reverse order of disassembly.

4) Assemble the backrest in the reverse order of disassembly.

5) Temporarily tighten the reclining hinge bolts in the order of (1) through (4) to an extent that the seat backrest assembly is not held securely.



(A) Vehicle inside

(B) Vehicle outside

6) Use the reclining lever to place the backrest in the most upright position, and check the first lock position of recliner.

7) Hold the seat cushion assembly securely, and tighten the reclining hinge bolts in the order described above until they reach the specified torque.

**CAUTION:**

**Do not touch the backrest assembly when tightening the reclining hinge bolts.**

8) Assemble each harness, inner belt assembly and each cover in the reverse order of removal.

***Tightening torque:***

***Refer to "COMPONENT" of "General Description". <Ref. to SE-2, COMPONENT, General Description.>***

**E: INSPECTION**

Check that there is no tear or fray on the seat cover.

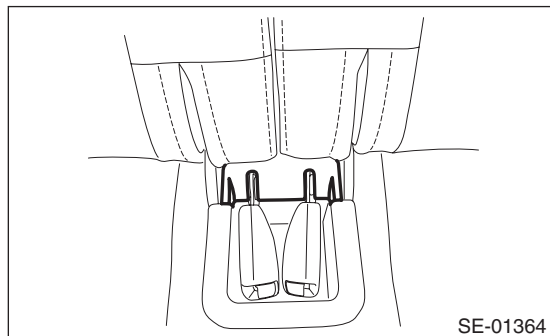
# Third Seat

## SEATS

### 4. Third Seat

#### A: REMOVAL

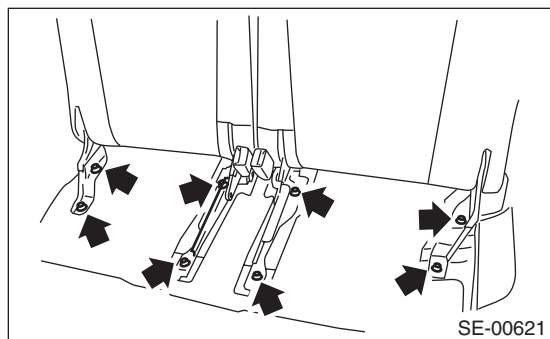
1) Remove the seat belt cover.



2) Lift up the front side of the 3rd seat cushion and then remove the hooks.

3) Lift up the 3rd seat cushion and remove the seat cushion by pushing it backward to detach the hook.

4) Remove the eight bolts securing the 3rd seat backrest.



5) Remove the 3rd seat.

#### B: INSTALLATION

Install in the reverse order of removal.

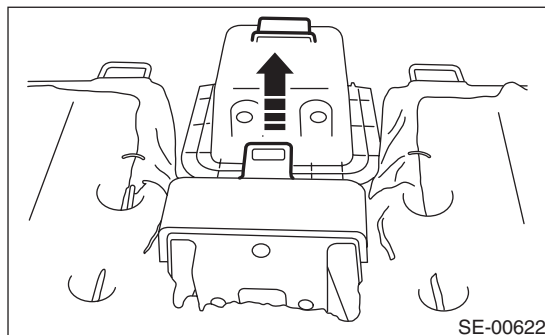
#### Tightening torque:

Refer to "COMPONENT" of "General Description". <Ref. to SE-2, COMPONENT, General Description.>

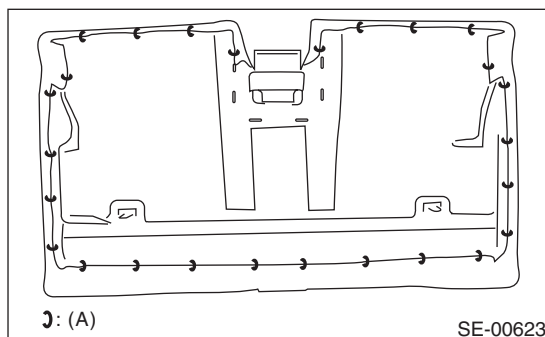
#### C: DISASSEMBLY

1) Remove the 3rd seat. <Ref. to SE-22, REMOVAL, Third Seat.>

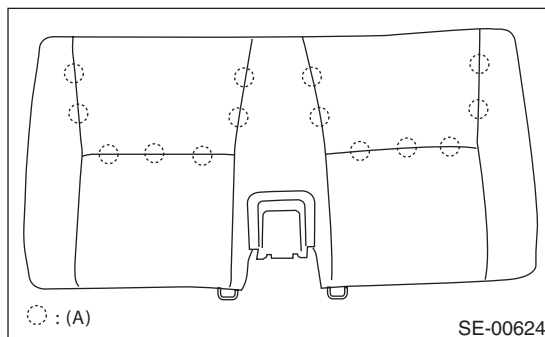
2) Remove the clips, then remove the seat belt tray.



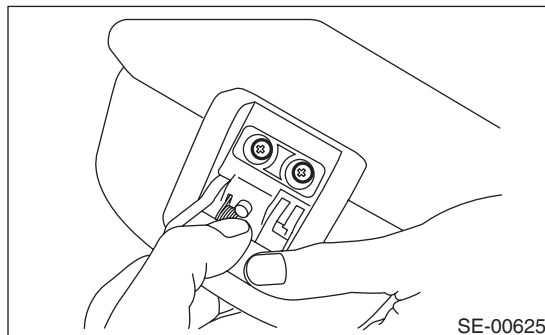
3) Remove the hog rings (A) on the rear side of seat cushion.



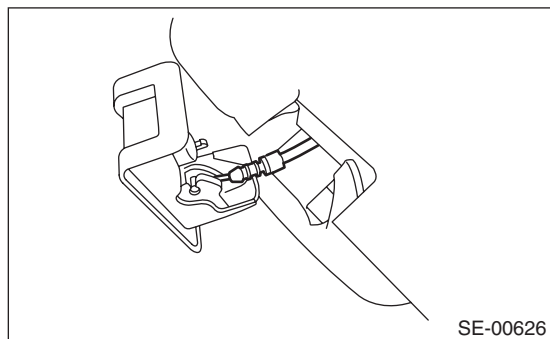
4) Remove the hog rings (A) on the front side of seat cushion.



5) Remove the two screws securing the hinge lever assembly.

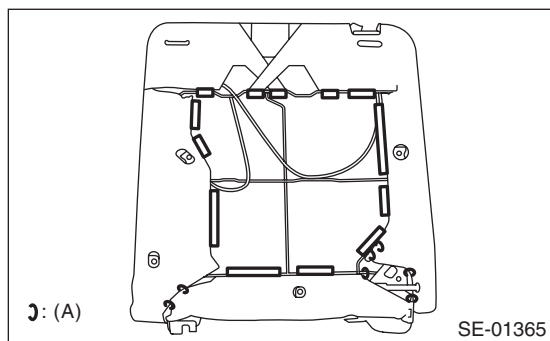


6) Disconnect the wire connected to the hinge lever assembly.

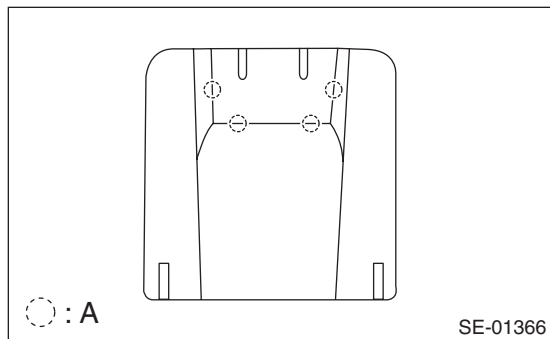


7) Remove the seat backrest cover.

8) Remove the hog rings (A) and hooks at the rear face of the backrest.

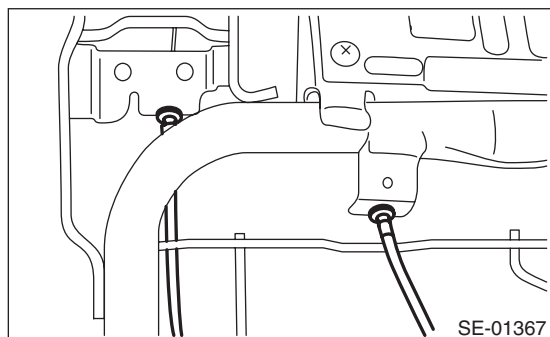


9) Remove the hog rings (A) on the front side of seat backrest.

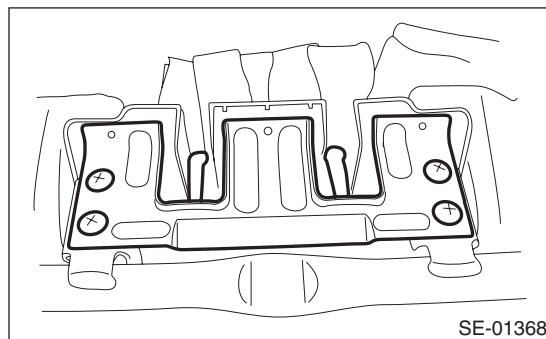


10) Remove the screws, and remove the headrest hinge cover.

11) Remove the wires that are connected to the headrest assembly from the backrest frame.



12) Remove the screws to remove the headrest assembly.



13) Pull out the frame from the seat backrest cushion.

## D: ASSEMBLY

### CAUTION:

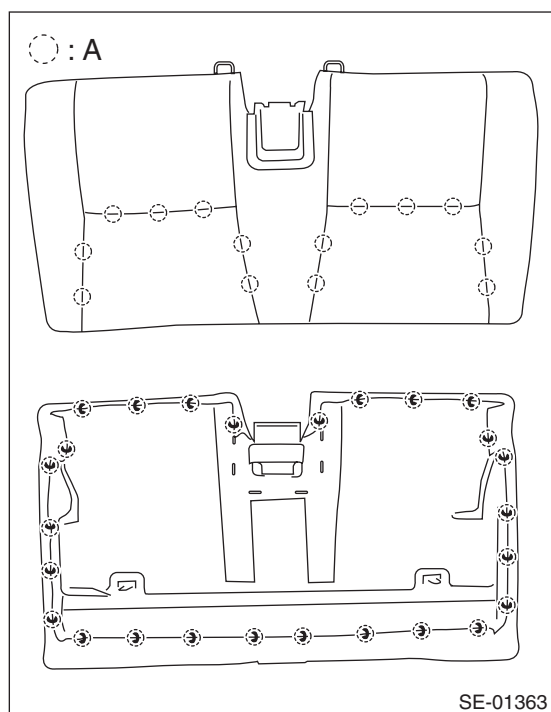
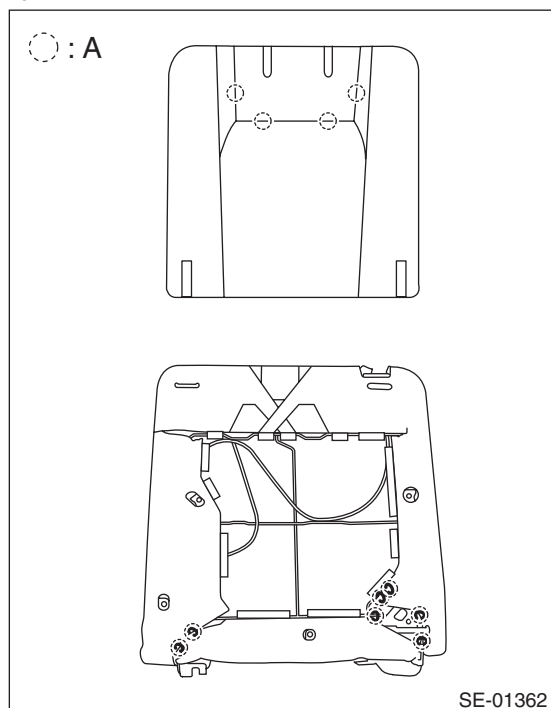
- Be careful not to stain or damage the backrest cover during assembly.
- Always use new hog rings.
- Secure the hog ring using hog ring pliers.
- Install the hog rings to the specified points securely and make sure that there is no wrinkle or twisting on backrest cover.

1) Assemble the seat cover in the same manner as the front seat. <Ref. to SE-11, ASSEMBLY, Front Seat.>

## Third Seat

### SEATS

2) Make sure that all hog rings (A) are attached securely.



3) Assemble the seat cushion in the reverse order of disassembly.

4) Assemble the backrest in the reverse order of disassembly.

5) Assemble each inner belt assembly and each cover in the reverse order of removal.

#### **Tightening torque:**

**Refer to "COMPONENT" of "General Description". <Ref. to SE-2, COMPONENT, General Description.>**

#### **E: INSPECTION**

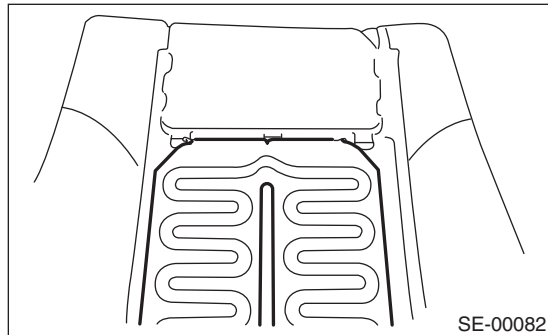
Check that there is no tear or fray on the seat cover.

## 5. Seat Heater System

### A: REMOVAL

#### 1. SEAT HEATER UNIT

- 1) Remove the front seats. <Ref. to SE-7, REMOVAL, Front Seat.>
- 2) Remove the backrest cover of front seat and seat cushion cover. <Ref. to SE-8, DISASSEMBLY, Front Seat.>
- 3) Remove the hog rings, and then remove the seat heater unit.



#### 2. SEAT HEATER SWITCH

The seat heater switch is built into the control panel. <Ref. to AC-32, REMOVAL, Control Panel.>

### B: INSTALLATION

#### CAUTION:

**If the seat cushion cover is removed or replaced, make sure to perform occupant detection system adjustment after installing the seat. <Ref. to OD(diag)-14, SYSTEM CALIBRATION (REZEROING), OPERATION, Subaru Select Monitor.>**

**Failure to do so may prevent the passenger's airbag from operating properly.**

Install in the reverse order of removal.

### C: INSPECTION

#### 1. WIRING DIAGRAM

<Ref. to WI-86, WIRING DIAGRAM, Power Seat System.>

#### 2. SEAT HEATER MODULE

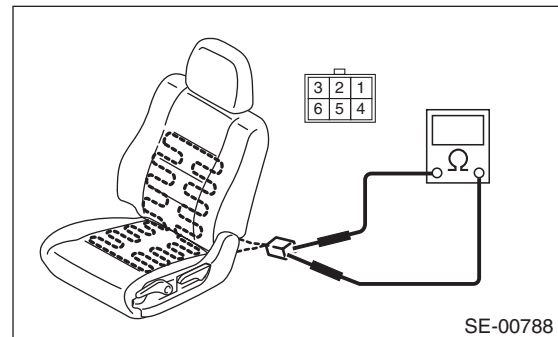
Disconnect the connector of the seat heater module, and check for continuity between terminals in connector.

#### Connector & terminal

**No. 1 — No. 3:**

**No. 1 — No. 4:**

**No. 3 — No. 4:**



If there is no continuity, replace the seat heater module.

#### 3. SEAT HEATER SWITCH

1) Perform the self-diagnosis of control panel. <Ref. to AC(diag)-10, Diagnostic Chart for Self-Diagnosis.>

2) Repair the harness between the seat heater module and the auto air conditioner control module.

3) Check the auto air conditioner control module. <Ref. to AC(diag)-8, Auto A/C Control Module I/O Signal.>

## 6. Power Seat System

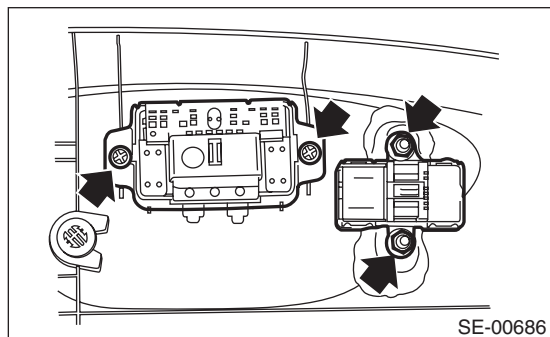
### A: REMOVAL

#### CAUTION:

When removing the front seat, disconnect the ground cable from the battery before disconnecting the side airbag module harness connector, and wait for 60 seconds before starting the operation.

#### 1. POWER SEAT SWITCH

- 1) Detach the connectors and remove the seat side cover outside. <Ref. to SE-8, DISASSEMBLY, Front Seat.>
- 2) Remove the screws to remove the power seat switch assembly.

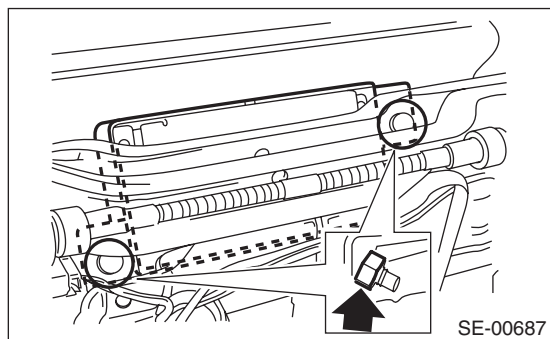


#### NOTE:

Perform the same procedure when removing the memory switch of memory-equipped seat.

#### 2. MEMORY MODULE (MEMORY-EQUIPPED SEAT)

- 1) Lift the seat cushion by operating the switch.
- 2) Remove the front seat from the vehicle.
- 3) Remove the nut and then remove the memory module.



### B: INSTALLATION

Install in the reverse order of removal.

#### NOTE:

- For the memory-equipped seat, always perform the initialize operation after the installation. <Ref. to SE-39, ADJUSTMENT, Power Seat System.>
- Check the following items after replacing the memory-equipped seat or the memory module.
  1. Memory feature is restored after turning the ignition switch to ON and shifting to P range.
  2. Memory feature is not restored after turning the ignition switch to ON and shifting to other than P range.

### C: INSPECTION

#### 1. WIRING DIAGRAM

- Driver's side (without memory) <Ref. to WI-87, DRIVER'S SEAT (WITH MEMORY), WIRING DIAGRAM, Power Seat System.>
- Driver's side (memory-equipped) <Ref. to WI-86, DRIVER'S SEAT (WITHOUT MEMORY), WIRING DIAGRAM, Power Seat System.>
- Passenger's side <Ref. to WI-88, PASSENGER'S SEAT, WIRING DIAGRAM, Power Seat System.>

#### 2. TROUBLE SYMPTOM

- Driver's seat (without memory)

Symptom	Criteria
All function fails to operate. <Ref. to SE-29, ALL FUNCTION FAILS TO OPERATE (DRIVER'S SEAT, WITHOUT MEMORY), INSPECTION, Power Seat System.>	<ul style="list-style-type: none"> <li>• Power seat switch</li> <li>• Power seat harness</li> <li>• Body harness</li> </ul>
A part of function does not operate. <Ref. to SE-29, SOME OF THE MOTORS DO NOT OPERATE (DRIVER'S SEAT, WITHOUT MEMORY), INSPECTION, Power Seat System.>	<ul style="list-style-type: none"> <li>• Power seat switch</li> <li>• Power seat harness</li> <li>• Relevant motor</li> </ul>



• Driver's seat (memory-equipped)

Symptom	Criteria
Does not operate by manual operation. <Ref. to SE-31, DOES NOT OPERATE IN MANUAL OPERATION (DRIVER'S SEAT, MEMORY-EQUIPPED), INSPECTION, Power Seat System.>	<ul style="list-style-type: none"> <li>• Power seat switch</li> <li>• Power seat harness</li> <li>• Body harness</li> <li>• Relevant motor and encoder</li> </ul>
A part of function does not operate. <Ref. to SE-32, SOME OF THE MOTORS DO NOT OPERATE (DRIVER'S SEAT, WITH MEMORY), INSPECTION, Power Seat System.>	<ul style="list-style-type: none"> <li>• Power seat switch</li> <li>• Power seat harness</li> <li>• Relevant motor and encoder</li> <li>• Memory module</li> </ul>
Fails to store the location to the memory <Ref. to SE-35, FAILS TO STORE THE LOCATION TO THE MEMORY (DRIVER'S SEAT, WITH MEMORY), INSPECTION, Power Seat System.>	<ul style="list-style-type: none"> <li>• Memory switch</li> <li>• Power seat harness</li> <li>• Memory module</li> </ul>
Restoring operation is impossible <Ref. to SE-35, FAILS TO PERFORM THE REPLAY OPERATION (DRIVER'S SEAT, WITH MEMORY), INSPECTION, Power Seat System.>	<ul style="list-style-type: none"> <li>• Memory switch</li> <li>• Memory module</li> <li>• Motor and encoder</li> <li>• Battery voltage (operation voltage)</li> </ul>
Initial setting is impossible <Ref. to SE-37, INITIALIZATION IS IMPOSSIBLE, INSPECTION, Power Seat System.>	<ul style="list-style-type: none"> <li>• Power seat harness</li> <li>• Memory module</li> </ul>

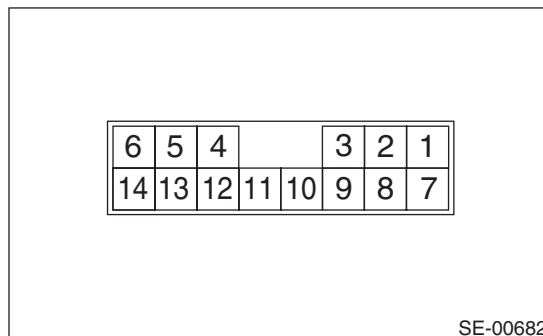
• Passenger's seat

Symptom	Criteria
All function fails to operate. <Ref. to SE-37, ALL FUNCTION FAILS TO OPERATE (PASSENGER'S SEAT), INSPECTION, Power Seat System.>	<ul style="list-style-type: none"> <li>• Power seat switch</li> <li>• Power seat harness</li> <li>• Body harness</li> </ul>
A part of function does not operate. <Ref. to SE-38, SOME MOTORS DO NOT OPERATE (PASSENGER'S SEAT), INSPECTION, Power Seat System.>	<ul style="list-style-type: none"> <li>• Power seat switch</li> <li>• Power seat harness</li> <li>• Relevant motor</li> </ul>

### 3. CHECK POWER SEAT SWITCH

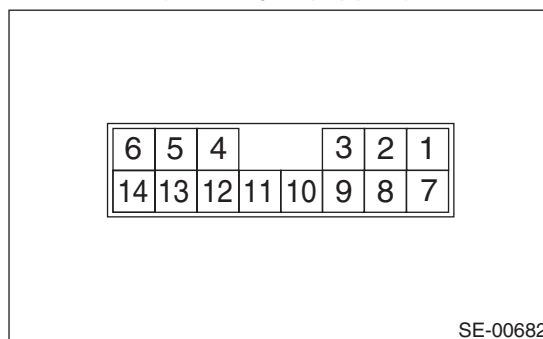
Move each switch and measure the resistance between connector terminals.

• Driver's seat (without memory)



Switch position	Terminal No.	Standard
Slide forward	7 and 14 8 and 13	Less than 10 Ω
Slide backward	7 and 13 8 and 14	Less than 10 Ω
Tilt up	7 and 2 8 and 1	Less than 10 Ω
Tilt down	7 and 1 8 and 2	Less than 10 Ω
Lifter up	7 and 5 8 and 6	Less than 10 Ω
Lifter down	7 and 6 8 and 5	Less than 10 Ω
Reclining forward	7 and 3 8 and 4	Less than 10 Ω
Reclining backward	7 and 4 8 and 3	Less than 10 Ω

• Driver's seat (memory-equipped)

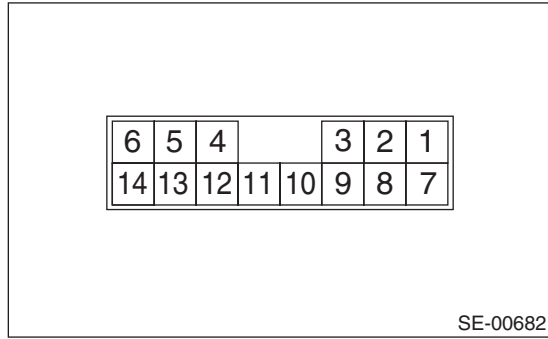


Switch position	Terminal No.	Standard
Slide forward	13 and 7	Less than 10 Ω
Slide backward	14 and 7	Less than 10 Ω
Tilt up	5 and 7	Less than 10 Ω
Tilt down	6 and 7	Less than 10 Ω
Lifter up	2 and 7	Less than 10 Ω
Lifter down	1 and 7	Less than 10 Ω
Reclining forward	4 and 7	Less than 10 Ω
Reclining backward	3 and 7	Less than 10 Ω

# Power Seat System

## SEATS

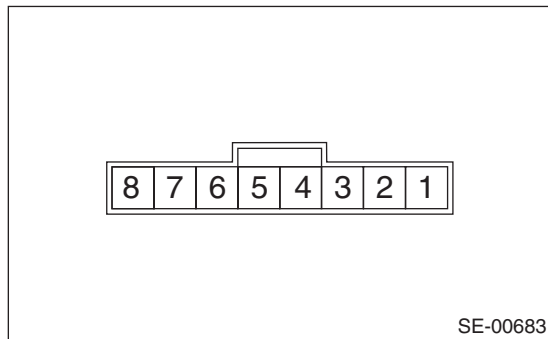
- Passenger's seat



Switch position	Terminal No.	Standard
Slide forward	7 and 13 8 and 14	Less than 10 $\Omega$
Slide backward	7 and 14 8 and 13	Less than 10 $\Omega$
Reclining forward	7 and 4 8 and 3	Less than 10 $\Omega$
Reclining backward	7 and 3 8 and 4	Less than 10 $\Omega$

### 4. CHECK MEMORY SWITCH (MEMORY-EQUIPPED)

Move each switch and measure the resistance between connector terminals.



Switch position	Terminal No.	Standard
Memory 1	3 and 1	Less than 10 $\Omega$
Memory 2	2 and 1	Less than 10 $\Omega$
Set	8 and 1	Less than 10 $\Omega$

## 5. ALL FUNCTION FAILS TO OPERATE (DRIVER'S SEAT, WITHOUT MEMORY)

Step	Check	Yes	No
<b>1</b> <b>CHECK SEAT FUNCTIONS.</b> Operate each power seat switch and check that each power seat function operates normally.	Does all function fails to operate?	Go to step 2.	Check the motor which does not operate. <Ref. to SE-29, SOME OF THE MOTORS DO NOT OPERATE (DRIVER'S SEAT, WITHOUT MEMORY), INSPECTION, Power Seat System.>
<b>2</b> <b>CHECK FUSE.</b> Check the power seat fuse inside the fuse box.	Is the fuse blown out?	Replace the appropriate fuse.	Go to step 3.
<b>3</b> <b>CHECK POWER SUPPLY CIRCUIT.</b> 1) Disconnect the connector of power seat switch assembly. 2) Measure the voltage between harness connector and chassis ground. <i>Connector &amp; terminal</i> <i>(R190) No. 7 — Chassis ground:</i>	Is the voltage 10 V or more?	Go to step 4.	Check body harness.
<b>4</b> <b>CHECK POWER SUPPLY CIRCUIT.</b> Measure the resistance between power seat switch harness connector and chassis ground. <i>Connector &amp; terminal</i> <i>(R190) No. 8 — Chassis ground:</i>	Is the resistance less than 10 $\Omega$ ?	Replace the power seat switch assembly.	Check body harness.

## 6. SOME OF THE MOTORS DO NOT OPERATE (DRIVER'S SEAT, WITHOUT MEMORY)

- Slide operation failure

Step	Check	Yes	No
<b>1</b> <b>CHECK SWITCH.</b> 1) Disconnect the connector of power seat switch assembly. 2) Measure the resistance between connector terminals when moving the switch to slide forward and slide backward. <Ref. to SE-27, CHECK POWER SEAT SWITCH, INSPECTION, Power Seat System.>	Is there any problem on the inspection result?	Go to step 2.	Replace the power seat switch assembly.
<b>2</b> <b>CHECK HARNESS.</b> 1) Disconnect the power seat switch connector and slide motor connector. 2) Measure the resistance between power seat switch connector and slide motor connector. <i>Connector &amp; terminal</i> <i>(R192) No. 1 — (R190) No. 14:</i> <i>(R192) No. 2 — (R190) No. 13:</i>	Is the resistance less than 10 $\Omega$ ?	Go to step 3.	Check power seat harness.
<b>3</b> <b>CHECK SLIDE MOTOR.</b> 1) Connect the power seat switch connector and slide motor connector. 2) Apply 12 V to the slide motor and check the motor rotation. <i>Connector &amp; terminal</i> <i>(R190) No. 14 (+) — (R190) No. 13 (-):</i> <i>(R190) No. 13 (+) — (R190) No. 14 (-):</i>	Does the motor rotate normally?	Check for temporary poor contact or mechanical trouble in slide rail.	Slide motor problem. Replace the slide rail assembly.

# Power Seat System

## SEATS

- Malfunction of tilt operation

Step	Check	Yes	No
<b>1 CHECK SWITCH.</b> 1) Disconnect the connector of power seat switch assembly. 2) Measure the resistance between connector terminals when moving the switch to tilt up and tilt down. <Ref. to SE-27, CHECK POWER SEAT SWITCH, INSPECTION, Power Seat System.>	Is there any problem on the inspection result?	Go to step 2.	Replace the power seat switch assembly.
<b>2 CHECK HARNESS.</b> 1) Disconnect the power seat switch connector and tilt motor connector. 2) Measure the resistance between power seat switch connector and tilt motor connector. <b>Connector &amp; terminal</b> (R193) No. 2 — (R190) No. 2: (R193) No. 3 — (R190) No. 1:	Is the resistance less than 10 Ω?	Go to step 3.	Check power seat harness.
<b>3 CHECK TILT MOTOR.</b> 1) Connect the power seat switch connector and tilt motor connector. 2) Apply 12 V to the tilt motor and check the motor rotation. <b>Connector &amp; terminal</b> (R190) No. 2 (+) — (R190) No. 1 (-): (R190) No. 1 (+) — (R190) No. 2 (-):	Does the motor rotate normally?	Check for temporary poor contact or mechanical trouble in tilt mechanism.	Tilt motor problem. Replace the slide rail assembly.

- Malfunction of lifter operation

Step	Check	Yes	No
<b>1 CHECK SWITCH.</b> 1) Disconnect the connector of power seat switch assembly. 2) Measure the resistance between connector terminals when moving the switch to lifter up and lifter down. <Ref. to SE-27, CHECK POWER SEAT SWITCH, INSPECTION, Power Seat System.>	Is there any problem on the inspection result?	Go to step 2.	Replace the power seat switch assembly.
<b>2 CHECK HARNESS.</b> 1) Disconnect the power seat switch connector and lifter motor connector. 2) Measure the resistance between power seat switch connector and lifter motor connector. <b>Connector &amp; terminal</b> (R194) No. 4 — (R190) No. 5: (R194) No. 3 — (R190) No. 6:	Is the resistance less than 10 Ω?	Go to step 3.	Check power seat harness.
<b>3 CHECK LIFTER MOTOR.</b> 1) Connect the power seat switch connector and lifter motor connector. 2) Apply 12 V to the lifter motor and check the motor rotation. <b>Connector &amp; terminal</b> (R190) No. 5 (+) — (R190) No. 6 (-): (R190) No. 6 (+) — (R190) No. 5 (-):	Does the motor rotate normally?	Check for temporary poor contact or mechanical trouble in lifter mechanism.	Lifter motor problem. Replace the slide rail assembly.

• Malfunction of reclining operation

Step	Check	Yes	No
<b>1 CHECK SWITCH.</b> 1) Disconnect the connector of power seat switch assembly. 2) Measure the resistance between connector terminals when moving the switch to reclining forward and reclining backward. <Ref. to SE-27, CHECK POWER SEAT SWITCH, INSPECTION, Power Seat System.>	Is there any problem on the inspection result?	Go to step 2.	Replace the power seat switch assembly.
<b>2 CHECK HARNESS.</b> 1) Disconnect the power seat switch connector and reclining motor connector. 2) Measure the resistance between power seat switch connector and reclining motor connector.  <b>Connector &amp; terminal</b> (R191) No. 2 — (R190) No. 3: (R191) No. 1 — (R190) No. 4:	Is the resistance less than 10 Ω?	Go to step 3.	Check power seat harness.
<b>3 CHECK RECLINING MOTOR.</b> 1) Connect the power seat switch connector and reclining motor connector. 2) Apply 12 V to the reclining motor and check the motor rotation.  <b>Connector &amp; terminal</b> (R190) No. 3 (+) — (R190) No. 4 (-): (R190) No. 4 (+) — (R190) No. 3 (-):	Does the motor rotate normally?	Check for temporary poor contact or mechanical trouble in reclining hinge.	Reclining motor problem. Replace the backrest hinge and motor assembly.

## 7. DOES NOT OPERATE IN MANUAL OPERATION (DRIVER'S SEAT, WITH MEMORY)

Step	Check	Yes	No
<b>1 CHECK SEAT FUNCTIONS.</b> Operate each power seat switch and check that each power seat function operates normally.	Does all function fails to operate?	Go to step 2.	Check the motor which does not operate. <Ref. to SE-32, SOME OF THE MOTORS DO NOT OPERATE (DRIVER'S SEAT, WITH MEMORY), INSPECTION, Power Seat System.>
<b>2 CHECK FUSE.</b> Check the power seat fuse inside the fuse box.	Is the fuse blown out?	Replace the appropriate fuse.	Go to step 3.
<b>3 CHECK POWER SUPPLY CIRCUIT.</b> 1) Disconnect the memory module connector. 2) Measure the voltage between harness connector and chassis ground.  <b>Connector &amp; terminal</b> (R195) No. 10 (+) — Chassis ground (-): (R196) No. 8 (+) — Chassis ground (-): (R196) No. 3 (+) — Chassis ground (-):	Is the voltage 10 V or more?	Go to step 4.	Check body harness.
<b>4 CHECK POWER SUPPLY CIRCUIT.</b> Measure the resistance between memory module harness connector and chassis ground.  <b>Connector &amp; terminal</b> (R196) No. 14 — Chassis ground: (R196) No. 12 — Chassis ground:	Is the resistance less than 10 Ω?	Go to step 5.	Check body harness.

# Power Seat System

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Step	Check	Yes	No
<b>5 CHECK SWITCH.</b> 1) Disconnect the connector of power seat switch assembly. 2) Measure the resistance between connector terminals when moving the switch to reclining forward and reclining backward. <Ref. to SE-27, CHECK POWER SEAT SWITCH, INSPECTION, Power Seat System.>	Is there any problem on the inspection result?	Replace the memory module.	Replace the power seat switch assembly.

### 8. SOME OF THE MOTORS DO NOT OPERATE (DRIVER'S SEAT, WITH MEMORY)

- Slide operation failure

Step	Check	Yes	No
<b>1 CHECK OPERATION.</b> Check the slide motor rotation while moving the switch to slide forward and slide backward.	Does the motor operate at least 1 second when the switch is operated?	Go to step 2.	Encoder deflection. Replace the slide rail assembly.
<b>2 CHECK SWITCH.</b> 1) Disconnect the harness connector of power seat switch assembly. 2) Measure the resistance between connector terminals when moving the switch to slide forward and slide backward. <Ref. to SE-27, CHECK POWER SEAT SWITCH, INSPECTION, Power Seat System.>	Is there any problem on the inspection result?	Go to step 3.	Replace the power seat switch assembly.
<b>3 CHECK HARNESS.</b> 1) Disconnect the power seat switch connector and slide motor connector. 2) Measure the resistance between the memory module connector and power seat switch connector. <b>Connector &amp; terminal</b> <b>(R195) No. 7 — (R190) No. 13:</b> <b>(R195) No. 6 — (R190) No. 14:</b>	Is the resistance less than 10 $\Omega$ ?	Go to step 4.	Check power seat harness.
<b>4 CHECK HARNESS.</b> 1) Disconnect the slide motor connector. 2) Measure the resistance between the memory module connector and slide motor connector. <b>Connector &amp; terminal</b> <b>(R196) No. 16 — (R206) No. 1:</b> <b>(R196) No. 15 — (R206) No. 2:</b>	Is the resistance less than 10 $\Omega$ ?	Go to step 5.	Check power seat harness.
<b>5 CHECK SLIDE MOTOR.</b> Apply battery voltage to the memory module connector and check the motor rotation. <b>Connector &amp; terminal</b> <b>(R196) No. 16 (+) — (R196) No. 15 (-):</b> <b>(R196) No. 15 (+) — (R196) No. 16 (-):</b>	Does the motor rotate normally?	Replace the memory module.	Slide motor problem. Replace the slide rail assembly.

• Malfunction of tilt operation

Step	Check	Yes	No
<b>1</b> <b>CHECK OPERATION.</b> Check the tilt motor rotation while moving the switch to tilt up and tilt down.	Does the motor rotate for one second or more when operating the switch?	Go to step 2.	Encoder defec-tion. Replace the slide rail assembly.
<b>2</b> <b>CHECK SWITCH.</b> 1) Disconnect the harness connector of power seat switch assembly. 2) Measure the resistance between connector terminals when moving the switch to tilt up and tilt down. <Ref. to SE-27, CHECK POWER SEAT SWITCH, INSPECTION, Power Seat System.>	Is there any problem on the inspection result?	Go to step 3.	Replace the power seat switch assembly.
<b>3</b> <b>CHECK HARNESS.</b> 1) Disconnect the power seat switch connector and tilt motor connector. 2) Measure the resistance between the mem-ory module connector and power seat switch connector. <b>Connector &amp; terminal</b> <b>(R195) No. 3 — (R190) No. 5:</b> <b>(R195) No. 2 — (R190) No. 6:</b>	Is the resistance less than 10 Ω?	Go to step 4.	Check power seat harness.
<b>4</b> <b>CHECK HARNESS.</b> 1) Disconnect the tilt motor connector. 2) Measure the resistance between the mem-ory module connector and tilt motor connector. <b>Connector &amp; terminal</b> <b>(R196) No. 4 — (R193) No. 3:</b> <b>(R196) No. 5 — (R193) No. 2:</b>	Is the resistance less than 10 Ω?	Go to step 5.	Check power seat harness.
<b>5</b> <b>CHECK TILT MOTOR.</b> Apply battery voltage to the memory module connector and check the motor rotation. <b>Connector &amp; terminal</b> <b>(R196) No. 4 (+) — (R196) No. 5 (-):</b> <b>(R196) No. 5 (+) — (R196) No. 4 (-):</b>	Does the motor rotate nor-mally?	Replace the mem-ory module.	Tilt motor problem. Replace the slide rail assembly.

• Malfunction of lifter operation

Step	Check	Yes	No
<b>1</b> <b>CHECK OPERATION.</b> Check the lifter motor rotation while turning the switch to lifter up and lifter down.	Does the motor rotate for one second or more when operating the switch?	Go to step 2.	Encoder defec-tion. Replace the slide rail assembly.
<b>2</b> <b>CHECK SWITCH.</b> 1) Disconnect the harness connector of power seat switch assembly. 2) Measure the resistance between connector terminals when moving the switch to lifter up and lifter down. <Ref. to SE-27, CHECK POWER SEAT SWITCH, INSPECTION, Power Seat System.>	Is there any problem on the inspection result?	Go to step 3.	Replace the power seat switch assembly.
<b>3</b> <b>CHECK HARNESS.</b> 1) Disconnect the power seat switch connector and lifter motor connector. 2) Measure the resistance between the mem-ory module connector and power seat switch connector. <b>Connector &amp; terminal</b> <b>(R195) No. 5 — (R190) No. 2:</b> <b>(R195) No. 4 — (R190) No. 1:</b>	Is the resistance less than 10 Ω?	Go to step 4.	Check power seat harness.

# Power Seat System

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Step	Check	Yes	No
<b>4 CHECK HARNESS.</b> 1) Disconnect the lifter motor connector. 2) Measure the resistance between the memory module connector and lifter motor connector. <b>Connector &amp; terminal</b> <b>(R196) No. 1 — (R194) No. 4:</b> <b>(R196) No. 2 — (R194) No. 3:</b>	Is the resistance less than 10 $\Omega$ ?	Go to step 5.	Check power seat harness.
<b>5 CHECK LIFTER MOTOR.</b> Apply battery voltage to the memory module connector and check the motor rotation. <b>Connector &amp; terminal</b> <b>(R196) No. 1 (+) — (R196) No. 2 (-):</b> <b>(R196) No. 2 (+) — (R196) No. 1 (-):</b>	Does the motor rotate normally?	Replace the memory module.	Lifter motor problem. Replace the slide rail assembly.

- Malfunction of reclining operation

Step	Check	Yes	No
<b>1 CHECK OPERATION.</b> Check the reclining motor rotation while moving the switch to reclining forward and reclining backward.	Does the motor rotate for one second or more when operating the switch?	Go to step 2.	Encoder deflection. Replace the backrest hinge and motor assembly.
<b>2 CHECK SWITCH.</b> 1) Disconnect the harness connector of power seat switch assembly. 2) Measure the resistance between connector terminals when moving the switch to reclining forward and reclining backward. <Ref. to SE-27, CHECK POWER SEAT SWITCH, INSPECTION, Power Seat System.>	Is there any problem on the inspection result?	Go to step 3.	Replace the power seat switch assembly.
<b>3 CHECK HARNESS.</b> 1) Disconnect the power seat switch connector and reclining motor connector. 2) Measure the resistance between the memory module connector and power seat switch connector. <b>Connector &amp; terminal</b> <b>(R195) No. 9 — (R190) No. 4:</b> <b>(R195) No. 8 — (R190) No. 3:</b>	Is the resistance less than 10 $\Omega$ ?	Go to step 4.	Check power seat harness.
<b>4 CHECK HARNESS.</b> 1) Disconnect the slide motor connector. 2) Measure the resistance between the memory module connector and reclining motor connector. <b>Connector &amp; terminal</b> <b>(R196) No. 6 — (R191) No. 1:</b> <b>(R196) No. 7 — (R191) No. 2:</b>	Is the resistance less than 10 $\Omega$ ?	Go to step 5.	Check power seat harness.
<b>5 CHECK RECLINING MOTOR.</b> Apply battery voltage to the memory module connector and check the motor rotation. <b>Connector &amp; terminal</b> <b>(R196) No. 6 (+) — (R196) No. 7 (-):</b> <b>(R196) No. 7 (+) — (R196) No. 6 (-):</b>	Does the motor rotate normally?	Replace the memory module.	Reclining motor problem. Replace the backrest hinge and motor assembly.



## 9. FAILS TO STORE THE LOCATION TO THE MEMORY (DRIVER'S SEAT, WITH MEMORY)

Step	Check	Yes	No
<b>1 CHECK SWITCH.</b> 1) Disconnect the harness connector of memory switch assembly. 2) Check memory switch. <Ref. to SE-28, CHECK MEMORY SWITCH (MEMORY-EQUIPPED), INSPECTION, Power Seat System.>	Is there any problem on the inspection result?	Go to step 2.	Replace the memory switch assembly.
<b>2 CHECK HARNESS.</b> Measure the resistance between the memory switch connector and memory module connector. <i>Connector &amp; terminal</i> <i>(R195) No. 13 — (R198) No. 3:</i> <i>(R195) No. 14 — (R198) No. 2:</i> <i>(R195) No. 15 — (R198) No. 8:</i>	Is the resistance less than 10 Ω?	Go to step 3.	Check power seat harness.
<b>3 SYSTEM INITIALIZATION.</b> Initialize memory seat system. <Ref. to SE-39, ADJUSTMENT, Power Seat System.>	Is the initialization completed successfully?	Replace the memory module.	<Ref. to SE-37, INITIALIZATION IS IMPOSSIBLE, INSPECTION, Power Seat System.>

## 10. FAILS TO PERFORM THE REPLAY OPERATION (DRIVER'S SEAT, WITH MEMORY)

Step	Check	Yes	No
<b>1 CHECK MEMORY FUNCTIONS.</b> Perform the memory operation of the seat position, and check the memory replay operation.	Does the seat position memory replay correctly?	Memory function is normal. Memory seems to be cleared since voltage was less from the operation-ensured voltage temporary at the time of memory restoring and manual operation. It operates normally by registering a memory.	Go to step 2.
<b>2 CHECK MEMORY FUNCTIONS.</b> At the step 1 memory operation, check the beep sound (once).	Check the beep sound?	Go to step 3.	<Ref. to SE-35, FAILS TO STORE THE LOCATION TO THE MEMORY (DRIVER'S SEAT, WITH MEMORY), INSPECTION, Power Seat System.>
<b>3 CHECK SWITCH.</b> 1) Disconnect the harness connector of memory switch assembly. 2) Check memory switch. <Ref. to SE-28, CHECK MEMORY SWITCH (MEMORY-EQUIPPED), INSPECTION, Power Seat System.>	Is there any problem on the inspection result?	Go to step 4.	Replace the memory switch assembly.

# Power Seat System

SEATS

Step	Check	Yes	No
<b>4 CHECK HARNESS.</b> Measure the resistance between the memory switch connector and memory module connector. <i>Connector &amp; terminal</i> (R195) No. 13 — (R198) No. 3: (R195) No. 14 — (R198) No. 2: (R195) No. 15 — (R198) No. 8:	Is the resistance less than 10 Ω?	Go to step 5.	Check power seat harness.
<b>5 CHECK IGNITION CIRCUIT.</b> Measure the voltage between harness connector and chassis ground while turning the ignition switch to ON. <i>Connector &amp; terminal</i> (R195) No. 11 (+) — Chassis ground (-):	Is the voltage 10 V or more?	Go to step 6.	Check body harness.
<b>6 CHECK TRANSMISSION CIRCUITS.</b> Measure the resistance between harness connector and chassis ground while shifting the select lever to P position. <i>Connector &amp; terminal</i> (R195) No. 12 — Chassis ground:	Is the resistance less than 10 Ω?	Go to step 7.	Check body harness.
<b>7 CHECK VEHICLE SPEED SIGNAL.</b> 1) Lift up the vehicle and support it with rigid racks. 2) Drive the vehicle faster than 10 km/h (6 MPH). <b>WARNING:</b> <b>Be careful not to be dragged in by the rotating wheel.</b> 3) Measure the voltage between harness connector and chassis ground. <i>Connector &amp; terminal</i> (R195) No. 9 (+) — Chassis ground (-):	Is the voltage less than 1 V ↔ 5 V or more?	Go to step 9.	Go to step 8.
<b>8 CHECK HARNESS BETWEEN VDCCM AND MEMORY UNIT.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connector from VDCCM and memory unit. 3) Measure the resistance between VDCCM harness connector and combination meter harness connector. <i>Connector &amp; terminal</i> (B310) No. 10 — (R195) No. 9:	Is the resistance less than 10 Ω?	Check the VDCCM. <Ref. to VDC(diag)-2, Basic Diagnostic Procedure.>	Check body harness.
<b>9 CHECK OPERATION.</b> Operate all power seat switches to check operation of each motor.	Does each motor rotate for one second or more when operating each switch?	Replace the memory module.	Encoder deflection. Replace the motor(s) found to be faulty.

## 11. INITIALIZATION IS IMPOSSIBLE

Step	Check	Yes	No
<b>1</b> <b>CHECK OPERATION.</b> Operate all power seat switches to check operation of each motor.	Does each motor rotate for one second or more when operating each switch?	Go to step 2.	Encoder defec-tion. Replace the motor(s) found to be faulty.
<b>2</b> <b>CHECK SWITCH.</b> 1) Disconnect the harness connector of power seat switch assembly. 2) Measure resistance between all terminals of power seat switch assembly. <Ref. to SE-27, CHECK POWER SEAT SWITCH, INSPEC-TION, Power Seat System.>	Is there any problem on the inspection result?	Replace the mem-ory module.	Replace the power seat switch assem-bly.

## 12. ALL FUNCTION FAILS TO OPERATE (PASSENGER'S SEAT)

Step	Check	Yes	No
<b>1</b> <b>CHECK SEAT FUNCTIONS.</b> Operate each power seat switch and check that each power seat function operates normally.	Does all function fails to operate?	Go to step 2.	Check the motor which does not operate. <Ref. to SE-38, SOME MOTORS DO NOT OPERATE (PAS-SENGER'S SEAT), INSPEC-TION, Power Seat System.>
<b>2</b> <b>CHECK FUSE.</b> Check the power seat fuse inside the fuse box.	Is the fuse blown out?	Replace the appro-priate fuse.	Go to step 3.
<b>3</b> <b>CHECK POWER SUPPLY CIRCUIT.</b> 1) Disconnect the connector of power seat switch assembly. 2) Measure the voltage between harness con-ector and chassis ground. <b>Connector &amp; terminal</b> <b>(R200) No. 7 (+) — Chassis ground (-):</b>	Is the voltage 10 V or more?	Go to step 4.	Check body har-ness.
<b>4</b> <b>CHECK POWER SUPPLY CIRCUIT.</b> Measure the resistance between power seat switch harness connector and chassis ground. <b>Connector &amp; terminal</b> <b>(R200) No. 8 — Chassis ground:</b>	Is the resistance less than 10 $\Omega$ ?	Replace the power seat switch assem-bly.	Check body har-ness.

# Power Seat System

SEATS

## 13.SOME MOTORS DO NOT OPERATE (PASSENGER'S SEAT)

- Slide operation failure

Step	Check	Yes	No
<b>1</b> <b>CHECK SWITCH.</b> 1) Disconnect the connector of power seat switch assembly. 2) Measure the resistance between connector terminals when moving the switch to slide forward and slide backward. <Ref. to SE-27, CHECK POWER SEAT SWITCH, INSPECTION, Power Seat System.>	Is there any problem on the inspection result?	Go to step 2.	Replace the power seat switch assembly.
<b>2</b> <b>CHECK HARNESS.</b> 1) Disconnect the power seat switch connector and slide motor connector. 2) Measure the resistance between power seat switch connector and slide motor connector. <b>Connector &amp; terminal</b> <b>(R202) No. 1 — (R200) No. 13:</b> <b>(R202) No. 2 — (R200) No. 14:</b>	Is the resistance less than 10 Ω?	Go to step 3.	Check power seat harness.
<b>3</b> <b>CHECK SLIDE MOTOR.</b> 1) Connect the power seat switch connector and slide motor connector. 2) Apply 12 V to the slide motor and check the motor rotation. <b>Connector &amp; terminal</b> <b>(R200) No. 14 (+) — (R200) No. 13 (-):</b> <b>(R200) No. 13 (+) — (R200) No. 14 (-):</b>	Does the motor rotate normally?	Check for temporary poor contact or mechanical trouble in slide rail.	Slide motor problem. Replace the slide rail assembly.

- Malfunction of reclining operation

Step	Check	Yes	No
<b>1</b> <b>CHECK SWITCH.</b> 1) Disconnect the connector of power seat switch assembly. 2) Measure the resistance between connector terminals when moving the switch to reclining forward and reclining backward. <Ref. to SE-27, CHECK POWER SEAT SWITCH, INSPECTION, Power Seat System.>	Is there any problem on the inspection result?	Go to step 2.	Replace the power seat switch assembly.
<b>2</b> <b>CHECK HARNESS.</b> 1) Disconnect the power seat switch connector and reclining motor connector. 2) Measure the resistance between power seat switch connector and reclining motor connector. <b>Connector &amp; terminal</b> <b>(R201) No. 2 — (R200) No. 4:</b> <b>(R201) No. 1 — (R200) No. 3:</b>	Is the resistance less than 10 Ω?	Go to step 3.	Check power seat harness.
<b>3</b> <b>CHECK RECLINING MOTOR.</b> 1) Connect the power seat switch connector and reclining motor connector. 2) Apply 12 V to the reclining motor and check the motor rotation. <b>Connector &amp; terminal</b> <b>(R200) No. 3 (+) — (R200) No. 4 (-):</b> <b>(R200) No. 4 (+) — (R200) No. 3 (-):</b>	Does the motor rotate normally?	Check for temporary poor contact or mechanical trouble in reclining hinge.	Reclining motor problem. Replace the backrest hinge and motor assembly.

## D: ADJUSTMENT

### NOTE:

The calibration procedures apply only to the memory-equipped seat on the driver's side.

### 1. INITIALIZING CONDITIONS

Perform the initializing operation to the memory module when the following conditions are met.

- When the seat was removed from vehicle.
- When the memory module was replaced.
- When the slide rail assembly or backrest hinge and motor assembly was removed or replaced.
- When the pulse generated while the seat is moving differs from the actual distance. (When memory replay operation is not normally carried out)

### 2. INITIALIZATION PROCEDURE

#### NOTE:

- Initialize the records inside the module by performing all the following steps regardless the item order.
- Buzzer sounds once when keeping the switch operation for three seconds with each seat in lock\* status.
- After the completion of all items for initialization process, the buzzer sounds three times when finishing the final operation and turning the switch from ON to OFF.

1) Move the seat backward using slide switch, and keep the seat lock\* status for three seconds or more.

2) Move the seat downward using tilt switch, and keep the seat lock\* status for three seconds or more.

3) Move the seat downward using lifter switch, and keep the seat lock\* status for three seconds or more.

4) Tilt the seat backrest forward using reclining switch, and keep the seat lock\* status for three seconds or more.

\*: Seat lock is the status that the switch is being operated although the seat has reached the movable terminal point, and that there is no pulse output from the encoder within the specified period of time.

#### NOTE:

When the following conditions are met, the initializing operation is cancelled even though the procedure is carried out halfway.

- Any operation interval between each initialization procedures from 1) to 4) exceeded 10 seconds.
- All operations throughout initialization procedure 1) to 4) was not performed.
- During initialization procedure, power supply was cut off, or the voltage to the memory module exceeded the range of operating voltage.

# Power Seat System

SEATS

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# SECURITY AND LOCKS

# SL

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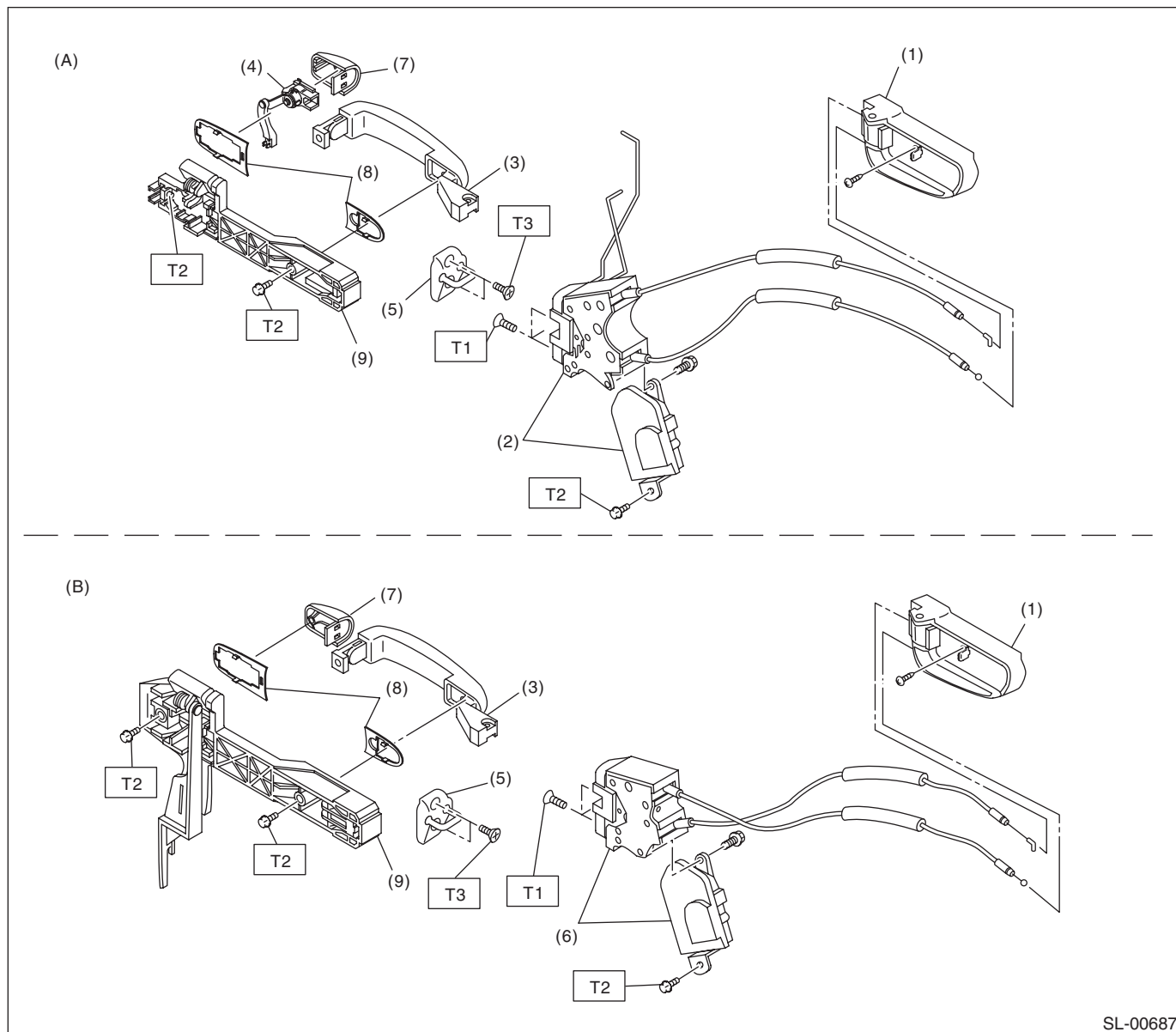
# General Description

## SECURITY AND LOCKS

### 1. General Description

#### A: COMPONENT

#### 1. DOOR LOCK ASSEMBLY



SL-00687

(A) Front

(B) Rear

(1) Inner remote ASSY

(6) Rear door latch and door lock actuator ASSY

**Tightening torque: N·m (kgf·m, ft·lb)**

(2) Front door latch and door lock actuator ASSY

(7) Door outer handle cover

**T1: 6.5 (0.66, 4.8)**

(3) Door outer handle

(8) Door outer handle spacer

**T2: 7.5 (0.76, 5.5)**

(4) Key cylinder

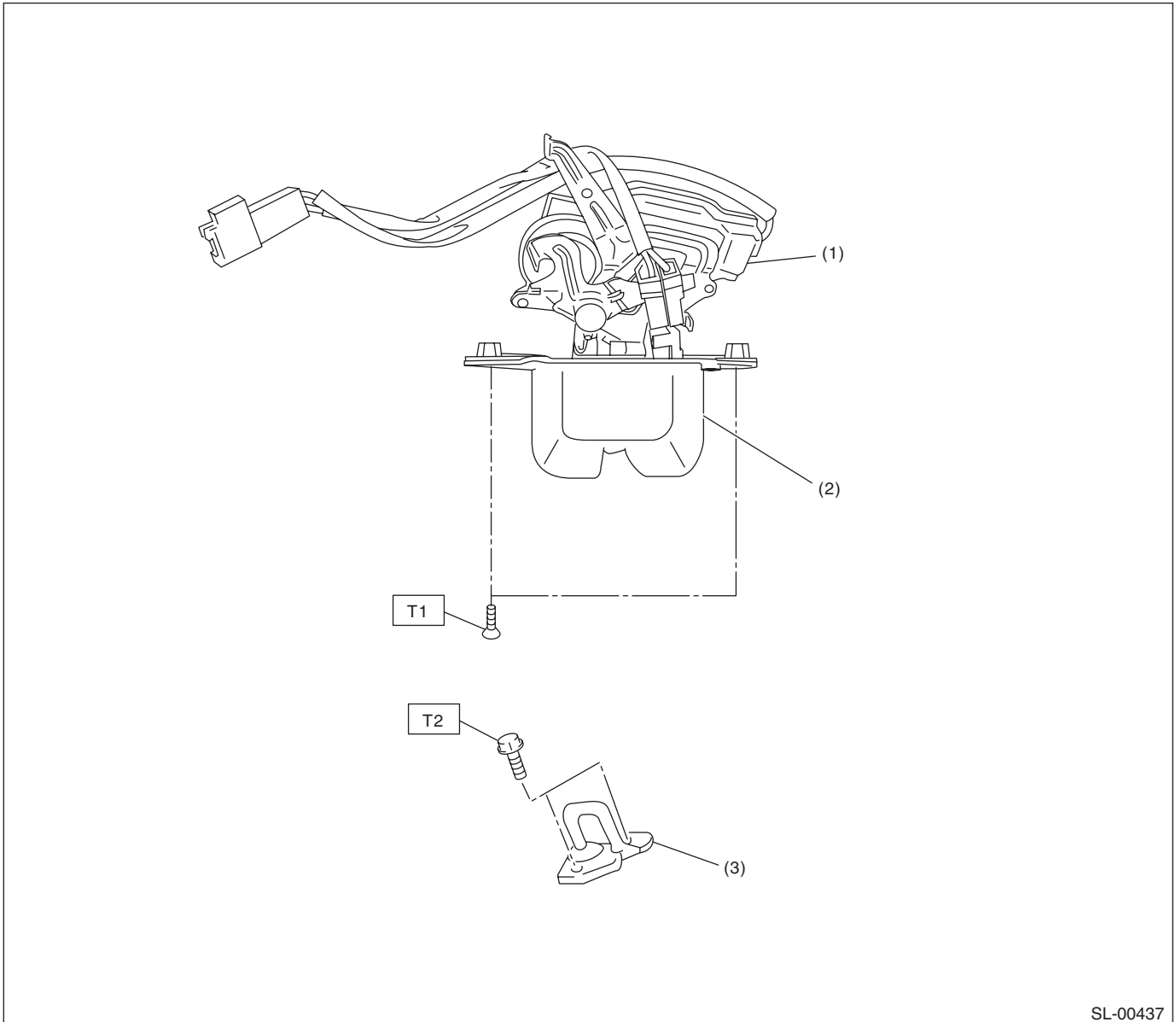
(9) Door outer handle frame ASSY

**T3: 18 (1.8, 13.3)**

(5) Striker



## 2. REAR GATE LOCK



SL-00437

- (1) Rear gate actuator
- (2) Rear gate latch
- (3) Striker

**Tightening torque: N·m (kgf·m, ft·lb)**

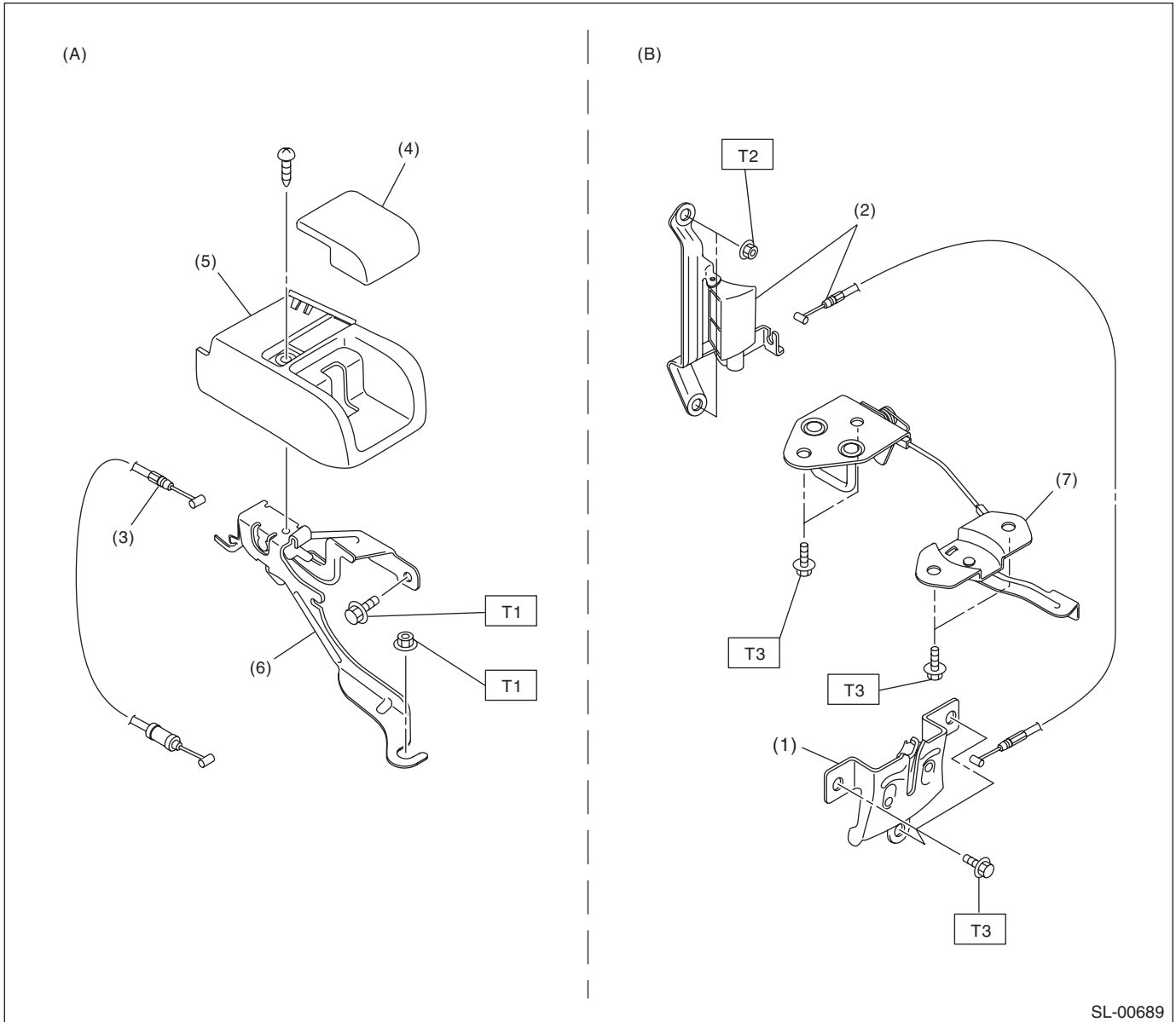
**T1: 28 (2.8, 20.6)**

**T2: 25 (2.5, 18.4)**

# General Description

## SECURITY AND LOCKS

### 3. FRONT HOOD LOCK AND REMOTE OPENERS



(A) Fuel lid

(B) Hood

- (1) Front hood lock ASSY
- (2) Cable ASSY, front hood
- (3) Cable ASSY, fuel
- (4) Pull lever

- (5) Cover
- (6) Pull handle ASSY
- (7) Hood operation lever

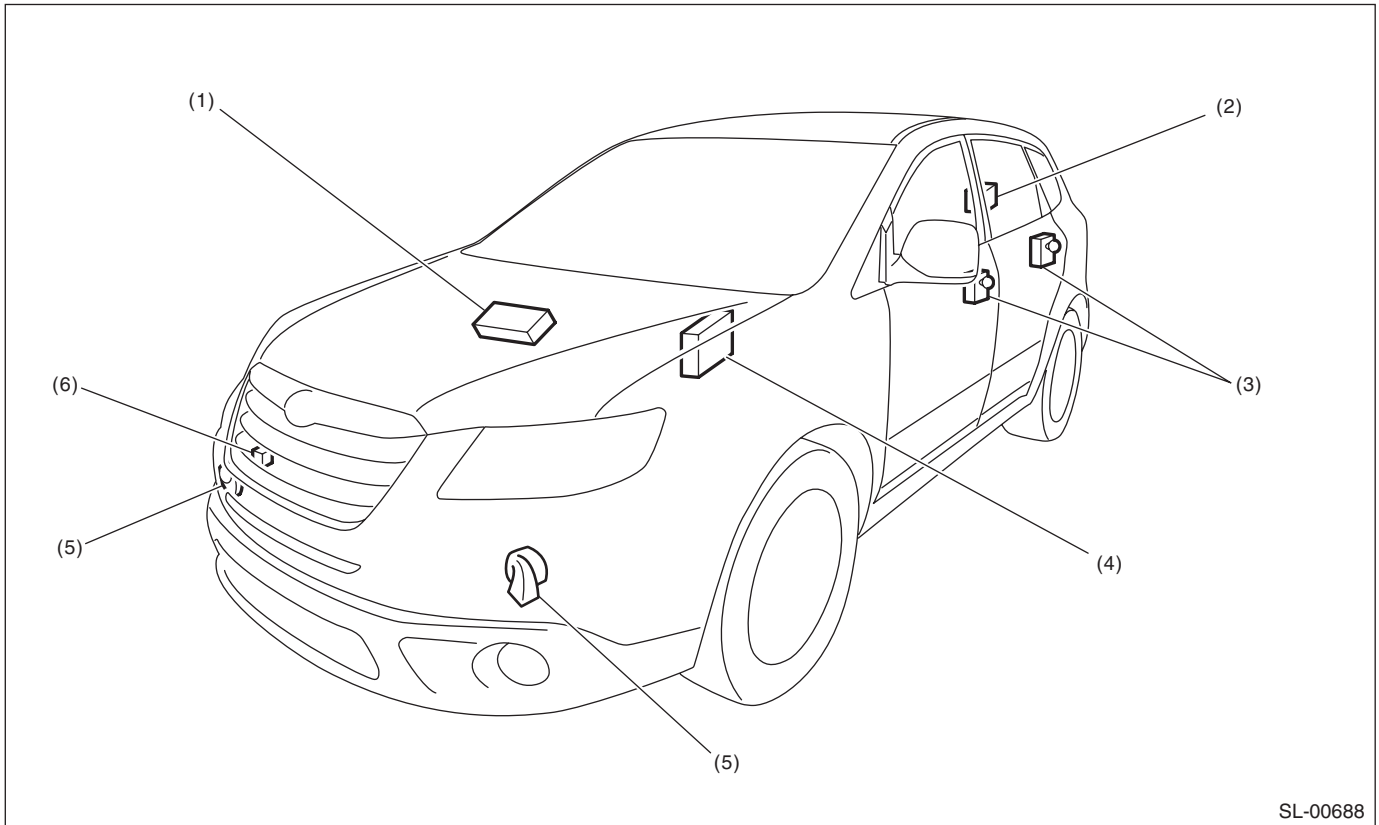
**Tightening torque: N·m (kgf·m, ft·lb)**

**T1: 7.5 (0.76, 5.5)**

**T2: 25 (2.55, 18.4)**

**T3: 33.0 (3.36, 24.3)**

### 4. KEYLESS ENTRY SYSTEM



SL-00688

(1) TPMS & keyless entry control module

(3) Door switch

(5) Horn

(2) Rear gate latch switch

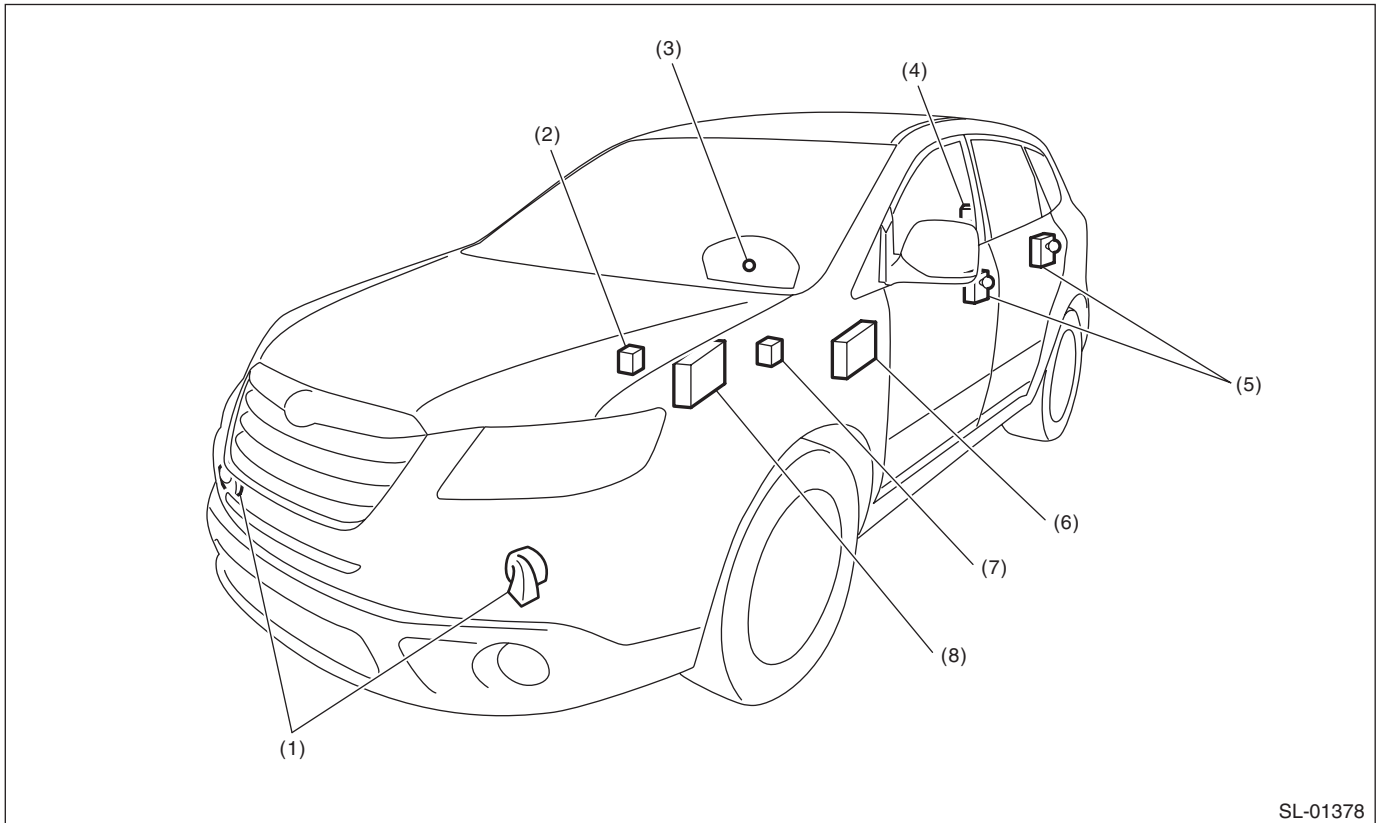
(4) Body integrated unit

(6) Keyless buzzer

# General Description

## SECURITY AND LOCKS

### 5. SECURITY SYSTEM



SL-01378

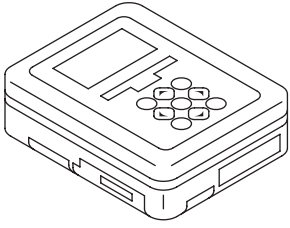
- |   |   |                                   |
|---|---|-----------------------------------|
| (1) Horn  | (4) Rear gate latch switch  | (7) Turn signal and hazard module |
| (2) Horn relay                                      | (5) Door switch   | (8) Body integrated unit          |
| (3) Security indicator light (in combination meter) | (6) Impact sensor (driver's seat instrument panel side) (dealer option) |                                   |

### B: CAUTION

- Before disassembling or reassembling parts, always disconnect the battery ground cable from battery. When repairing the audio, control module, etc. which are provided with memory functions, record the memory contents before disconnecting the ground cable from battery. Otherwise, these contents are erased upon disconnection.
- Reassemble the parts in the reverse order of disassembly unless otherwise indicated.
- Adjust the parts to the specifications described in this manual if so designated.
- Connect the connectors securely during reassembly.
- After reassembly, ensure the functional parts operate smoothly.
- The airbag system wiring harness is routed near electrical parts and switches.
- The airbag system wiring harnesses and connectors are colored yellow. Do not use the electrical test equipment on these circuits.
- Be careful not to damage the airbag system wiring harness when servicing the ignition key cylinder.

## C: PREPARATION TOOL

### 1. SPECIAL TOOL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p style="text-align: center;">ST1B022XU0</p>	1B022XU0	SUBARU SELECT MONITOR III KIT	Used for setting of each function and trouble-shooting for electrical system.

### 2. GENERAL TOOL

TOOL NAME	REMARKS
Circuit tester	Used for measuring resistance and voltage.
Drill	Used for replacing ignition key lock.
Clip remover	Used for removing trim.
Clip clamp pliers	Used for removal of various clips and clamps.
TORX® T20	Used for removing and installing the door outer handle.

# Door Lock Control System

SECURITY AND LOCKS

## 2. Door Lock Control System

### A: WIRING DIAGRAM

#### 1. DOOR LOCK CONTROL

<Ref. to WI-158, WIRING DIAGRAM, Keyless Entry System.>

### B: ELECTRICAL SPECIFICATION

#### 1. BODY INTEGRATED UNIT

Refer to Control Module I/O Signal in the LAN SYSTEM (DIAGNOSTICS). <Ref. to LAN(diag)-9, ELECTRICAL SPECIFICATION, Control Module I/O Signal.>

### C: INSPECTION

#### 1. SYMPTOM CHART

Symptoms	Repair order	Reference
The door lock control system does not operate.	1. Remove and visually check fuse No. 3 (in the fuse & relay box), No. 7 (in the fuse & relay box) and No. 8 (in the main fuse box).	If the fuse is blown out, replace the fuse with a new part. When there is no defective with the fuse, check the power supply and ground circuit. <Ref. to SL-9, CHECK POWER SUPPLY & GROUND CIRCUIT, INSPECTION, Door Lock Control System.>
	2. Check the power supply and ground circuit for body integrated unit.	<Ref. to SL-9, CHECK POWER SUPPLY & GROUND CIRCUIT, INSPECTION, Door Lock Control System.>
	3. Check the door lock switch and the circuit.	<Ref. to SL-9, CHECK DOOR LOCK SWITCH, INSPECTION, Door Lock Control System.>
	4. Check the rear gate release switch and the circuit.	<Ref. to SL-10, CHECK REAR GATE RELEASE SWITCH CIRCUIT, INSPECTION, Door Lock Control System.>
	5. Check the door lock actuator and the circuit.	<Ref. to SL-11, CHECK DOOR LOCK ACTUATOR & CIRCUIT, INSPECTION, Door Lock Control System.>
A specific door lock actuator does not operate.	Check the door lock actuator and circuit.	<Ref. to SL-11, CHECK DOOR LOCK ACTUATOR & CIRCUIT, INSPECTION, Door Lock Control System.>

## 2. CHECK POWER SUPPLY & GROUND CIRCUIT

Step	Check	Yes	No
<b>1 CHECK POWER SUPPLY.</b> 1) Disconnect the harness connector of body integrated unit. 2) Measure the voltage between harness connector terminal and chassis ground. <i>Connector &amp; terminal</i> <i>(i84) No. 34 (+) — Chassis ground (-):</i> <i>(B281) No. 2 (+) — Chassis ground (-):</i> <i>(B280) No. 7 (+) — Chassis ground (-):</i>	Is the voltage 10 V or more?	Go to step 2.	Check the harness for open or short circuit between body integrated unit and fuse.
<b>2 CHECK GROUND CIRCUIT.</b> Measure the resistance between harness connector terminal and chassis ground. <i>Connector &amp; terminal</i> <i>(i84) No. 21 — Chassis ground:</i> <i>(B280) No. 22 — Chassis ground:</i> <i>(B281) No. 8 — Chassis ground:</i> <i>(B281) No. 9 — Chassis ground:</i>	Is the resistance less than 10 $\Omega$ ?	The power supply and ground circuit are OK.	Repair the harness.

## 3. CHECK DOOR LOCK SWITCH

Step	Check	Yes	No
<b>1 CHECK DOOR LOCK SWITCH.</b> Check the input from door lock switch to body integrated unit using Subaru Select Monitor. 1) Prepare the Subaru Select Monitor kit. 2) Turn the ignition switch to ON (engine OFF) and run the "PC application for Subaru Select Monitor". 3) On «System Selection Menu» display, select {Integ. unit mode}. 4) On «System Selection Menu» display, select {Integ. unit mode}. Select {Current Data Display & Save}. 5) On «System Selection Menu» display, select {Integ. unit mode}. Select {Current Data Display & Save}. Operate the door lock switches (driver's seat and passenger's seat) in the LOCK direction, and check the input of {Manual lock SW input}.	Does the display switch between OFF $\leftrightarrow$ ON when each door lock switch is moved to LOCK?	Go to step 2.	Go to step 3.
<b>2 CHECK DOOR LOCK SWITCH.</b> From the condition in step 1), check the {Manual unlock SW input} input by operating each door lock switch (driver's and passenger's) in the UNLOCK direction.	Does the display switch between OFF $\leftrightarrow$ ON when each door lock switch is moved to UNLOCK direction?	The door lock switch is OK.	Go to step 4.
<b>3 CHECK DOOR LOCK SWITCH.</b> 1) Disconnect the door lock switch harness connector. 2) Use a tester and check the continuity when the door lock switch is operated to the LOCK side. <i>Connector &amp; terminal</i> <i>Driver's side:</i> <i>(D7) No. 9 — (D7) No. 5:</i> <i>Passenger's side:</i> <i>(D125) No. 4 — (D125) No. 5:</i>	Did the indicator change from "No continuity" (1 M $\Omega$ or more) to "Continuity exists" (less than 10 $\Omega$ )?	Go to step 4.	Replace the power window main switch or door lock switch.

# Door Lock Control System

## SECURITY AND LOCKS

Step	Check	Yes	No
<b>4 CHECK DOOR LOCK SWITCH.</b> Use a tester and check the continuity when the door lock switch is operated to the UNLOCK side. <i>Connector &amp; terminal</i> <i>Driver's side:</i> (D7) No. 8 — (D7) No. 5: <i>Passenger's side:</i> (D125) No. 2 — (D125) No. 5:	Did the indicator change from "No continuity" (1 MΩ or more) to "Continuity exists" (less than 10 Ω)?	Go to step 5.	Replace the power window main switch or door lock switch.
<b>5 CHECK HARNESS.</b> Use a tester to measure the resistance between the door lock switch harness connector and chassis ground. <i>Connector &amp; terminal</i> <i>Driver's side:</i> (D7) No. 5 — Chassis ground: <i>Passenger's side:</i> (D125) No. 5 — Chassis ground:	Is the resistance less than 10 Ω?	Go to step 6.	Repair or replace the harness.
<b>6 CHECK HARNESS.</b> 1) Disconnect the harness connector of body integrated unit. 2) Measure the resistance between the body integrated unit and door lock switch. <i>Connector &amp; terminal</i> <i>Driver's side:</i> (D7) No. 9 — (i84) No. 15: (D7) No. 8 — (i84) No. 29: <i>Passenger's side:</i> (D125) No. 4 — (i84) No. 15: (D125) No. 2 — (i84) No. 29:	Is the resistance less than 10 Ω?	Replace the body integrated unit. <Ref. to SL-48, Body Integrated Unit.>	Repair or replace the harness.

### 4. CHECK REAR GATE RELEASE SWITCH CIRCUIT

Step	Check	Yes	No
<b>1 CHECK REAR GATE RELEASE SWITCH.</b> Check the input from rear gate release switch to body integrated unit using Subaru Select Monitor. 1) Prepare the Subaru Select Monitor kit. 2) Turn the ignition switch to ON (engine OFF) and run the "PC application for Subaru Select Monitor". 3) On «System Selection Menu» display, select {Integ. unit mode}. 4) On «System Selection Menu» display, select {Integ. unit mode}. Select {Current Data Display & Save}. 5) On «System Selection Menu» display, select {Integ. unit mode}. Select {Current Data Display & Save}. Check the {R Gate Release SW input} input by operating the rear gate release switch.	Does the display switch between OFF ↔ ON, when the rear gate release switch is operated?	Rear gate release switch is normal.	Go to step 2.
<b>2 CHECK HARNESS.</b> Measure the resistance between the body integrated unit and rear gate release switch. <i>Connector &amp; terminal</i> (B281) No. 22 — (D135) No. 2:	Is the resistance less than 10 Ω?	Go to step 3.	Repair or replace the harness.



# Door Lock Control System

SECURITY AND LOCKS

Step	Check	Yes	No
<b>3 CHECK HARNESS.</b> Measure the resistance between the rear gate release switch and chassis ground. <i>Connector &amp; terminal</i> <i>(D135) No. 1 — Chassis ground:</i>	Is the resistance less than 10 $\Omega$ ?	Go to step 4.	Repair or replace the harness.
<b>4 CHECK REAR GATE RELEASE SWITCH.</b> Measure the resistance between connector terminals when the rear gate release switch is pressed, and when it is released. <i>Connector &amp; terminal</i> <i>(D135) No. 2 — (135) No. 1:</i>	Is the resistance when the switch is pressed less than 10 $\Omega$ , and 1 M $\Omega$ or more when released?	Replace the body integrated unit. <Ref. to SL-48, Body Integrated Unit.>	Replace the rear gate release switch. <Ref. to SL-37, Rear Gate Release Switch.>

## 5. CHECK DOOR LOCK ACTUATOR & CIRCUIT

Step	Check	Yes	No
<b>1 CHECK HARNESS (DOOR LOCK).</b> Measure the resistance between body integrated unit and each door lock actuator. <i>Connector &amp; terminal</i> <i>(i84) No. 7 — (D72) No. 2: (front door LH)</i> <i>(i84) No. 7 — (D18) No. 2: (front door RH)</i> <i>(i84) No. 7 — (D26) No. 2: (rear door LH)</i> <i>(i84) No. 7 — (D32) No. 2: (rear door RH)</i>	Is the resistance less than 10 $\Omega$ ?	Go to step 2.	Repair or replace the harness.
<b>2 CHECK HARNESS (DOOR UNLOCK).</b> Measure the resistance between body integrated unit and each door lock actuator. <i>Connector &amp; terminal</i> <i>(i84) No. 23 — (D72) No. 4: (front door LH)</i> <i>(i84) No. 8 — (D18) No. 4: (front door RH)</i> <i>(i84) No. 8 — (D26) No. 4: (rear door LH)</i> <i>(i84) No. 8 — (D32) No. 4: (rear door RH)</i>	Is the resistance less than 10 $\Omega$ ?	Go to step 3.	Repair or replace the harness.
<b>3 CHECK HARNESS (REAR GATE UNLOCK).</b> Measure the resistance between the body integrated unit and rear gate lock actuator. <i>Connector &amp; terminal</i> <i>(i84) No. 22 — (D140) No. 1:</i>	Is the resistance less than 10 $\Omega$ ?	Go to step 4.	Repair or replace the harness.
<b>4 CHECK HARNESS (REAR GATE UNLOCK).</b> Measure the resistance between the rear gate lock actuator and chassis ground. <i>Connector &amp; terminal</i> <i>(D140) No. 2 — Chassis ground:</i>	Is the resistance less than 10 $\Omega$ ?	Go to step 5.	Repair or replace the harness.
<b>5 CHECK BODY INTEGRATED UNIT.</b> Measure the voltage between the connector terminals of the body integrated unit when moving the door lock switch to LOCK. <i>Connector &amp; terminal</i> <i>Except for front door LH</i> <i>(i84) No. 7 (+) — (i84) No. 8 (-):</i> <i>Front door LH</i> <i>(i84) No. 7 (+) — (i84) No. 23 (-):</i>	Does the voltage change from less than 1.0 V $\rightarrow$ 9 V or more? (During lock output)	Go to step 6.	Replace the body integrated unit. <Ref. to SL-48, Body Integrated Unit.>
<b>6 CHECK BODY INTEGRATED UNIT.</b> Measure the voltage between the connector terminals of the body integrated unit when moving the door lock switch to UNLOCK. <i>Connector &amp; terminal</i> <i>Except for front door LH</i> <i>(i84) No. 8 (+) — (i84) No. 7 (-):</i> <i>Front door LH</i> <i>(i84) No. 23 (+) — (i84) No. 7 (-):</i>	Does the voltage change from less than 1.0 V $\rightarrow$ 9 V or more? (During unlock output)	Go to step 7.	Replace the body integrated unit. <Ref. to SL-48, Body Integrated Unit.>

# Door Lock Control System

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Step	Check	Yes	No
<b>7</b> <b>CHECK BODY INTEGRATED UNIT.</b> Measure the voltage between body integrated unit and chassis ground when moving the rear gate opener button. <i><b>Connector &amp; terminal</b></i> <i><b>(i84) No. 22 (+) — Chassis ground (-):</b></i>	Does the voltage change from less than 1.0 V → 9 V or more? (During unlock output)	Go to step <b>8</b> .	Replace the body integrated unit. <Ref. to SL-48, Body Integrated Unit.>
<b>8</b> <b>CHECK DOOR LOCK ACTUATOR.</b> Check the door lock actuator. <ul style="list-style-type: none"> <li>• Front door lock actuator &lt;Ref. to SL-31, INSPECTION, Front Door Latch and Door Lock Actuator Assembly.&gt;</li> <li>• Rear door lock actuator &lt;Ref. to SL-35, INSPECTION, Rear Door Latch and Door Lock Actuator Assembly.&gt;</li> </ul>	Is the door lock actuator OK?	Go to step <b>9</b> .	Replace the door latch and door lock actuator assembly.
<b>9</b> <b>CHECK REAR GATE LOCK ACTUATOR.</b> Check the rear gate lock actuator. <Ref. to SL-38, Rear Gate Latch Assembly.>	Is the rear gate lock actuator normal?	Check the harness for open or short circuits between the body integrated unit and rear gate lock actuator.	Replace the rear gate latch assembly.

## 3. Keyless Entry System

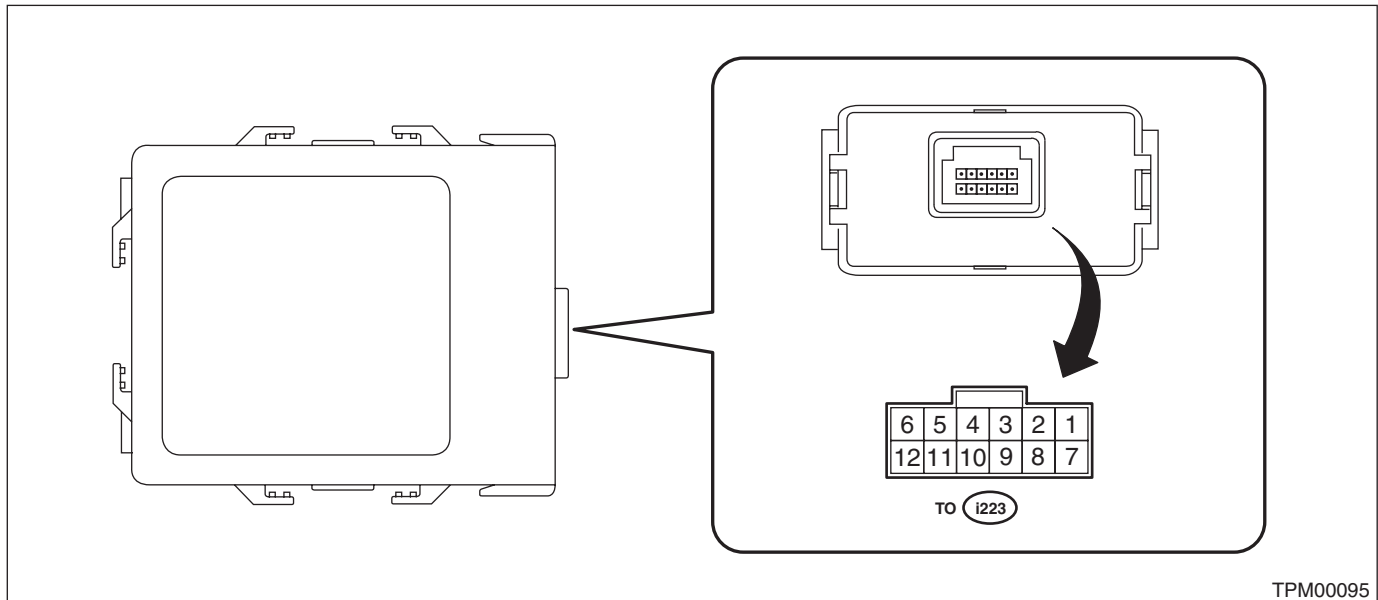
### A: WIRING DIAGRAM

#### 1. KEYLESS ENTRY

<Ref. to WI-158, WIRING DIAGRAM, Keyless Entry System.>

### B: ELECTRICAL SPECIFICATION

#### 1. KEYLESS ENTRY CONTROL MODULE



Description	Terminal No.	Measuring condition
—	1	—
Tire pressure warning light output	2	Illuminate when malfunction occurs, or tire pressure decreases
Speed sensor signal	3	While driving (Pulse signal)
Ignition power supply	4	IG switch ON (Battery voltage)
GND	5	0 V (Always)
Battery power supply	6	Battery voltage (Always)
—	7	—
—	8	—
—	9	—
—	10	—
Body integrated unit	11	Battery voltage cannot be measured because of digital signal.
Select monitor communication	12	Serial communication

#### 2. BODY INTEGRATED UNIT

Refer to Control Module I/O Signal in the LAN SYSTEM (DIAGNOSTICS). <Ref. to LAN(diag)-9, ELECTRICAL SPECIFICATION, Control Module I/O Signal.>

# Keyless Entry System

## SECURITY AND LOCKS

### C: INSPECTION

#### 1. SYMPTOM CHART

Symptoms	Repair order	Reference
None of the functions of the keyless entry system operate.	1. Check the transmitter battery.	<Ref. to SL-16, CHECK TRANSMITTER BATTERY AND FUNCTION, INSPECTION, Keyless Entry System.>
	2. Remove and visually check fuse No. 3 (in the fuse & relay box), No. 7 (in the fuse & relay box) and No. 8 (in the main fuse box).	<Ref. to SL-17, CHECK BODY INTEGRATED UNIT POWER SUPPLY AND GROUND CIRCUIT, INSPECTION, Keyless Entry System.>
	3. Check the keyless entry control module.	<Ref. to SL-17, CHECK KEYLESS ENTRY CONTROL MODULE, INSPECTION, Keyless Entry System.>
	4. Check the power supply and ground circuit for body integrated unit.	<Ref. to SL-17, CHECK BODY INTEGRATED UNIT POWER SUPPLY AND GROUND CIRCUIT, INSPECTION, Keyless Entry System.>
	5. Check the key warning switch.	<Ref. to SL-19, CHECK KEY WARNING SWITCH, INSPECTION, Keyless Entry System.>
	6. Check the door switch.	<Ref. to SL-18, CHECK DOOR SWITCH, INSPECTION, Keyless Entry System.>
	7. Check the body integrated unit.	<Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>
The transmitter cannot be registered.	1. Check the key warning switch.	<Ref. to SL-19, CHECK KEY WARNING SWITCH, INSPECTION, Keyless Entry System.>
	2. Check the door lock switch signal.	<Ref. to SL-21, CHECK DOOR LOCK SWITCH, INSPECTION, Keyless Entry System.>
	3. Check the ignition switch.	<Ref. to SL-24, CHECK IGNITION SWITCH, INSPECTION, Keyless Entry System.>
	4. Check the door switch.	<Ref. to SL-18, CHECK DOOR SWITCH, INSPECTION, Keyless Entry System.>
	5. Check the body integrated unit.	<Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>
Door lock or unlock does not operate. NOTE: If the door lock control system does not operate when using the door lock switch, check the door lock control system. <Ref. to SL-8, INSPECTION, Door Lock Control System.>	1. Check the transmitter battery.	<Ref. to SL-16, CHECK TRANSMITTER BATTERY AND FUNCTION, INSPECTION, Keyless Entry System.>
	2. Check the keyless entry control module.	<Ref. to SL-17, CHECK KEYLESS ENTRY CONTROL MODULE, INSPECTION, Keyless Entry System.>
	3. Check the key warning switch.	<Ref. to SL-19, CHECK KEY WARNING SWITCH, INSPECTION, Keyless Entry System.>
	4. Check the door switch.	<Ref. to SL-18, CHECK DOOR SWITCH, INSPECTION, Keyless Entry System.>
	5. Check the body integrated unit.	<Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>

# Keyless Entry System

## SECURITY AND LOCKS

Symptoms	Repair order	Reference
The panic alarm does not operate.	1. Check the keyless transmitter battery and function.	<Ref. to SL-16, CHECK TRANSMITTER BATTERY AND FUNCTION, INSPECTION, Keyless Entry System.>
	2. Check the horn operation.	<Ref. to SL-22, CHECK HORN OPERATION, INSPECTION, Keyless Entry System.>
	3. Check the body integrated unit.	<Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>
The keyless buzzer and hazard light do not operate.	1. Check the keyless buzzer operation.	<Ref. to SL-23, CHECK KEYLESS BUZZER, INSPECTION, Keyless Entry System.>
	2. Check the hazard light operation.	<Ref. to SL-20, CHECK HAZARD LIGHT OPERATION, INSPECTION, Keyless Entry System.>
	3. Check the body integrated unit.	<Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>
Room light does not operate.	1. Check the room light operation.	<Ref. to SL-19, CHECK ROOM LIGHT OPERATION, INSPECTION, Keyless Entry System.>
	2. Check the body integrated unit.	<Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>
Ignition switch illumination does not operate.	1. Check the ignition switch illumination.	<Ref. to SL-22, CHECK IGNITION SWITCH ILLUMINATION, INSPECTION, Keyless Entry System.>
	2. Check the body integrated unit.	<Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>

# Keyless Entry System

## SECURITY AND LOCKS

### 2. CHECK TRANSMITTER BATTERY AND FUNCTION

#### CAUTION:

Be sure to reset the keyless transmitter of other vehicle which is registered to the inspection target vehicle, and the vehicle to which the keyless transmitter is registered for inspection, to the condition before performing the inspection. (Register the keyless transmitter again.)

Step	Check	Yes	No
<b>1 CHECK TRANSMITTER BATTERY.</b> 1) Remove the battery from the transmitter. <Ref. to SL-49, REMOVAL, Transmitter.> 2) Check the battery voltage. <Ref. to SL-49, INSPECTION, Transmitter.>	Is the voltage 2.5 V or more?	Go to step 2.	Replace the transmitter battery. <Ref. to SL-49, Transmitter.>
<b>2 CHECK KEYLESS TRANSMITTER BATTERY.</b> Register the keyless transmitter which operates normally on other vehicles to the inspection target vehicle. <Ref. to SL-49, REGISTRATION OF KEYLESS TRANSMITTER WITH SUBARU SELECT MONITOR, REPLACEMENT, Transmitter.> 1) Close all the doors and rear gate of inspection target vehicle. 2) Remove the key from ignition switch. 3) Using the keyless transmitter, lock and unlock the doors and rear gate of vehicle.	Can the check vehicle be locked and unlocked properly?	Go to step 3.	Due to vehicle malfunction, continue the keyless entry system diagnosis.
<b>3 CHECK KEYLESS TRANSMITTER BATTERY.</b> Register the keyless transmitter of inspection target vehicle to the another vehicle which the keyless system operates normally. <Ref. to SL-49, REGISTRATION OF KEYLESS TRANSMITTER WITH SUBARU SELECT MONITOR, REPLACEMENT, Transmitter.>	Is the keyless transmitter registered correctly?	Go to step 4.	Replace the transmitter. <Ref. to SL-49, REGISTRATION OF KEYLESS TRANSMITTER WITH SUBARU SELECT MONITOR, REPLACEMENT, Transmitter.>
<b>4 CHECK KEYLESS TRANSMITTER BATTERY.</b> Check the registered keyless transmitter battery. 1) Close all the doors and rear gate of the vehicle which keyless system operates normally. 2) Remove the key from ignition switch. 3) Using the keyless transmitter, lock and unlock the doors and rear gate of vehicle.	Does the vehicle operate lock and unlock normally?	The transmitter is OK.	Replace the transmitter. <Ref. to SL-49, REGISTRATION OF KEYLESS TRANSMITTER WITH SUBARU SELECT MONITOR, REPLACEMENT, Transmitter.>

## 3. CHECK KEYLESS ENTRY CONTROL MODULE

Step	Check	Yes	No
<b>1 CHECK DIAGNOSTIC TROUBLE CODE (DTC).</b> 1) Prepare the Subaru Select Monitor kit. 2) Turn the ignition switch to ON (engine OFF) and run the "PC application for Subaru Select Monitor III". 3) On the System Selection Menu, select the {Integ. Unit mode}. 4) Select the {Diagnostic Code(s) Display}. 5) Check that the DTC is displayed.	Is DTC B1500 "Keyless UART com. Malfunction" displayed?	Go to step 2.	Keyless entry control module is normal.
<b>2 CHECK POWER SUPPLY.</b> 1) Disconnect the keyless entry control module harness connector (i223). 2) Measure the voltage between harness connector terminal and chassis ground. <i>Connector &amp; terminal (i223) No. 6 (+) — Chassis ground (-):</i>	Is the voltage 10 V or more?	Go to step 3.	Check the harness for open circuits and shorts between the keyless entry control module and fuse.
<b>3 CHECK GROUND CIRCUIT.</b> Measure the resistance between harness connector terminal and chassis ground. <i>Connector &amp; terminal (i223) No. 5 — Chassis ground:</i>	Is the resistance less than 10 $\Omega$ ?	Go to step 4.	Repair the harness.
<b>4 CHECK KEYLESS ENTRY CONTROL MODULE CIRCUIT.</b> 1) Disconnect the harness connector of body integrated unit (i84). 2) Measure the resistance between harness connector terminals. <i>Connector &amp; terminal (i84) No. 9 — (i223) No. 11:</i>	Is the resistance less than 10 $\Omega$ ?	Replace the keyless entry control module. <Ref. to SL-46, Keyless Entry Control Module.>	Repair the harness.

## 4. CHECK BODY INTEGRATED UNIT POWER SUPPLY AND GROUND CIRCUIT

Step	Check	Yes	No
<b>1 CHECK POWER SUPPLY OF BODY INTEGRATED UNIT.</b> 1) Disconnect the harness connector of body integrated unit (i84, B280, B281). 2) Measure the voltage between harness connector terminal and chassis ground. <i>Connector &amp; terminal (i84) No. 34 (+) — Chassis ground (-): (B280) No. 7 (+) — Chassis ground (-): (B281) No. 2 (+) — Chassis ground (-):</i>	Is the voltage 10 V or more?	Go to step 2.	Check the harness between the body integrated unit and fuse for open or short circuits.
<b>2 CHECK BODY INTEGRATED UNIT GROUND CIRCUIT.</b> 1) Disconnect the harness connector of body integrated unit (B280, B281). 2) Measure the resistance between harness connector terminal and chassis ground. <i>Connector &amp; terminal (i84) No. 21 — Chassis ground: (B280) No. 22 — Chassis ground: (B281) No. 8 — Chassis ground: (B281) No. 9 — Chassis ground:</i>	Is the resistance less than 10 $\Omega$ ?	Check body integrated unit. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>	Repair the harness.

# Keyless Entry System

## SECURITY AND LOCKS

### 5. CHECK DOOR SWITCH

	Step	Check	Yes	No
1	<p><b>CHECK DOOR SWITCH CIRCUIT.</b> Measure the voltage between the body integrated unit harness connector terminal and chassis ground.</p> <p><b>Connector &amp; terminal</b> <b>Front door RH:</b> (i84) No. 32 (+) — Chassis ground (-): <b>Front door LH:</b> (i84) No. 19 (+) — Chassis ground (-): <b>Rear door RH:</b> (i84) No. 18 (+) — Chassis ground (-): <b>Rear door LH:</b> (i84) No. 31 (+) — Chassis ground (-): <b>Rear gate:</b> (i84) No. 17 (+) — Chassis ground (-):</p>	Is the voltage 0 V when each door or rear gate is opened?	Go to step 2.	Go to step 3.
2	<p><b>CHECK DOOR SWITCH CIRCUIT.</b> Measure the voltage between the body integrated unit harness connector terminal and chassis ground.</p> <p><b>Connector &amp; terminal</b> <b>Front door RH:</b> (i84) No. 32 (+) — Chassis ground (-): <b>Front door LH:</b> (i84) No. 19 (+) — Chassis ground (-): <b>Rear door RH:</b> (i84) No. 18 (+) — Chassis ground (-): <b>Rear door LH:</b> (i84) No. 31 (+) — Chassis ground (-): <b>Rear gate:</b> (i84) No. 17 (+) — Chassis ground (-):</p>	Is the voltage 10 V or more when each door or rear gate is closed?	The door switch is OK.	Go to step 3.
3	<p><b>CHECK DOOR SWITCH.</b> 1) Disconnect the door switch harness connector (R9, R12, R16, R22). 2) Measure the resistance between door switch terminals.</p> <p><b>Connector &amp; terminal</b> <b>(R12) Front RH door switch:</b> <b>(R9) Front LH door switch:</b> <b>(R16) Rear RH door switch:</b> <b>(R22) Rear LH door switch:</b> <b>No. 1 — No. 3:</b> <b>Rear gate latch switch:</b> <b>(D140) No. 3 — No. 4:</b></p>	Is the resistance 1 M $\Omega$ or more when door switch is pushed?	Go to step 4.	Replace the door switch.
4	<p><b>CHECK DOOR SWITCH.</b> Measure the resistance between door switch terminals.</p> <p><b>Connector &amp; terminal</b> <b>(R12) Front RH door switch:</b> <b>(R9) Front LH door switch:</b> <b>(R16) Rear RH door switch:</b> <b>(R22) Rear LH door switch:</b> <b>No. 1 — No. 3:</b> <b>Rear gate latch switch:</b> <b>(D140) No. 3 — No. 4:</b></p>	Is the resistance less than 1 $\Omega$ when door switch is released?	Check the harness for open or short between body integrated unit and door switch.	Replace the door switch.



## 6. CHECK KEY WARNING SWITCH

Step	Check	Yes	No
<b>1 CHECK FUSE.</b> Remove and visually check the fuse No. 14 (in the main fuse box).	Is the fuse blown out?	Replace the fuse with a new part.	Go to step 2.
<b>2 CHECK KEY WARNING SWITCH CIRCUIT.</b> 1) Disconnect the harness connector of body integrated unit (B281). 2) Insert the key into ignition switch. (LOCK position) 3) Measure the voltage between harness connector terminal and chassis ground. <i>Connector &amp; terminal</i> <i>(B281) No. 7 (+) — Chassis ground (-):</i>	Is the voltage 10 V or more?	Go to step 3.	Go to step 4.
<b>3 CHECK KEY WARNING SWITCH CIRCUIT.</b> 1) Remove the key from ignition switch. 2) Measure the voltage between harness connector terminal and chassis ground. <i>Connector &amp; terminal</i> <i>(B281) No. 7 (+) — Chassis ground (-):</i>	Is the voltage 0 V?	The key warning switch is OK.	Go to step 4.
<b>4 CHECK KEY WARNING SWITCH.</b> 1) Disconnect the key warning switch harness connector (B350). 2) Insert the key into ignition switch. (LOCK position) 3) Measure the resistance between key warning switch terminals. <i>Connector &amp; terminal</i> <i>(B350) No. 3 — No. 4:</i>	Is the resistance less than 1 $\Omega$ ?	Go to step 5.	Replace the key warning switch.
<b>5 CHECK KEY WARNING SWITCH.</b> 1) Remove the key from ignition switch. 2) Measure the resistance between key warning switch terminals. <i>Connector &amp; terminal</i> <i>(B350) No. 3 — No. 4:</i>	Is the resistance 1 M $\Omega$ or more?	Check the following: • Harness for open circuits and shorts between the key warning switch and fuse • Harness for open or short between the body integrated unit and key warning switch	Replace the key warning switch.

## 7. CHECK ROOM LIGHT OPERATION

Step	Check	Yes	No
<b>1 CHECK ROOM LIGHT OPERATION.</b> 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.
<b>2 CHECK HARNESS BETWEEN ROOM LIGHT AND BODY INTEGRATED UNIT.</b> 1) Disconnect the body integrated unit harness connector (B280) and room light harness connector (R52). 2) Measure the resistance between the body integrated unit harness connector terminal and room light harness connector terminal. <i>Connector &amp; terminal</i> <i>(B280) No. 3 — (R52) No. 2:</i>	Is the resistance less than 10 $\Omega$ ?	The room light operation circuit is OK.	Check the harness for open or short between body integrated unit and room light.

# Keyless Entry System

## SECURITY AND LOCKS

### 8. CHECK HAZARD LIGHT OPERATION

	Step	Check	Yes	No
1	<b>CHECK HAZARD LIGHT OPERATION.</b> Make sure the hazard light blinks when hazard switch is turned to ON.	Does the hazard light blink?	Go to step 2.	Check the hazard light circuit.
2	<b>CHECK OUTPUT TO HAZARD LIGHT.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the key warning switch harness connector. 3) Prepare the Subaru Select Monitor kit. 4) Turn the ignition switch to ON (engine OFF), and run the "Application for Subaru Select Monitor III". 5) On the System Selection Menu, select the {Integ. Unit mode}. 6) Select {Integ. Unit customizing}. 7) Check {Emergency light setup}, and then switch to ON setting if necessary. 8) Select the {Current Data Display & Save}. 9) Remove the key from ignition switch. 10) When operate the LOCK/UNLOCK button of transmitter, check the hazard output signal of body integrated unit.	Is output signal is present when operating the transmitter LOCK/UNLOCK button?	Go to step 3.	Check body integrated unit. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>
3	<b>CHECK CIRCUIT OF HAZARD LIGHT.</b> 1) Disconnect the harness connector of body integrated unit (B280). 2) Disconnect the turn signal and hazard unit harness connector (B32). 3) Measure the resistance between harness connector terminals. <b>Connector &amp; terminal</b> <b>(B280) No. 12 — (B32) No. 8:</b>	Is the resistance less than 10 $\Omega$ ?	Check body integrated unit. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>	Repair the harness.

### 9. CHECK REAR GATE RELEASE ACTUATOR OPERATION

	Step	Check	Yes	No
1	<b>CHECK REAR GATE RELEASE ACTUATOR OPERATION.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the key warning switch harness connector. 3) Prepare the Subaru Select Monitor kit. 4) Turn the ignition switch to ON (engine OFF), and run the "Application for Subaru Select Monitor III". 5) On the System Selection Menu, select the {Integ. unit mode}. 6) Select {Current Data Display & Save}. 7) Check the rear gate release output signal of body integrated unit when operating the LOCK/UNLOCK button of keyless transmitter.	Is output signal is present when operating the transmitter LOCK/UNLOCK button?	Go to step 2.	Check body integrated unit. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>

# Keyless Entry System

## SECURITY AND LOCKS

Step	Check	Yes	No
<b>2 CHECK CIRCUIT OF REAR GATE RELEASE ACTUATOR.</b> 1) Disconnect the harness connector of body integrated unit (i84). 2) Disconnect the rear gate release actuator harness connector (D140). 3) Measure the resistance between harness connectors. <b>Connector &amp; terminal</b> <b>(i84) No. 22 — (D140) No. 1:</b>	Is the resistance less than 10 $\Omega$ ?	Go to step 3.	Repair the harness.
<b>3 CHECK CIRCUIT OF HAZARD LIGHT.</b> 1) Check the ground circuit of rear gate release actuator 2) Disconnect the rear gate release actuator harness connector (D140). 3) Measure the resistance between harness connector terminal and chassis ground. <b>Connector &amp; terminal</b> <b>(D140) No. 2 — Chassis ground:</b>	Is the resistance less than 10 $\Omega$ ?	Check the rear gate lock actuator. <Ref. to SL-38, INSPECTION, Rear Gate Latch Assembly.>	Repair the harness.

### 10.CHECK DOOR LOCK SWITCH

Step	Check	Yes	No
<b>1 CHECK DOOR LOCK SWITCH.</b> Check the input signal from door lock switch to body integrated unit using Subaru Select Monitor. 1) Prepare the Subaru Select Monitor kit. 2) Turn the ignition switch to ON (engine OFF), and run the "Application for Subaru Select Monitor III". 3) On the System Selection Menu, select the {Integ. unit mode}. 4) Select the {Current Data Display & Save}. 5) Check the input signal to body integrated unit by operating the door lock switch.	Is the normal input signal displayed when the door lock switch is moved to LOCK/UNLOCK?	The door lock switch is OK.	Go to step 2.
<b>2 CHECK DOOR LOCK SWITCH CIRCUIT.</b> 1) Disconnect the harness connector of body integrated unit (i84). 2) Measure the resistance between the harness connector terminal and chassis ground when moving the door lock switch to LOCK. <b>Connector &amp; terminal</b> <b>(i84) No. 15 — Chassis ground:</b>	Is the resistance less than 10 $\Omega$ ?	Go to step 3.	Go to step 4.
<b>3 CHECK DOOR LOCK SWITCH CIRCUIT.</b> Measure the resistance between the harness connector terminal and chassis ground when the door lock switch is moved to UNLOCK. <b>Connector &amp; terminal</b> <b>(i84) No. 29 — Chassis ground:</b>	Is the resistance less than 10 $\Omega$ ?	The door lock switch is OK.	Go to step 4.

# Keyless Entry System

## SECURITY AND LOCKS

Step	Check	Yes	No
<b>4 CHECK DOOR LOCK SWITCH.</b> 1) Disconnect the door lock switch harness connector (D7 or D125). 2) Measure the resistance between the door lock switch terminals when moving the door lock switch to LOCK. <b>Connector &amp; terminal</b> <b>Driver's side:</b> <b>(D7) No. 5 — No. 9:</b> <b>Passenger's side:</b> <b>(D125) No. 2 — No. 5:</b>	Is the resistance less than 1 $\Omega$ ?	Go to step 5.	Replace the door lock switch.
<b>5 CHECK DOOR LOCK SWITCH.</b> Measure the resistance between the door lock switch terminals when moving the door lock switch to UNLOCK. <b>Connector &amp; terminal</b> <b>Driver's side:</b> <b>(D7) No. 5 — No. 8:</b> <b>Passenger's side:</b> <b>(D125) No. 4 — No. 5:</b>	Is the resistance less than 1 $\Omega$ ?	Check the harness for open circuits or shorts between the body integrated unit and the door lock switch.	Replace the door lock switch.

## 11.CHECK IGNITION SWITCH ILLUMINATION

Step	Check	Yes	No
<b>1 CHECK FUSE.</b> Remove and visually check the fuse No. 14 (in the main fuse box).	Is the fuse blown out?	Replace the fuse with a new part.	Go to step 2.
<b>2 CHECK POWER SUPPLY.</b> 1) Disconnect the ignition switch illumination harness connector (B414). 2) Measure the voltage between harness connector terminal and chassis ground. <b>Connector &amp; terminal</b> <b>(B414) No. 2 (+) — Chassis ground (-):</b>	Is the voltage 10 V or more?	Go to step 3.	Check the harness for open circuits and shorts between the ignition switch illumination and fuse.
<b>3 CHECK IGNITION SWITCH ILLUMINATION CIRCUIT.</b> 1) Disconnect the body integrated unit harness connector (B280) and ignition switch light harness connector (B414). 2) Measure the resistance between body integrated unit harness connector terminal and ignition switch illumination harness connector terminal. <b>Connector &amp; terminal</b> <b>(B280) No. 4 — (B414) No. 1:</b>	Is the resistance less than 10 $\Omega$ ?	Replace the ignition switch illumination bulb with a new part. <Ref. to LI-40, REMOVAL, Ignition Switch Illumination.>	Check the harness for open circuits and shorts between the body integrated unit and ignition switch illumination.

## 12.CHECK HORN OPERATION

Step	Check	Yes	No
<b>1 CHECK HORN OPERATION.</b> Make sure the horn sounds when the horn switch is pushed.	Does the horn sound?	Go to step 2.	Check the horn circuit.
<b>2 CHECK HORN OPERATION.</b> 1) Disconnect the harness connector of body integrated unit (B280). 2) Connect the harness connector terminal to ground using a suitable lead wire. <b>Connector &amp; terminal</b> <b>(B280) No. 11 (+) — Chassis ground (-):</b>	Does the horn sound?	Check the body integrated unit. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>	Check the harness for open circuits and/or shorts between the body integrated unit and horn relay.

## 13.CHECK KEYLESS BUZZER

Step	Check	Yes	No
<b>1 CHECK KEYLESS BUZZER OPERATION.</b> Check that the keyless buzzer sounds when LOCK or OPEN button of keyless remote control key is pressed.	Does the keyless buzzer sound?	Keyless buzzer is normal.	Go to step 2.
<b>2 CHECK KEYLESS BUZZER ON/OFF SWITCH.</b> NOTE: If operations 1-5 are performed with the keyless buzzer OFF, the keyless buzzer will turn ON. 1) Close the driver's side door and remove the key from the ignition key cylinder. 2) Push the door lock switch to the UNLOCK side, and insert the key into the ignition key cylinder. 3) From step 2, pull out ←→ insert the key 5 times from/to the ignition key cylinder within 10 seconds. 4) From step 3, open → close the driver's side door within 10 seconds. 5) The keyless buzzer sound ON/OFF will switch, and the hazard light will blink 3 times. If the driver's side door is not open → close within 10 seconds in step 4, the hazard light will blink once and the setting will not be changed.) 6) Check that the keyless buzzer sounds when LOCK or OPEN button of keyless remote control key is pressed.	Does the keyless buzzer sound?	Keyless buzzer is normal.	Go to step 3.
<b>3 CHECK FOR POWER SUPPLY OF KEYLESS BUZZER.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the keyless buzzer harness connector (F102). 3) Press the LOCK/UNLOCK button of the keyless transmitter. 4) Measure the voltage between harness connector terminal and chassis ground. <b>Connector &amp; terminal</b> <b>(F102) No. 1 (+) — Chassis ground (-):</b>	Is the voltage 10 V or more?	Go to step 4.	Check the harness for open circuits and shorts between the keyless buzzer and fuse.
<b>4 CHECK FOR GROUND CIRCUIT OF KEYLESS BUZZER.</b> 1) Disconnect the harness connector of body integrated unit (i84). 2) Measure the resistance between harness connector terminals. <b>Connector &amp; terminal</b> <b>(i84) No. 6 — (F102) No. 1:</b>	Is the resistance less than 10 Ω?	Go to step 5.	Repair the harness.
<b>5 CHECK KEYLESS BUZZER.</b> 1) Remove the keyless buzzer. 2) Install the keyless buzzer to another vehicle which operates keyless buzzer normally, check the buzzer sounds.	Does the keyless buzzer sound?	Check the body integrated unit or door lock switch. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.> <Ref. to GW-8, Power Window Control Switch.>	Replace the keyless buzzer.

# Keyless Entry System

## SECURITY AND LOCKS

### 14.CHECK IGNITION SWITCH

#### CAUTION:

When the ignition key lock is replaced, all ignition keys also must be registered. (Refer to the “IMMOBILIZER TEACHING OPERATION MANUAL”.)

	Step	Check	Yes	No
1	<b>CHECK FUSIBLE LINK.</b> Remove the fusible link main SBF and SBF-6 (in main fuse box), and visually check.	Is the fusible link blown out?	Replace the fusible link main SBF or SBF-6. If the replaced fusible link has blown out easily, repair the short circuit between the fusible link and the ignition switch.	Go to step 2.
2	<b>CHECK FOR POWER SUPPLY OF IGNITION SWITCH.</b> 1) Disconnect the ignition switch harness connector (B72). 2) Measure the voltage between harness connector terminal and chassis ground. <b>Connector &amp; terminal</b> <b>(B72) No. 3 (+) — Chassis ground (-):</b>	Is the voltage 10 V or more?	Go to step 3.	Check the harness for open circuits and shorts between the ignition switch and fusible link.
3	<b>CHECK IGNITION SWITCH.</b> 1) Insert the ignition key into ignition switch, and turn the each position. 2) Measure the resistance between ignition switch terminals. <b>Connector &amp; terminal</b> <b>No. 3 — No. 4 (ACC position):</b> <b>No. 3 — No. 4 — No. 6 — No. 1 (ON position):</b> <b>No. 3 — No. 6 — No. 1 — No. 2 (ST position):</b>	Is the resistance less than 1 $\Omega$ when turning the ignition key to each position?	Ignition switch is normal.	Replace the ignition switch with a new one. <Ref. to SL-41, REPLACEMENT, Ignition Key Lock.>

## 4. Security System

### A: WIRING DIAGRAM

<Ref. to WI-162, WIRING DIAGRAM, Security System.>

### B: ELECTRICAL SPECIFICATION

#### 1. BODY INTEGRATED UNIT

Refer to Control Module I/O Signal in the LAN SYSTEM (DIAGNOSTICS). <Ref. to LAN(diag)-9, ELECTRICAL SPECIFICATION, Control Module I/O Signal.>

### C: INSPECTION

#### 1. BASIC DIAGNOSTIC PROCEDURE

Step	Check	Yes	No
<b>1 INITIAL CHECK.</b> Check keyless entry system.	Does the keyless entry system operate normally?	Go to step 2.	Check keyless entry system. <Ref. to SL-14, INSPECTION, Keyless Entry System.>
<b>2 CHECK SECURITY ON/OFF SETTING.</b> 1) Press the LOCK button of the transmitter. 2) Check the security indicator light blinking patterns.	Is the security indicator light blinking patterns as follows? •When monitoring lag is set to 0 seconds: Blinks twice within 0.5 seconds at 2 second intervals. •When monitoring lag is set to 30 seconds: repeats the turning on for 0.2 seconds and turning off for 0.2 seconds for 30 seconds.	Go to step 5.	Go to step 3.
<b>3 CHANGE SETTING OF SECURITY SYSTEM.</b> Change the setting of security system to ON. <Ref. to SL-27, SECURITY SYSTEM ON/OFF SETTING, INSPECTION, Security System.>	Is setting change completed correctly?	Go to step 4.	<ul style="list-style-type: none"> <li>• Check the ignition switch circuit. &lt;Ref. to SL-28, CHECK IGNITION SWITCH CIRCUIT, INSPECTION, Security System.&gt;</li> <li>• Check the door lock switch circuit. &lt;Ref. to SL-21, CHECK DOOR LOCK SWITCH, INSPECTION, Keyless Entry System.&gt;</li> </ul>
<b>4 CHECK SETTING CHANGE OF SECURITY SYSTEM.</b> 1) Remove the key from ignition switch, and then close all doors. 2) Press the LOCK button of the transmitter. 3) Check the security indicator light blinking patterns.	Is the security indicator light blinking patterns as follows? •When monitoring lag is set to 0 seconds: Blinks twice within 0.5 seconds at 2 second intervals. •When monitoring lag is set to 30 seconds: repeats the turning on for 0.2 seconds and turning off for 0.2 seconds for 30 seconds.	Go to step 5.	Check the security indicator light circuit. <Ref. to SL-27, CHECK SECURITY INDICATOR LIGHT CIRCUIT, INSPECTION, Security System.>

# Security System

## SECURITY AND LOCKS

Step	Check	Yes	No
<b>5</b> <b>CHECK SECURITY SYSTEM OPERATION.</b> Press the LOCK button of keyless transmitter, and wait for 30 seconds.	Does the security indicator light blink twice within 0.5 seconds in 2 second intervals?	Go to step 6.	Replace the body integrated unit. <Ref. to SL-48, Body Integrated Unit.>
<b>6</b> <b>CHECK SECURITY ALARM OPERATION.</b> 1) Unlock all doors using the door lock switch on driver's door. 2) Open any door or rear gate.	Does the security alarm operate when opening any door or rear gate?	Go to step 7.	<ul style="list-style-type: none"> <li>• Check the door switch. &lt;Ref. to SL-27, CHECK DOOR SWITCH, INSPECTION, Security System.&gt;</li> <li>• Check the rear gate latch switch. &lt;Ref. to SL-27, CHECK REAR GATE LATCH SWITCH, INSPECTION, Security System.&gt;</li> </ul>
<b>7</b> <b>CHECK SECURITY ALARM OPERATION.</b> Check the security alarm operation.	Does all of the following security alarm operate? •Horn sounds •Hazard light blinks •Security indicator light illuminates	Go to step 8.	<ul style="list-style-type: none"> <li>• Check the horn. &lt;Ref. to SL-28, CHECK HORN, INSPECTION, Security System.&gt;</li> <li>• Check the hazard light. &lt;Ref. to SL-28, CHECK HAZARD LIGHT OPERATION, INSPECTION, Security System.&gt;</li> </ul>
<b>8</b> <b>CHECK SECURITY ALARM CANCEL OPERATION.</b> Press any button of transmitter while operating security alarm. Or turn the ignition switch to OFF → ON once.	Does all of the following security alarm stop? •Horn stops •Hazard light stops	Go to step 9.	Check the ignition switch circuit. <Ref. to SL-28, CHECK IGNITION SWITCH CIRCUIT, INSPECTION, Security System.>
<b>9</b> <b>CHECK SECURITY SYSTEM CONDITION MEMORY.</b> Check that the system functions properly even when the battery is not connected temporarily. <Ref. to SL-27, CHECK SECURITY SYSTEM CONDITION MEMORY, INSPECTION, Security System.>	Does the system function properly when the battery is not connected temporarily?	Go to step 10.	Replace the body integrated unit. <Ref. to SL-48, Body Integrated Unit.>
<b>10</b> <b>CHECK IMPACT SENSOR.</b> Check the sensibility of impact sensor. <Ref. to SL-44, CHECK IMPACT SENSOR, ADJUSTMENT, Impact Sensor.>	Is the sensibility set properly?	Press the UNLOCK button of keyless transmitter, and finish the diagnosis.	Adjust the sensitivity. <Ref. to SL-45, IMPACT SENSITIVITY ADJUSTMENT, ADJUSTMENT, Impact Sensor.>

**NOTE:**

Check the function settings of the body integrated unit if any of the following symptoms appear. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>

- The horn does not sound even when the security system operates.
- The horn sounds when setting the security to ON using the keyless transmitter.



## 2. CHECK SECURITY SYSTEM CONDITION MEMORY

- 1) Remove the key from ignition switch.
- 2) Close all doors and the rear gate.
- 3) Open the front hood.
- 4) Press the LOCK button of transmitter, and then wait until the security indicator light flashes twice for 0.5 seconds at intervals of 2 seconds.
- 5) Disconnect the ground cable from the battery.
- 6) Connect the battery ground cable to the battery.
- 7) Check that the security indicator light blinks twice within 0.5 seconds at 2 second intervals. When it does not blink, replace the body integrated unit.

## 3. SECURITY SYSTEM ON/OFF SETTING

- 1) Close all doors and rear gate, and sit in the driver's seat. Press the UNLOCK button of the keyless transmitter.
- 2) Turn the ignition switch to ON.
- 3) Push the centralized door lock switch down and open the driver's side door at the same time, and hold in this condition for 10 seconds
- 4) If the security system is ON, it will turn OFF. If OFF, it will turn ON.

Setting	Horn activation	Meter display
ON → OFF	Twice	[AL_OF]
OFF → ON	Once	[AL_ON]

## 4. CHECK DOOR SWITCH

For operation procedure, refer to the door switch inspection of the keyless entry system. <Ref. to SL-18, CHECK DOOR SWITCH, INSPECTION, Keyless Entry System.>

## 5. CHECK REAR GATE LATCH SWITCH

For operation procedure, refer to the door switch inspection of the keyless entry system. <Ref. to SL-18, CHECK DOOR SWITCH, INSPECTION, Keyless Entry System.>

## 6. CHECK SECURITY INDICATOR LIGHT CIRCUIT

For operation procedures, refer to the "SECURITY INDICATOR LIGHT CIRCUIT" of "IMMOBILIZER (DIAGNOSTICS)". <Ref. to IM(diag)-11, CHECK SECURITY INDICATOR LIGHT CIRCUIT, INSPECTION, Diagnostics Chart for Security Indicator Light.>

# Security System

## SECURITY AND LOCKS

### 7. CHECK HORN

	Step	Check	Yes	No
1	<b>CHECK HORN OPERATION.</b> Check the horn sounds when the horn switch is pushed.	Does the horn sound?	Go to step 2.	Check the horn circuit.
2	<b>CHECK OUTPUT TO HORN RELAY.</b> 1) Prepare the Subaru Select Monitor kit. 2) Turn the ignition switch to ON (engine OFF), and run the "Application for Subaru Select Monitor III". 3) On the System Selection Menu, select the {Integ. unit mode}. 4) Select {Function check}. 5) Select {Horn Output} and execute.	Does the horn sound?	Horn circuit is OK.	Go to step 3.
3	<b>CHECK HORN RELAY CIRCUIT.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the harness connector of body integrated unit (B280). 3) Disconnect the main fuse box harness connector (B186). 4) Measure the resistance between harness connector terminals. <i><b>Connector &amp; terminal</b></i> <i><b>(B280) No. 11 — (B186) No. 1:</b></i>	Is the resistance less than 10 Ω?	Check the body integrated unit. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>	Repair the harness.

### 8. CHECK HAZARD LIGHT OPERATION

For operation procedure, refer to the hazard light inspection of the keyless entry system. <Ref. to SL-20, CHECK HAZARD LIGHT OPERATION, INSPECTION, Keyless Entry System.>

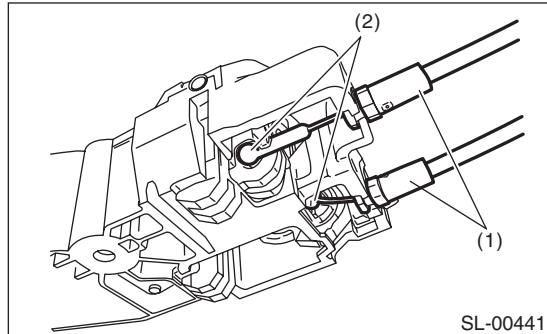
### 9. CHECK IGNITION SWITCH CIRCUIT

	Step	Check	Yes	No
1	<b>CHECK IGNITION SWITCH VOLTAGE.</b> 1) Prepare the Subaru Select Monitor kit. 2) Turn the ignition switch to ON (engine OFF), and run the "Application for Subaru Select Monitor III". 3) On the System Selection Menu, select the {Integ. unit mode}. 4) Select the {Current Data Display & Save}. 5) Check the {BATT voltage} and {IG power supply voltage}.	Is the {IG power supply voltage} within ±1 V against {BATT voltage}?	The ignition switch input circuit is OK.	Go to step 2.
2	<b>CHECK IGNITION SWITCH CIRCUIT.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the harness connector of body integrated unit (i84). 3) Turn the ignition switch to ON. 4) Measure the voltage between harness connector terminal and chassis ground. <i><b>Connector &amp; terminal</b></i> <i><b>(i84) No. 1 (+) — Chassis ground (-):</b></i>	Is the voltage 10 V or more?	Check the body integrated unit. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>	Check the harness for open or short circuit between body integrated unit and fuse.

## 5. Front Inner Remote

### A: REMOVAL

- 1) Remove the door trim. <Ref. to EI-36, REMOVAL, Door Trim.>
- 2) Remove the cable from the cable holder.
- 3) Remove the screw, move the inner remote to the rear, and remove from the panel.
- 4) Remove the cable (1).
- 5) Remove the cable end (2), and remove the inner remote.



### B: INSTALLATION

Install in the reverse order of removal.

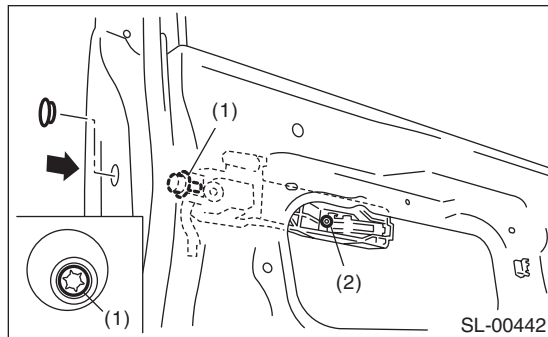
### C: INSPECTION

- 1) Check the cables of the remote handle and lock knob for deformation. If any deformation is found, correct the deformation, as this may cause the improper operation. Replace the front door latch & door lock actuator assembly, if the deformation can not be corrected.
- 2) Check the remote handle and lock knob for smooth operation.

### 6. Front Outer Handle

#### A: REMOVAL

- 1) Raise the front door glass to the top position.
- 2) Remove the door trim. <Ref. to EI-36, REMOVAL, Door Trim.>
- 3) Remove the cable from the front inner remote. <Ref. to SL-29, REMOVAL, Front Inner Remote.>
- 4) Remove the sealing cover. <Ref. to EB-17, REMOVAL, Front Sealing Cover.>
- 5) Remove the plug at the rear end of the door panel.
- 6) Remove the rod clamp.
- 7) Loosen the bolt (1) and turn bolt (2) five times.



- 8) Remove the outer handle cover.
- 9) Move the front outer handle forward, and detach the front outer handle.

#### CAUTION:

**Do not apply excessive force to remove the handle from door panel, not to deform the door panel.**

- 10) Remove the outer side spacer, and slide the frame assembly forward from the inner side, then remove.

#### B: INSTALLATION

Install in the reverse order of removal.

#### *Tightening torque:*

*<Ref. to SL-2, DOOR LOCK ASSEMBLY, COMPONENT, General Description.>*

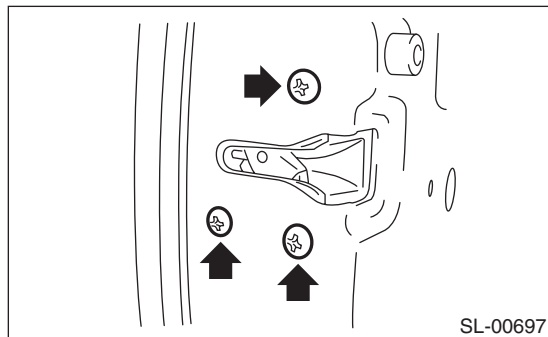
#### C: INSPECTION

- 1) Check the key cylinder and latch contacting securely.
- 2) Check rod for deformation.
- 3) Check the lever and rod for smooth operation.

## 7. Front Door Latch and Door Lock Actuator Assembly

### A: REMOVAL

- 1) Raise the front door glass to the top position.
- 2) Disconnect the ground cable from battery.
- 3) Remove the front door trim. <Ref. to EI-36, REMOVAL, Door Trim.>
- 4) Remove the cable from the front inner remote. <Ref. to SL-29, REMOVAL, Front Inner Remote.>
- 5) Remove the sealing cover. <Ref. to EB-17, REMOVAL, Front Sealing Cover.>
- 6) Remove the door sash. <Ref. to GW-10, REMOVAL, Front Door Glass.>
- 7) Remove the connection rod of the key cylinder lever. (Driver's side only)
- 8) Remove the three screws.



- 9) Remove the front door latch and actuator assembly, and disconnect the connector.

### B: INSTALLATION

Install in the reverse order of removal.

#### **Tightening torque:**

<Ref. to SL-2, DOOR LOCK ASSEMBLY, COMPONENT, General Description.>

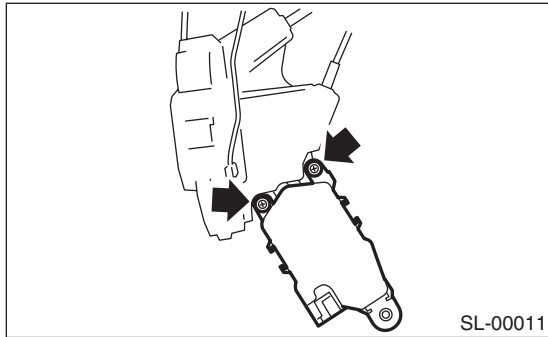
### C: INSPECTION

- 1) Check rod and cable for deformation. If any deformation is found, correct the deformation, as this may cause the improper operation. Replace the front door latch and actuator assembly, if the deformation can not be corrected.
- 2) Check the lever, rod, and cable for smooth operation.

### 8. Front Door Lock Actuator

#### A: REMOVAL

- 1) Remove the front door latch and door lock actuator assembly. <Ref. to SL-31, REMOVAL, Front Door Latch and Door Lock Actuator Assembly.>
- 2) Remove the pawl of front door latch security cover, and then remove the cover.
- 3) Remove the screw from front door latch and door lock actuator, and then remove the door lock actuator.



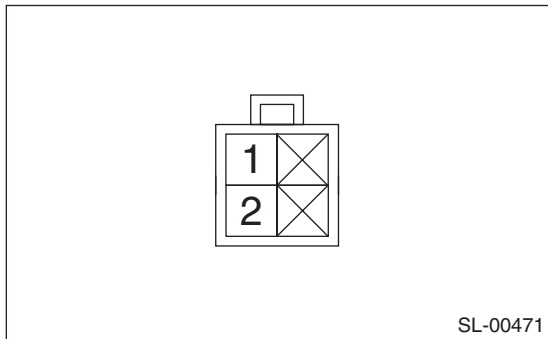
#### B: INSTALLATION

Install in the reverse order of removal.

#### C: INSPECTION

- 1) Disconnect the door lock actuator harness connector.
- 2) Connect the battery to door lock actuator terminals.

If defective, replace the door lock actuator.

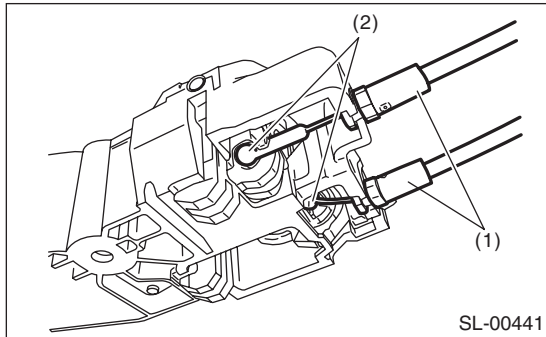


Terminal No.	Actuator operation
No. 1 (+) and No. 2 (-)	Unlock → Lock
No. 2 (+) and No. 1 (-)	Lock → Unlock

## 9. Rear Inner Remote

### A: REMOVAL

- 1) Remove the rear door trim. <Ref. to EI-36, REMOVAL, Door Trim.>
- 2) Remove the screw, slide the inner remote to the rear, and remove from the panel.
- 3) Remove the cable (1).
- 4) Remove the cable end (2), and detach the inner remote handle.



### B: INSTALLATION

Install in the reverse order of removal.

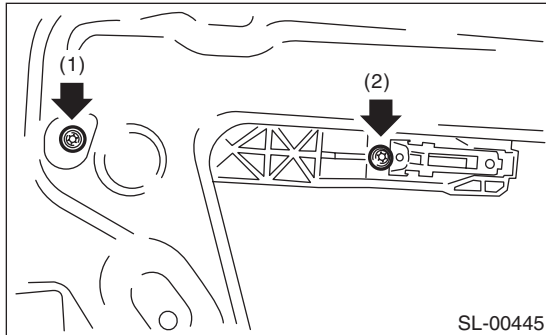
### C: INSPECTION

- 1) Check the cables of the remote handle and lock knob for deformation. If any deformation is found, correct the deformation, as this may cause the improper operation. Replace the rear door latch and door lock actuator assembly, if the deformation can not be corrected.
- 2) Check the remote handle and lock knob for smooth operation.
- 3) Check the child safety lock for correct operations.

### 10.Rear Outer Handle

#### A: REMOVAL

- 1) Raise the rear door glass to the top position.
- 2) Disconnect the ground cable from battery.
- 3) Remove the rear door trim. <Ref. to EI-36, REMOVAL, Door Trim.>
- 4) Remove the cable from rear inner remote. <Ref. to SL-33, REMOVAL, Rear Inner Remote.>
- 5) Remove the sealing cover. <Ref. to EB-20, NOTE, Rear Sealing Cover.>
- 6) Loosen the bolt (1) and turn bolt (2) twice.



- 7) Detach the outer handle cover.
- 8) Move the rear outer handle towards the rear, and remove the rear outer handle.

#### CAUTION:

**Do not apply excessive force to remove the handle from door panel, not to deform the door panel.**

- 9) Remove the outer side spacer, and slide the frame assembly forward from the inner side, then remove.

#### B: INSTALLATION

Install in the reverse order of removal.

#### *Tightening torque:*

*<Ref. to SL-2, DOOR LOCK ASSEMBLY, COMPONENT, General Description.>*

#### C: INSPECTION

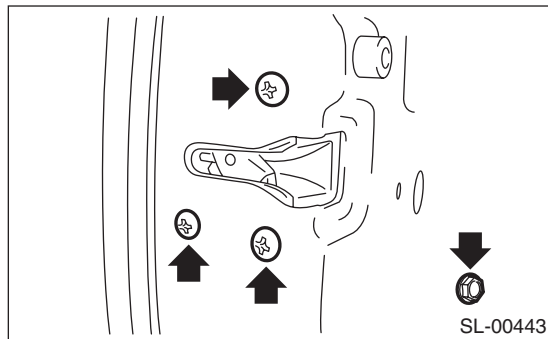
- 1) Inspect to make sure that the latch is in secure contact.
- 2) Check the handle and cable for smooth operation.



## 11. Rear Door Latch and Door Lock Actuator Assembly

### A: REMOVAL

- 1) Raise the door glass to the top position.
- 2) Disconnect the ground cable from battery.
- 3) Remove the rear door trim. <Ref. to EI-36, REMOVAL, Door Trim.>
- 4) Remove the cable from rear inner remote. <Ref. to SL-33, REMOVAL, Rear Inner Remote.>
- 5) Remove the sealing cover. <Ref. to EB-20, NOTE, Rear Sealing Cover.>
- 6) Remove the rear sash. <Ref. to GW-18, REMOVAL, Rear Regulator and Motor Assembly.>
- 7) Remove the three screws and one bolt.



- 8) Disconnect the connectors, and then remove the rear door latch and door lock actuator assembly.

### B: INSTALLATION

Install in the reverse order of removal.

#### *Tightening torque:*

<Ref. to SL-2, DOOR LOCK ASSEMBLY, COMPONENT, General Description.>

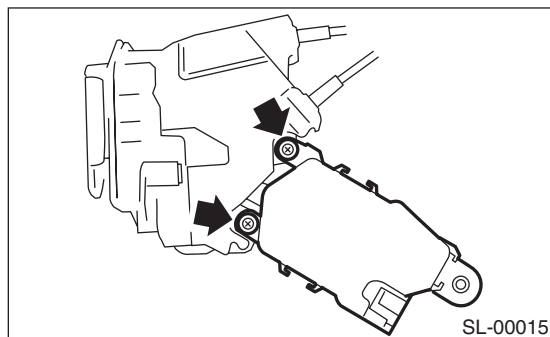
### C: INSPECTION

- 1) Check cable for deformation. If any deformation is found, correct the deformation, as this may cause the improper operation. Replace the rear door latch and door lock actuator assembly, if the deformation can not be corrected.
- 2) Check the lever and cable for smooth operation.

## 12.Rear Door Lock Actuator

### A: REMOVAL

- 1) Remove the rear door latch and door lock actuator assembly. <Ref. to SL-35, REMOVAL, Rear Door Latch and Door Lock Actuator Assembly.>
- 2) Remove the screw from the rear door latch and door lock actuator, and then remove the door lock actuator.



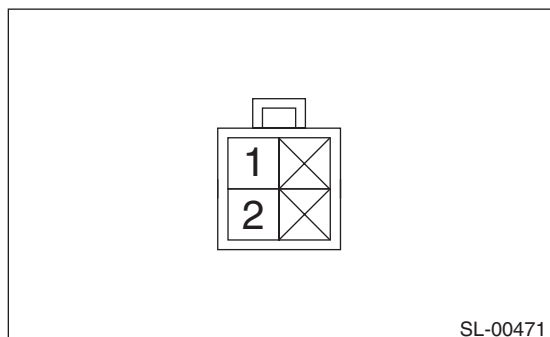
### B: INSTALLATION

Install in the reverse order of removal.

### C: INSPECTION

- 1) Disconnect the door lock actuator harness connector.
- 2) Connect the battery to door lock actuator terminals.

If defective, replace the door lock actuator.

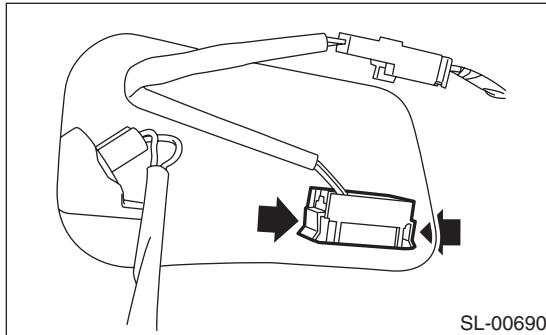


Terminal No.	Actuator operation
No. 1 (+) and No. 2 (-)	Unlock → Lock
No. 2 (+) and No. 1 (-)	Lock → Unlock

## 13.Rear Gate Release Switch

### A: REMOVAL

- 1) Remove the rear gate trim. <Ref. to EI-52, REMOVAL, Rear Gate Trim.>
- 2) Disconnect the harness connector of the rear gate release switch.
- 3) Hold the rear gate release switch hook, and remove the rear gate release switch.



### B: INSTALLATION

Install in the reverse order of removal.

### C: INSPECTION

- 1) Disconnect the harness connector of the rear gate release switch.
- 2) Inspect the continuity between the rear gate release switch connector terminals.

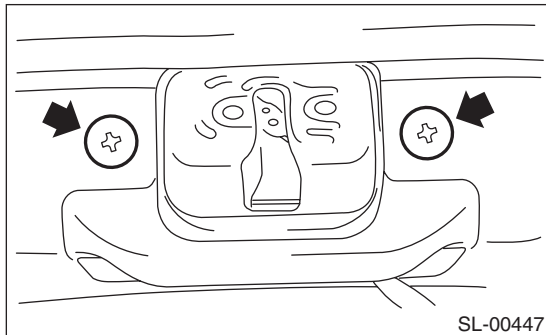
Switch	Terminals	Standard
Open	No. 1 and No. 2	Less than 1 $\Omega$
Close		1 M $\Omega$ or more

If NG, replace the rear gate release switch.

## 14. Rear Gate Latch Assembly

### A: REMOVAL

- 1) Disconnect the ground cable from battery.
- 2) Remove the rear gate trim. <Ref. to EI-52, REMOVAL, Rear Gate Trim.>
- 3) Disconnect the harness connector of rear gate latch assembly.
- 4) Remove the two screws.



- 5) Remove the rear gate latch assembly.

### B: INSTALLATION

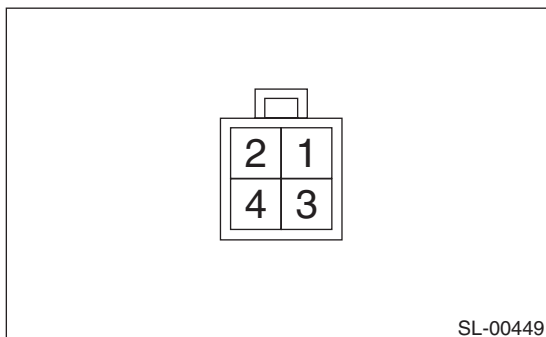
Install in the reverse order of removal.

#### *Tightening torque:*

<Ref. to SL-3, REAR GATE LOCK, COMPONENT, General Description.>

### C: INSPECTION

- 1) Disconnect the rear gate lock actuator harness connector.
- 2) Connect the battery to rear gate lock actuator terminals.



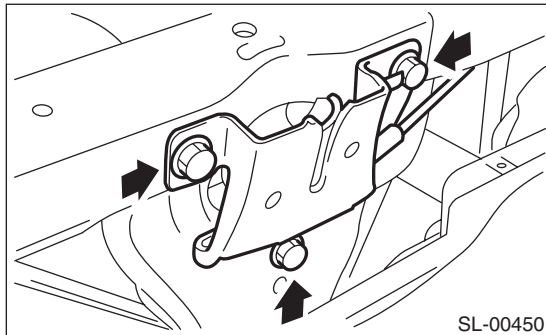
Terminal No.	Actuator operation
No. 1 (+) and No. 2 (-)	Lock → Unlock

Replace the rear gate latch assembly if faulty.

## 15. Front Hood Lock Assembly

### A: REMOVAL

- 1) Open the front hood.
- 2) Remove the engine front cover.
- 3) Remove the bolts, and then detach the front hood lock assembly.



- 4) Remove the cable from lock assembly.

### B: INSTALLATION

Install in the reverse order of removal.

#### **Tightening torque:**

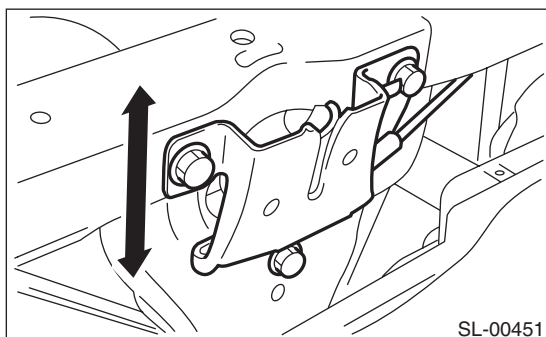
<Ref. to SL-4, FRONT HOOD LOCK AND REMOTE OPENERS, COMPONENT, General Description.>

NOTE:

Apply grease to the movable part.

### C: ADJUSTMENT

Loosen the bolt, and adjust the lock assembly while moving it up and down.



### D: INSPECTION

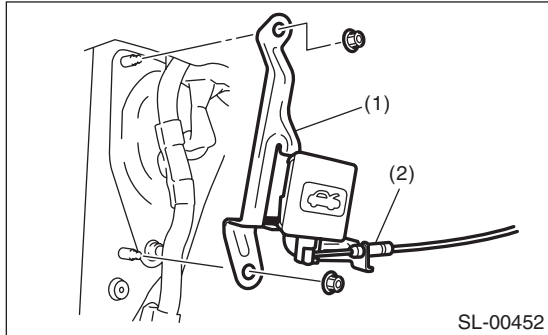
- 1) Check the striker for deformation or abnormal wear.
- 2) Check the safety lever for improper movement.
- 3) Check other levers and springs for rust formation or unsmooth movement.

## 16. Remote Openers

### A: REMOVAL

#### 1. FRONT HOOD OPENER

- 1) Remove the nuts, and remove the front hood opener lever.
- 2) Remove the cable from the front hood opener.

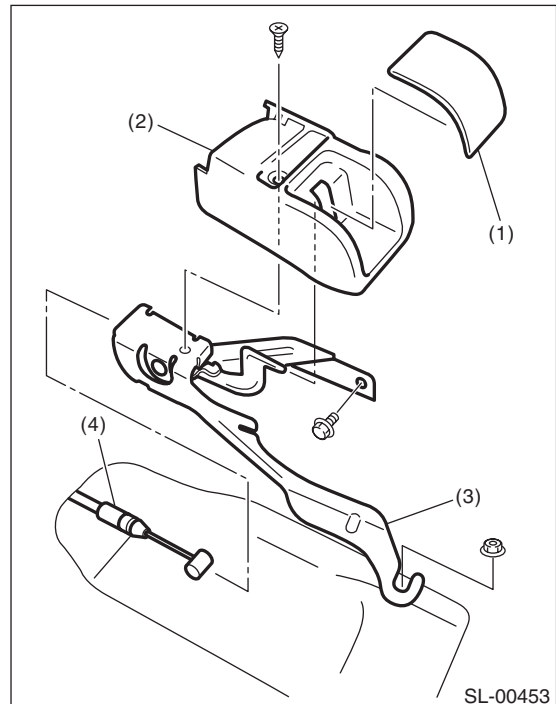


- (1) Front hood opener
- (2) Cable

#### 2. FUEL FILLER FLAP LID OPENER

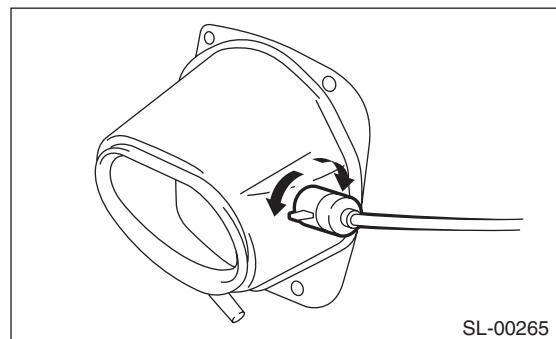
- 1) Remove the second row seats. <Ref. to SE-15, REMOVAL, Second Seat.>
- 2) Remove the third-row seats. <Ref. to SE-22, REMOVAL, Third Seat.>
- 3) Remove the following side trims. <Ref. to EI-44, REMOVAL, Side Trim.>
  - Front door scuff plate LH
  - Rear door scuff plate LH
  - Center pillar lower trim
- 4) Remove the right rear quarter trim. <Ref. to EI-46, REMOVAL, Rear Quarter Trim.>
- 5) Turn over the floor mat to remove the clips securing the cable.
- 6) Remove the cover.

- 7) Remove the bolt and nut, and then detach the pull handle assembly.



- (1) Pull lever
- (2) Cover
- (3) Pull handle ASSY
- (4) Cable

- 8) Remove the cable from pull handle assembly.
- 9) Rotate the fuel lock inside the quarter panel to 90° and remove. (Either right or left turn)



### B: INSTALLATION

Install in the reverse order of removal.

#### **Tightening torque:**

<Ref. to SL-4, FRONT HOOD LOCK AND REMOTE OPENERS, COMPONENT, General Description.>

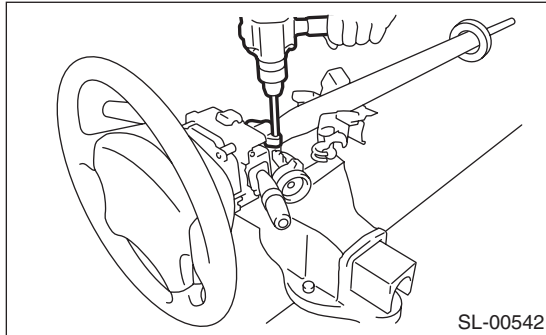
### C: INSPECTION

Make sure the front hood and fuel filler lid open and close smoothly.

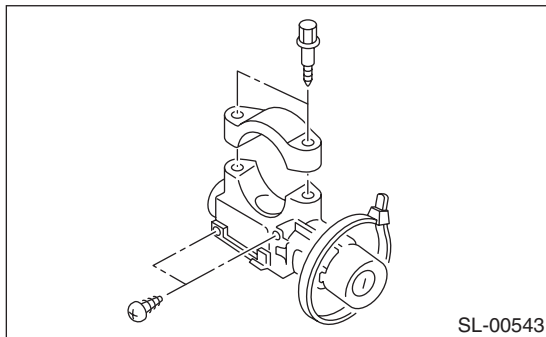
## 17. Ignition Key Lock

### A: REPLACEMENT

- 1) Disconnect the ground cable from battery.
- 2) Remove the steering column. <Ref. to PS-15, REMOVAL, Tilt Steering Column.>
- 3) Secure the steering column in a vise. Remove the bolt with a drill.

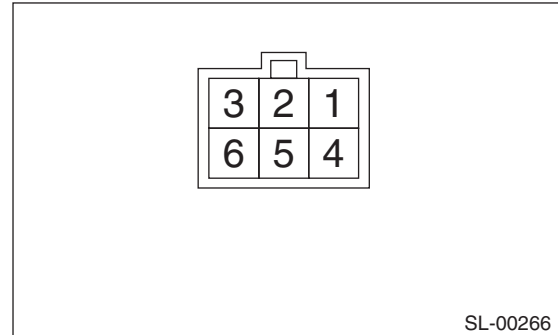


- 4) Remove the ignition key lock.
- 5) Using a new bolt, tighten the bolts (until the bolt head is wrenched off).



### B: INSPECTION

- 1) Remove the instrument panel lower cover.
- 2) Remove the lower column cover.
- 3) Unfasten the fixing clip which secures harness, and then disconnect the connector of the ignition switch from body harness.
- 4) Turn the ignition key plate to each position and check the continuity between terminals of ignition connector.



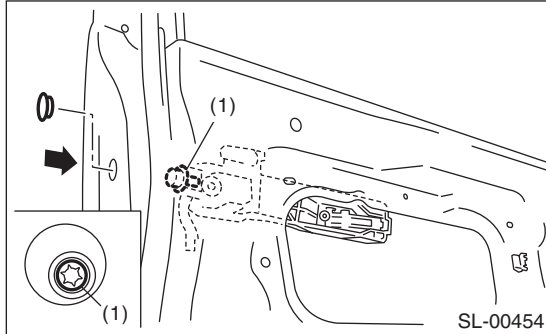
Switch position	Terminal No.	Standard
LOCK	—	—
ACC	No. 3 and No. 4	Less than 1 Ω
ON	No. 3, No. 1 and No. 4 No. 3 and No. 6	Less than 1 Ω
ST	No. 3 and No. 1 No. 3, No. 2 and No. 6	Less than 1 Ω

If NG, replace the ignition switch.

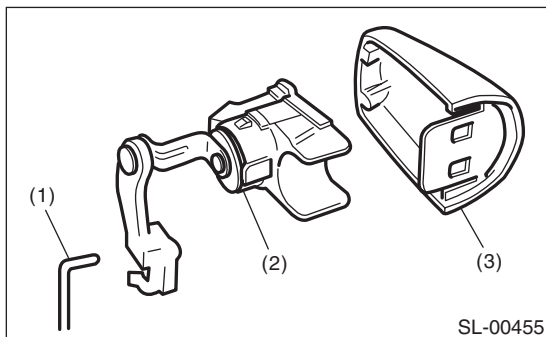
## 18. Key Lock Cylinders

### A: REPLACEMENT

- 1) Raise the front door glass to the top position.
- 2) Remove the door trim. <Ref. to EI-36, REMOVAL, Door Trim.>
- 3) Remove the sealing cover.
- 4) Remove the plug at the rear end of the panel.
- 5) Loosen the bolt (1) and remove the rod clamp.



- 6) Remove the key cylinder all together with the handle cover.
- 7) Remove the key cylinder from cover, and replace the key cylinder.



- (1) Latch connection rod
- (2) Key cylinder
- (3) Door outer handle cover



## 19. Security Control Module

### A: NOTE

The control of security system is carried out in body integrated unit. Refer to the section of body integrated unit for work.

- Removal <Ref. to SL-48, REMOVAL, Body Integrated Unit.>
- Installation <Ref. to SL-48, INSTALLATION, Body Integrated Unit.>

## 20. Impact Sensor

### A: REMOVAL

- 1) Remove the key from ignition switch.
- 2) Close all doors and the rear gate.
- 3) Press the UNLOCK button of the keyless transmitter.
- 4) Change the setting of impact sensor using Subaru Select Monitor.
- 5) Disconnect the ground cable from the battery.
- 6) Remove the impact sensor.

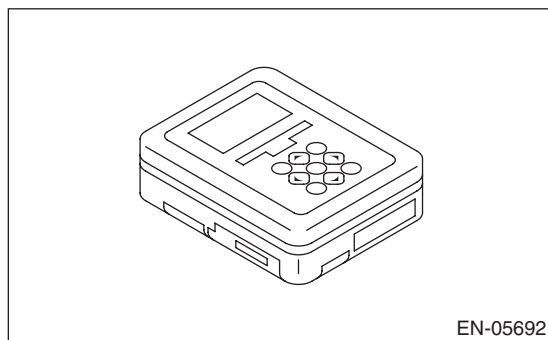
### B: INSTALLATION

- 1) Remove the key from ignition switch.
- 2) Close all doors and the rear gate.
- 3) Press the UNLOCK button of the keyless transmitter.
- 4) Disconnect the ground cable from the battery.
- 5) Install the impact sensor.
- 6) Connect the battery ground cable to the battery.
- 7) Change the setting of impact sensor using Subaru Select Monitor.

### C: OPERATION

#### 1. IMPACT SENSOR SETTING USING SUBARU SELECT MONITOR

- 1) Prepare the Subaru Select Monitor kit. <Ref. to EN(H6DO)(diag)-8, PREPARATION TOOL, General Description.>



- 2) Prepare PC with Subaru Select Monitor installed.
- 3) Connect USB cable to SDI (Subaru Diagnostic Interface) and PC USB port (Subaru Select Monitor dedicated port).

**NOTE:**

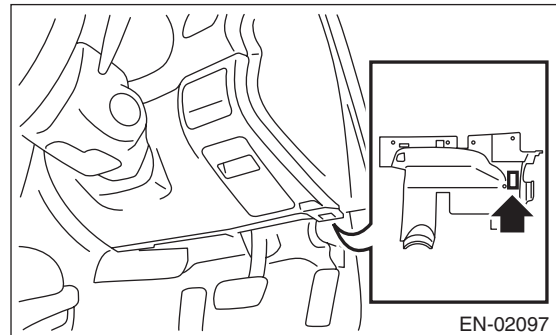
The dedicated port for the Subaru Select Monitor means the USB port which was used to install the Subaru Select Monitor.

- 4) Connect the diagnosis cable to SDI.

- 5) Connect SDI to data link connector located in the lower portion of the instrument panel (on the driver's side).

**CAUTION:**

**Do not connect scan tools other than the Subaru Select Monitor.**



- 6) Start the PC.
- 7) Turn the ignition switch to ON (engine OFF) and run the "PC application for Subaru Select Monitor III".
- 8) On the System Selection Menu, select the {Integ. Unit mode}.
- 9) Select {ECM customizing}.
- 10) Make a impact monitor setting.
  - When installing: ON
  - When removing: OFF
- 11) Make a impact monitor ON/OFF setting.
  - When installing: ON
  - When removing: OFF
- 12) Turn the ignition switch to OFF, and then remove the Subaru Select Monitor.

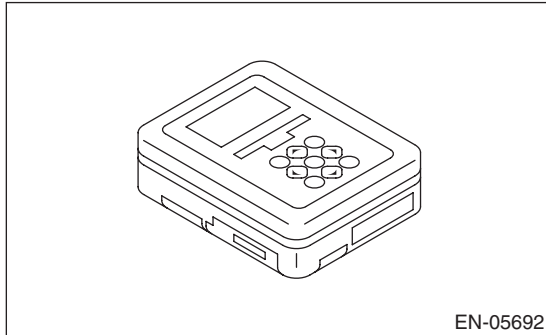
### D: ADJUSTMENT

#### 1. CHECK IMPACT SENSOR

- 1) Remove the key from ignition switch.
- 2) Close all windows.
- 3) Close all doors and the rear gate. Leave open the front hood.
- 4) Press the LOCK button of the keyless transmitter from outside of vehicle.
- 5) Check that the security indicator light blinks twice within 0.5 seconds in 2 second cycles after 30 seconds.
- 6) Hit the windshield with your palm continuously and check the security alarm operates. Lift up the front hood approx. 12 cm (4.7 in) or more, and then drop it off to check the operation of security alarm.
- 7) If NG, adjust the impact sensitivity.

## 2. IMPACT SENSITIVITY ADJUSTMENT

1) Prepare the Subaru Select Monitor kit. <Ref. to EN(H6DO)(diag)-8, PREPARATION TOOL, General Description.>



2) Prepare PC with Subaru Select Monitor installed.

3) Connect USB cable to SDI (Subaru Diagnostic Interface) and PC USB port (Subaru Select Monitor dedicated port).

**NOTE:**

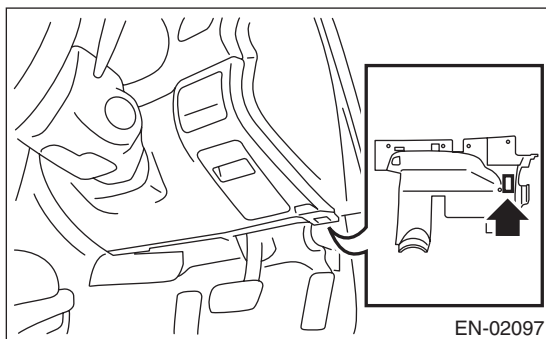
The dedicated port for the Subaru Select Monitor means the USB port which was used to install the Subaru Select Monitor.

4) Connect the diagnosis cable to SDI.

5) Connect SDI to data link connector located in the lower portion of the instrument panel (on the driver's side).

**CAUTION:**

**Do not connect scan tools other than the Subaru Select Monitor.**



6) Start the PC.

7) Turn the ignition switch to ON (engine OFF) and run the "PC application for Subaru Select Monitor III".

8) On the System Selection Menu, select the {Impact Sensor}.

9) Make a {Sensitivity Adjustment Mode}.

- Sensitivity can be adjusted in 11 levels (0 to 10).
- Initial setting is 5.
- Smaller number means more sensitive.
- Larger number means less sensitive.

10) Turn the ignition switch to OFF, and then remove the Subaru Select Monitor.

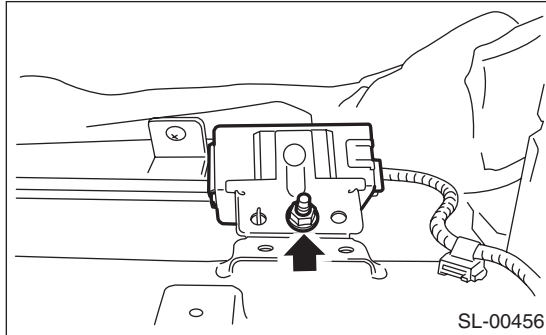
**NOTE:**

- Set the sensor so as not to let the alarm on normal vibration (reclining to the door, hit the ball and etc.).
- Set the sensor to operate the alarm with hitting the door or window glass, etc. continuously like a mayhem by robbery.
- Ask the customer about parking situation for setting, because the alarm operate when the vibration not only the burglar but also the construction etc.

## 21. Keyless Entry Control Module

### A: REMOVAL

- 1) Disconnect the ground cable from battery.
- 2) Remove the glove box. <Ref. to EI-38, REMOVAL, Glove Box.>
- 3) Remove the nut, disconnect the connector and remove the keyless entry control module.



### B: INSTALLATION

Install in the reverse order of removal.

## 22. Keyless Buzzer

### A: REMOVAL

- 1) Disconnect the ground cable from the battery.
- 2) Remove the keyless buzzer installed to the backside of radiator bracket.

### B: INSTALLATION

Install in the reverse order of removal.

### C: INSPECTION

Install the keyless buzzer to another vehicle which operates keyless buzzer normally, check the buzzer sounds. If NG, replace the keyless buzzer.

### 23. Body Integrated Unit

#### A: REMOVAL

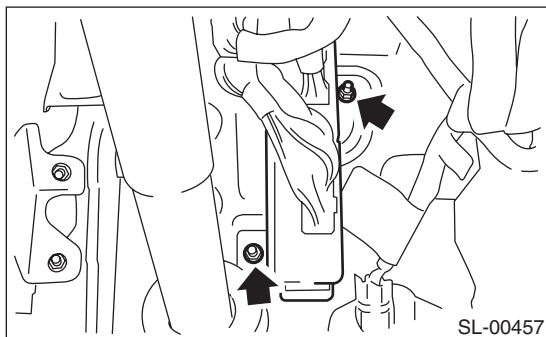
##### NOTE:

- When replacing the body integrated unit, check the current setting and note it. <Ref. to LAN(diag)-18, CONFIRMATION OF CURRENT SETTING, OPERATION, Subaru Select Monitor.>
- When replacing the body integrated unit, all immobilizer keys also must be replaced and registered again. Prepare the new immobilizer key and security ID plate.

- 1) Disconnect the ground cable from battery.
- 2) Remove the instrument panel lower cover. <Ref. to EI-37, REMOVAL, Instrument Panel Lower Cover.>
- 3) Disconnect the connector of body integrated unit.

##### CAUTION:

- **Be careful to keep water and other foreign materials away from body integrated unit.**
  - **Do not install or register an immobilizer related module of other registered vehicles in order to diagnose failures or inspect functions.**
- 4) Remove two mounting nuts for body integrated unit bracket, and remove the bracket.



#### B: INSTALLATION

Install in the reverse order of removal.

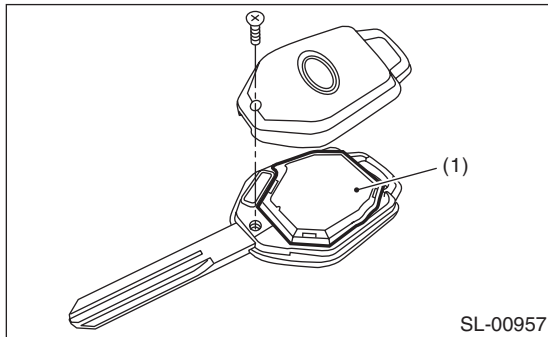
##### NOTE:

- When the same body integrated unit is reinstalled in the same vehicle, it is not necessary to register the immobilizer again.
- Make sure that there are no differences from the contents of the current settings after installation. <Ref. to LAN(diag)-18, CONFIRMATION OF CURRENT SETTING, OPERATION, Subaru Select Monitor.>

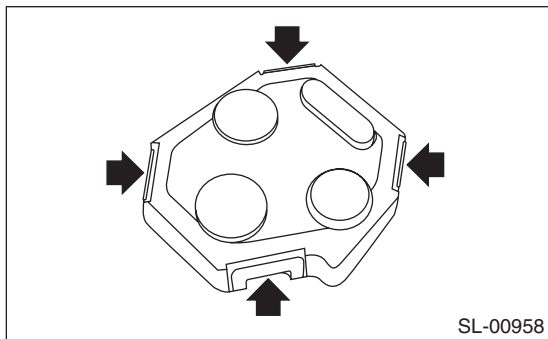
## 24. Transmitter

### A: REMOVAL

1) Disassemble the keyless transmitter, and take out the transmitter case (1).



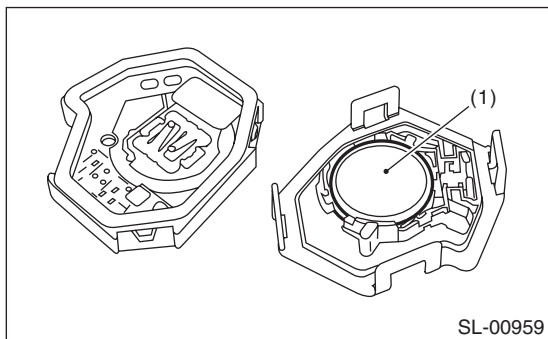
2) Remove the claw, and open the transmitter case.



3) Remove the battery (1) from the transmitter.

#### NOTE:

To prevent static electricity damage to the transmitter printed circuit board, touch the steel area of building with hand to discharge static electricity carried on body or clothes before disassembling the transmitter.



### B: INSTALLATION

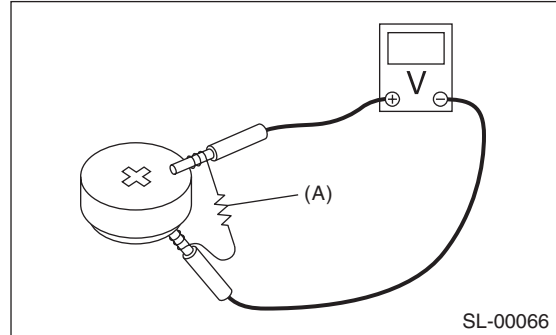
Install in the reverse order of removal.

### C: INSPECTION

Measure the voltage between the keyless transmitter battery (+) terminal and (-) terminal.

#### NOTE:

Battery discharge occurs during the measurement. Complete the measurement within 5 seconds.



(A) Resistance (47  $\Omega$ )

Tester connection		Standard
(+)	(-)	
Battery Positive terminal	Battery Ground terminal	2.5 — 3.0 V

If NG, replace the battery. (Use CR1620 or equivalent.)

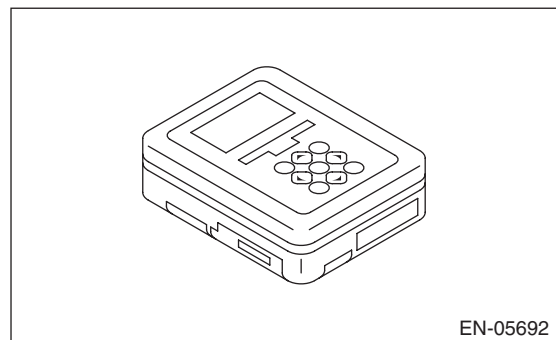
### D: REPLACEMENT

#### 1. REGISTRATION OF KEYLESS TRANSMITTER WITH SUBARU SELECT MONITOR

##### NOTE:

- A maximum of four keyless transmitter can be registered for each individual vehicle.
- When replacing or adding the keyless transmitter, new registration of transmitter is necessary.

1) Prepare the Subaru Select Monitor kit. <Ref. to EN(H6DO)(diag)-8, PREPARATION TOOL, General Description.>



2) Prepare PC with Subaru Select Monitor installed.

# Transmitter

## SECURITY AND LOCKS

3) Connect the USB cable to SDI (Subaru Diagnosis Interface) and USB port on the personal computer (dedicated port for the Subaru Select Monitor).

### NOTE:

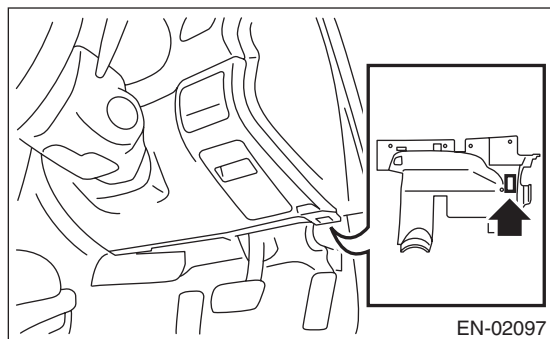
The dedicated port for the Subaru Select Monitor means the USB port which was used to install the Subaru Select Monitor.

4) Connect the diagnosis cable to SDI.

5) Connect SDI to data link connector located in the lower portion of the instrument panel (on the driver's side).

### CAUTION:

**Do not connect scan tools other than the Subaru Select Monitor.**



6) Start the PC.

7) Turn the ignition switch to ON (engine OFF) and run the "PC application for Subaru Select Monitor".

8) On the «System Selection Menu» of the Subaru Select Monitor, select the {Each System Check} → {Integ. unit mode} → {Keyless transmitter ID registration}.

9) Input the 8-digit ID number attached to the tag plate of the transmitter or inside the transmitter, from left to right. Press the [Enter] key.

10) The ID number you have entered will be shown. Make sure that the ID number shown is the same as that of the tag plate.

11) Press the [OK] key if the ID number is correct. Press the [NO] key if incorrect, to return to the step 3) and try again.

12) «ID is being registered...» is displayed and registration starts.

13) «ID registration completed» will be displayed when the registration process is done.

14) To exit, select «END:NO», and press the [NO] key to return to {Transmitter ID registration}. If there are additional keyless transmitters to be registered, select «The following are registered: OK» to return to the step 3).

### NOTE:

- If the registration fails, «ID cannot register. Try again.» will be shown. Select the [OK] key to return to the {Keyless ID registration}. Retry starting from the step 2).

- «END: NO» is shown on the Subaru Select Monitor when fourth keyless transmitter has been registered. Select the [NO] key to return to {Keyless ID registration}.



## 25. Immobilizer Control Module

### A: NOTE

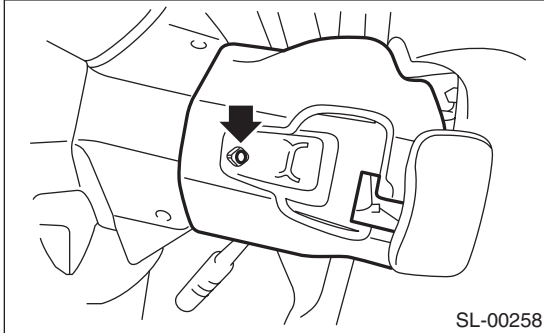
The control of immobilizer system is carried out in body integrated unit. Refer to the section of body integrated unit for work.

- Removal <Ref. to SL-48, REMOVAL, Body Integrated Unit.>
- Installation <Ref. to SL-48, INSTALLATION, Body Integrated Unit.>

### 26. Immobilizer Antenna

#### A: REMOVAL

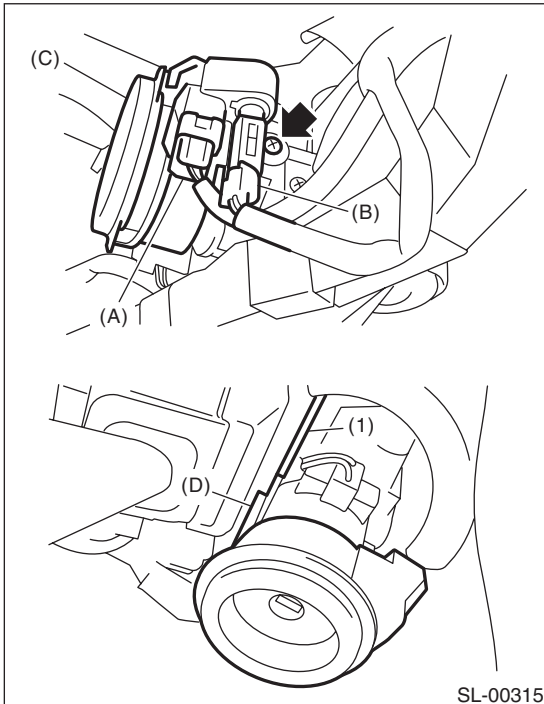
- 1) Disconnect the ground cable from battery.
- 2) Remove the screws, and detach the upper column cover and lower column cover.



- 3) Remove the instrument panel lower cover. <Ref. to EI-37, REMOVAL, Instrument Panel Lower Cover.>
- 4) Disconnect the immobilizer antenna connector (A) and ignition switch lighting connector (B).
- 5) Loosen the screw and release the lock (D) at opposite side using flat tip screwdriver (1), and then detach the immobilizer antenna (C).

#### CAUTION:

**Do not apply excessive force to remove the immobilizer antenna and lock. Otherwise they may be broken because those parts are the products made of a plastic.**



#### B: INSTALLATION

Install in the reverse order of removal.

# SUNROOF/T-TOP/CONVERTIBLE TOP (SUNROOF)

# SR

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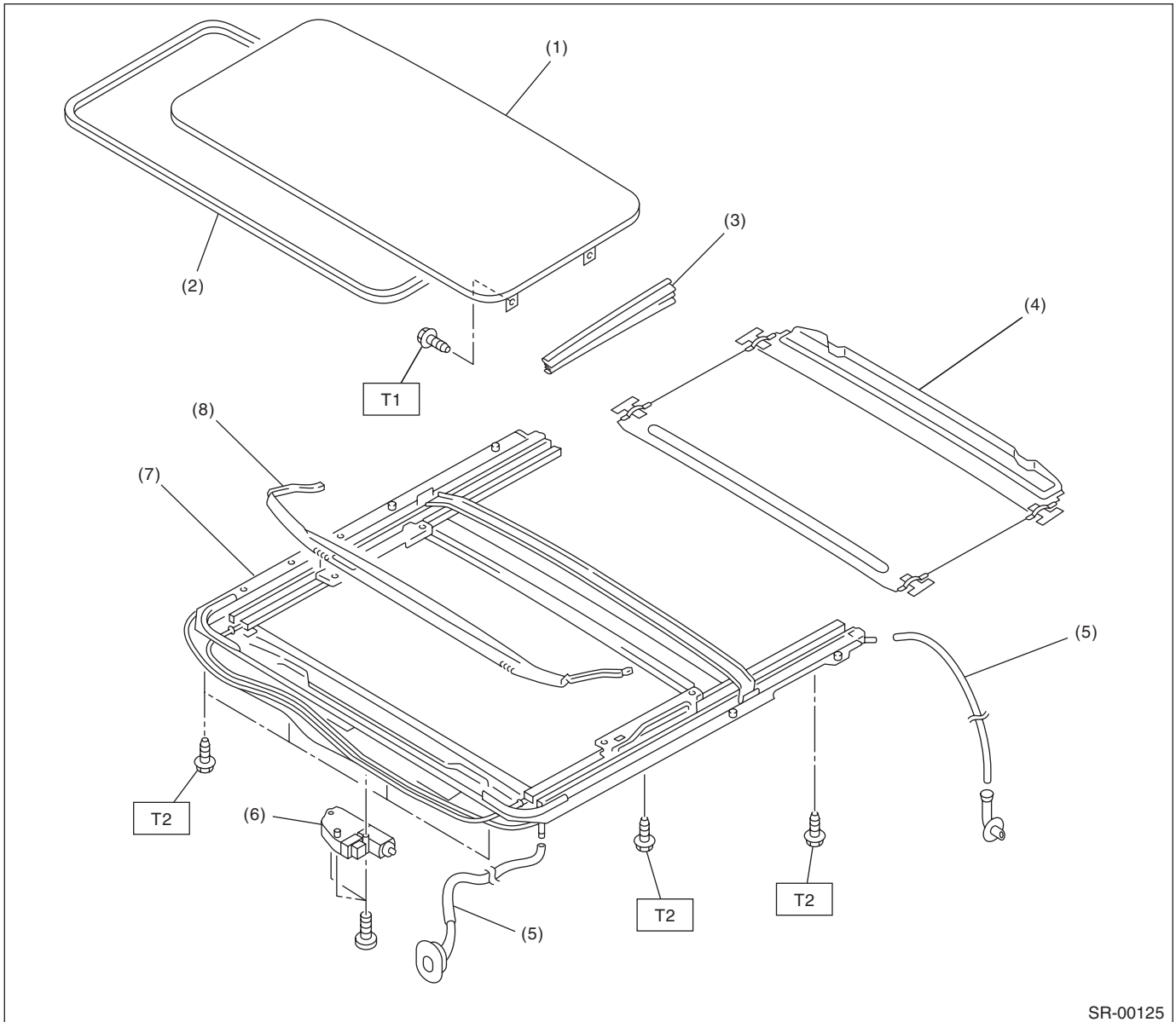
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# General Description

SUNROOF/T-TOP/CONVERTIBLE TOP (SUNROOF)

## 1. General Description

### A: COMPONENT



- (1) Glass lid
- (2) Weather strip
- (3) Cover
- (4) Sunshade

- (5) Drain tube
- (6) Motor ASSY
- (7) Frame ASSY
- (8) Deflector

**Tightening torque: N·m (kgf·m, ft·lb)**

**T1: 4.5 (0.46, 3.3)**

**T2: 6.0 (0.61, 4.4)**

# General Description

SUNROOF/T-TOP/CONVERTIBLE TOP (SUNROOF)

---

## B: CAUTION

- Before disassembling or reassembling parts, always disconnect the battery ground cable from battery. When replacing the audio, control unit, and other parts provided with memory functions, record the memory contents before disconnecting the battery ground cable in order to prevent memory deletion.
- Reassemble the parts in the reverse order of disassembly unless otherwise indicated.
- Adjust parts to the given specifications.
- Connect the connectors securely for reassembly.
- After reassembly, make sure functional parts operate smoothly.

## C: PREPARATION TOOL

### 1. GENERAL TOOL

TOOL NAME	REMARKS
Circuit tester	Used for measuring resistance and voltage.
TORX® T20	Used for the removal of the sun roof lid and sunshade.

# Sunroof Control System

SUNROOF/T-TOP/CONVERTIBLE TOP (SUNROOF)

## 2. Sunroof Control System

### A: WIRING DIAGRAM

#### 1. SUNROOF

<Ref. to WI-157, WIRING DIAGRAM, Sunroof Control System.>

### B: INSPECTION

Symptom	Inspection order
Water leakage	<ol style="list-style-type: none"><li>1. Check roof panel and glass lid for improper or poor sealing.</li><li>2. Check drain tube for clogging.</li><li>3. Check sunroof frame seal and body for improper fit.</li></ol>
Booming noise, wind noise and other noise	<ol style="list-style-type: none"><li>1. Check glass lid and roof panel for improper clearance.</li><li>2. Check sunshade and roof trim for improper clearance.</li></ol>
Abnormal motor noise	<ol style="list-style-type: none"><li>1. Check installing part of motor for looseness.</li><li>2. Check gears and bearings for wear.</li><li>3. Check cable for wear.</li><li>4. Check cable pipe for deformities.</li></ol>
Failure of sunroof (Motor operates properly.)	<ol style="list-style-type: none"><li>1. Check guide rail for foreign particles.</li><li>2. Check guide rail for improper installation.</li><li>3. Check parts for mutual interference.</li><li>4. Check cable slider for improper clinching.</li><li>5. Check cable for improper installation.</li></ol>
Motor does not rotate or rotate improperly.	<ol style="list-style-type: none"><li>1. Check fuse for blown out.</li><li>2. Check switch for improper function.</li><li>3. Check motor for incorrect terminal voltage.</li><li>4. Check the relay for improper operation.</li><li>5. Check poor grounding system.</li><li>6. Check harness for open or short and terminals for poor connections.</li></ol>
Failure turn of glass lid	Check guide rail for foreign particles.

- Failure turn of glass lid while driving rough road.

Glass lid has auto-reverse function. When applied above specified force to the glass lid, the lid turns back and stops. When operating the glass lid (open or close) while driving the rough road, the lid judges vibration as a force and may causes failure turns. When the failure turn is occurred, need to perform the initialize operation with following procedure.

#### 1. INITIALIZE OPERATION

- 1) Tilt up the glass lid.
- 2) Release the switch once, and press the tilt up switch again for 15 seconds.
- 3) When the glass lid is raised a little and returned to tilt up position, release the switch for the moment. (Initialization of position detecting function)
- 4) Holding down the tilt up switch again within 5 seconds from releasing the switch will automatically perform tilt down/slide open/slide close. (When 5 seconds pass, the position detecting function is cancelled.)
- 5) Initialize operation is completed.

# Glass Lid

SUNROOF/T-TOP/CONVERTIBLE TOP (SUNROOF)

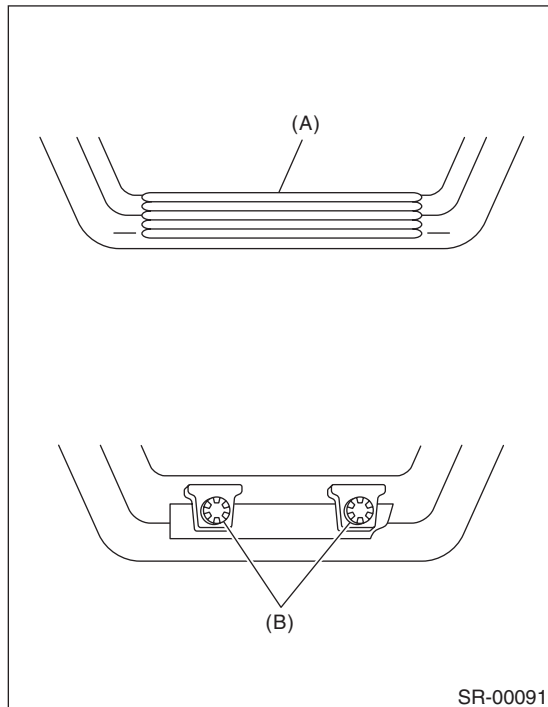
## 3. Glass Lid

### A: REMOVAL

- 1) Completely close the glass lid, and then open the sunshade.
- 2) Remove the cover (A), and then remove the TORX® bolts (B).

#### CAUTION:

The thread locker is applied to the TORX® bolts, so use the new parts once they are removed.



- 3) Remove the glass lid carefully.

### B: INSTALLATION

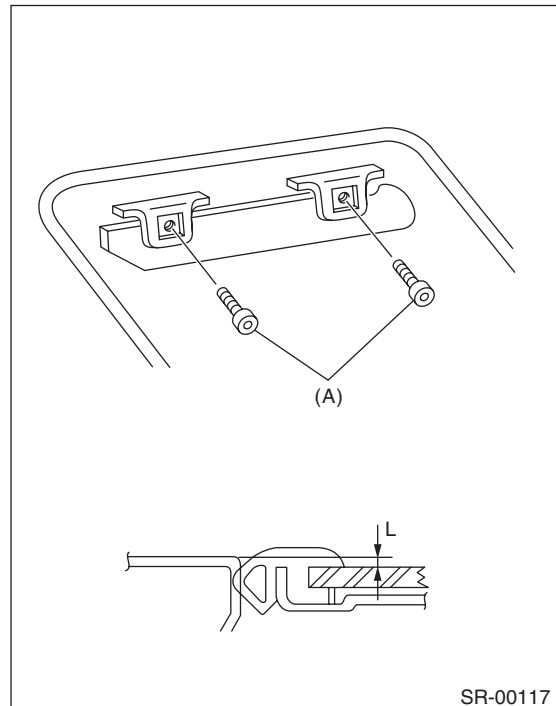
Install in the reverse order of removal.

### C: ADJUSTMENT

Loosen the glass lid mounting TORX® bolts (A), and then adjust the height with moving the lid.

**Difference in height between glass lid and roof panel L:**

**2.0±1.0 mm (0.079±0.039 in)**

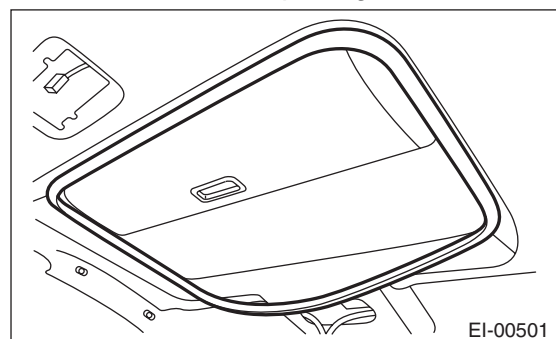


### D: FORCED DRIVE

If glass lid dose not operate or is not supplied with power, move the glass lid using the hexagon wrench\*.

\*: **L shape universal purpose hexagon wrench width across flat 4 mm (0.16 in)**

- 1) Remove the spot map light. <Ref. to LI-34, REMOVAL, Spot Map Light.>
- 2) Remove the sunroof opening trim.



- 3) Remove the sun visor clip.
- 4) Insert the hexagon wrench securely until it touches the motor shaft edge.

#### CAUTION:

**Make sure not to bend or wrinkle the roof trim during work.**

- 5) Turn the hexagon wrench, and move the glass lid.
- Turning right, the glass lid open.
  - Turning left, the glass lid close.

# Sunroof Assembly

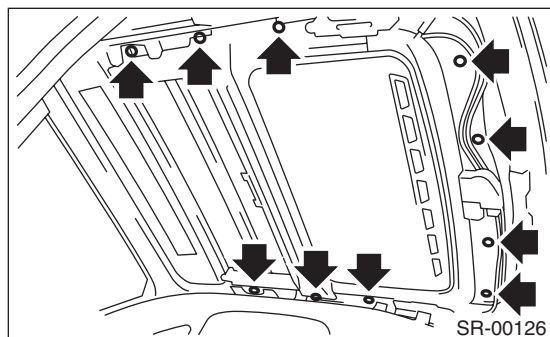
SUNROOF/T-TOP/CONVERTIBLE TOP (SUNROOF)

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## 4. Sunroof Assembly

### A: REMOVAL

- 1) Disconnect the ground cable from battery.
- 2) Remove the roof trim. <Ref. to EI-51, REMOVAL, Roof Trim.>
- 3) Disconnect the harness connector of sunroof motor.
- 4) Remove the glass lid. <Ref. to SR-5, REMOVAL, Glass Lid.>
- 5) Remove the drain tube from frame assembly.
- 6) Remove the bolts, and then detach the frame assembly.



### B: INSTALLATION

#### CAUTION:

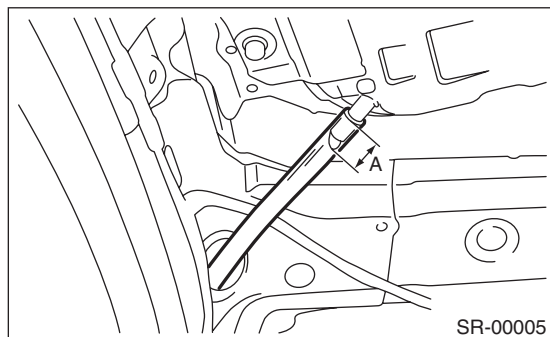
**Be careful not to snag the harness.**  
Install in the reverse order of removal.

#### NOTE:

- Be sure to connect the harness connector.
- When installing the drain tube, insert it securely into drain pipe.

#### Length A:

**15 mm (0.59 in) or more**



### C: DISASSEMBLY

- 1) Remove the sunroof motor. <Ref. to SR-7, REMOVAL, Sunroof Motor.>
- 2) Remove the sunshade. <Ref. to SR-9, REMOVAL, Sunshade.>

### D: ASSEMBLY

Assemble in the reverse order of disassembly.



### 5. Sunroof Motor

#### A: REMOVAL

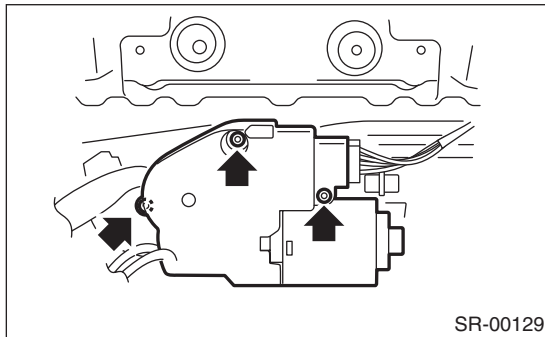
**CAUTION:**

- When removing the clip, use great care not to damage the roof trim.
- Never rotate the motor assembly after removing it.

- 1) Completely close the glass lid.
- 2) Disconnect the ground cable from battery.
- 3) Remove the roof trim. <Ref. to EI-51, REMOVAL, Roof Trim.>
- 4) Disconnect the harness connector, and then remove the motor assembly mounting screw.

**CAUTION:**

When removing the motor assembly, secure the cable wires to prevent moves.

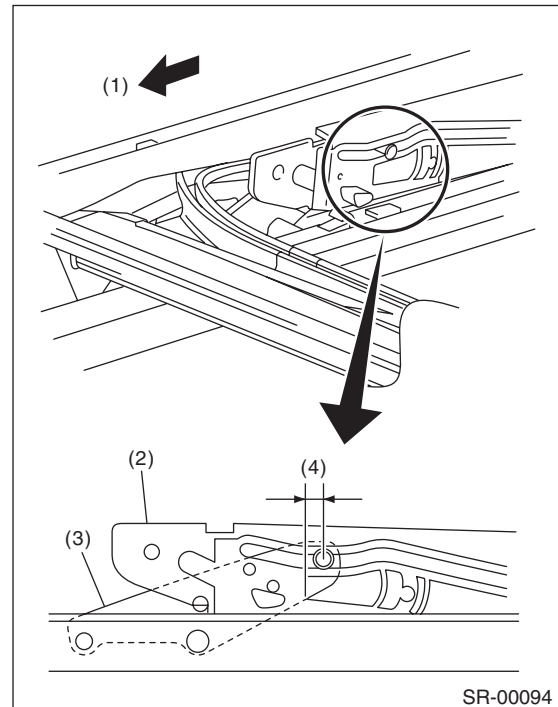


#### B: INSTALLATION

**CAUTION:**

When installing the motor assembly, be careful not to move the sunroof cable.

- 1) Align the coulisse assembly and link assembly in the same position.



- (1) Front
- (2) Coulisse ASSY
- (3) Link ASSY
- (4) 4.7 mm (0.185 in)

- 2) Install the motor assembly.
- 3) Connect the harness connector of motor assembly, and then connect the battery ground cable to battery.
- 4) Perform the initialize operation of motor.
  - (1) Tilt up the glass lid.
  - (2) Release the switch once, and press the tilt up switch again for 15 seconds.
  - (3) When the glass lid is raised a little and on tilt up position, release the switch for the moment.
  - (4) Keep pressing the tilt up switch within 5 seconds from releasing the switch, glass lid automatically performs the tilts down → slides open → slides close operation, then the initialize operation is completed.
- 5) Check the operation of sunroof with following table.

Operation	Switch position
(1) Glass lid closes completely.	Close
(2) Glass lid tilt up to the top position.	Tilt up
(3) Glass lid lowers completely.	Tilt down
(4) Glass lid opens completely.	Open
(5) Glass lid closes 150 mm (5.91 in) away from the completely closed position.	Close
(6) Glass lid closes completely.	Close

- 6) Install the trim in the reverse order of removal.

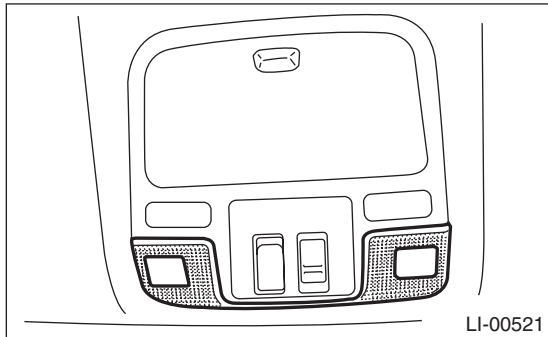
# Sunroof Switch

SUNROOF/T-TOP/CONVERTIBLE TOP (SUNROOF)

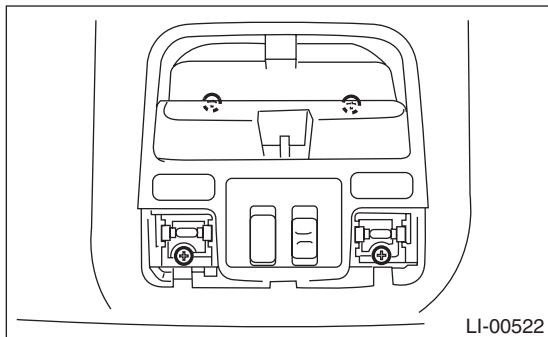
## 6. Sunroof Switch

### A: REMOVAL

- 1) Disconnect the ground cable from the battery.
- 2) Remove the spot map light lens.



- 3) Remove the screws, and then remove the overhead console.



- 4) Disconnect the harness connector, and then remove the sunroof switch.

### B: INSTALLATION

Install in the reverse order of removal.

### C: INSPECTION

Measure the sunroof switch resistance.

Switch position	Terminal No.	Standard	Connector No.
Open	1 and 3	Less than 1 $\Omega$	R128
Close	3 and 4	Less than 1 $\Omega$	
Tilt up	1 and 3	Less than 1 $\Omega$	R187
Tilt down	3 and 4	Less than 1 $\Omega$	

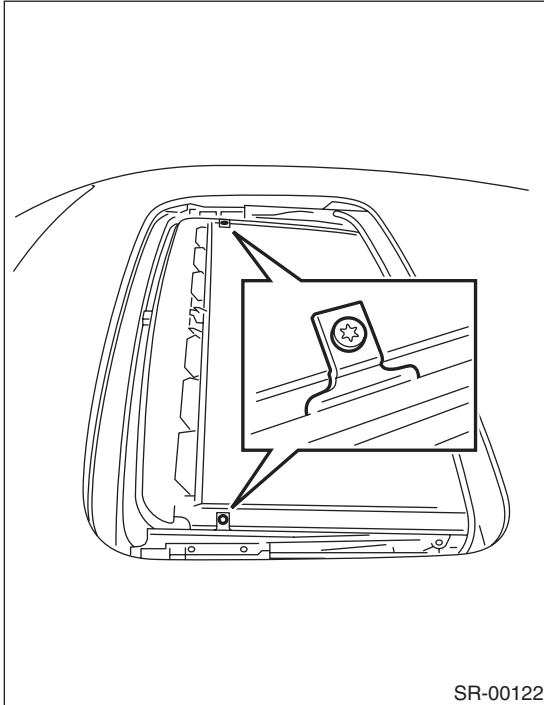
# Sunshade

SUNROOF/T-TOP/CONVERTIBLE TOP (SUNROOF)

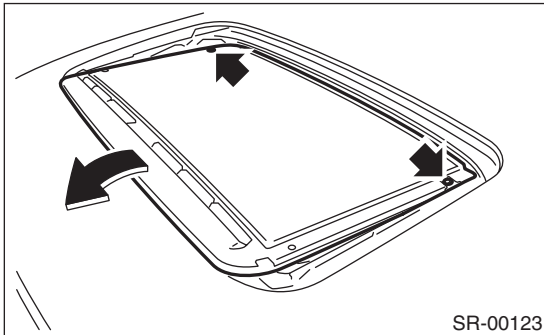
## 7. Sunshade

### A: REMOVAL

- 1) Remove the glass lid. <Ref. to SR-5, REMOVAL, Glass Lid.>
- 2) Loosen the TORX® bolt to remove the front sunshade bracket.



- 3) Pull the sunshade until the rear sunshade bracket comes into the sight, then loosen the TORX® bolts to remove the sunshade.



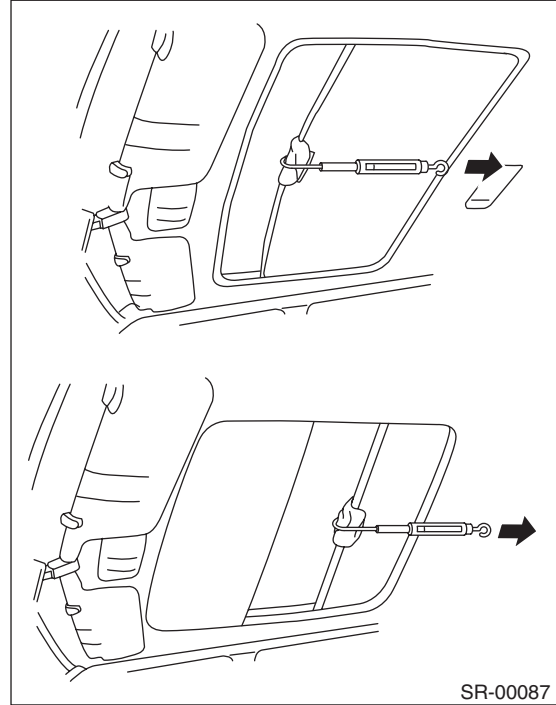
### B: INSTALLATION

Install in the reverse order of removal.

### C: INSPECTION

#### 1. CHECK FOR MOVING LOAD OF SUNSHADE

- 1) Attach a spring scale to sunshade edge using a cloth.



- 2) Pull the spring scale to measure moving load of the sunshade.

#### **Moving load of sunshade:**

##### **Specification**

**$18.0 \pm 5.0$  N ( $1.8 \pm 0.5$  kgf,  $13 \pm 3.7$  lbf)**

#### NOTE:

Moving load is larger at the beginning of pulling a spring scale, so take a spring scale reading while sunshade sliding smoothly.

- 3) If moving load exceeds specifications, check the glass lid, sunshade and frame assembly for improper installation.

# Sunshade

SUNROOF/T-TOP/CONVERTIBLE TOP (SUNROOF)

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# EXTERIOR/INTERIOR TRIM



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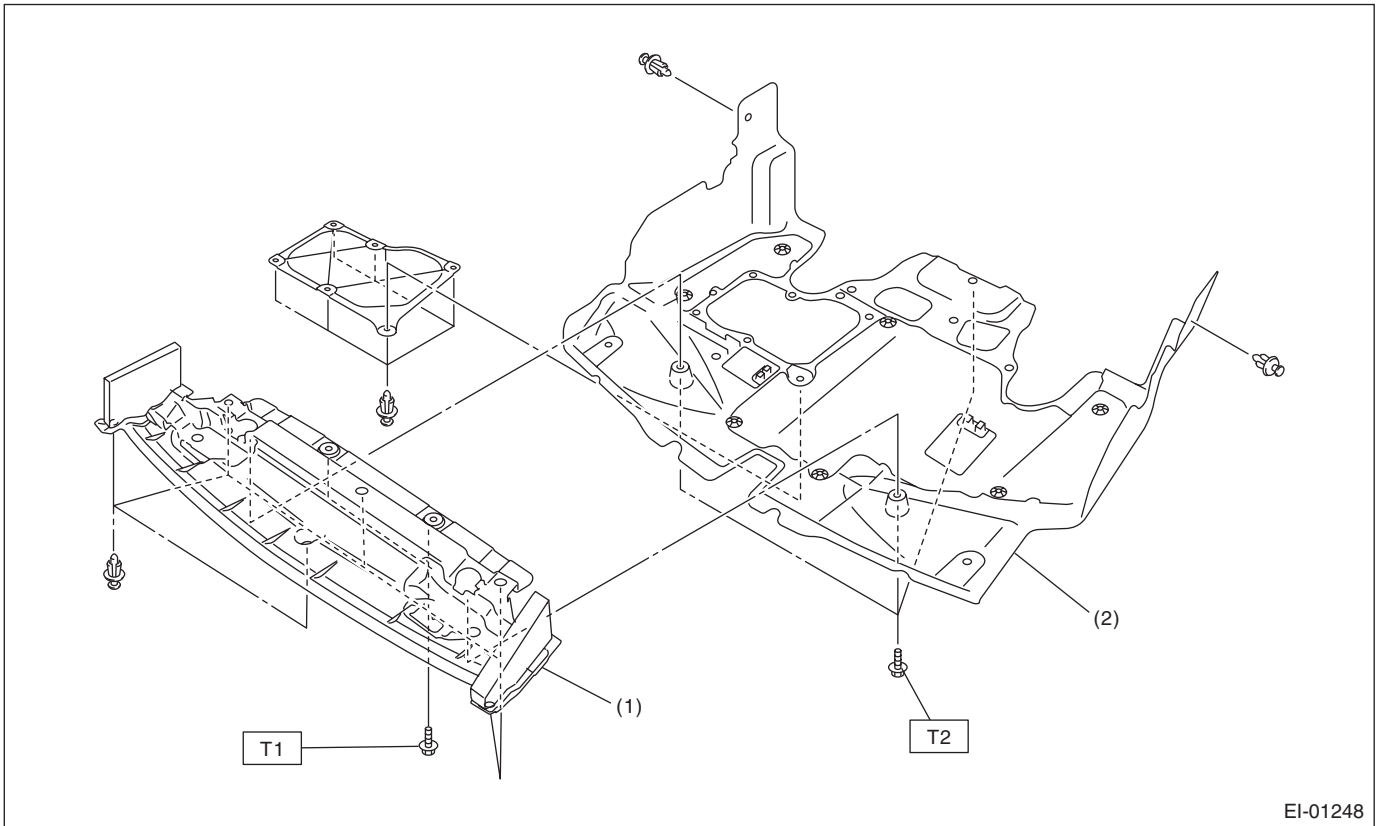
# General Description

EXTERIOR/INTERIOR TRIM

## 1. General Description

### A: COMPONENT

#### 1. UNDER COVER



EI-01248

(1) Front lower cover

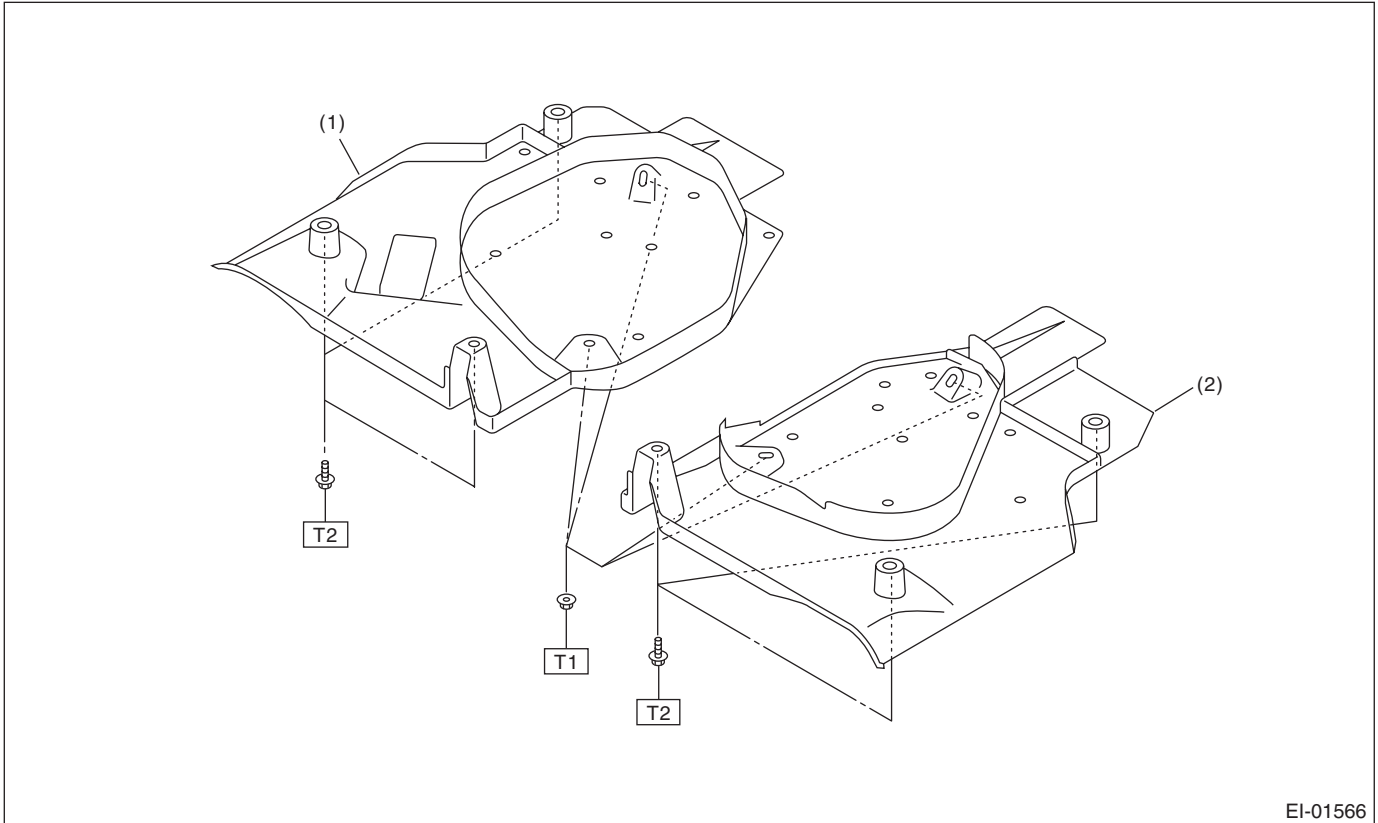
(2) Under cover

**Tightening torque: N-m (kgf-m, ft-lb)**

**T1: 7.5 (0.76, 5.5)**

**T2: 17.5 (1.78, 12.7)**

## 2. UNDER PROTECTOR



EI-01566

(1) Fuel tank protector RH

(2) Fuel tank protector LH

**Tightening torque: N·m (kgf-m, ft-lb)**

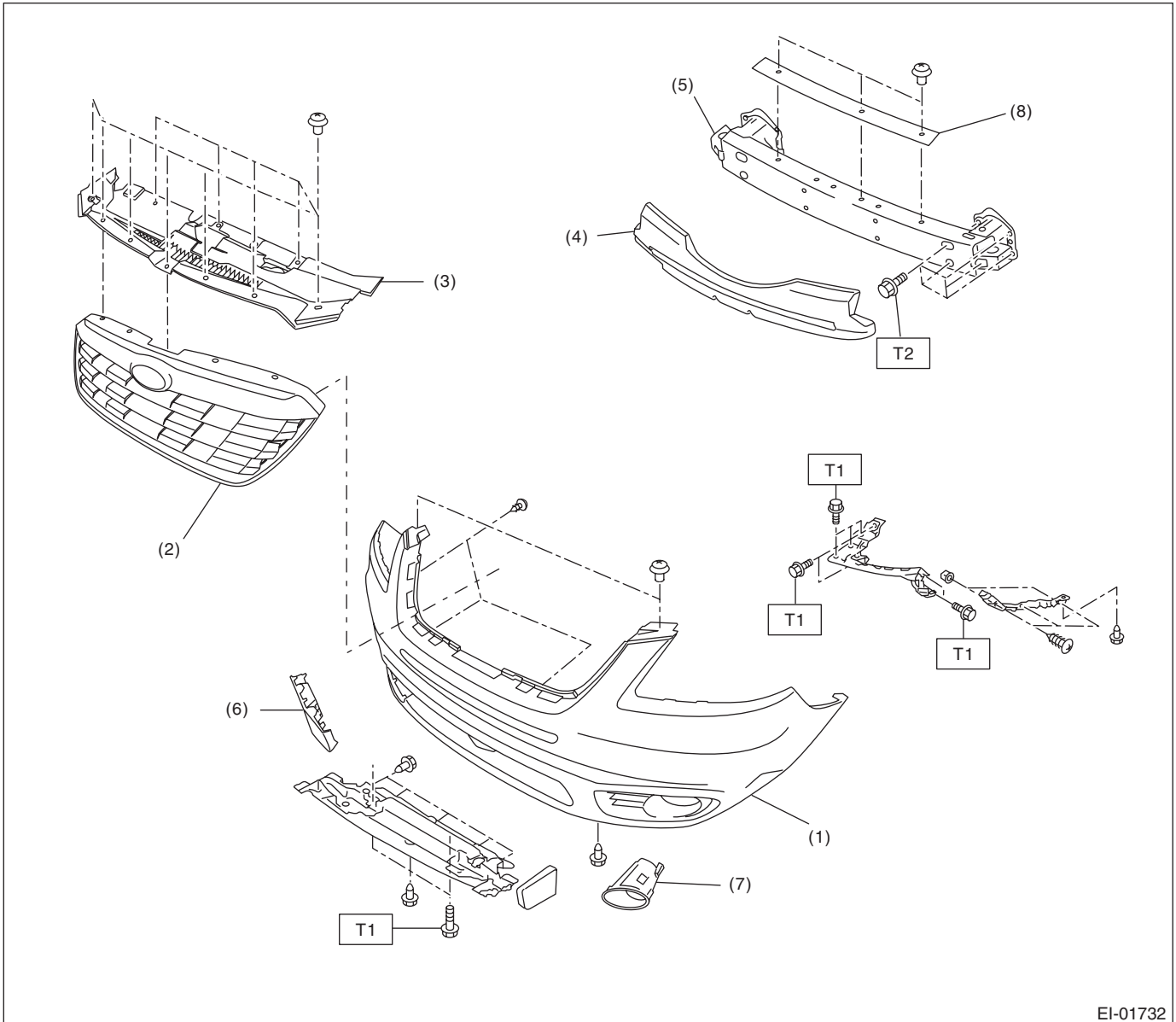
**T1: 9.0 (0.92, 6.6)**

**T2: 18 (1.84, 13.3)**

# General Description

## EXTERIOR/INTERIOR TRIM

### 3. FRONT BUMPER



- |                          |                               |
|--------------------------|-------------------------------|
| (1) Bumper face          | (5) Bumper beam reinforcement |
| (2) Front grille         | (6) Towing hook cover         |
| (3) Front upper cover    | (7) Fog light ASSY            |
| (4) Energy absorber foam | (8) Bumper beam cover         |

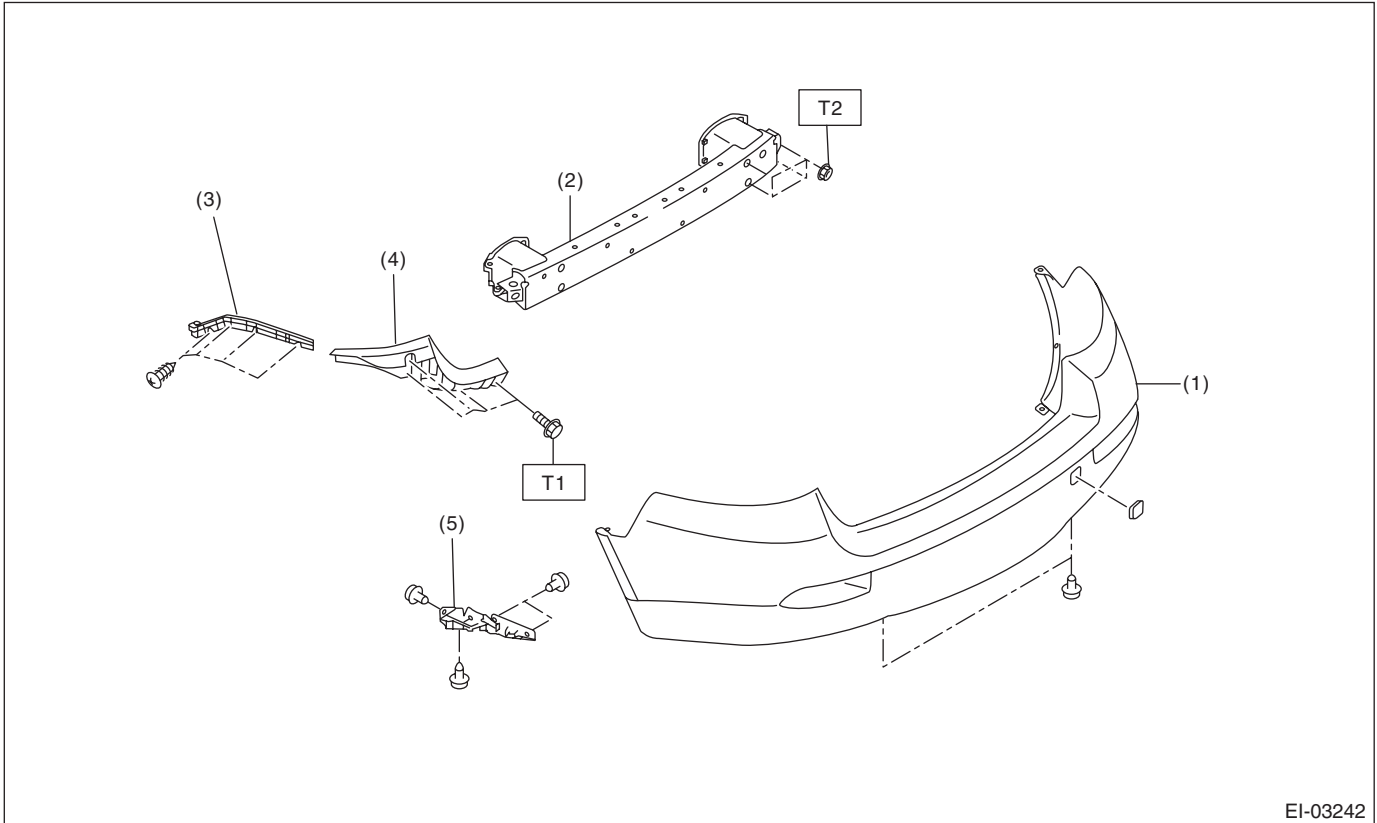
**Tightening torque: N·m (kgf·m, ft·lb)**

**T1: 7.5 (0.76, 5.5)**

**T2: 33 (3.4, 24)**



## 4. REAR BUMPER



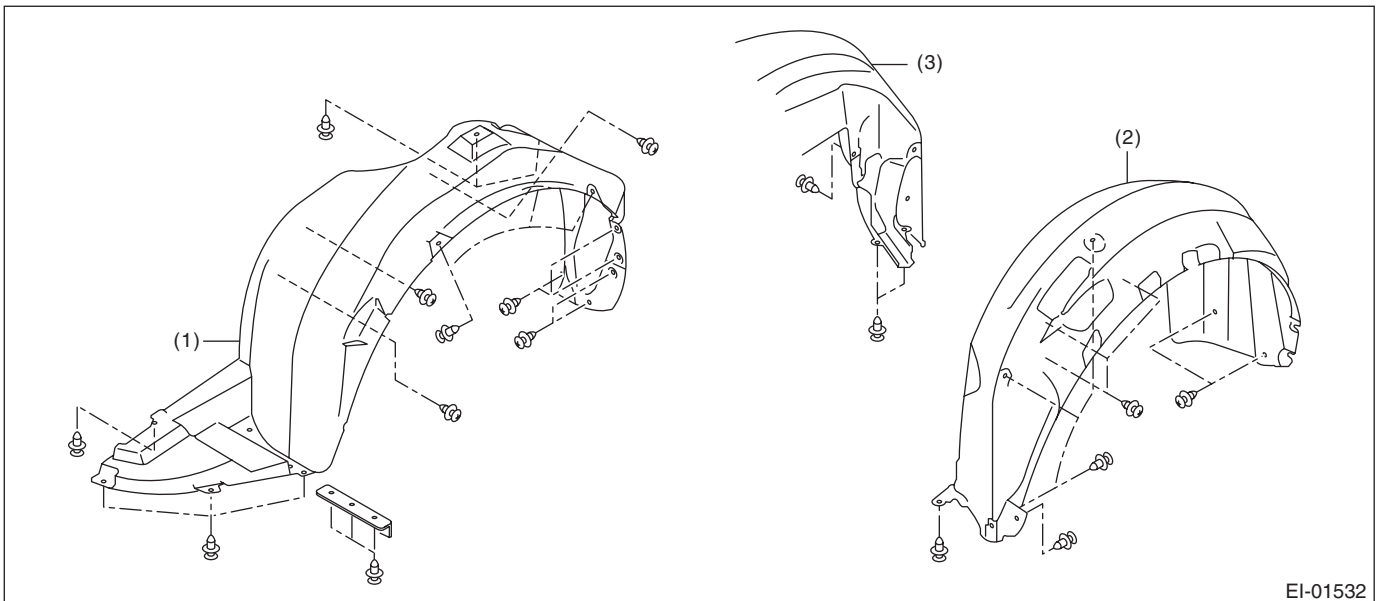
- (1) Bumper face
- (2) Bumper beam reinforcement
- (3) Rear side bracket
- (4) Rear corner bracket
- (5) Bumper side rear cover

**Tightening torque: N·m (kgf·m, ft·lb)**

**T1: 7.5 (0.76, 5.5)**

**T2: 53 (5.4, 38)**

## 5. MUD GUARD

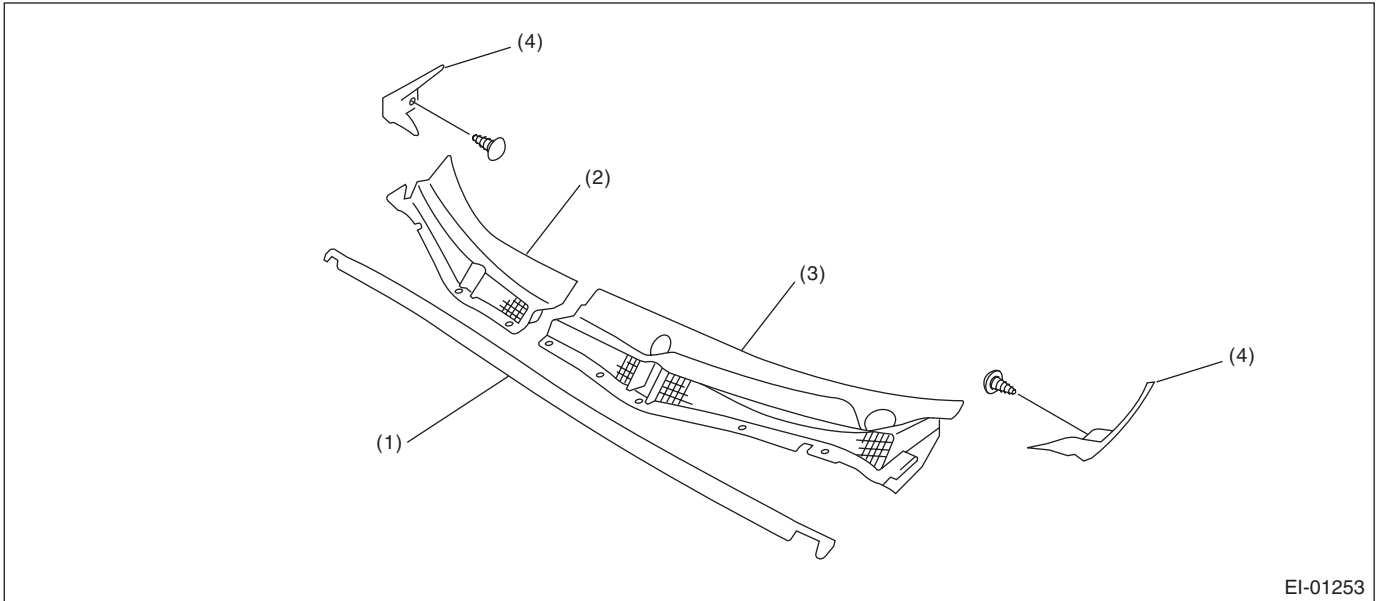


- (1) Front mud guard
- (2) Rear mud guard LH
- (3) Rear mud guard RH

# General Description

EXTERIOR/INTERIOR TRIM

## 6. COWL PANEL



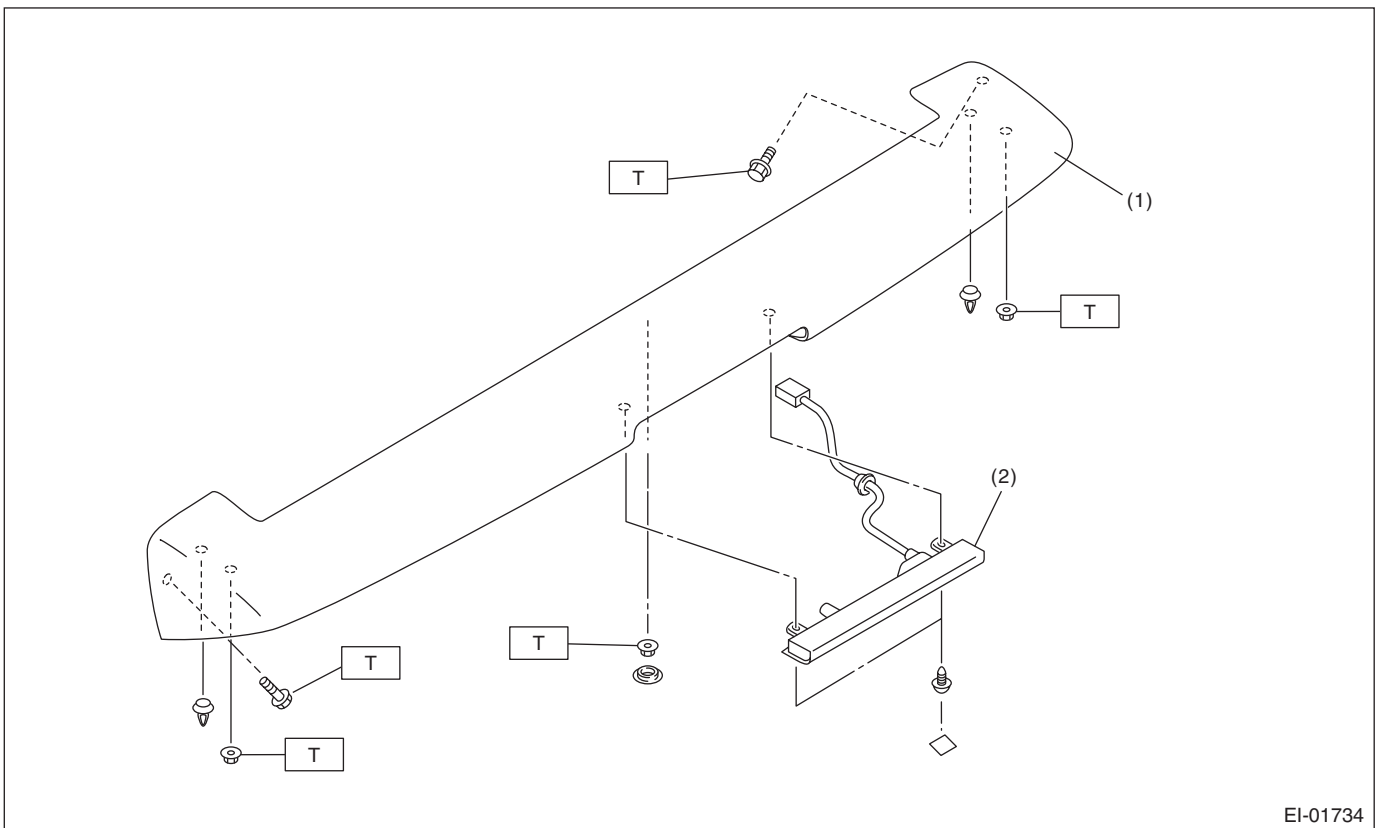
EI-01253

- (1) Weather strip
- (2) Cowl panel RH

(3) Cowl panel LH

(4) Cowl panel side

## 7. ROOF SPOILER



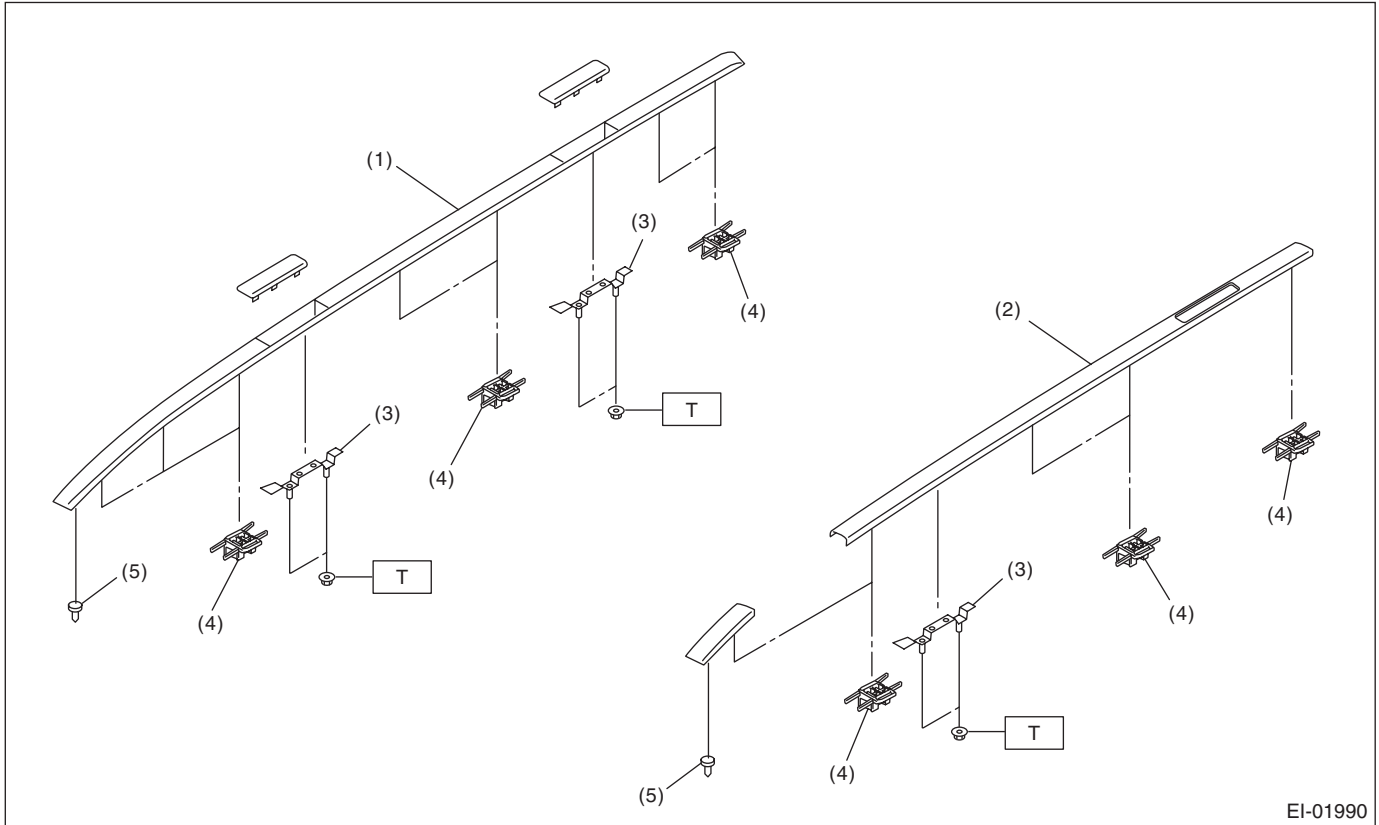
EI-01734

- (1) Roof spoiler
- (2) High-mounted stop light

**Tightening torque: N·m (kgf·m, ft·lb)**

**T: 4.5 (0.46, 3.32)**

## 8. ROOF MOLDING



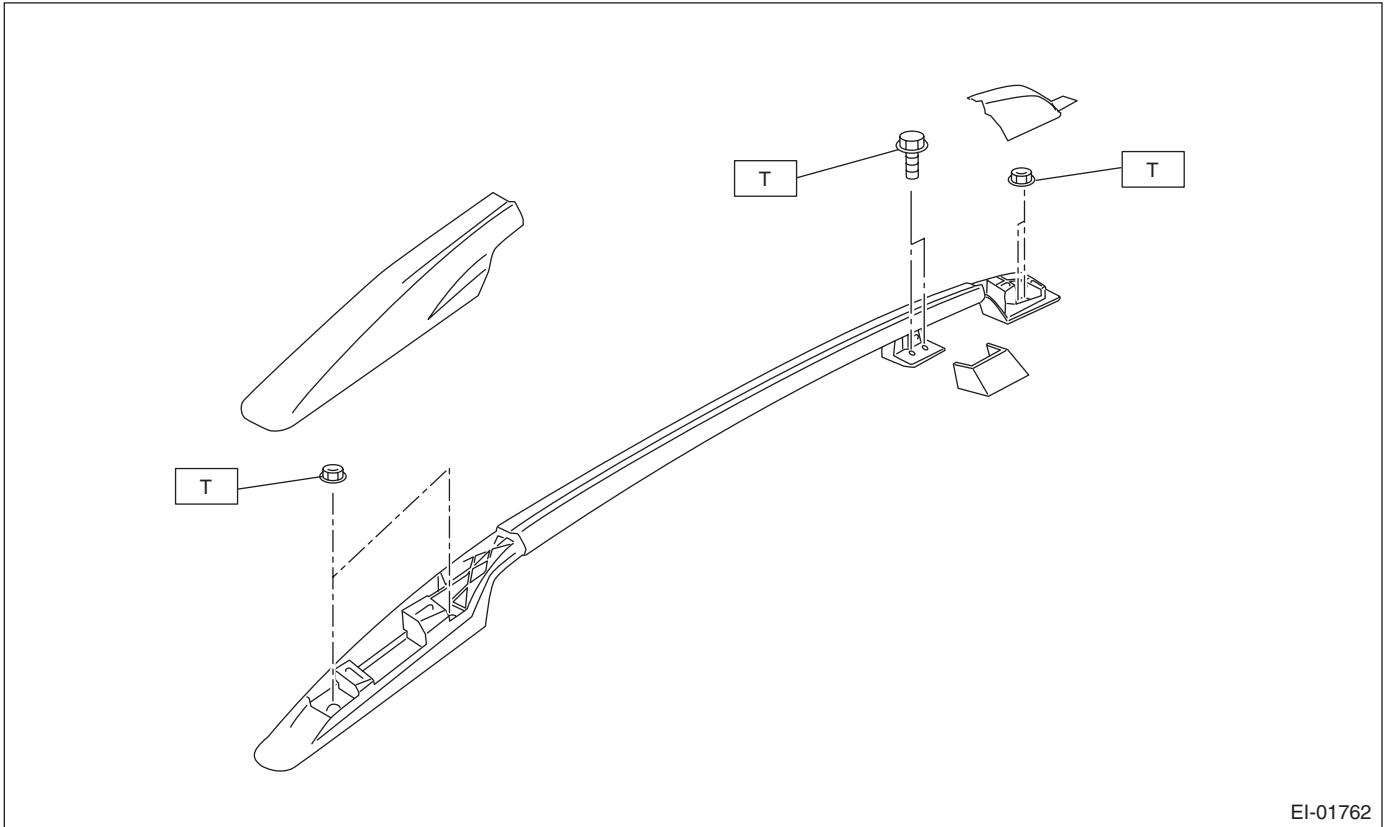
- |                                   |           |
|-----------------------------------|-----------|
| (1) Roof molding                  | (4) Clip  |
| (2) Roof molding (with roof rail) | (5) Rivet |
| (3) Roof carrier attachment       |           |

**Tightening torque: N·m (kgf-m, ft-lb)**  
**T: 10 (1.0, 7.23)**

# General Description

EXTERIOR/INTERIOR TRIM

## 9. ROOF RAIL

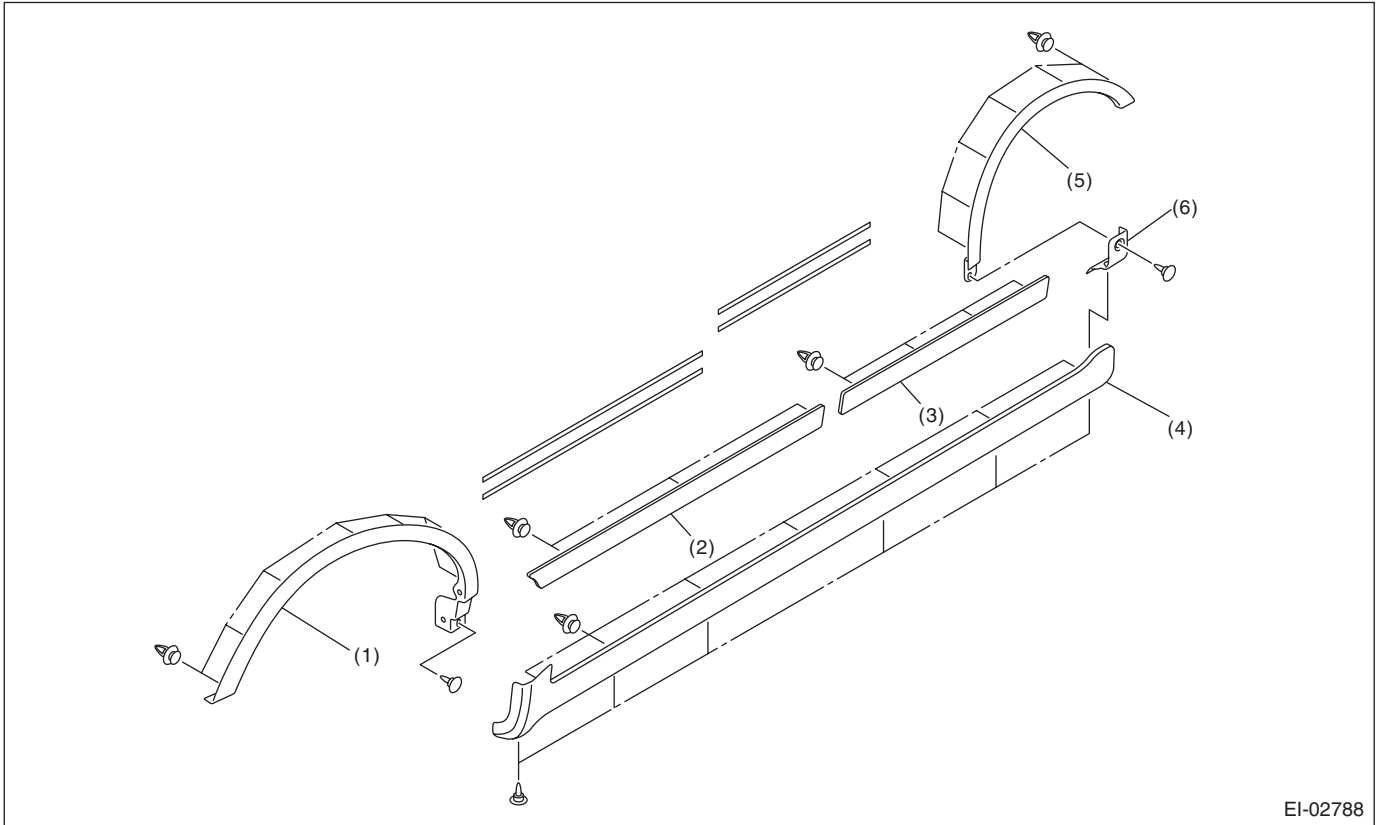


EI-01762

**Tightening torque: N·m (kgf·m, ft·lb)**

**T: 7.5 (0.76, 5.5)**

## 10.SIDE GARNISH



EI-02788

(1) Front fender garnish  
(2) Front door garnish

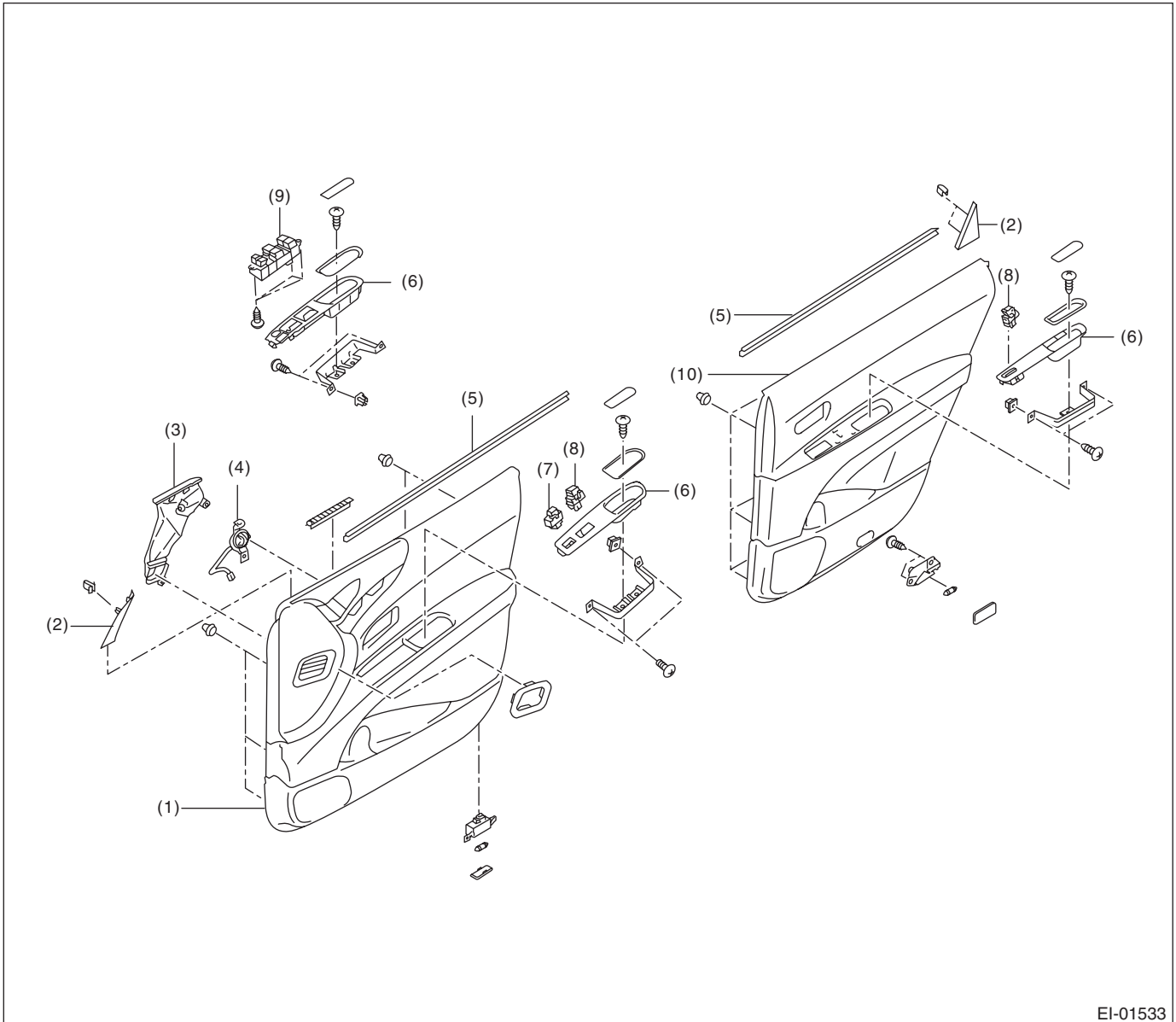
(3) Rear door garnish  
(4) Side sill garnish

(5) Rear quarter garnish  
(6) Garnish end cover

# General Description

## EXTERIOR/INTERIOR TRIM

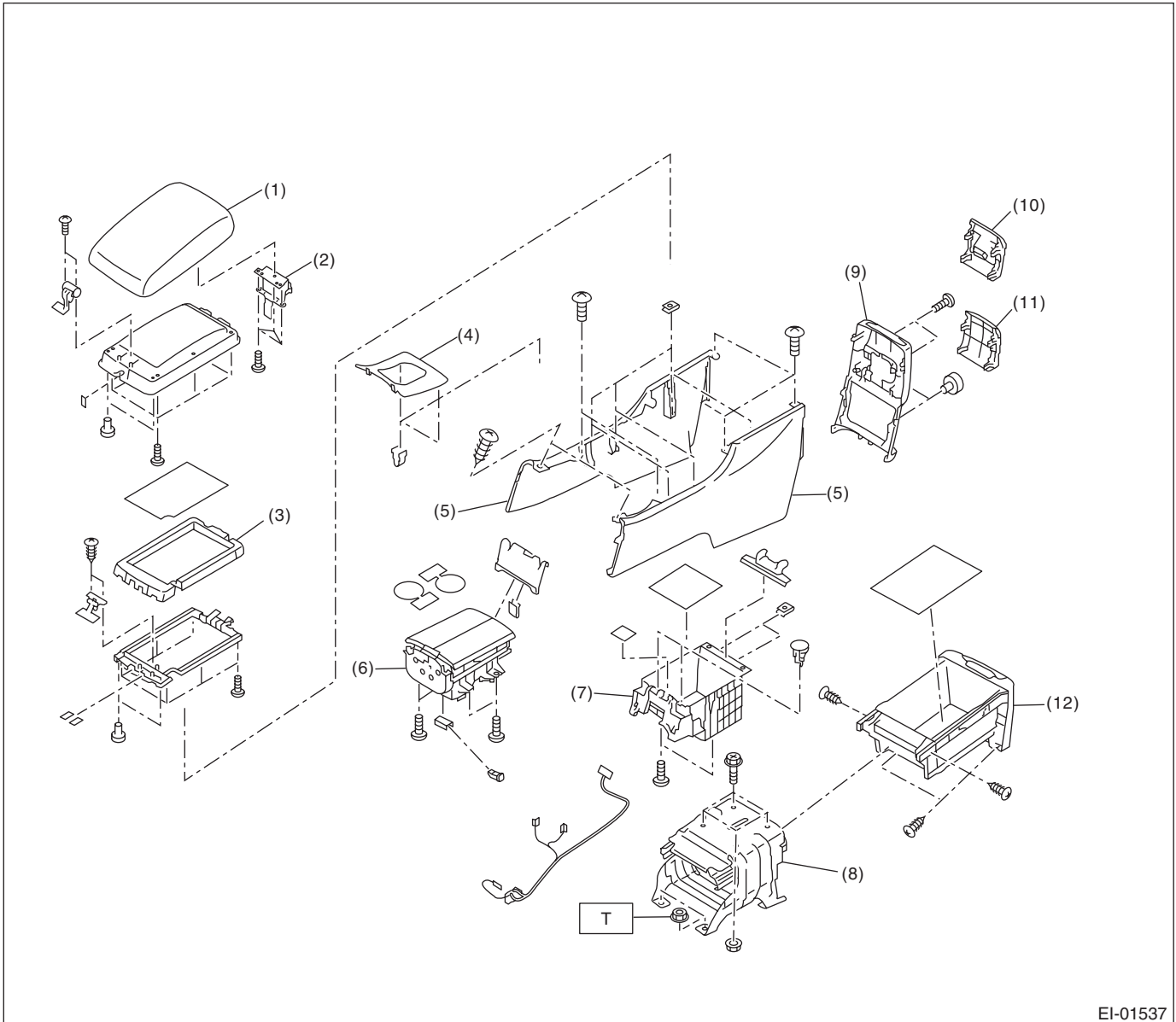
### 11.DOOR TRIM



EI-01533

- |                     |                               |                                   |
|---------------------|-------------------------------|-----------------------------------|
| (1) Front door trim | (5) Weather strip             | (9) Power window main switch ASSY |
| (2) Gusset cover    | (6) Power window switch cover | (10) Rear door trim               |
| (3) Defroster duct  | (7) Door lock switch          |                                   |
| (4) Tweeter         | (8) Power window sub-switch   |                                   |

## 12. CONSOLE BOX



EI-01537

- |                         |  |                           |
|-------------------------|--|---------------------------|
| (1) Console upper lid   | (6) Cup holder ASSY                      | (11) Rear panel cover     |
| (2) Lid hinge           | (7) Console pocket                       | (12) Console lower pocket |
| (3) Console lower lid   | (8) Console frame                        |                           |
| (4) Console front panel | (9) Console rear panel                   |                           |
| (5) Console side panel  | (10) Rear panel cover (with rear cooler) |                           |

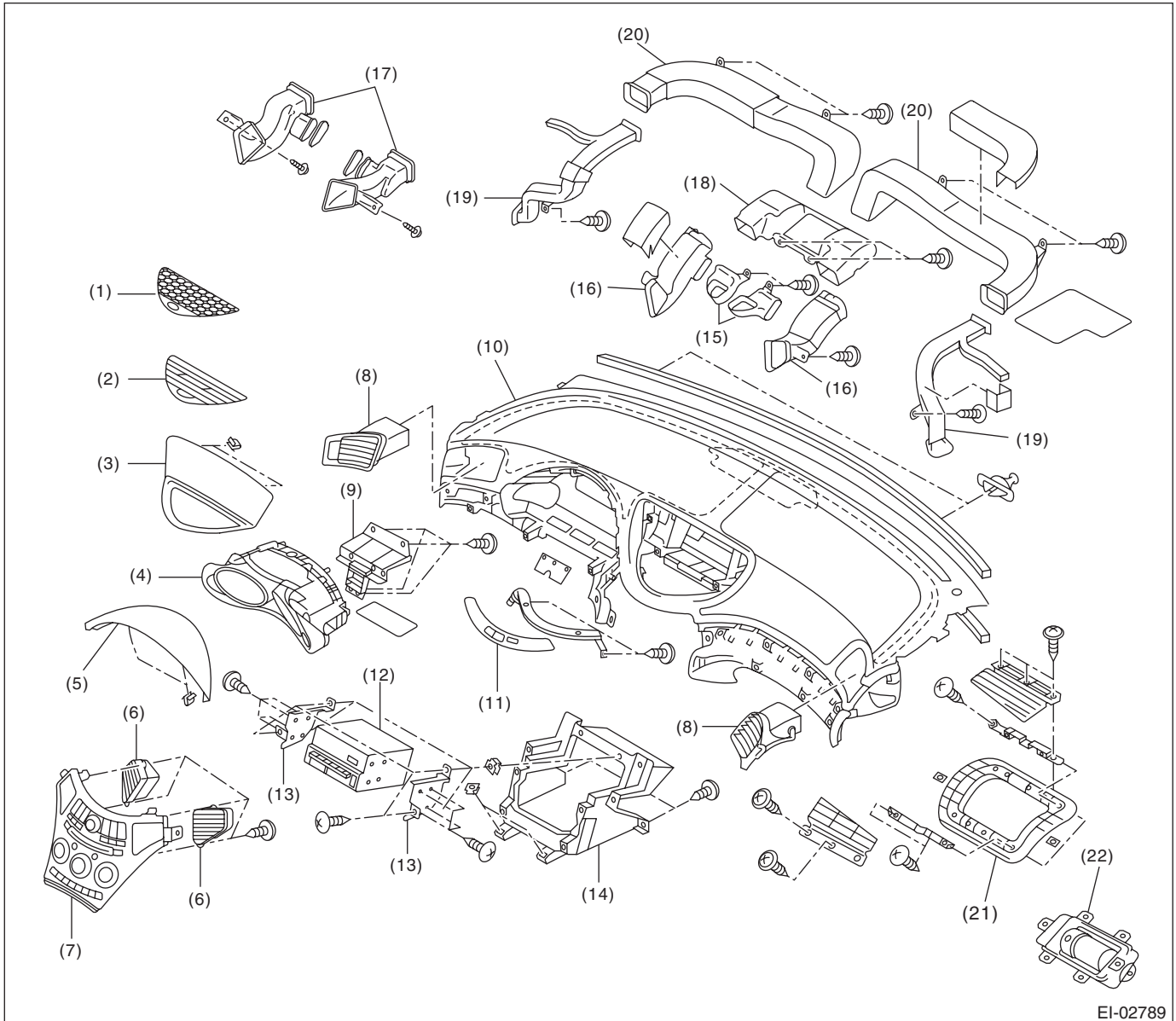
**Tightening torque: N·m (kgf·m, ft·lb)**

**T: 6.5 (0.66, 4.79)**

# General Description

## EXTERIOR/INTERIOR TRIM

### 13. INSTRUMENT PANEL



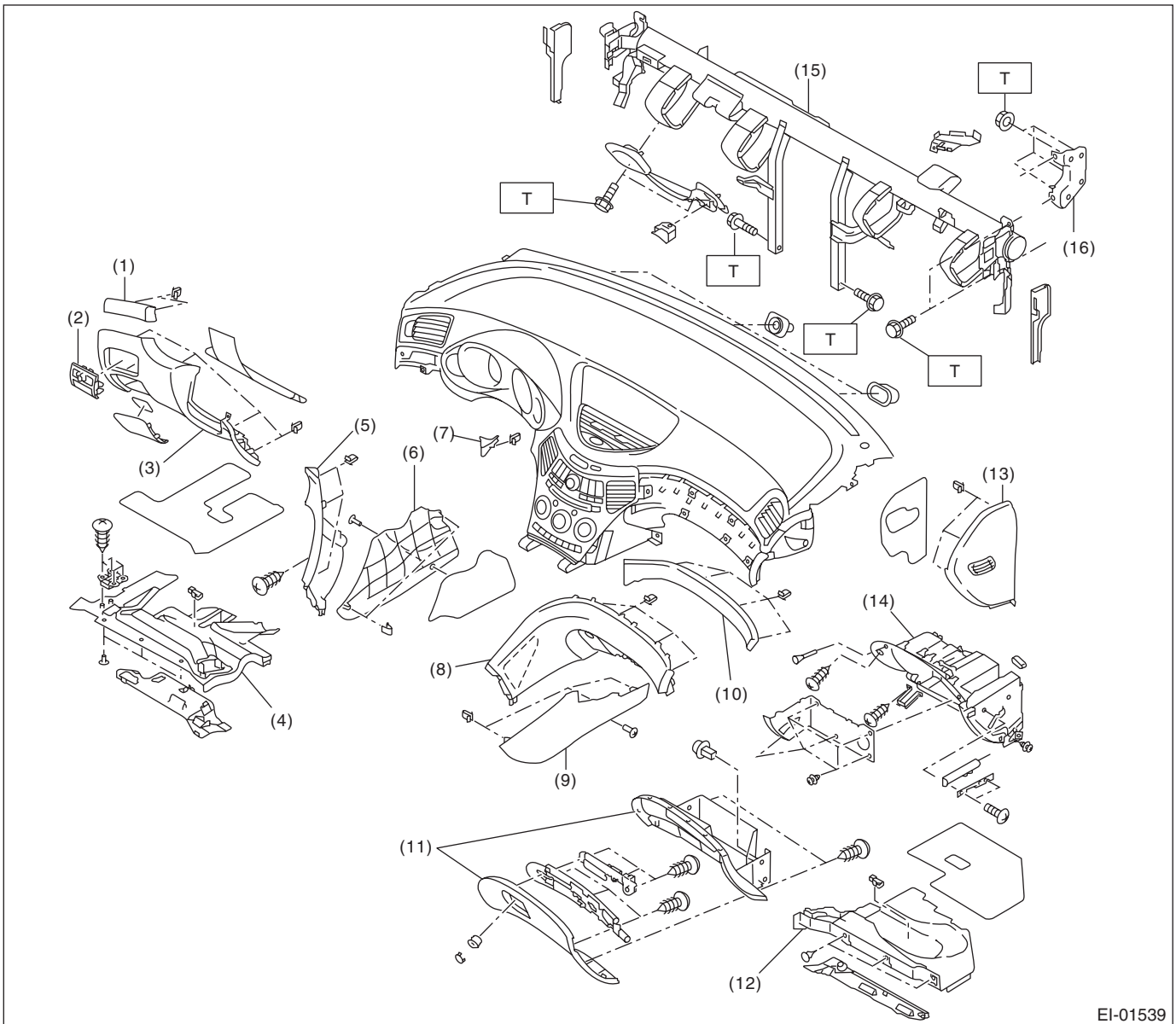
EI-02789

- |  |                                  |  |
|--|----------------------------------|--|
| (1) Speaker grille (for harman/kardon audio) | (9) Meter stay                   | (17) Center duct (for harman/kardon audio) |
| (2) Air vent upper grille                    | (10) Instrument panel upper ASSY | (18) Center ventilation duct               |
| (3) Display cover                            | (11) Upper control switch        | (19) Side defroster duct                   |
| (4) Combination meter ASSY                   | (12) Audio ASSY                  | (20) Side ventilation duct                 |
| (5) Meter visor                              | (13) Audio bracket               | (21) Passenger's airbag stay               |
| (6) Air vent center grille                   | (14) Center console frame        | (22) Passenger's airbag module ASSY        |
| (7) Control panel                            | (15) Upper duct                  |  |
| (8) Air vent side grille                     | (16) Center duct                 |  |



# General Description

EXTERIOR/INTERIOR TRIM



EI-01539

- |  |                                  |                                    |
|--|----------------------------------|------------------------------------|
| (1) Garnish LH                         | (8) Console side panel upper RH  | (15) Steering support beam ASSY    |
| (2) Switch ASSY                        | (9) Console side panel lower RH  | (16) Steering support beam bracket |
| (3) Instrument panel lower cover upper | (10) Garnish RH                  |                                    |
| (4) Instrument panel lower cover under | (11) Glove box lid               |                                    |
| (5) Console side panel upper LH        | (12) Glove box lower cover       |                                    |
| (6) Console side panel lower LH        | (13) Instrument panel side cover |                                    |
| (7) Garnish CTR                        | (14) Glove box panel             |                                    |

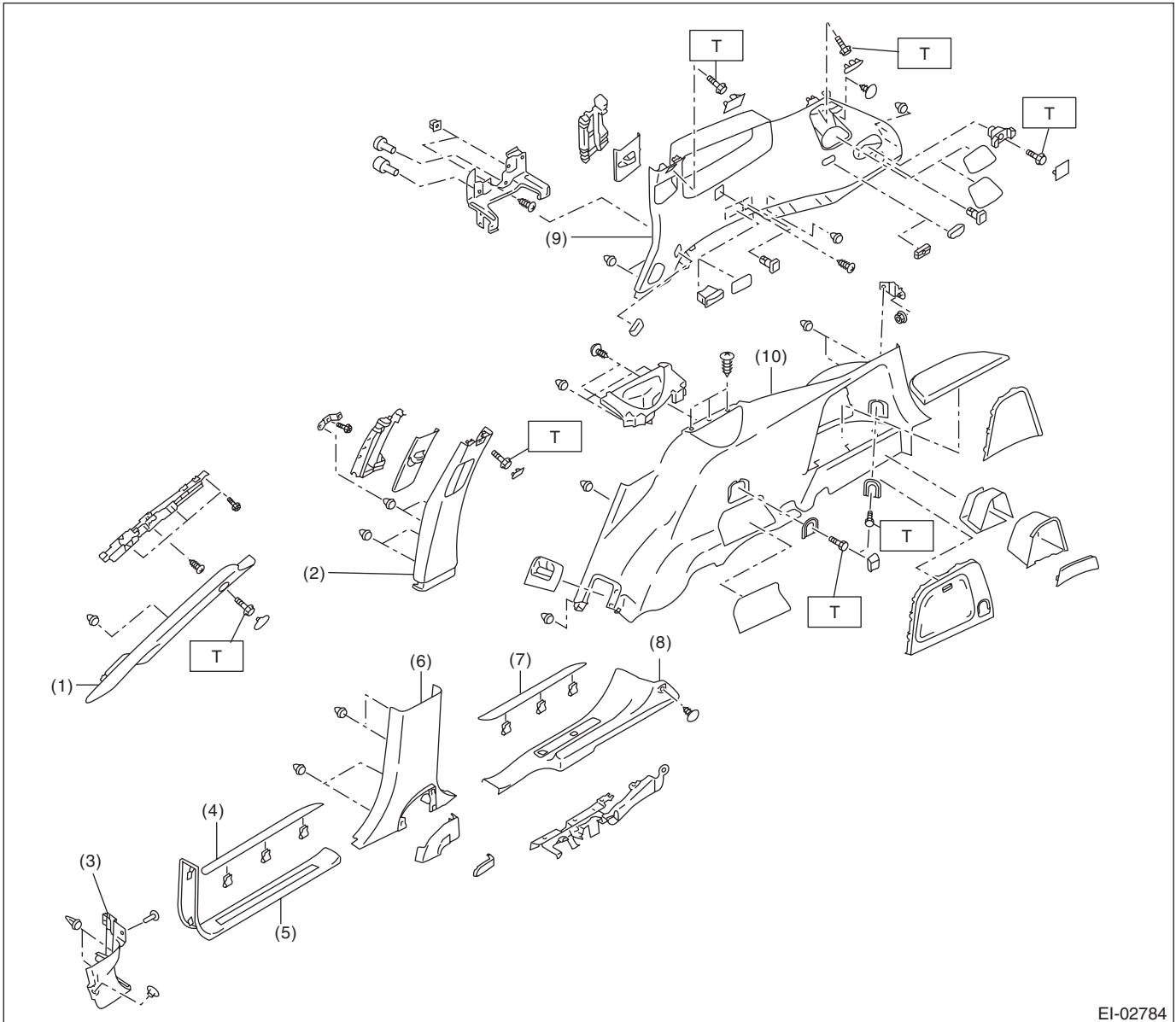
**Tightening torque: N·m (kgf·m, ft·lb)**

**T: 25 (25.5, 18)**

# General Description

## EXTERIOR/INTERIOR TRIM

### 14.SIDE TRIM



EI-02784

- (1) Front pillar upper trim
- (2) Center pillar upper trim
- (3) Front pillar lower trim
- (4) Front scuff plate
- (5) Front door scuff plate

- (6) Center pillar lower trim
- (7) Rear scuff plate
- (8) Rear door scuff plate
- (9) Rear quarter upper trim

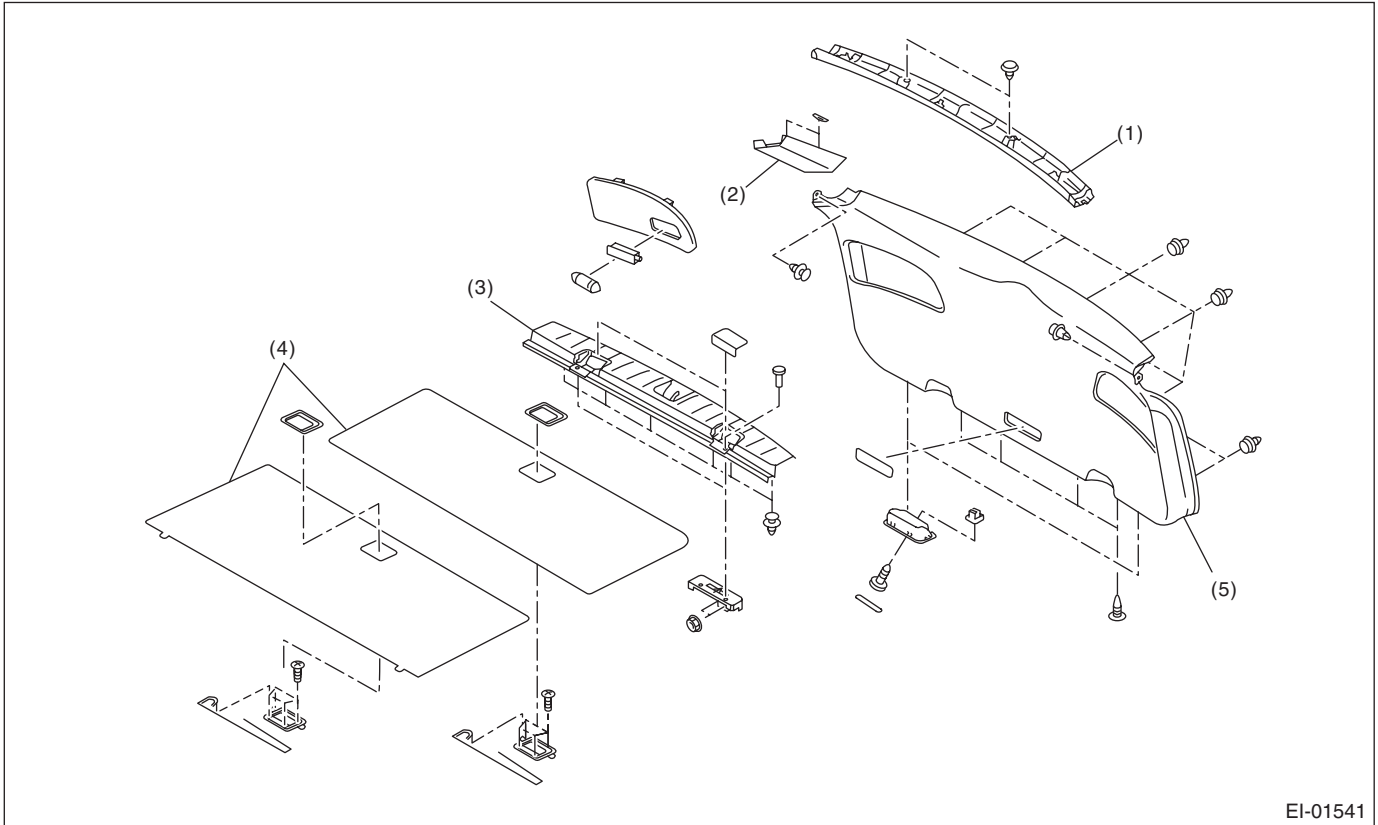
- (10) Rear quarter lower trim

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**Tightening torque: N·m (kgf·m, ft·lb)**  
**T: 7.5 (0.76, 5.5)**

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## 15.REAR GATE TRIM



EI-01541

(1) Rear gate panel upper trim  
(2) Rear gate panel pillar trim

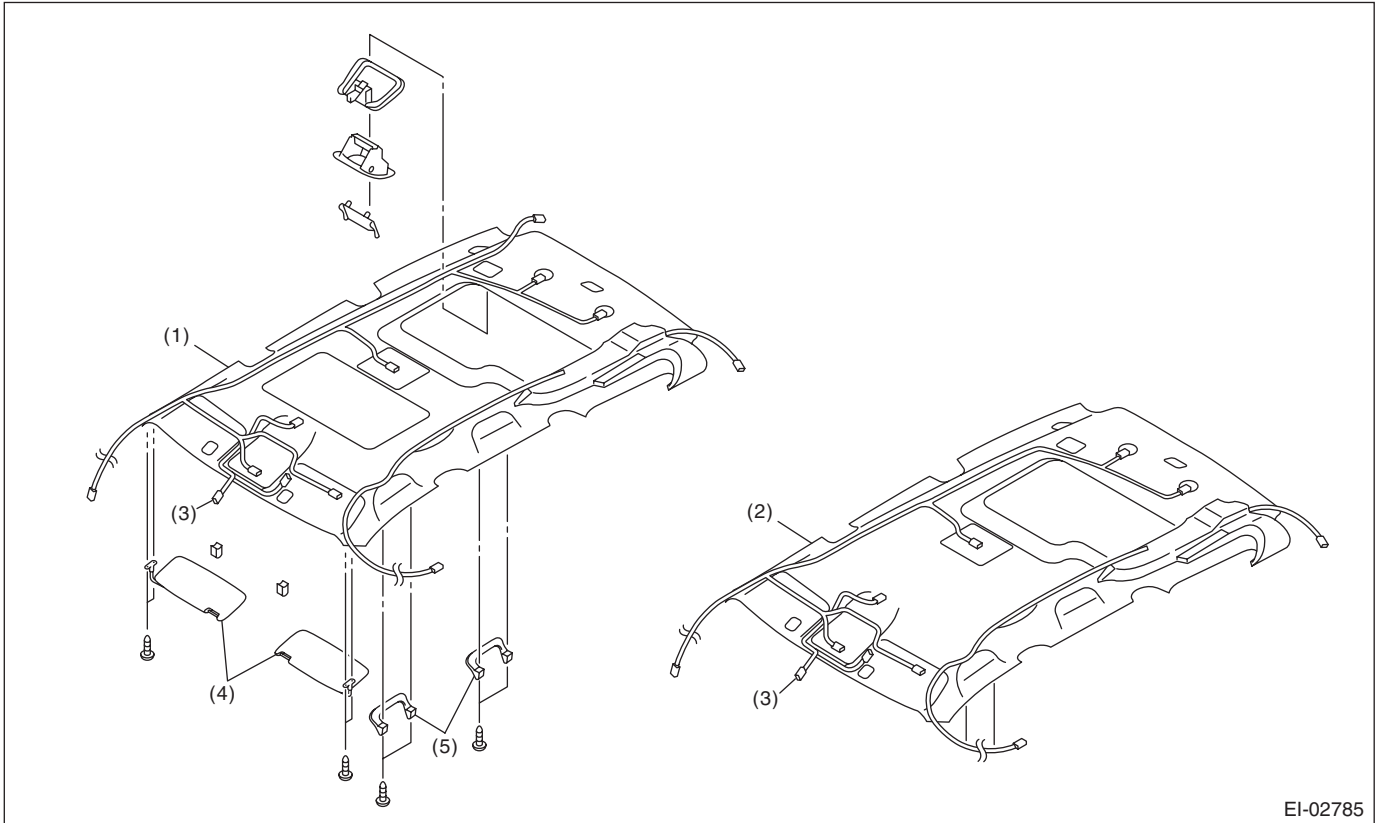
(3) Luggage floor end cover  
(4) Luggage floor mat

(5) Rear gate panel lower trim

# General Description

## EXTERIOR/INTERIOR TRIM

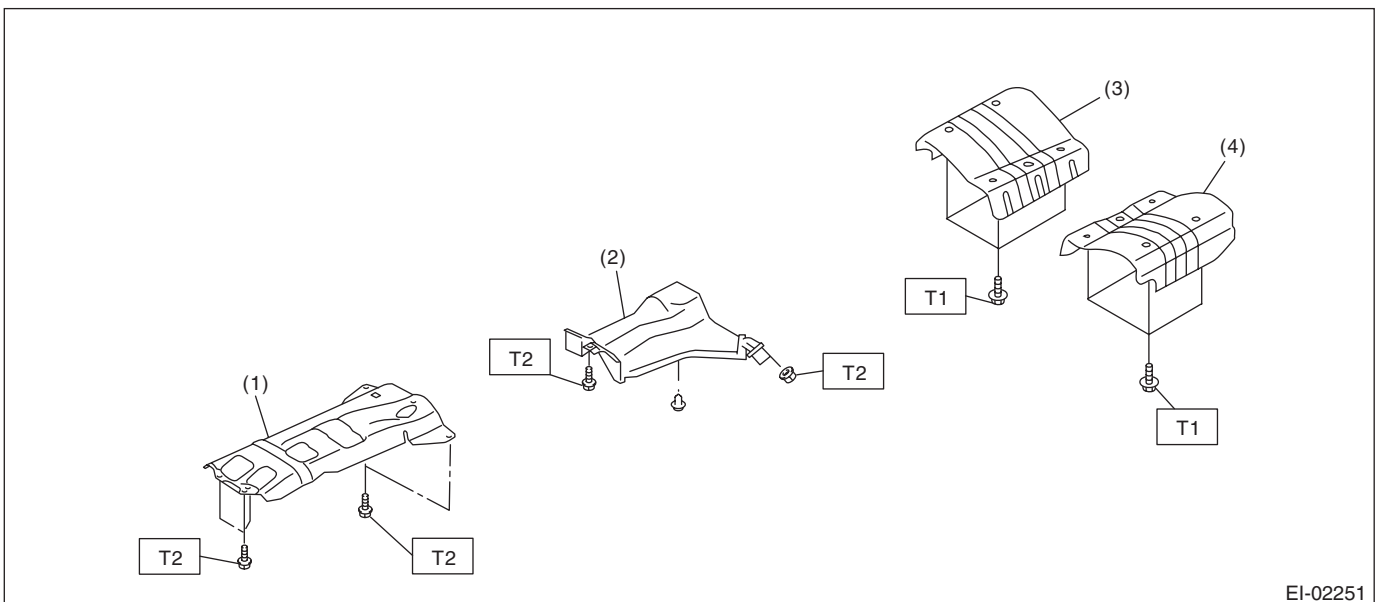
### 16.ROOF TRIM



EI-02785

- |                                    |   |                 |
|------------------------------------|---|-----------------|
| (1) Roof trim (model with sunroof) | (3) RCD mirror code (model with RCD mirror) | (5) Assist rail |
| (2) Roof trim                      | (4) Sun visor                               |                 |

### 17.HEAT SHIELD COVER

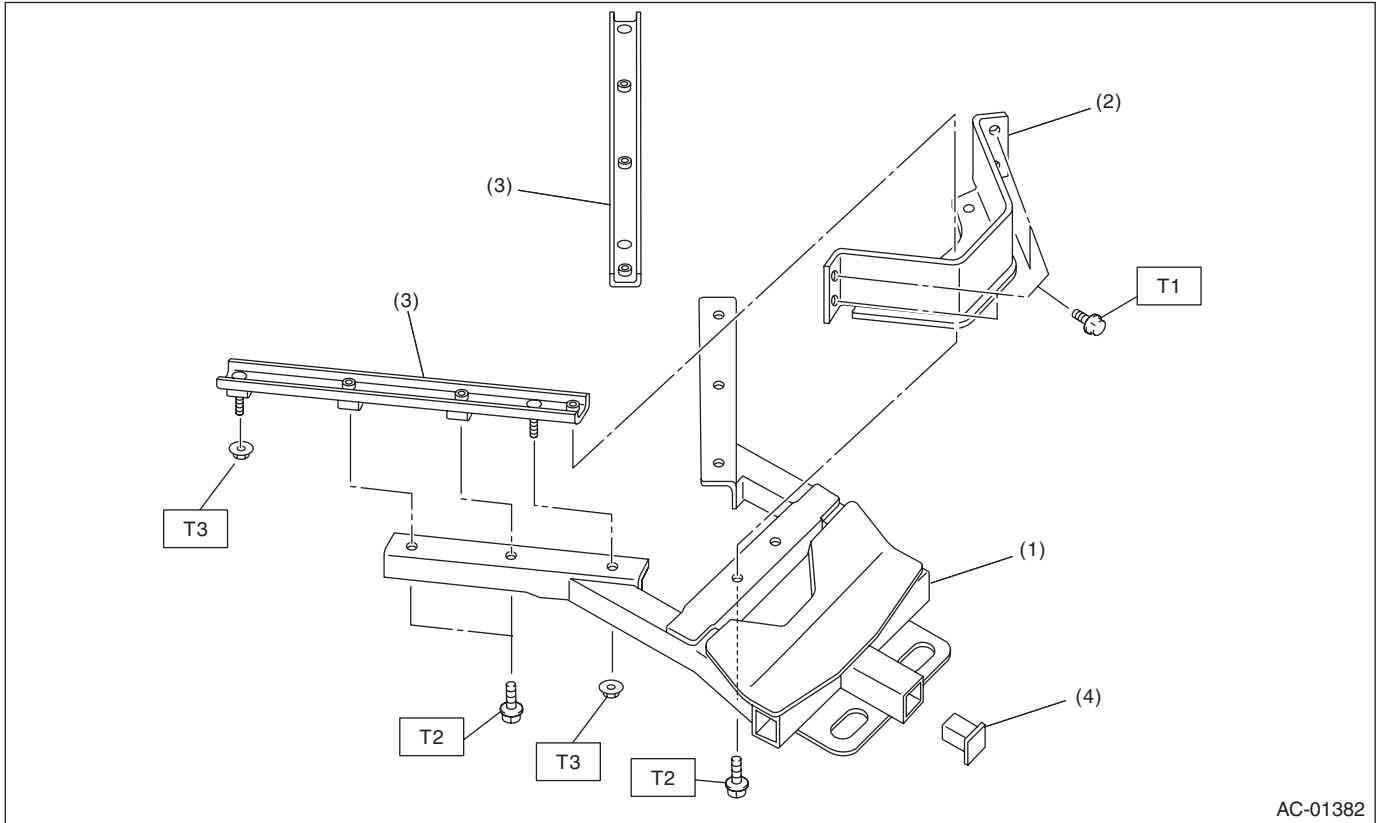


EI-02251

- |                              |                               |
|------------------------------|-------------------------------|
| (1) Front heat shield cover  | (3) Rear heat shield cover RH |
| (2) Center heat shield cover | (4) Rear heat shield cover LH |

**Tightening torque:N-m (kgf-m, ft-lb)**  
**T1: 7.5 (0.76, 5.5)**  
**T2: 18 (1.84, 13.3)**

## 18. TRAILER HITCH



- (1) Main frame
- (2) Center frame
- (3) Side frame
- (4) Cover

**Tightening torque: N·m (kgf·m, ft·lb)**

**T1: 13 (1.33, 9.4)**

**T2: 33 (3.37, 23.9)**

**T3: 53 (5.4, 38.3)**

## B: PREPARATION TOOL

TOOL NAME	REMARKS
Clip remover	Used for removing trim.
Clip clamp pliers	Used for removal of various clips and clamps.

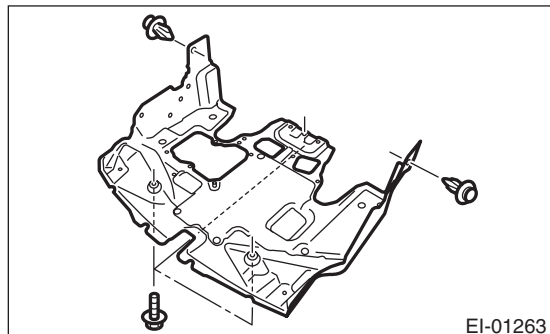
# Front Under Cover

EXTERIOR/INTERIOR TRIM

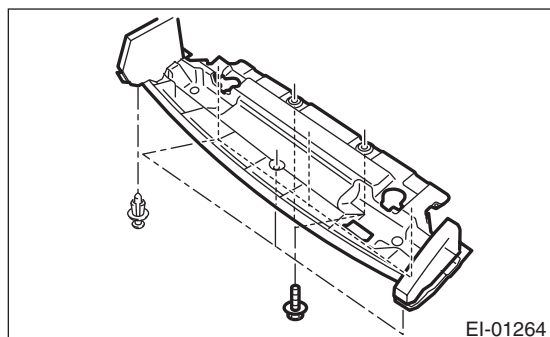
## 2. Front Under Cover

### A: REMOVAL

- 1) Lift up the vehicle.
- 2) Remove the clips and bolts, then remove the undercover.



- 3) Remove the clips and bolts, then remove the front lower cover.



### B: INSTALLATION

Install in the reverse order of removal.

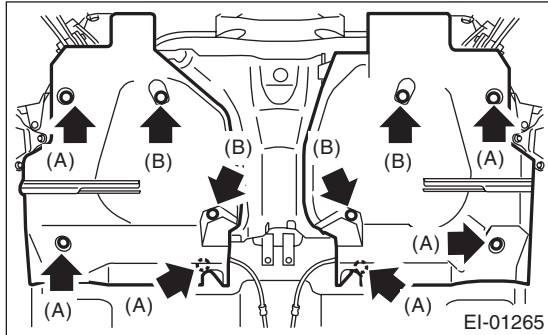
#### *Tightening torque:*

*Refer to "COMPONENT" of "General Description". <Ref. to EI-2, UNDER COVER, COMPONENT, General Description.>*

### 3. Fuel Tank Protector

#### A: REMOVAL

- 1) Lift up the vehicle.
- 2) Remove the bolts (A) and nuts (B), and then remove the fuel tank protector.



#### B: INSTALLATION

Install in the reverse order of removal.

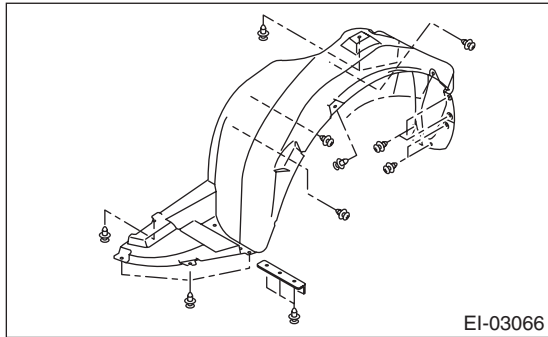
**Tightening torque:**

**Refer to "COMPONENT" of "General Description". <Ref. to EI-3, UNDER PROTECTOR, COMPONENT, General Description.>**

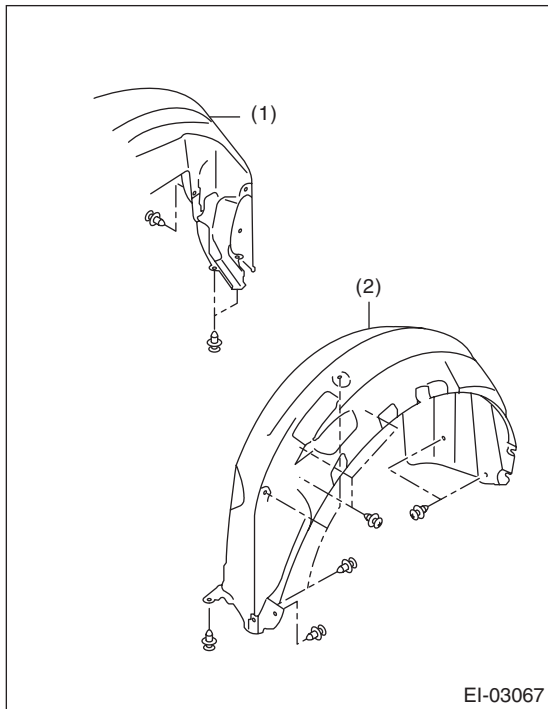
## 4. Mud Guard

### A: REMOVAL

- 1) Remove the wheels.
  - 2) Loosen the clips to remove mud guard.
- Front mud guard



- Rear mud guard



- (1) Rear mud guard LH
- (2) Rear mud guard RH

### B: INSTALLATION

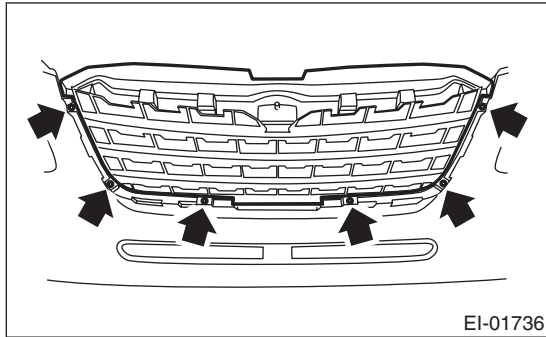
Install in the reverse order of removal.



## 5. Front Grille

### A: REMOVAL

- 1) Remove the front bumper. <Ref. to EI-22, REMOVAL, Front Bumper.>
- 2) Remove the screws, and remove the front grille from bumper face.



### B: INSTALLATION

Install in the reverse order of removal.

# Front Bumper

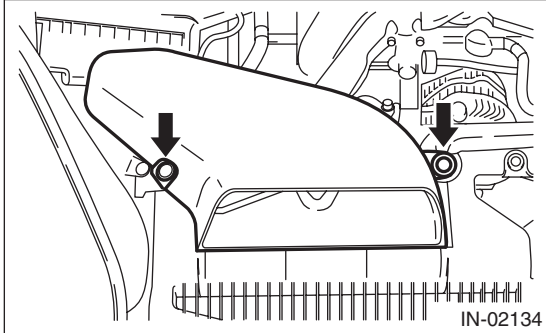
EXTERIOR/INTERIOR TRIM

## 6. Front Bumper

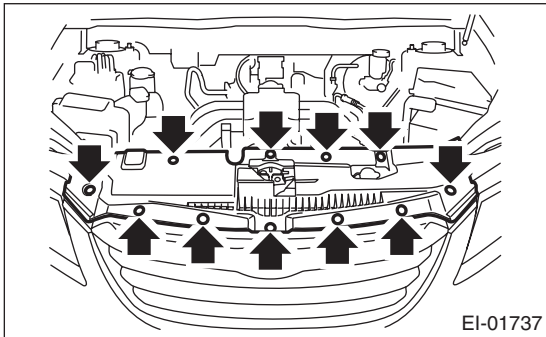
### A: REMOVAL

#### 1. FRONT BUMPER FACE

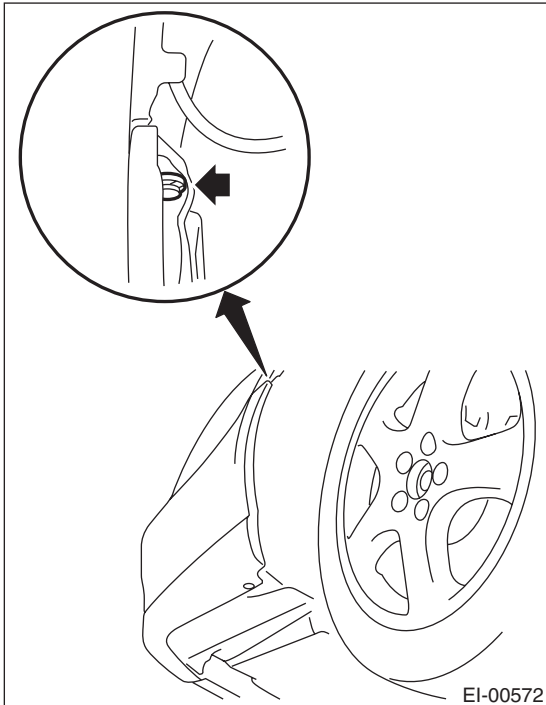
1) Remove the air intake duct.



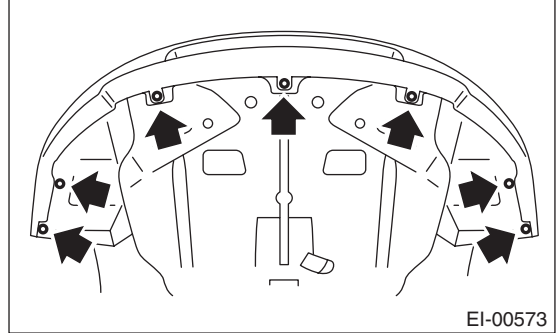
2) Remove the front upper cover.



3) Turn over the front mud guard, and remove the clips connecting the fender and bumper.



4) Remove the clips at the lower side of bumper.



5) Disconnect the fog light connector. (Model with fog light)

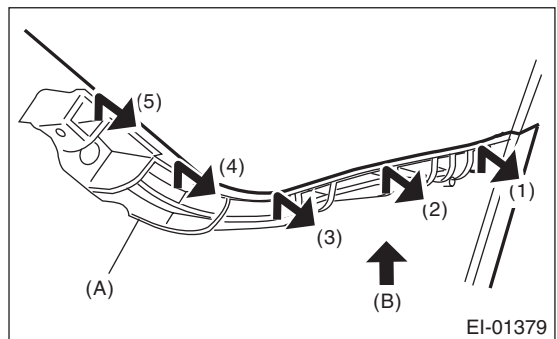
6) Remove the bumper face side claws from guide bracket (A).

#### CAUTION:

**Do not pull forcibly. The bumper face side claws can be damaged.**

#### NOTE:

Lifting the bumper face upward, and removing in the order of (B), (1)-(5) of the fender side, will make it easier to remove.

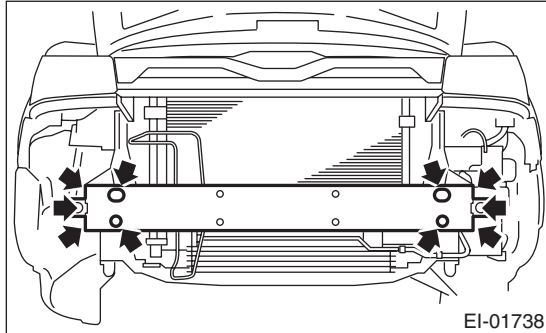


7) Remove the front grille from bumper face. <Ref. to EI-21, REMOVAL, Front Grille.>

8) Remove the fog light from bumper face. <Ref. to LI-21, REMOVAL, Front Fog Light Assembly.>

## 2. FRONT BUMPER BEAM ASSEMBLY

- 1) Remove the front bumper face.
- 2) Remove the energy absorber foam from bumper beam.
- 3) Remove the bolts, and remove the bumper beam assembly from vehicle body.



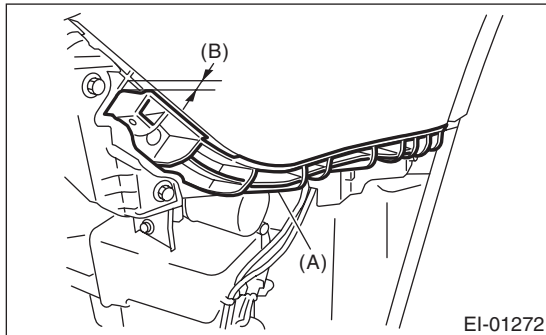
**NOTE:**

After all bolts are removed, lift the whole bumper beam a little to remove it from vehicle body.

## B: INSTALLATION

### 1. FRONT BUMPER FACE

- 1) Mount the bumper face securely in the gap between guide bracket (A) and fender (B).



- 2) Install in the reverse order of removal.

### 2. FRONT BUMPER BEAM ASSEMBLY

Install in the reverse order of removal.

**Tightening torque:**

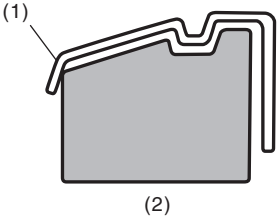
Refer to “COMPONENT” of “General Description”. <Ref. to EI-4, FRONT BUMPER, COMPONENT, General Description.>

# Front Bumper

EXTERIOR/INTERIOR TRIM

## C: REPAIR

### 1. COATING METHOD FOR PP BUMPER

Process No.	Process name	Job contents	
1	Bumper installation	Place the bumper on a paint worktable as required. Use the paint worktable conforming to inner shape of bumper if possible.	 <p>(1) Bumper (2) Set bumper section</p> <p>EI-00234</p>
2	Masking	Mask specified part (black base) with masking tape. Use masking tape for PP.	
3	Degreasing/cleaning	Clean all parts to be painted with white gasoline, normal alcohol, etc. to remove dirt, oil, fat, etc.	
4	Primer paint	Apply primer to all parts to be painted, using spray gun. Use primer (clear).	
5	Drying	Dry at normal temperature [10 to 15 min. at 20°C (68°F)]. In half-dried condition, PP primer paint is dissolved by solvent, e.g. thinner, etc. Therefore, if dust or dirt must be removed, use ordinary alcohol etc.	
6	Top coat paint (I)	Non-colored	Metallic paint
		Use section (block) paint for top coat. For paint/hardener mixture, observe the specifications recommended by the manufacturers. <ul style="list-style-type: none"> <li>• Viscosity: 10 — 13 sec./20°C (68°F)</li> <li>• Film thickness: 35 — 45 μ</li> <li>• Spraying pressure: 245 — 343 kPa (2.5 — 3.5 kgf/cm<sup>2</sup>, 36 — 50 psi)</li> </ul>	Use section (block) paint for top coat. For paint/hardener mixture, observe the specifications recommended by the manufacturers. <ul style="list-style-type: none"> <li>• Viscosity: 10 — 13 sec./20°C (68°F)</li> <li>• Film thickness: 15 — 20 μ</li> <li>• Spraying pressure: 245 — 343 kPa (2.5 — 3.5 kgf/cm<sup>2</sup>, 36 — 50 psi)</li> </ul>
7	Drying	Not required.	Dry at normal temperature [at least 10 min. at 20°C (68°F)]. In half-dried condition, avoid dust, dirt.
8	Top coat paint (II)	Not required.	Apply a clear coat to parts with top coat paint (I), three times at 5 — 7 minute intervals. For paint/hardener mixture, observe the specifications recommended by the manufacturers. <ul style="list-style-type: none"> <li>• Viscosity: 14 — 16 sec./20°C (68°F)</li> <li>• Film thickness: 25 — 30 μ</li> <li>• Spraying pressure: 245 — 343 kPa (2.5 — 3.5 kgf/cm<sup>2</sup>, 36 — 50 psi)</li> </ul>
9	Drying	60°C (140°F), 60 min. or 80°C (176°F), 30 min. If the temperature is higher than 80°C (176°F), PP may be deformed. Keep maximum temperature at 80°C (176°F) or less.	
10	Inspection	Check paint.	
11	Removal of masking	Remove the masking tape applied in procedure 2.	

## 2. REPAIR INSTRUCTIONS FOR COLORED PP BUMPER

**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. Damages limited to the shallow scratches that cause only a change in the luster of the base material or coating, can be almost fully restored. Before repairing a damaged area, explain this point to the customer and obtain an understanding about the matter.

Repair methods are outlined below, based on a classification of the extent of damage.

1) Minor damage causing only a change in the luster of the bumper due to a light touch  
Almost restorable.

Process No.	Process name	Job contents	
1	Cleaning	Clean the area to be repaired using water.	
2	Sanding	Grind the repairing area with #500 sand paper in a “feathering” motion.	
3	Finish	Resin section	Coated section
		Repeatedly apply wax to the affected area using soft cloth (such as flannel). Recommended wax: Tire wax or equivalent	
		Polish the waxed area with clean cloth after 5 — 10 minutes.	
		Perform either the same procedures as for the resin section or process No. 18 and subsequent in section 3), depending on the degree and nature of damage.	

2) Deep damage caused by scratching with fences etc.

A dent cannot be repaired but a whitened or swelled part can be removed.

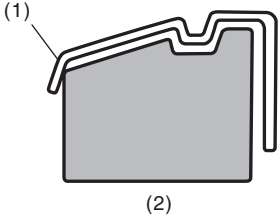
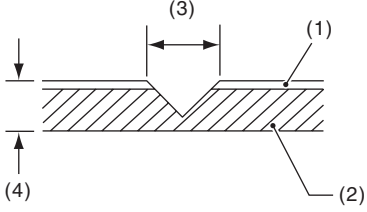
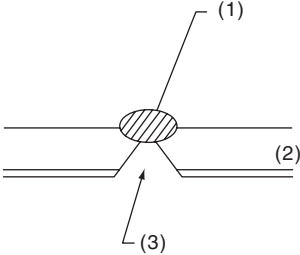
Process No.	Process name	Job contents	
1	Cleaning	Clean the damaged area with water.	
2	Removal of damaged area	Cut off protruding area, if any, due to collision, using a putty knife.	
3	Sanding	Grind the affected area with #100 — #500 sand paper.	
4	Finish	Resin section	Coated section
		Same as process No. 3 in section 1).	
		Perform process No. 12 and subsequent operations in section 3).	

# Front Bumper

## EXTERIOR/INTERIOR TRIM

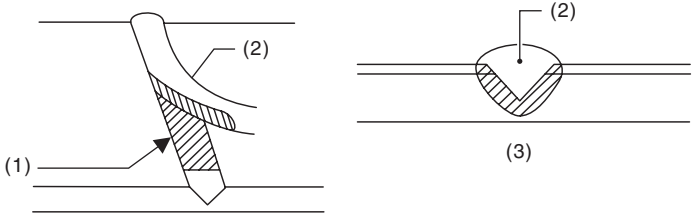

3) Deep damage such as a break or hole that requires filling

Much of the peripheral grained surface must be sacrificed for repair. The degree of restoration is not really worth the expense. (The surface, however, will become almost flush with adjacent areas.)

Process No.	Process name	Job contents	
1	Bumper removal	Remove the bumper as required.	
2	Removal of parts	Remove the parts built into bumper as required.	
3	Bumper placement	Place the bumper on a paint worktable as required. It is recommended to use the paint worktable conforming to internal shape of bumper.	 <p>(1) Bumper (2) Set bumper section</p> <p>EI-00234</p>
4	Surface preparation	Remove dust, oil, etc. from areas to be repaired and surrounding areas, using a suitable solvent (white gasoline or alcohol, etc.).	
5	Cutting	If the damage is a crack or a hole, 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 base surface. Next, use a knife or grinder to carve a V-shaped groove in the area for repair.	 <p>(1) Paint surface (2) PP base surface (3) 20 — 30 mm (0.79 — 1.18 in) (4) 3 mm (0.12 in)</p> <p>EI-00235</p>
6	Sanding (I)	Grind beveled surface with sand paper (#40 — #60) to smooth finish.	
7	Cleaning	Clean the sanded surface with the same solvent as used in process No. 4.	
8	Temporary welding	Grind the side just opposite the beveled area with sand paper (#40 — #60) and clean using a solvent. Temporarily spot-weld the side, using PP welding rod and heater gun.	 <p>(1) Welded point (Use heater gun and PP welding rod) (2) PP base surface (3) Beveled section</p> <p>NOTE:</p> <ul style="list-style-type: none"> <li>Do not melt welding rod until it flows out. This results in reduced strength.</li> <li>Leave the welded spot unattended until it cools completely.</li> </ul> <p>EI-00236</p>

# Front Bumper

EXTERIOR/INTERIOR TRIM

Process No.	Process name	Job contents
9	Welding	<p>Using a heater gun and PP welding rod, weld the beveled spot while melting both the rod and damaged area.</p>  <p>(1) Welding rod (2) Melt hatched area (3) Section</p> <p>NOTE:</p> <ul style="list-style-type: none"> <li>• Melt the sections indicated by hatched area.</li> <li>• Do not melt the welding rod until it flows out, in order to provide strength.</li> <li>• Always keep the heater gun 1 to 2 cm (0.4 to 0.8 in) away from the welding spot.</li> <li>• Leave the welded spot unattended until it cools completely.</li> </ul> <p style="text-align: right;">EI-00237</p>
10	Sanding (II)	<p>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.</p>  <p style="text-align: right;">EI-00042</p> <p>Sand the welded spot smooth with #240 sand paper.</p>
11	Masking	Mask the black substrate section using masking tape.
12	Cleaning/degreasing	Completely clean the entire coated area, using solvent similar to that used in process No. 4.
13	Primer coating	<p>Apply a coat of primer for bumpers to the repaired surface and its surrounding areas. Mask these areas, if necessary.</p> <p>NOTE: Be sure to apply a coat of primer using a spray gun at a pressure of 245 — 343 kPa (2.5 — 3.5 kgf/cm<sup>2</sup>, 36 — 50 psi).</p>
14	Leave unattended	<p>Leave the repaired area unattended at 20°C (68°F) for 10 to 15 minutes until primer is half-dry.</p> <p>NOTE: If dirt or dust comes in contact with the coated area, wipe it off with a cloth dampened with alcohol. (Do not use thinner since the coated area tends to melt.)</p>
15	Surfacer coating	<p>Apply a coat of surfacer for PP bumpers to the repaired area two or three times at an interval of 3 — 5 minutes.</p> <p>For surfacer/hardener mixture, viscosity and paint thickness, observe the specifications of the surfacers to be used.</p>
16	Drying	Allow the coated surface to dry for 20 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.

# Front Bumper

## EXTERIOR/INTERIOR TRIM

Process No.	Process name	Job contents	
		Non-colored	Metallic paint
19	Top coat (I)	Use a "block" coating method. For paint/hardener mixture, observe the specifications recommended by the manufacturers. <ul style="list-style-type: none"> <li>• Viscosity: 11 — 13 sec./20°C (68°F)</li> <li>• Coating film thickness: 40 — 50 μ</li> <li>• Spraying pressure: 245 — 343 kPa (2.5 — 3.5 kgf/cm<sup>2</sup>, 36 — 50 psi)</li> </ul>	Use a "block" coating method. For paint/hardener mixture, observe the specifications recommended by the manufacturers. <ul style="list-style-type: none"> <li>• Viscosity: 11 — 13 sec./20°C (68°F)</li> <li>• Coating film thickness: 20 — 30 μ</li> <li>• Spraying pressure: 245 — 343 kPa (2.5 — 3.5 kgf/cm<sup>2</sup>, 36 — 50 psi)</li> </ul>
20	Leave unattended	Not required.	Leave unattended at 20°C (68°F) for at least 10 minutes until the topcoated area is half-dry. <b>NOTE:</b> 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. For paint/hardener mixture, observe the specifications recommended by the manufacturers. <ul style="list-style-type: none"> <li>• Viscosity: 10 — 13 sec./20°C (68°F)</li> <li>• Coating film thickness: 20 — 30 μ</li> <li>• Spraying pressure: 245 — 343 kPa (2.5 — 3.5 kgf/cm<sup>2</sup>, 36 — 50 psi)</li> </ul>
22	Drying	Allow the coated surface to dry for two hours at 20°C (68°F) or 30 minutes at 60°C (140°F). <b>NOTE:</b> 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	Removal of masking	Remove the masking tape applied in process No. 11 and 13.	
25	Parts installation	Install parts on the bumper in reverse order of removal.	
26	Bumper installation	Install the bumper.	

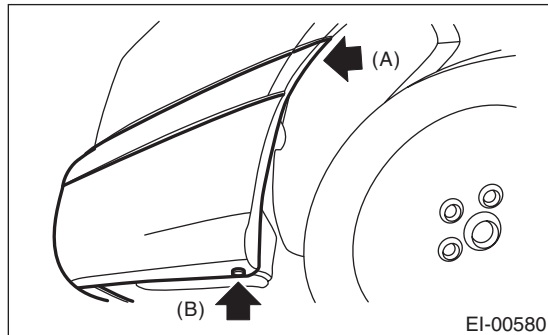


## 7. Rear Bumper

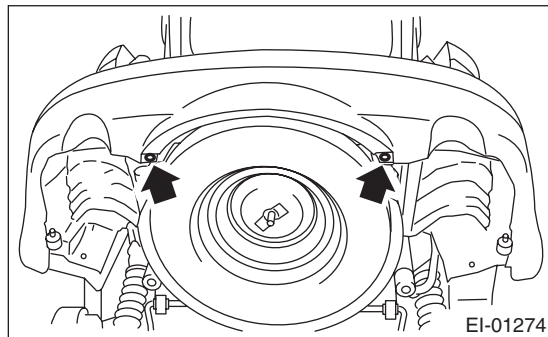
### A: REMOVAL

#### 1. REAR BUMPER FACE

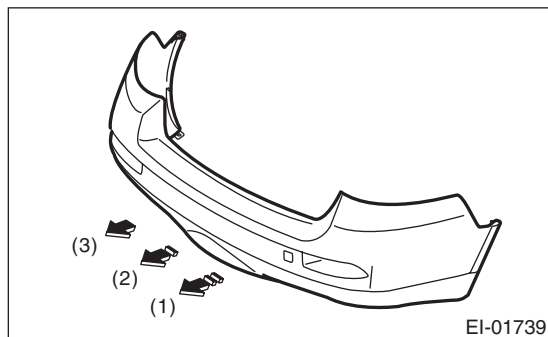
1) Turn over the mud guard, and remove the clip (A) and (B) inside wheel house and in the lower side of bumper.



2) Remove the clips on the lower side of rear bumper.



3) Remove the rear bumper from vehicle body.



#### CAUTION:

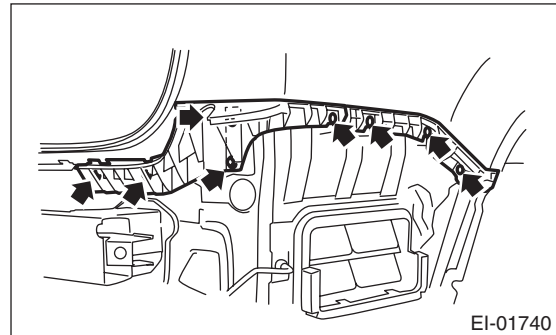
**Do not pull with a excessive force. Otherwise the bracket installation area may be damaged.**

#### NOTE:

- Lifting the bumper face upward, and removing in the order of (1) — (3) of the fender side, will make it easier to remove.
  - When removing the bumper face from bracket, it is easier to remove from the end in order.
- 4) Remove the reflector or rear fog light.

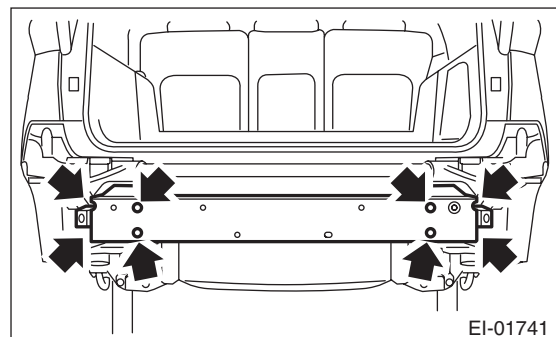
#### 2. REAR BUMPER BRACKET

- 1) Remove the rear bumper face from vehicle body.
- 2) Remove the corner and side bracket.



#### 3. REAR BUMPER BEAM ASSEMBLY

- 1) Remove the rear bumper face.
- 2) Remove the nuts, and remove the bumper beam assembly from the vehicle body.



### B: INSTALLATION

Install in the reverse order of removal.

#### Tightening torque:

**Refer to "COMPONENT" of "General Description". <Ref. to EI-5, REAR BUMPER, COMPONENT, General Description.>**

### C: REPAIR

Refer to front bumper repair. <Ref. to EI-24, REPAIR, Front Bumper.>

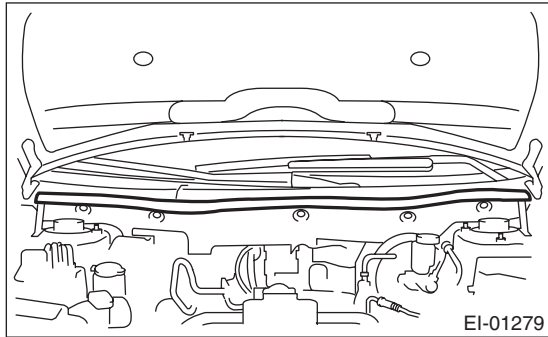
# Cowl Panel

EXTERIOR/INTERIOR TRIM

## 8. Cowl Panel

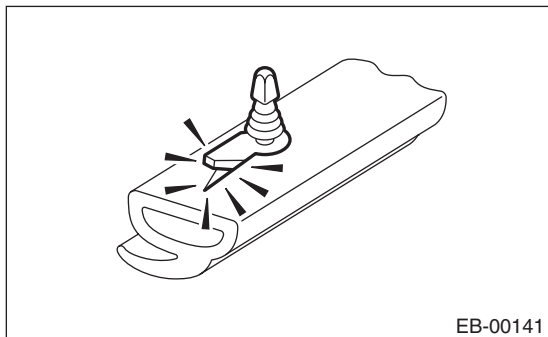
### A: REMOVAL

- 1) Remove the wiper arm. <Ref. to WW-16, REMOVAL, Front Wiper Arm.>
- 2) Remove the weather strip clips, and remove the weather strip.

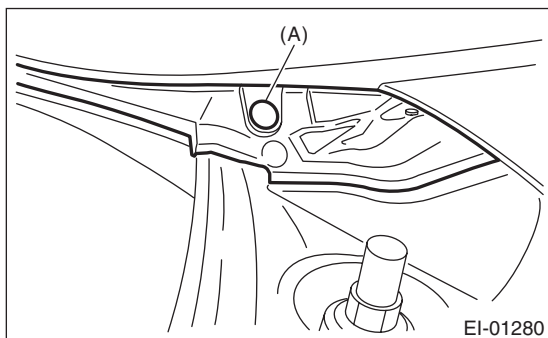


#### NOTE:

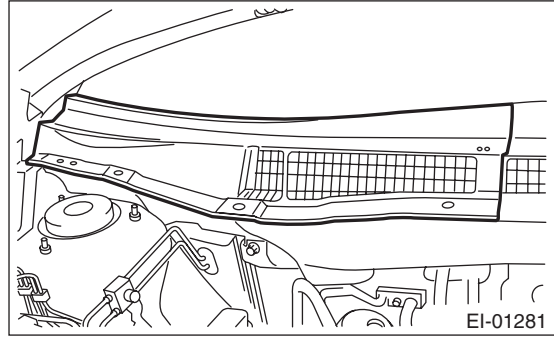
If the weather strip clip is removed with excessive force, the weather strip may be damaged. Be sure to use a clip remover to remove.



- 3) Remove the clip (A) and remove the cowl panel side.



- 4) Pull and remove the cowl panel RH.



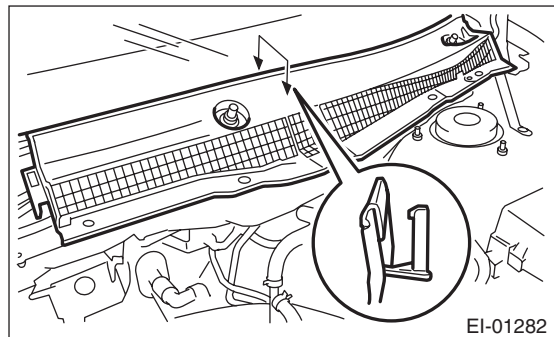
- 5) Remove the cowl panel LH.

### B: INSTALLATION

Install in the reverse order of removal.

#### NOTE:

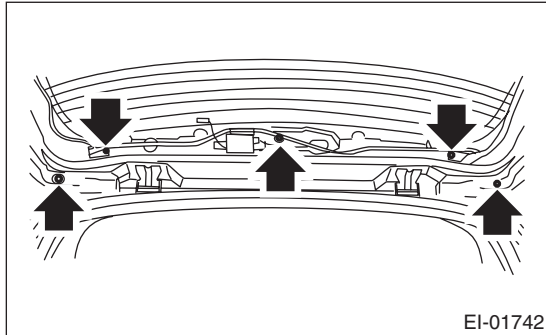
Hook the craw of cowl panel to the windshield.



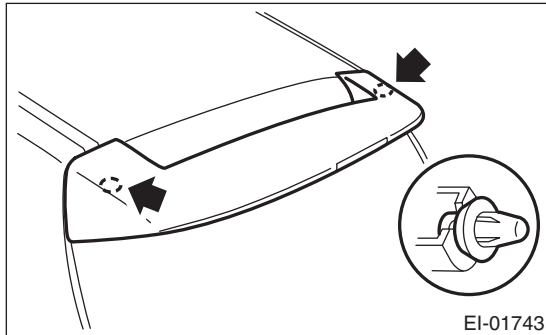
## 9. Roof Spoiler

### A: REMOVAL

- 1) Remove the rear gate upper trim. <Ref. to EI-52, REMOVAL, Rear Gate Trim.>
- 2) Disconnect the connector of high-mounted stop light.
- 3) Remove the nut and bolt.



- 4) Remove the clips, and remove the roof spoiler.



### B: INSTALLATION

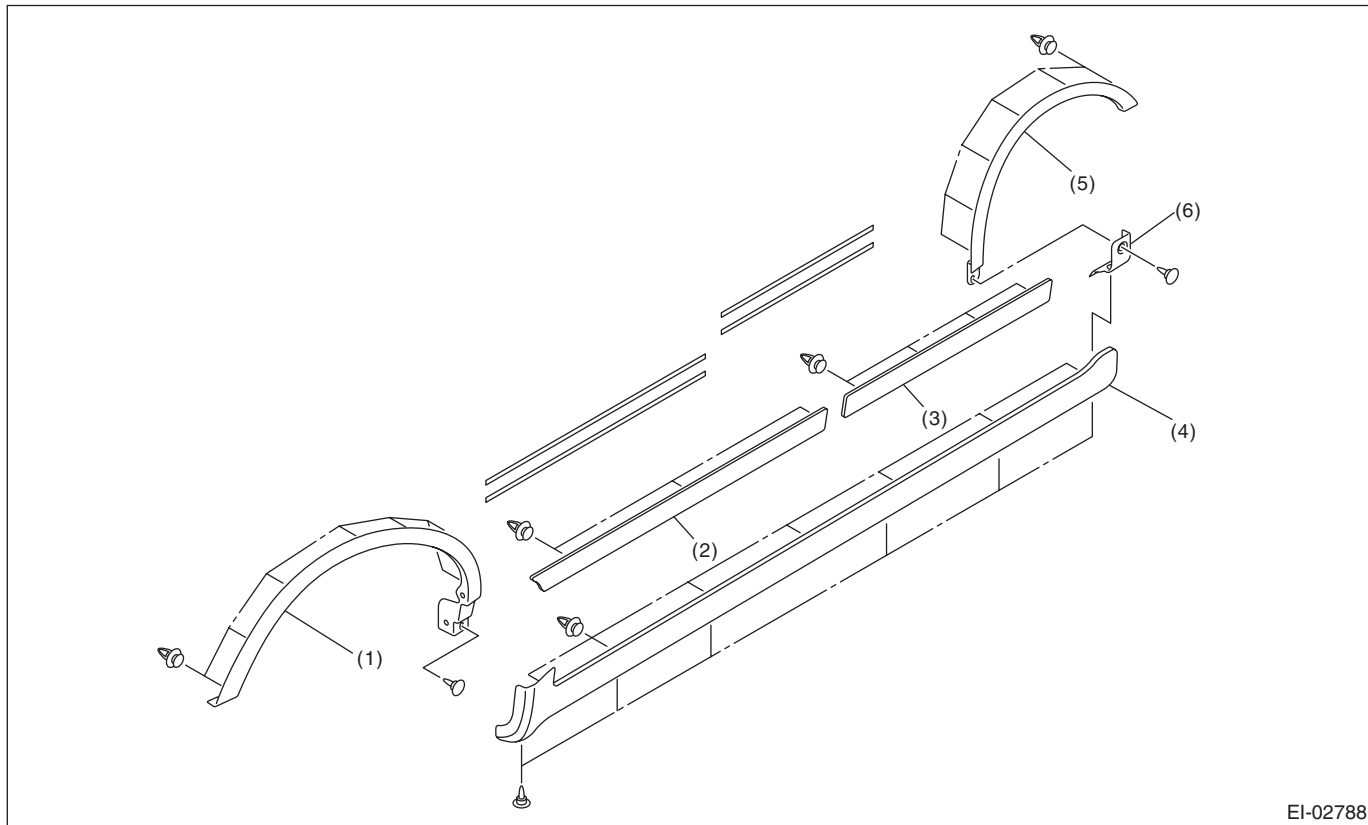
Install in the reverse order of removal.

#### **Tightening torque:**

**4.5 N·m (0.46 kgf·m, 3.32 ft·lb)**

## 10.Side Garnish

### A: REMOVAL



EI-02788

- |                          |                       |                          |
|--------------------------|-----------------------|--------------------------|
| (1) Front fender garnish | (3) Rear door garnish | (5) Rear quarter garnish |
| (2) Front door garnish   | (4) Side sill garnish | (6) Garnish end cover    |

1) Remove the clip on the bottom side of the vehicle body, and the clip that is attached with the front and rear mudguards.

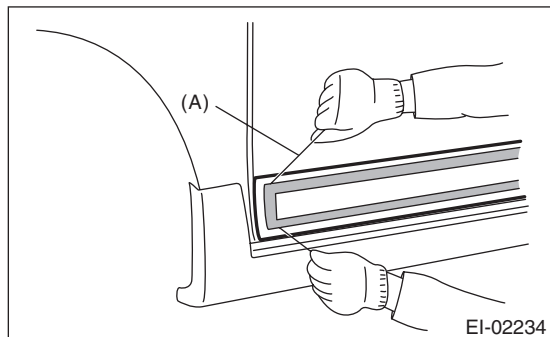
2) Remove the double sided tape and the clip on the vehicle side, and remove the side garnish.

(1) Insert a thin piece of string (A) of 0.8 mm (0.031 in) or less (fishing line, etc.) between the vehicle body and the door garnish.

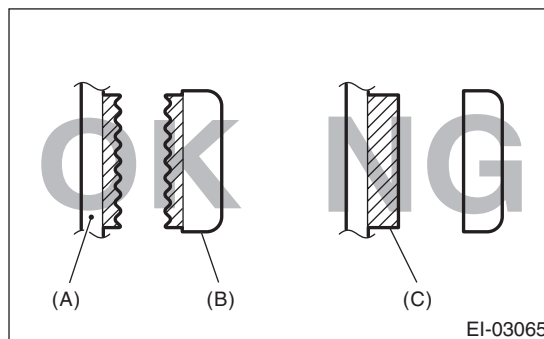
(2) Cut the double sided tape, and remove the clip using a clip remover.

#### NOTE:

- To optimize the effect of solvent, slide the thread along body without removing the double-sided tape on the surface of body and garnish.
- If it is difficult to remove the double-sided tape, warm it up to approx. 40°C (104°F).
- If the double-sided tape remains thick on the surface due to interfacial peeling, apply solvent after slicing off the double-sided tape using a cutter.



EI-02234



EI-03065

- |                       |
|-----------------------|
| (A) Panel             |
| (B) Door garnish      |
| (C) Double-sided tape |

(3) Apply masking tape around the double-sided tape remaining on the surface of body or garnish.

(4) Apply solvent uniformly on the double-sided tape using a brush.

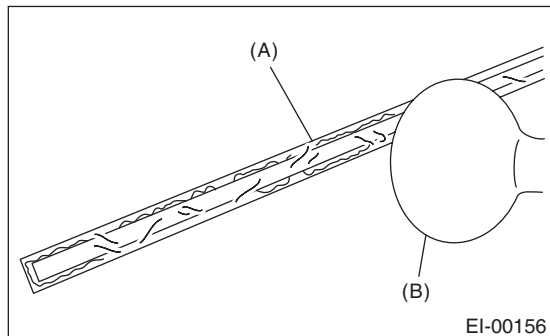
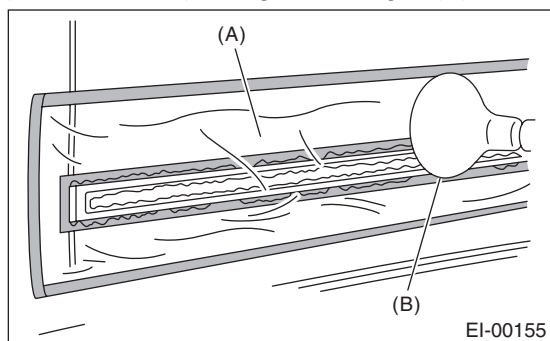
**CAUTION:**

- Do not use solvent to the body which has been repaired with lacquer paint.
- Wipe off immediately when the solvent is attached on surface of the body or garnish.

**Solvent:**

**3M 8907 or equivalent**

(5) Cover the area where solvent is applied using plastic wrap (A), and then heat the double-sided tape for 5 to 10 minutes in 40 — 60°C (104 — 140°F) using a heat light (B).



**CAUTION:**

**Do not heat the double-sided tape until the surface becomes white and excessively dried.**

(6) Remove the double-sided tape using a plastic spatula.

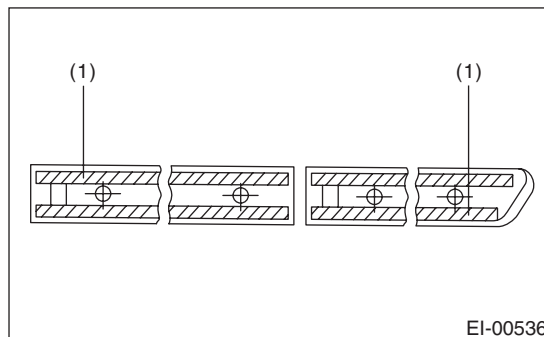
(7) After completely removing the double-sided tape, detach the masking tape and clean the surface using a cotton cloth damped with white gasoline.

3) Remove the front fender garnish and rear quarter garnish.

4) Remove the door garnish.

**B: INSTALLATION**

1) Apply primer to the door garnish surface where the double-sided tape is to be adhered, and then adhere the double-sided tape as shown in the figure.



- (1) Double-sided tape:  
 Thickness = 1.2 mm (0.047 in)  
 Width 5 mm (0.197 n)

**Primer:**

**3M K-500 or equivalent**

**Double-sided tape:**

**3M 5531-5 or equivalent**

2) Heat the adhering part using a heat light.

Body side: 40 — 60°C (104 — 140°F)

Door garnish side: 20 — 30°C (68 — 86°F)

3) Peel off the backing sheet of double-sided tape, align the clip position, and then adhere the tape to the body while taking care to avoid air entering.

**CAUTION:**

**To keep the adhesion, do not wash the vehicle within 24 hours from installation.**

# Roof Molding

EXTERIOR/INTERIOR TRIM

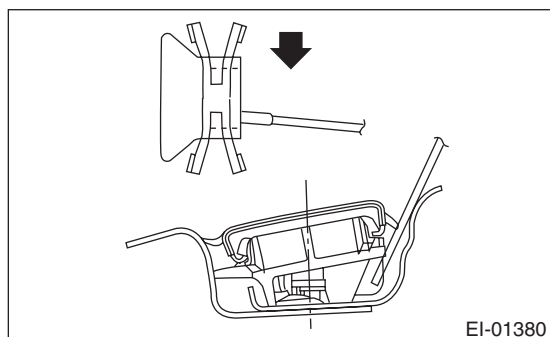
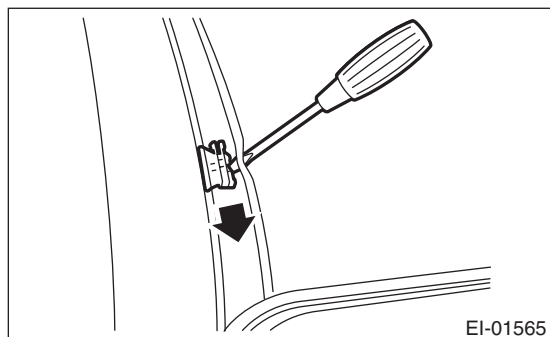
## 11. Roof Molding

### A: REMOVAL

1) Turn over the edge of the roof molding, and remove the inside clips with flat tip screwdriver by sliding as arrow indicates.

Right side: slide towards the front of the vehicle.

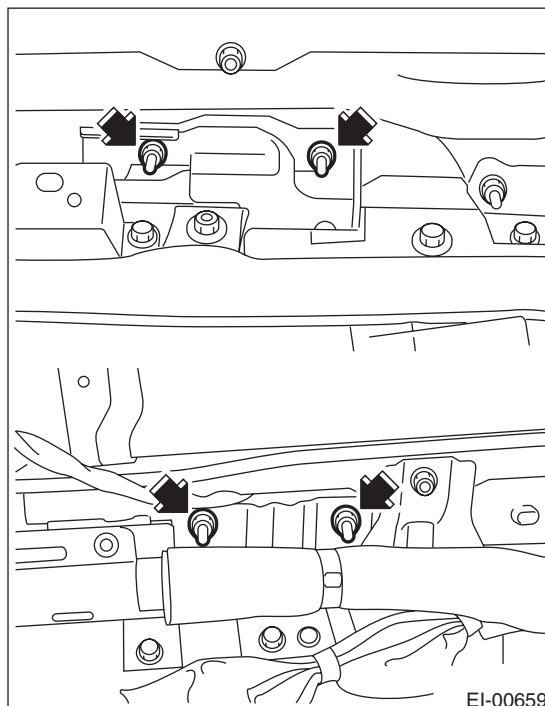
Left side: slide towards the rear of the vehicle.



2) Pull the roof molding upward, and remove it from vehicle body.

3) Remove the roof trim. <Ref. to EI-51, Roof Trim.>

4) Remove the nuts, and remove the roof carrier attachment.



### B: INSTALLATION

1) Install the roof carrier attachment.

**Tightening torque:**

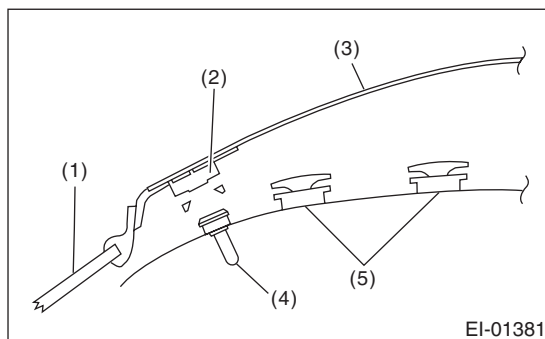
**10 N·m (1.0 kgf·m, 7.23 ft·lb)**

2) Remove each clip from the roof molding, and install them to the vehicle side.

**CAUTION:**

**Always replace clips that were damaged during removal of the roof molding.**

3) Push the front end of the roof molding against the front window, and attach the forward positioning clip onto the rivet on the body.

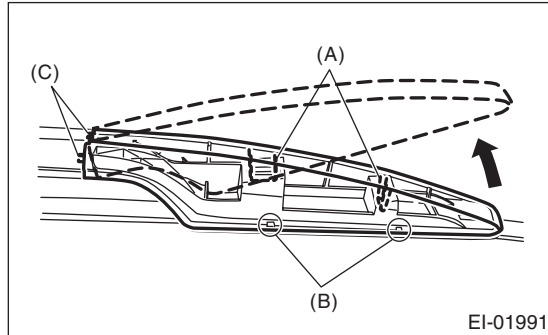


- (1) Windshield
- (2) Positioning clip
- (3) Roof molding
- (4) Rivet
- (5) Clip

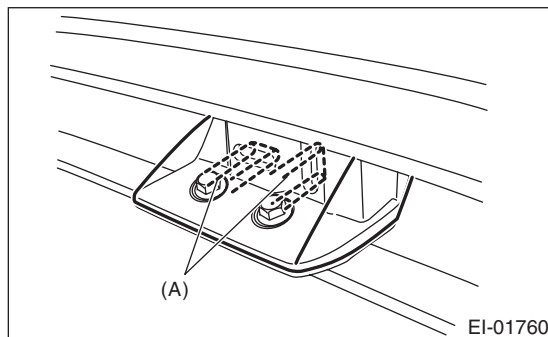
## 12. Roof Rail

### A: REMOVAL

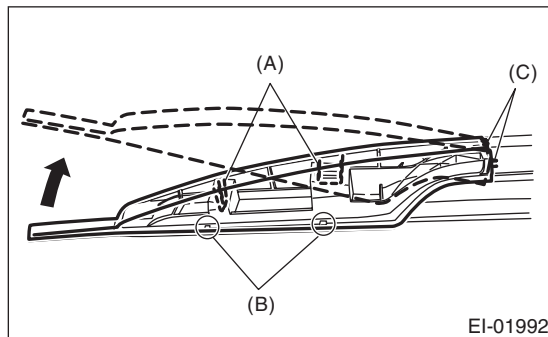
1) Remove the roof rail cover front with the pawl (C) as a support point while removing clip (A) and pawl (B).



2) Remove the clips (A), and then remove the roof rail cover center.



3) Remove the roof rail cover rear with the pawl (C) as a support point while removing clip (A) and pawl (B).



4) Remove the nuts and bolts, and remove the roof rail from the vehicle body.

### B: INSTALLATION

Install in the reverse order of removal.

**Tightening torque:**

**7.5 N·m (0.76 kgf-m, 5.5 ft-lb)**

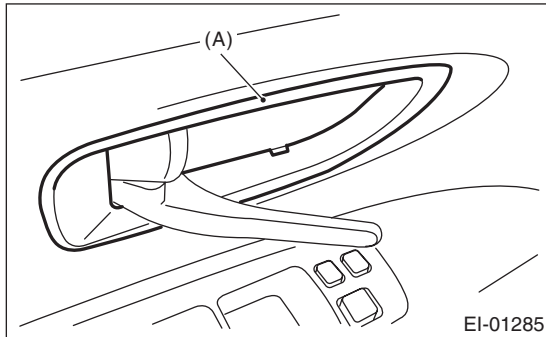
# Door Trim

EXTERIOR/INTERIOR TRIM

## 13. Door Trim

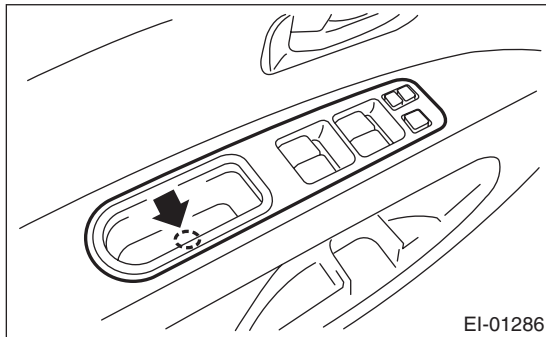
### A: REMOVAL

- 1) Disconnect the ground cable from the battery.
- 2) Remove the cover (A) at inner remote.

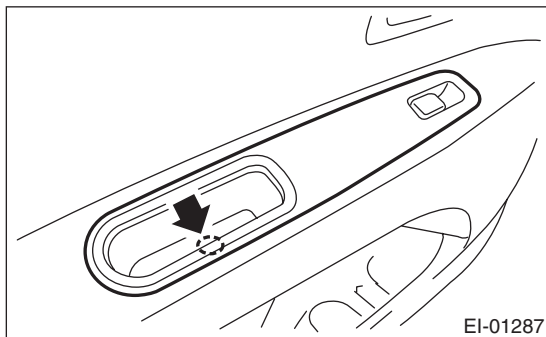


- 3) Remove the bottom cover at the pull handle.
- 4) Remove the screw to remove the power window switch assembly.

- Front door

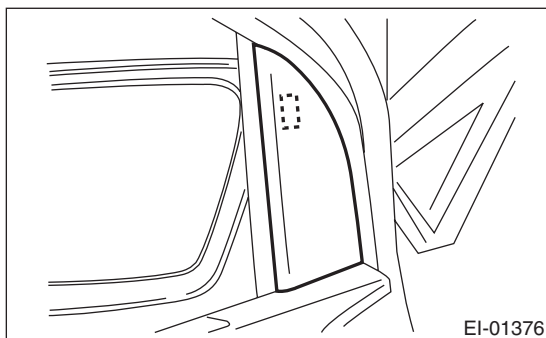


- Rear door

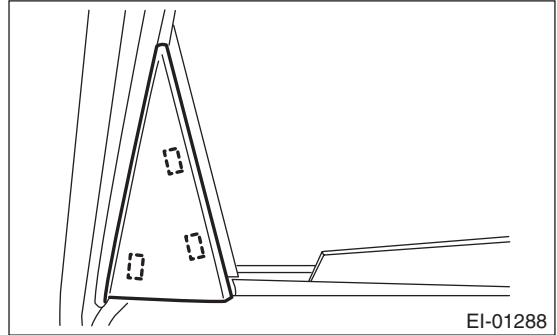


- 5) Remove the gusset cover.

- Front door

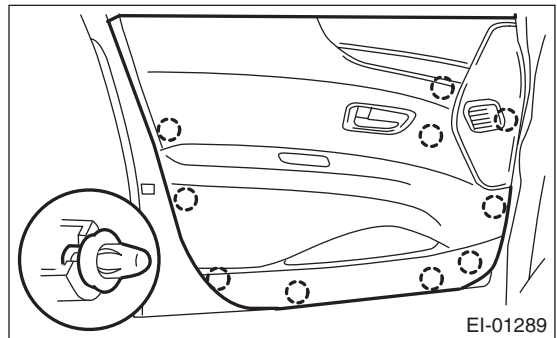


- Rear door

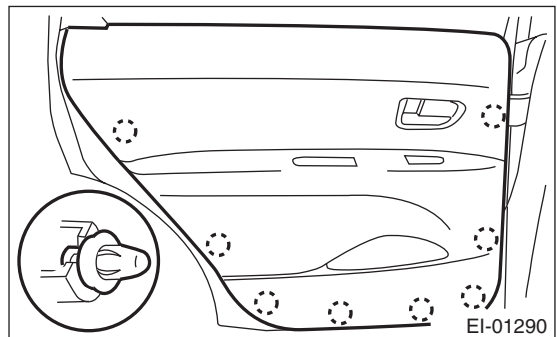


- 6) Remove the clip, and disconnect the each connector to remove the door trim.

- Front door trim



- Rear door trim



### B: INSTALLATION

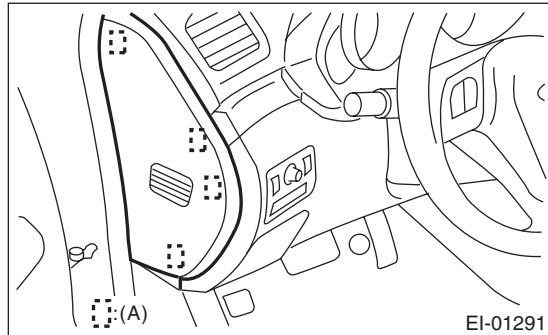
Install in the reverse order of removal.



## 14. Instrument Panel Lower Cover

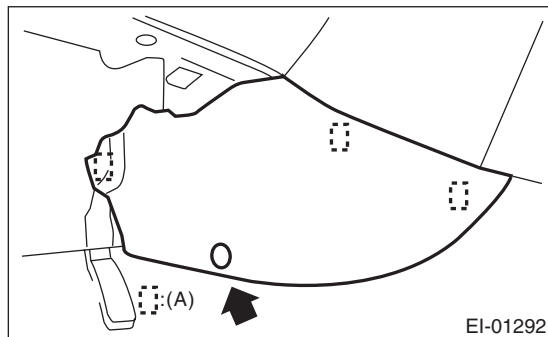
### A: REMOVAL

- 1) Remove the front door scuff plate and front pillar lower trim. <Ref. to EI-44, REMOVAL, Side Trim.>
- 2) Remove the instrument panel side cover LH.



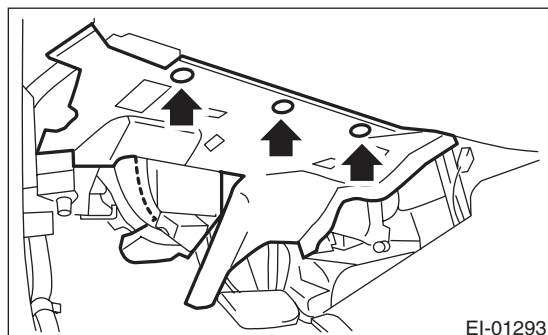
(A) Hook

- 3) Remove the clips, and remove the console side panel lower LH.

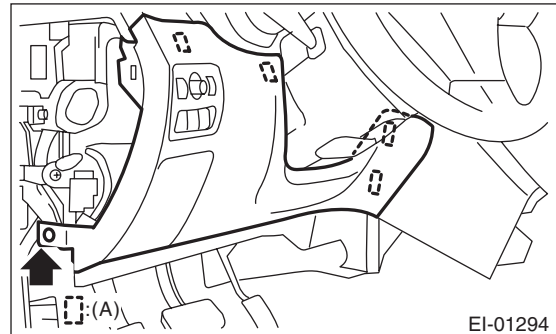


(A) Hook

- 4) Remove the clips, and remove the instrument panel lower cover under.



- 5) Remove the clip (A) and hooks, disconnect the connectors, and then remove the instrument panel lower cover upper.



### B: INSTALLATION

Install in the reverse order of removal.

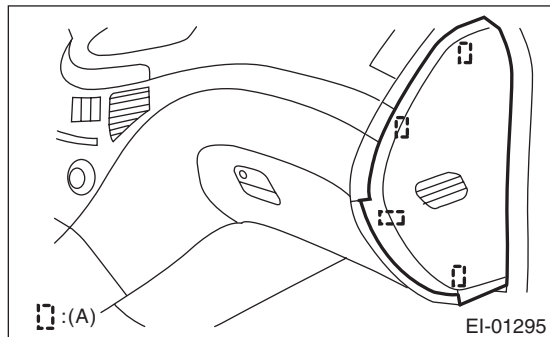
# Glove Box

EXTERIOR/INTERIOR TRIM

## 15. Glove Box

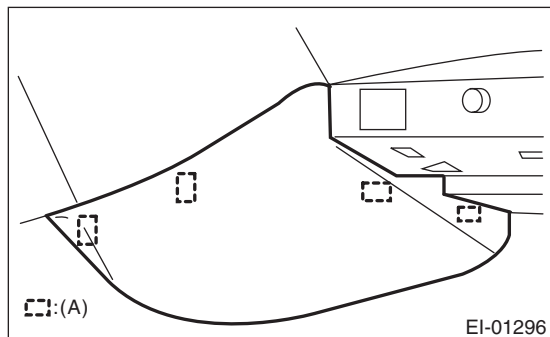
### A: REMOVAL

- 1) Remove the front door scuff plate and front pillar lower trim. <Ref. to EI-44, REMOVAL, Side Trim.>
- 2) Remove the instrument panel side cover RH.



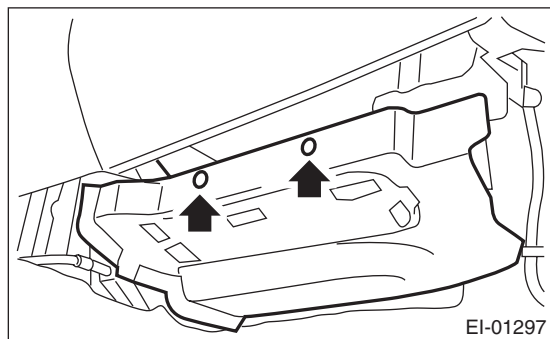
(A) Hook

- 3) Remove the console side panel lower RH.

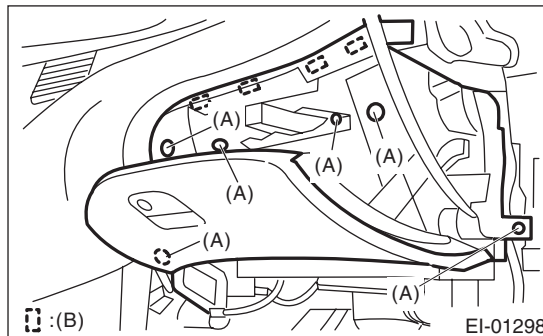


(A) Hook

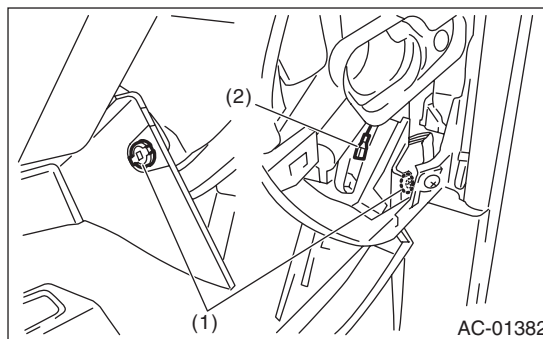
- 4) Remove the clips, and remove the glove box lower cover.



- 5) Remove the screws (A) and hooks (B), and disconnect the connector, and then remove the glove box assembly.



- 6) Remove the clip (1) in the glove box and damper strap (2).



- 7) Remove the left and right stoppers of glove box lid, and then remove the glove box lid.

### NOTE:

The glove box lid can be removed without using the glove box assembly.

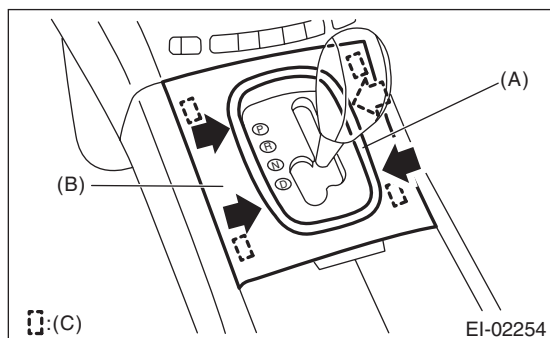
### B: INSTALLATION

Install in the reverse order of removal.

## 16. Console Box

### A: REMOVAL

1) Remove the ring indicator (A) and console front panel (B).

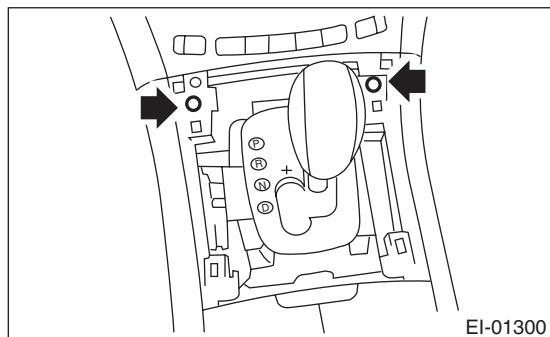


(C) Clip

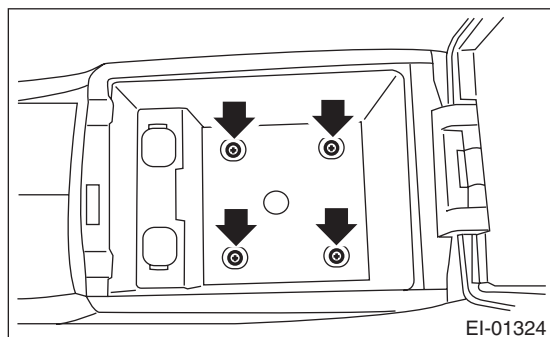
#### NOTE:

The ring indicator can be easily removed by inserting the clip remover or equivalent into the positions indicated by arrows.

2) Remove the screws.



3) Remove the bolts inside the upper pocket.



4) Pull out the console lower pocket, and remove the console box.

### B: INSTALLATION

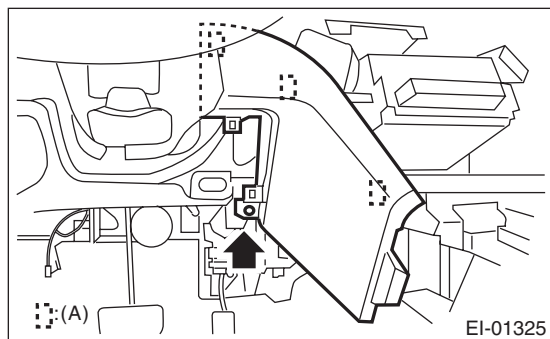
Install in the reverse order of removal.

## 17.Center Console

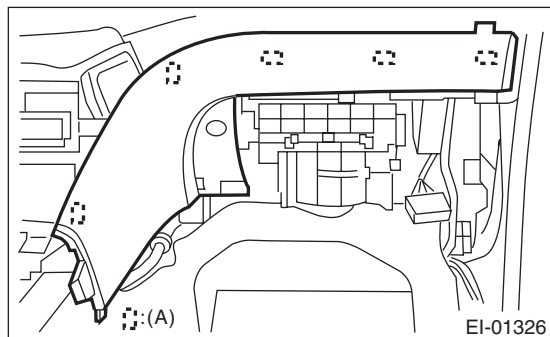
### A: REMOVAL

- 1) Remove the control panel. <Ref. to AC-32, REMOVAL, Control Panel.>
- 2) Remove the instrument panel lower cover. <Ref. to EI-37, REMOVAL, Instrument Panel Lower Cover.>
- 3) Remove the glove box. <Ref. to EI-38, REMOVAL, Glove Box.>
- 4) Remove the console box. <Ref. to EI-39, REMOVAL, Console Box.>
- 5) Remove the screws and clips (A) to remove the console side panel upper.

- Driver's side



- Passenger's side



### B: INSTALLATION

Install in the reverse order of removal.

## 18. Instrument Panel Assembly

### A: REMOVAL

#### CAUTION:

Take care of the following when removing the instrument panel from the vehicle body.

- Refer to “CAUTION” of “General Description” before starting the work. <Ref. to AB-4, CAUTION, General Description.>
- Be sure to disconnect each harness connector. Applying excessive force may damage the harness.
- Be careful to the harness of airbag system. Damage of the harness may cause the airbag system malfunction.
- Take care not to damage the interior trims when removing the instrument panel from the vehicle body.

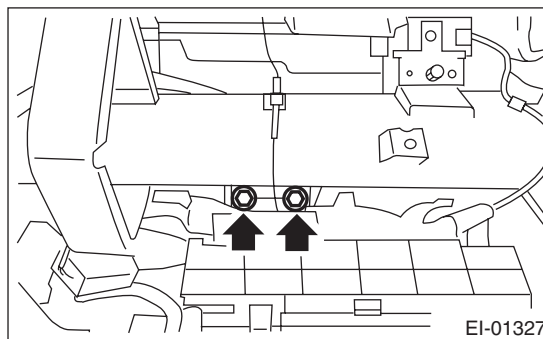
#### NOTE:

- Putting alignment marks to each connector as necessary facilitates the reassembly work.
- When storing the removed instrument panel, be sure to prepare a table or the like to put the instrument panel on in order to prevent damage.

### 1. INSTRUMENT PANEL UPPER

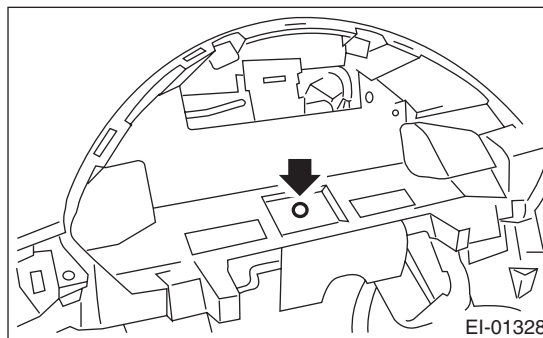
- 1) Disconnect the ground cable from battery and wait for at least 60 seconds before starting work.
- 2) Remove the console box. <Ref. to EI-39, REMOVAL, Console Box.>
- 3) Remove the instrument panel lower cover. <Ref. to EI-37, REMOVAL, Instrument Panel Lower Cover.>
- 4) Remove the glove box. <Ref. to EI-38, REMOVAL, Glove Box.>
- 5) Remove the center console. <Ref. to EI-40, REMOVAL, Center Console.>
- 6) Remove the audio unit. <Ref. to ET-13, REMOVAL, Audio.>
- 7) Remove the combination meter assembly. <Ref. to IDI-11, REMOVAL, Combination Meter.>
- 8) Remove the upper grille. <Ref. to AC-49, UPPER GRILLE, REMOVAL, Air Vent Grille.>
- 9) Remove the multi function display or navigation monitor, and warning box. <Ref. to ET-26, REMOVAL, Navigation Display.>
- 10) Remove the front pillar upper trim. <Ref. to EI-44, REMOVAL, Side Trim.>

- 11) Remove the mounting bolts of the passenger's side airbag module.

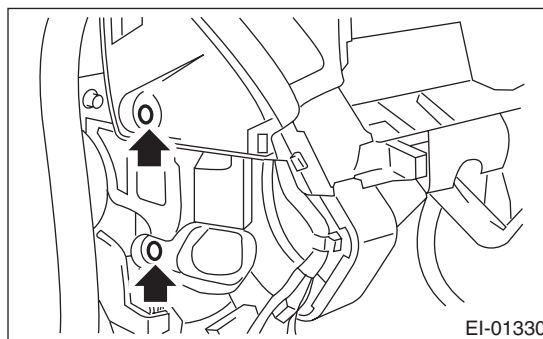


- 12) Remove the following screws.

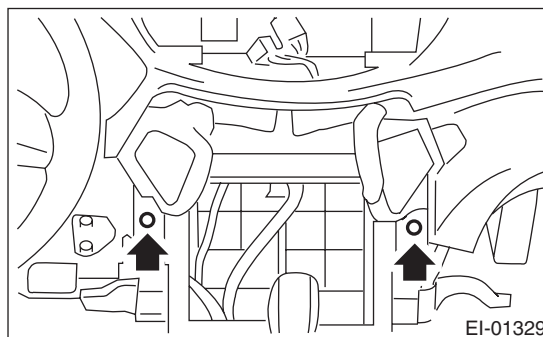
- In combination meter house



- At the sides (left and right) of instrument panel



- Instrument panel center



- 13) Make sure that the instrument panel upper is removed from the steering support beam

- 14) Disconnect the connectors, and remove the instrument panel from vehicle body.

- 15) Remove the heater vent duct. <Ref. to AC-51, REMOVAL, Heater Vent Duct.>

# Instrument Panel Assembly

## EXTERIOR/INTERIOR TRIM

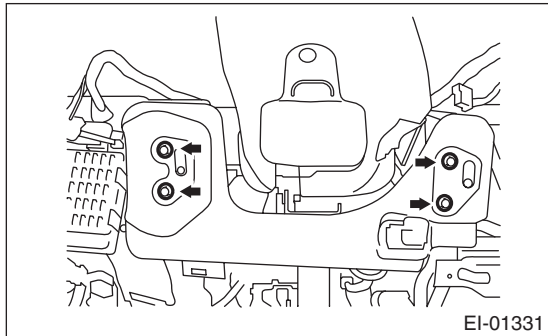
16) Remove the air vent grille. <Ref. to AC-49, REMOVAL, Air Vent Grille.>

17) Remove the passenger airbag module. <Ref. to AB-15, REMOVAL, Passenger's Airbag Module.>

### 2. STEERING SUPPORT BEAM

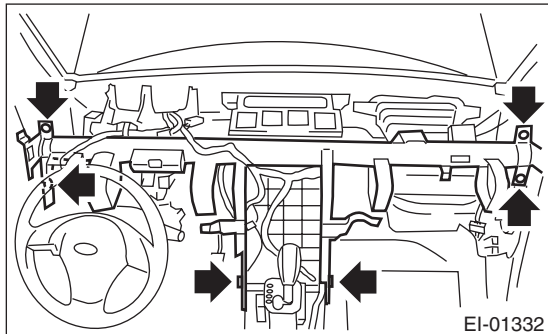
1) Remove the instrument panel upper.

2) Remove the bolts, and then remove the knee guard plate.



3) Remove the steering shaft from the steering support beam. <Ref. to PS-15, REMOVAL, Tilt Steering Column.>

4) Remove the bolts and remove the steering support beam.



### 3. INSTRUMENT PANEL ASSEMBLY

1) Disconnect the ground cable from battery and wait for at least 60 seconds before starting work.

2) Remove the console box. <Ref. to EI-39, REMOVAL, Console Box.>

3) Remove the instrument panel lower cover. <Ref. to EI-37, REMOVAL, Instrument Panel Lower Cover.>

4) Remove the glove box. <Ref. to EI-38, REMOVAL, Glove Box.>

5) Remove the center console. <Ref. to EI-40, REMOVAL, Center Console.>

6) Remove the front pillar upper trim. <Ref. to EI-44, REMOVAL, Side Trim.>

7) Remove the steering shaft from the steering support beam. <Ref. to PS-15, REMOVAL, Tilt Steering Column.>

8) Disconnect the connectors, and remove the instrument panel from vehicle body.

9) Remove the bolts and remove the steering support beam.

#### NOTE:

For positions of the mounting bolt of steering support beam, refer to the removal procedure of the steering support beam.

10) Make sure that the each harness connector is disconnected, and remove the instrument panel assembly from the vehicle body.

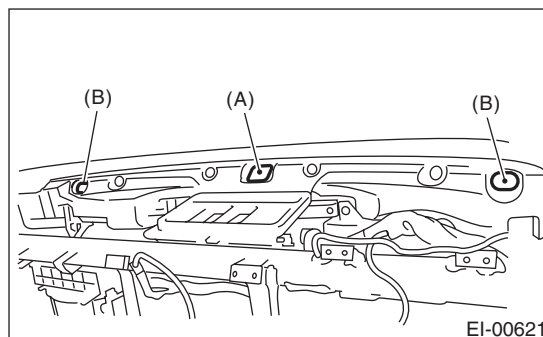
#### NOTE:

Remove the passenger's side door trim to facilitate the work.

## B: INSTALLATION

### 1. INSTRUMENT PANEL UPPER

1) Insert the matching pins (three places) on the instrument panel tip into the grommet (A) and (B) on the body panel side.



2) Check that the matching pins are inserted securely, and then route the harness.

3) Tighten the instrument panel with screws, and recheck the installation condition of instrument panel and harness routing.

4) Install in the reverse order of removal.

**NOTE:**

How to install insulator and pad;

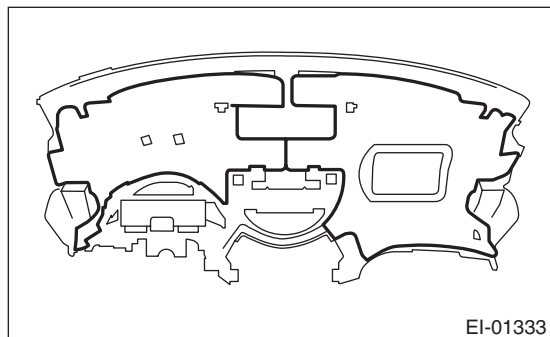
- Adhesive

Use polyurethane adhesive. When assembling the instrument panel assembly, wait until the adhesive has evaporated to prevent filling of the smell in the compartment.

- Double-sided tape

Use commercial double-sided tape. (Use strong double-sided adhesive tape.)

- Install locations



## 2. STEERING SUPPORT BEAM

1) Temporarily tighten the steering support beam with bolts, and then route the harness.

2) Make sure that there is no mutual interference in each pedal, and then tighten each bolt.

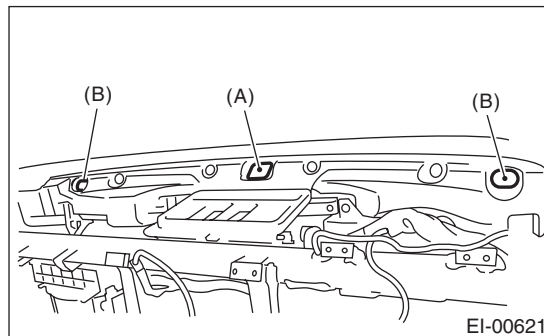
**Tightening torque:**

**25 N·m (25.5 kgf·m, 18 ft·lb)**

3) Install in the reverse order of removal.

## 3. INSTRUMENT PANEL ASSEMBLY

1) Insert the matching pins (three places) on the instrument panel tip into the grommet (A) and (B) on the body panel side.



2) Check that the matching pins are inserted securely, and then route the harness.

3) Temporarily tighten the steering support beam with bolts, and then route the harness.

4) Make sure that there is no mutual interference in each pedal, and then tighten each bolt.

**Tightening torque:**

**25 N·m (25.5 kgf·m, 18 ft·lb)**

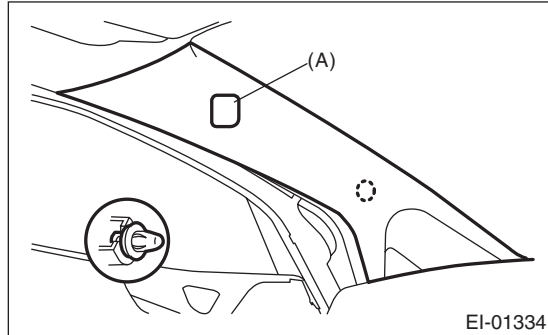
5) Install in the reverse order of removal.

## 19. Side Trim

### A: REMOVAL

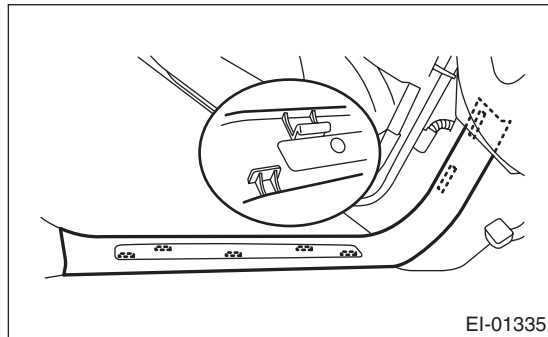
#### 1. FRONT PILLAR UPPER TRIM

- 1) Remove the cap (A) on the upper side of pillar trim, and remove the bolt inside.
- 2) Remove the front pillar upper trim.

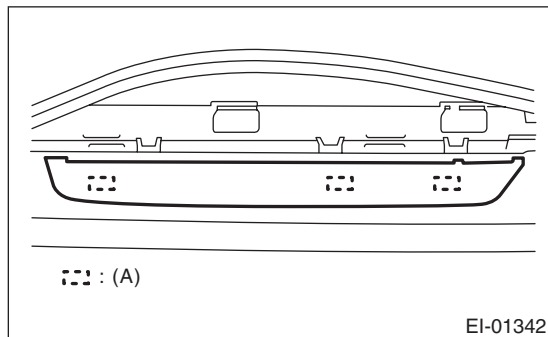


#### 2. FRONT DOOR SCUFF PLATE

- 1) Remove the front door scuff plate.



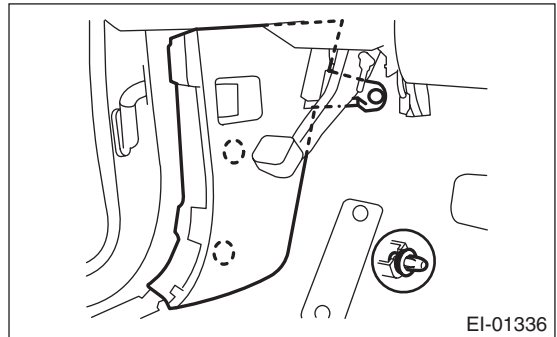
- 2) Remove the scuff plate outer.



(A) Claw

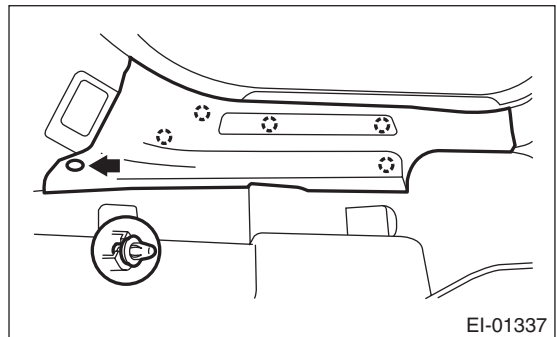
#### 3. FRONT PILLAR LOWER TRIM

- 1) Remove the front door scuff plate.
- 2) Remove the clip, and remove the front pillar trim.

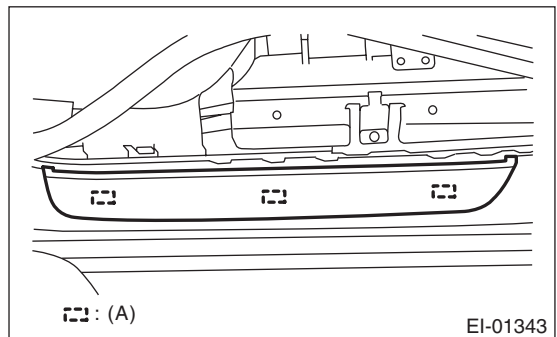


#### 4. REAR DOOR SCUFF PLATE

- 1) Remove the clips and disengage the claws on the rear side of scuff plate, and then remove the rear door scuff plate.



- 2) Remove the scuff plate outer.

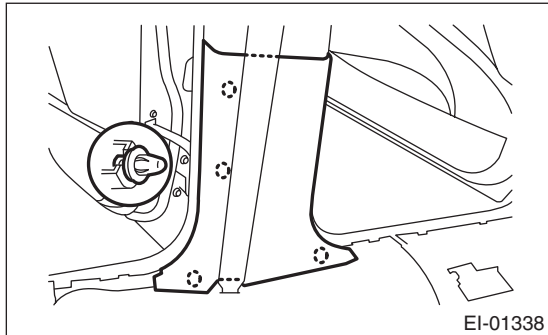


(A) Claw



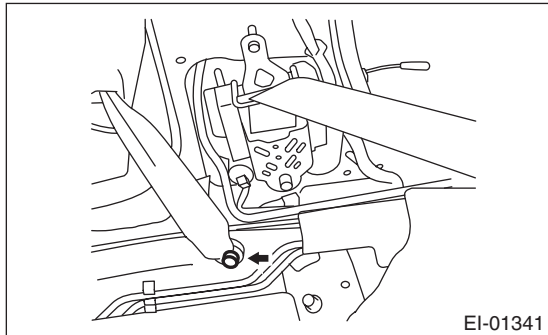
## 5. CENTER PILLAR LOWER TRIM

- 1) Remove the front door scuff plate.
- 2) Remove the rear door scuff plate.
- 3) Remove the clip, and remove the center pillar lower trim.

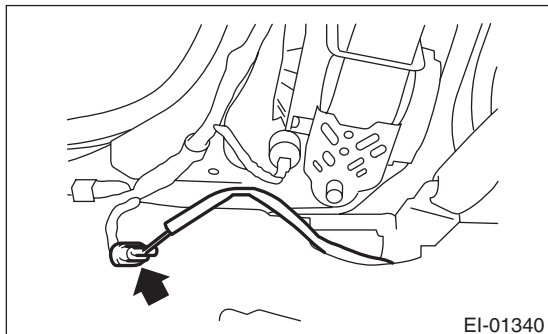


## 6. CENTER PILLAR UPPER TRIM

- 1) When removing the parts of passenger's side, disconnect the ground cable from battery and wait for at least 60 seconds before starting work.
- 2) Remove the front door scuff plate.
- 3) Remove the rear door scuff plate.
- 4) Remove the center pillar lower trim.
- 5) Turn over the floor mat to remove the seat belt lower anchor bolt.

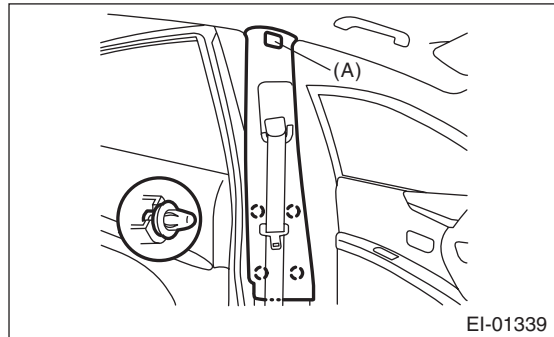


- 6) On passenger's side, disconnect the connector of the seat belt tension sensor.



- 7) Remove cap (A) on the upper side of the pillar trim, and remove the bolt inside.

- 8) Remove the clip, and remove the center pillar upper trim.



## B: INSTALLATION

Install each side trim in the reverse order of removal.

### NOTE:

When installing the side trim, make sure that the clips and hooks match the holes of vehicle body before pushing the parts.

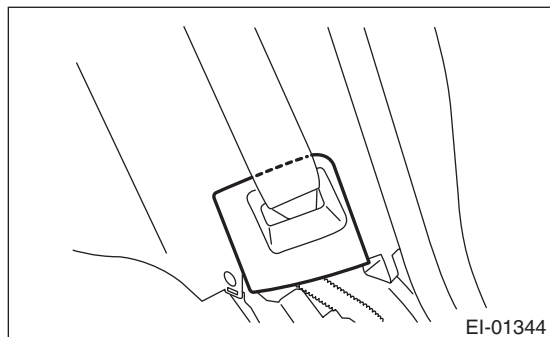
# Rear Quarter Trim

EXTERIOR/INTERIOR TRIM

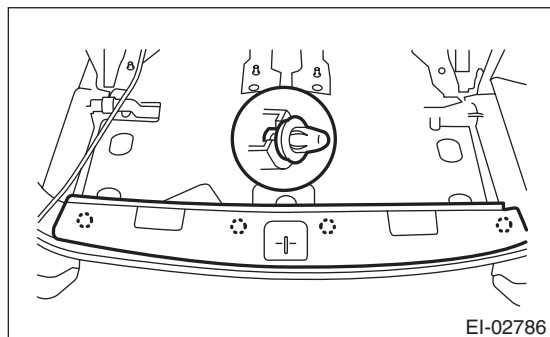
## 20. Rear Quarter Trim

### A: REMOVAL

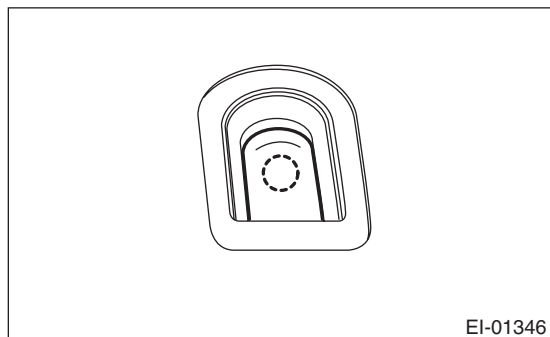
- 1) Remove the third-row seats. <Ref. to SE-22, REMOVAL, Third Seat.>
- 2) Remove the rear door scuff plate. <Ref. to EI-44, REAR DOOR SCUFF PLATE, REMOVAL, Side Trim.>
- 3) Remove the lower anchor cover.



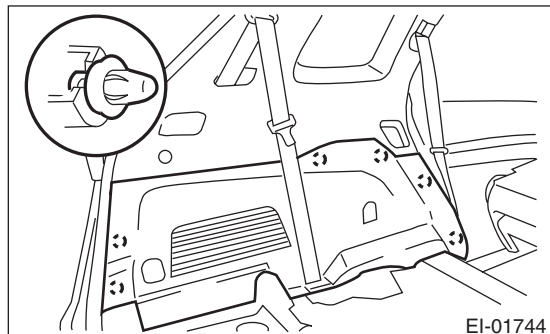
- 4) Remove the luggage floor mat and utility box.
- 5) Remove the luggage floor end cover.



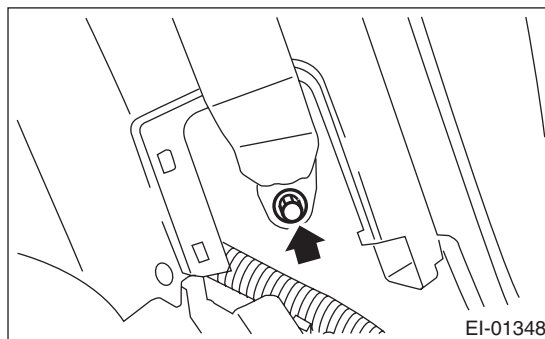
- 6) Remove the cover, and remove the bolts inside.



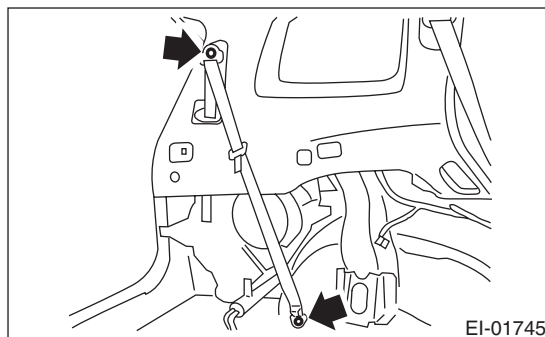
- 7) Remove the rear quarter lower trim.



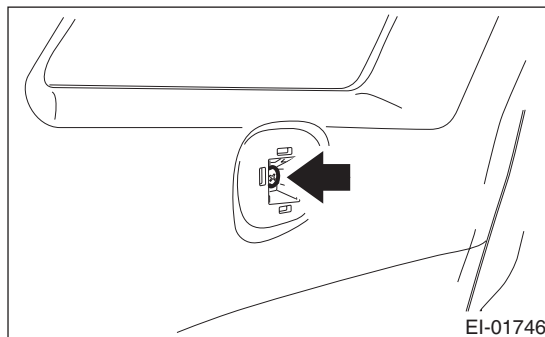
- 8) Remove the lower anchor bolts of second-row seat belts.



- 9) Remove the upper and lower anchor bolts of third-row seat belts.



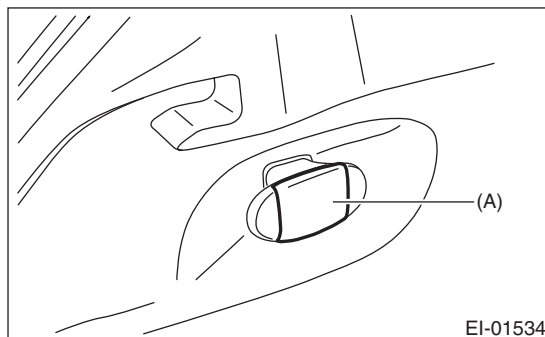
- 10) Remove the screws.



### NOTE:

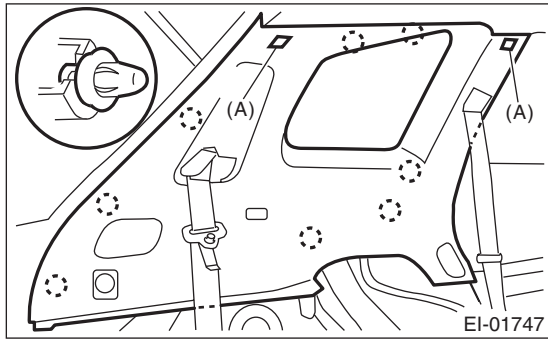
For models equipped with a third-row seat, there is a cap.

- 11) Remove the cover (A), and remove the bolts inside.



- 12) Remove cap (A) on the upper side of the pillar trim, and remove the bolt inside.

13) Disconnect each connector, and remove the rear quarter upper trim.



## **B: INSTALLATION**

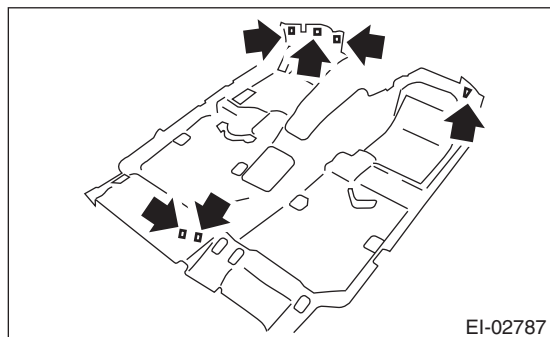
Install in the reverse order of removal.

## 21. Floor Mat

### A: REMOVAL

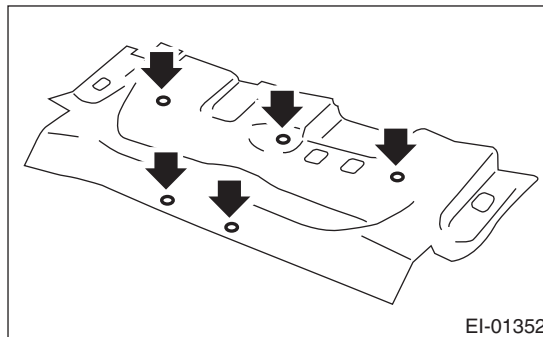
#### 1. FRONT FLOOR MAT

- 1) Remove the front seats. <Ref. to SE-7, REMOVAL, Front Seat.>
- 2) Remove the second row seats. <Ref. to SE-15, REMOVAL, Second Seat.>
- 3) Remove the console box. <Ref. to EI-39, REMOVAL, Console Box.>
- 4) Remove the instrument panel lower cover. <Ref. to EI-37, REMOVAL, Instrument Panel Lower Cover.>
- 5) Remove the glove box. <Ref. to EI-38, REMOVAL, Glove Box.>
- 6) Remove the following trims. <Ref. to EI-44, REMOVAL, Side Trim.>
  - Front door scuff plate
  - Rear door scuff plate
  - Front pillar lower trim
  - Center pillar lower trim
- 7) Remove the remote opener cover. <Ref. to SL-40, REMOVAL, Remote Openers.>
- 8) Remove the navigation unit. <Ref. to ET-27, REMOVAL, Navigation Body.>
- 9) Remove the clips, then remove the front floor mats.



#### 2. REAR FLOOR MAT

- 1) Remove the second row seats. <Ref. to SE-15, REMOVAL, Second Seat.>
- 2) Remove the third-row seats. (7 seater model) <Ref. to SE-22, REMOVAL, Third Seat.>
- 3) Remove the luggage box (front). (5 seater model)
- 4) Remove the rear quarter lower trim. <Ref. to EI-46, REMOVAL, Rear Quarter Trim.>
- 5) Remove the clips, then remove the rear floor mats.



### B: INSTALLATION

Install in the reverse order of removal.

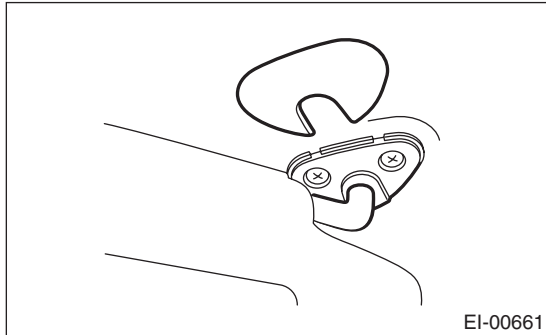
#### NOTE:

- Secure the mat firmly with hook and clip.
- Insert the mat edge firmly into the groove of side sill cover.

## 22.Sun Visor

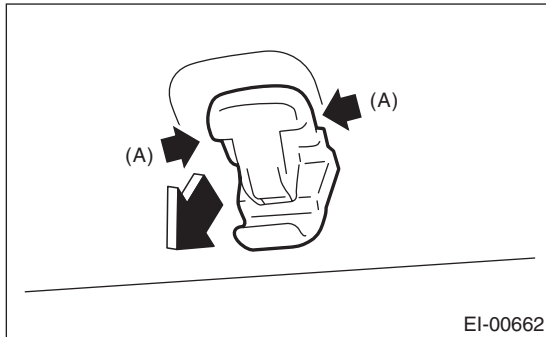
### A: REMOVAL

1) Remove the cover, loosen the mounting screws, and remove the sun visor.



2) Disconnect the connector. (Model with vanity mirror light)

3) While pressing the (A) on the both side using flat tip screwdriver, pull the sun visor hook to remove it.



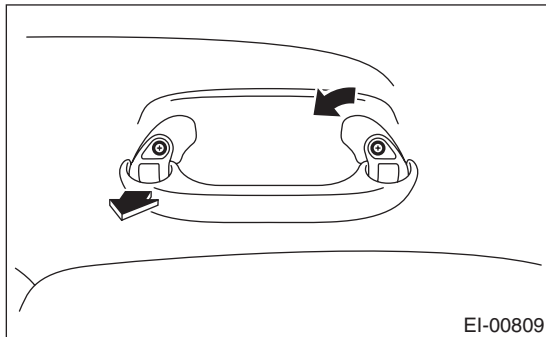
### B: INSTALLATION

Install in the reverse order of removal.

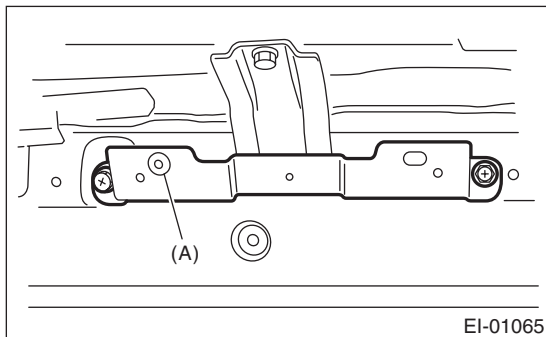
## 23. Assist Grip

### A: REMOVAL

- 1) Remove the screw cover, and remove the screw inside.
- 2) Pull the left side of assist grip, and rotate the right side of it counterclockwise to remove.



- 3) Remove the roof trim. <Ref. to EI-51, REMOVAL, Roof Trim.>
- 4) Remove the bolts, and remove the assist grip bracket.



(A) Grommet

### B: INSTALLATION

Install in the reverse order of removal.

#### CAUTION:

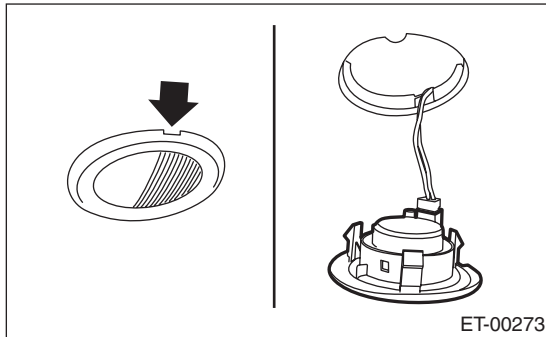
**Be sure to install the grommet to assist grip bracket.**

**When the assist grip is installed with no grommet, it will cause the grip to not return properly.**

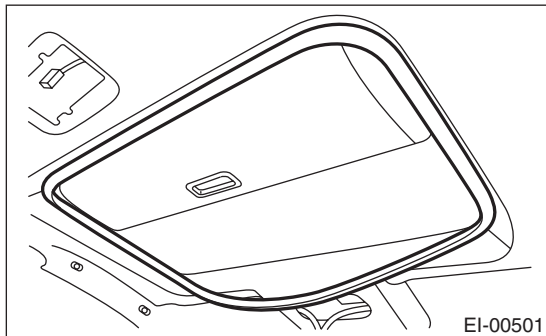
## 24. Roof Trim

### A: REMOVAL

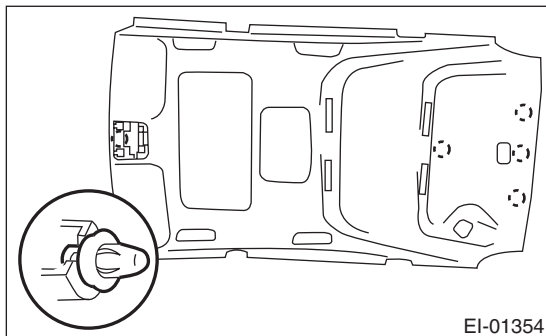
- 1) Disconnect the ground cable from battery.
- 2) Remove the spot map light. <Ref. to LI-34, REMOVAL, Spot Map Light.>
- 3) Remove the room light or rear entertainment (model with rear entertainment system). <Ref. to LI-35, REMOVAL, Room Light.>
- 4) Remove the sun visor. <Ref. to EI-49, REMOVAL, Sun Visor.>
- 5) Remove the assist grip. <Ref. to EI-50, REMOVAL, Assist Grip.>
- 6) Remove the front pillar upper trim and center pillar upper trim. <Ref. to EI-44, REMOVAL, Side Trim.>
- 7) Remove the rear quarter upper trim. <Ref. to EI-46, REMOVAL, Rear Quarter Trim.>
- 8) Remove the tweeter from the roof trim.



- 9) Remove the sunroof opening trim. (Model with sunroof)



- 10) Remove the clips and each harness, pull out the rear center seat belt, and remove the roof trim.



### B: INSTALLATION

Install in the reverse order of removal.

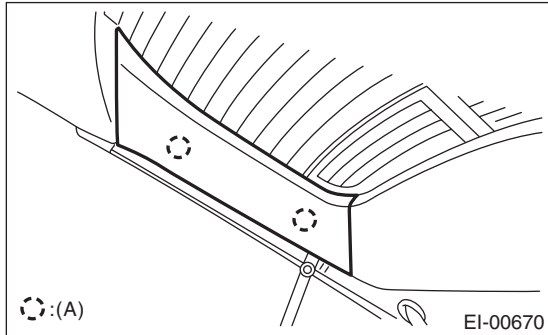
# Rear Gate Trim

EXTERIOR/INTERIOR TRIM

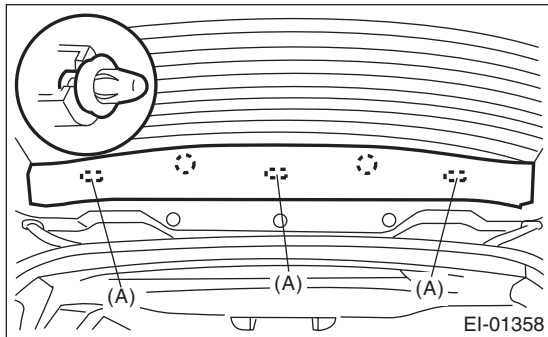
## 25.Rear Gate Trim

### A: REMOVAL

1) Remove the claws (A), and remove the rear gate pillar trim.

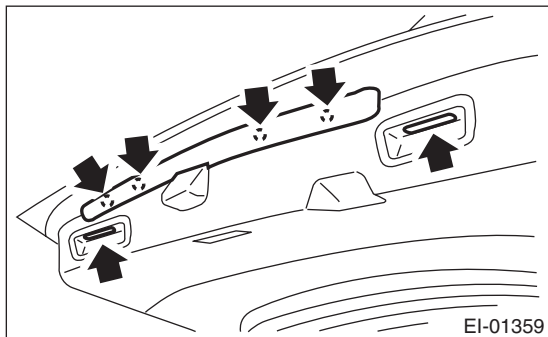


2) Remove the clips and claws (A), and remove the rear gate upper trim.

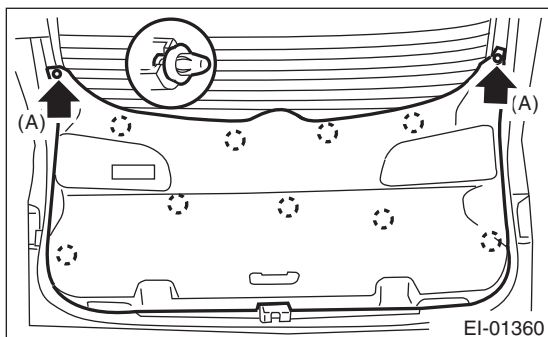


3) Remove the cover in the inner handle, and loosen the inside screw.

4) Turn over the weather strip, and remove the clips.



5) Remove the clips (A), and remove the rear gate lower trim.



### B: INSTALLATION

Install in the reverse order of removal.

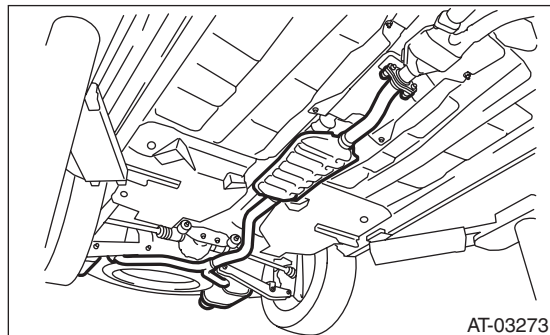


## 26.Heat Shield Cover

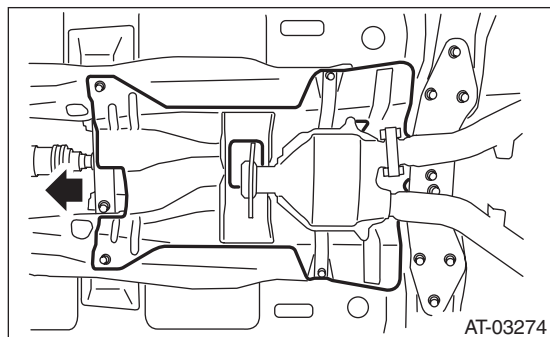
### A: REMOVAL

#### 1. FRONT HEAT SHIELD COVER

1) Remove the rear exhaust pipe.



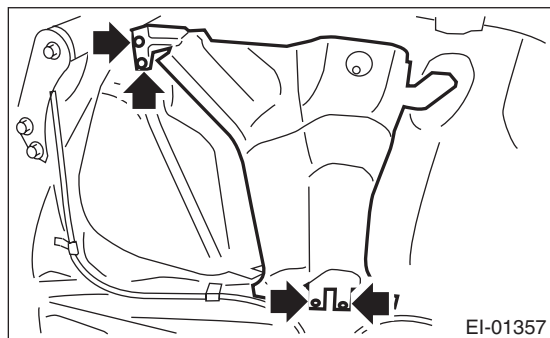
2) Remove the bolts to remove the front heat shield cover.



#### 2. CENTER HEAT SHIELD COVER

1) Remove the fuel tank protector. <Ref. to EI-19, REMOVAL, Fuel Tank Protector.>

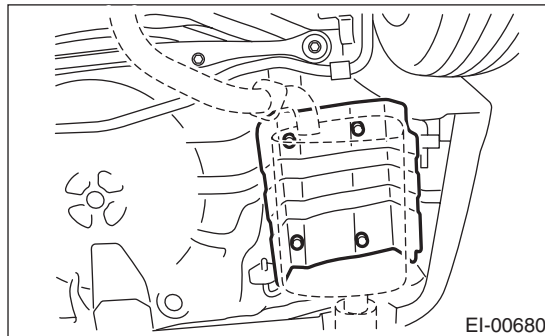
2) Remove the nut and bolt to remove center heat shield cover.



#### 3. REAR HEAT SHIELD COVER

1) Remove the muffler. <Ref. to EX(H6DO)-7, REMOVAL, Rear Exhaust Pipe.>

2) Remove the rear heat shield cover.



### B: INSTALLATION

Install in the reverse order of removal.

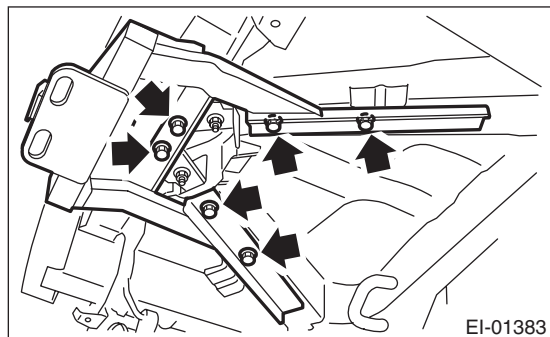
#### Tightening torque:

Refer to “COMPONENT” of “General Description”. <Ref. to EI-16, HEAT SHIELD COVER, COMPONENT, General Description.>

## 27.Trailer Hitch

### A: REMOVAL

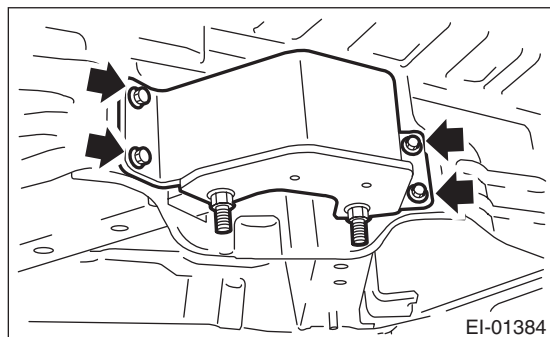
- 1) Remove the spare tire hoist. <Ref. to WT-11, REMOVAL, Spare Tire Hoist.>
- 2) Remove the bolt, and then detach the main frame.



### CAUTION:

**The trailer hitch main frame is heavy. Be careful when removing.**

- 3) Remove the bolts, and then remove the center frame.



- 4) Remove the side frame from the vehicle.

### B: INSTALLATION

Install in the reverse order of removal.

#### **Tightening torque:**

**Refer to "COMPONENT" of "General Description".**

**<Ref. to EI-17, TRAILER HITCH, COMPONENT, General Description.>**

# EXTERIOR BODY PANELS

# *EB*

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3. Front Fender .....	14
4. Front Door .....	15
5. Front Sealing Cover .....	17
6. Rear Door .....	18
7. Rear Sealing Cover .....	20
8. Rear Gate .....	21

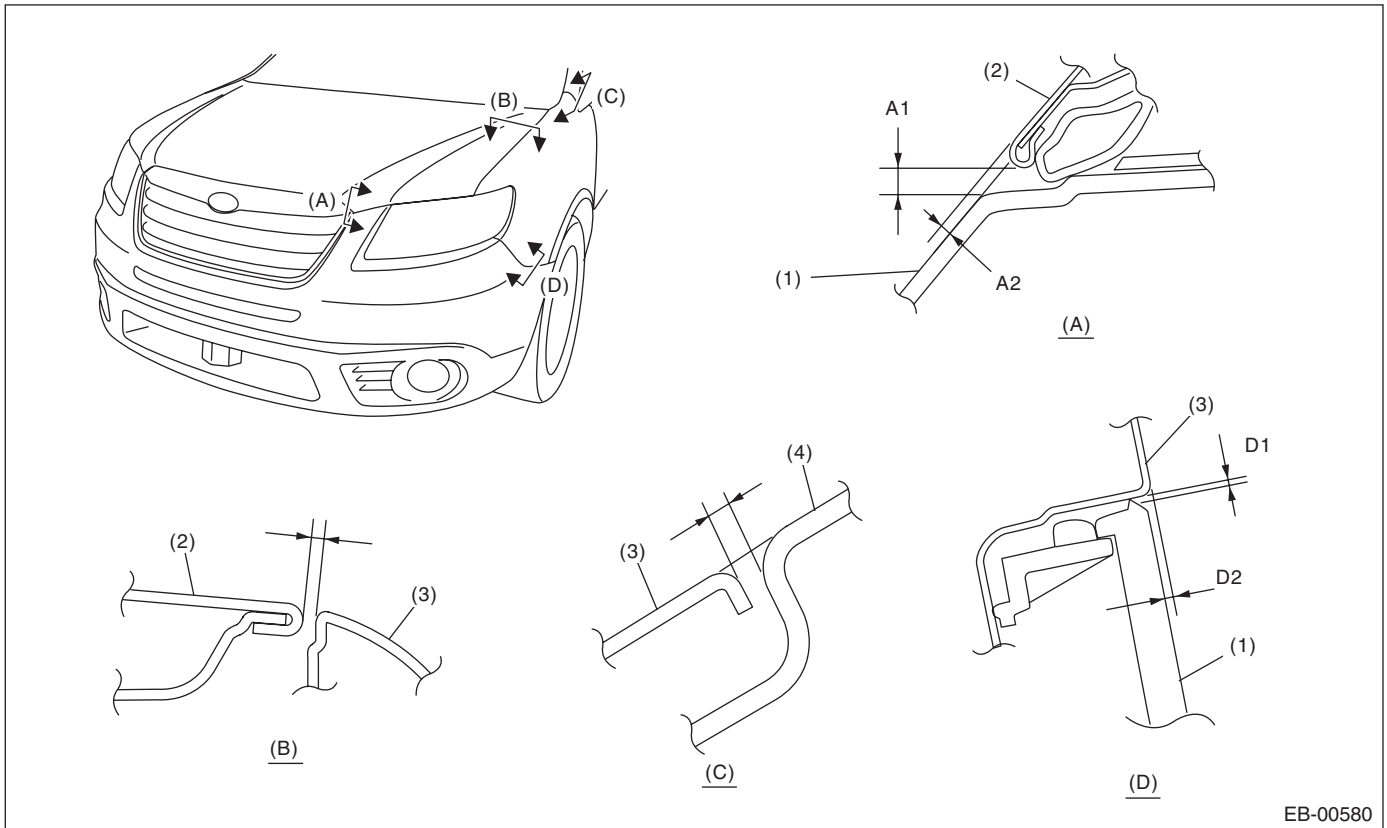
# General Description

## EXTERIOR BODY PANELS

### 1. General Description

#### A: SPECIFICATION

#### 1. FRONT



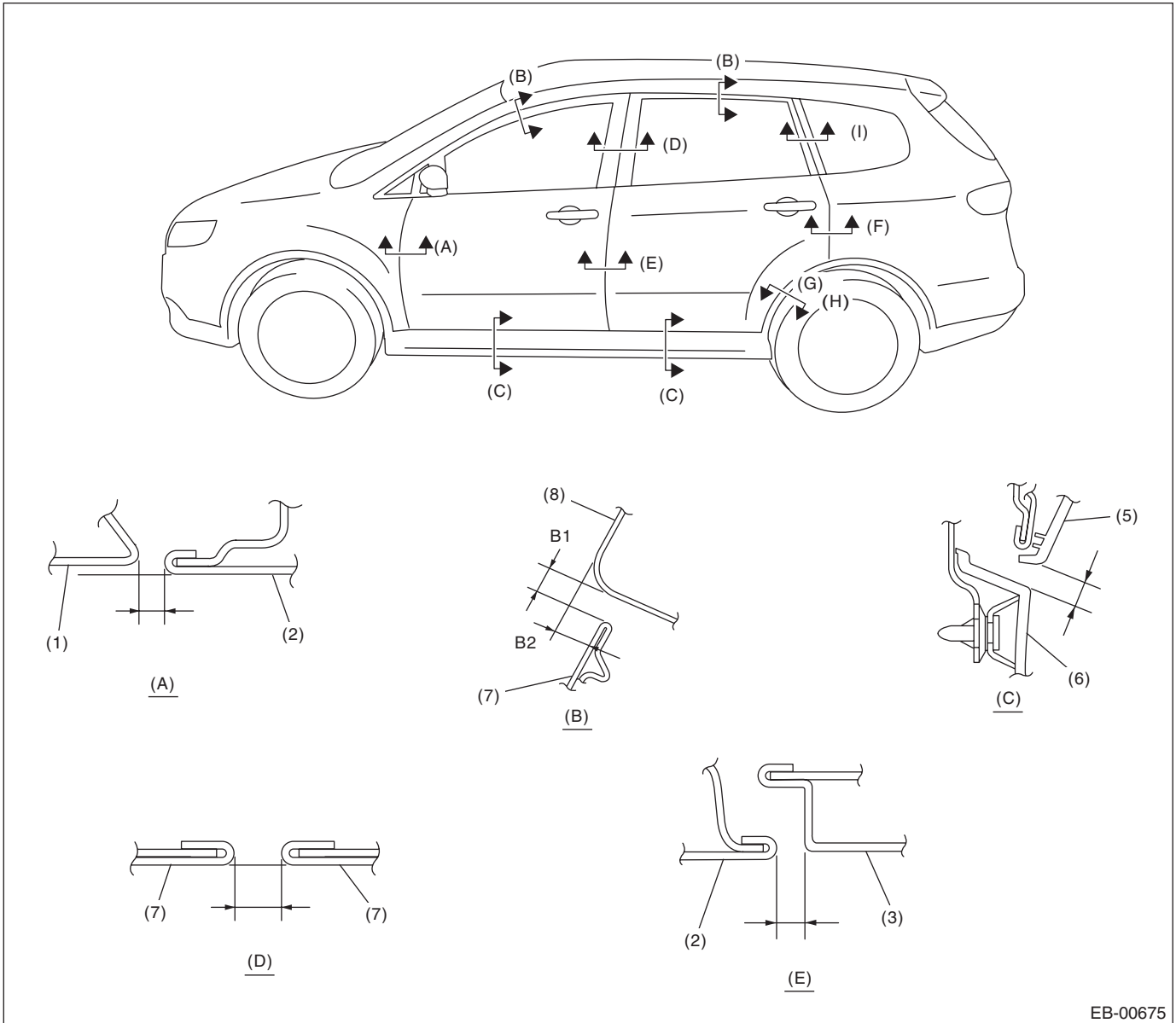
- (1) Front bumper  
(2) Front hood panel

- (3) Front fender panel

- (4) Front pillar

Section	Part	Standard
(A)	Front hood panel to front bumper	A1: 5.0±1.0 mm (0.20±0.04 in) A2: 2.0±1.0 mm (0.08±0.04 in)
(B)	Front hood panel to Front fender panel	3.5±1.0 mm (0.14±0.04 in)
(C)	Front fender panel to Front pillar	2.0±0.5 mm (0.08±0.02 in)
(D)	Front bumper to Front fender panel	D1: 0.3+0.7, -0.3 mm (0.012+0.028, -0.012 in) D2: 0.7+0.5, -0.7 mm (0.028+0.02, -0.028 in)

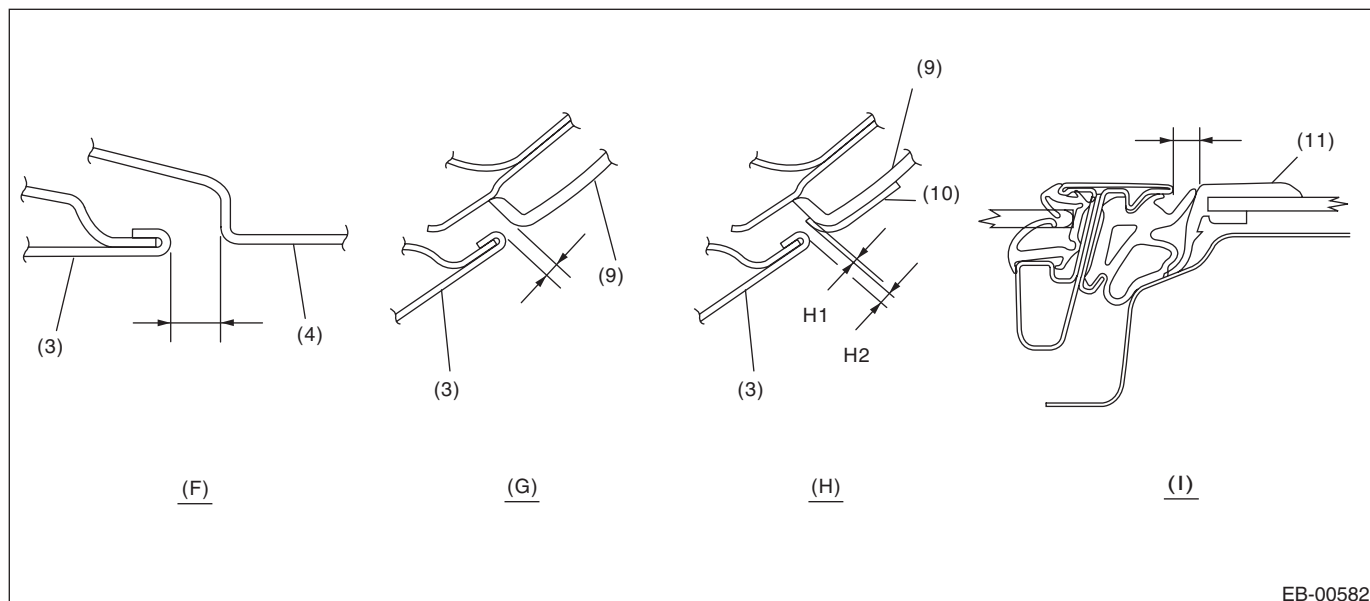
### 2. SIDE



EB-00675

# General Description

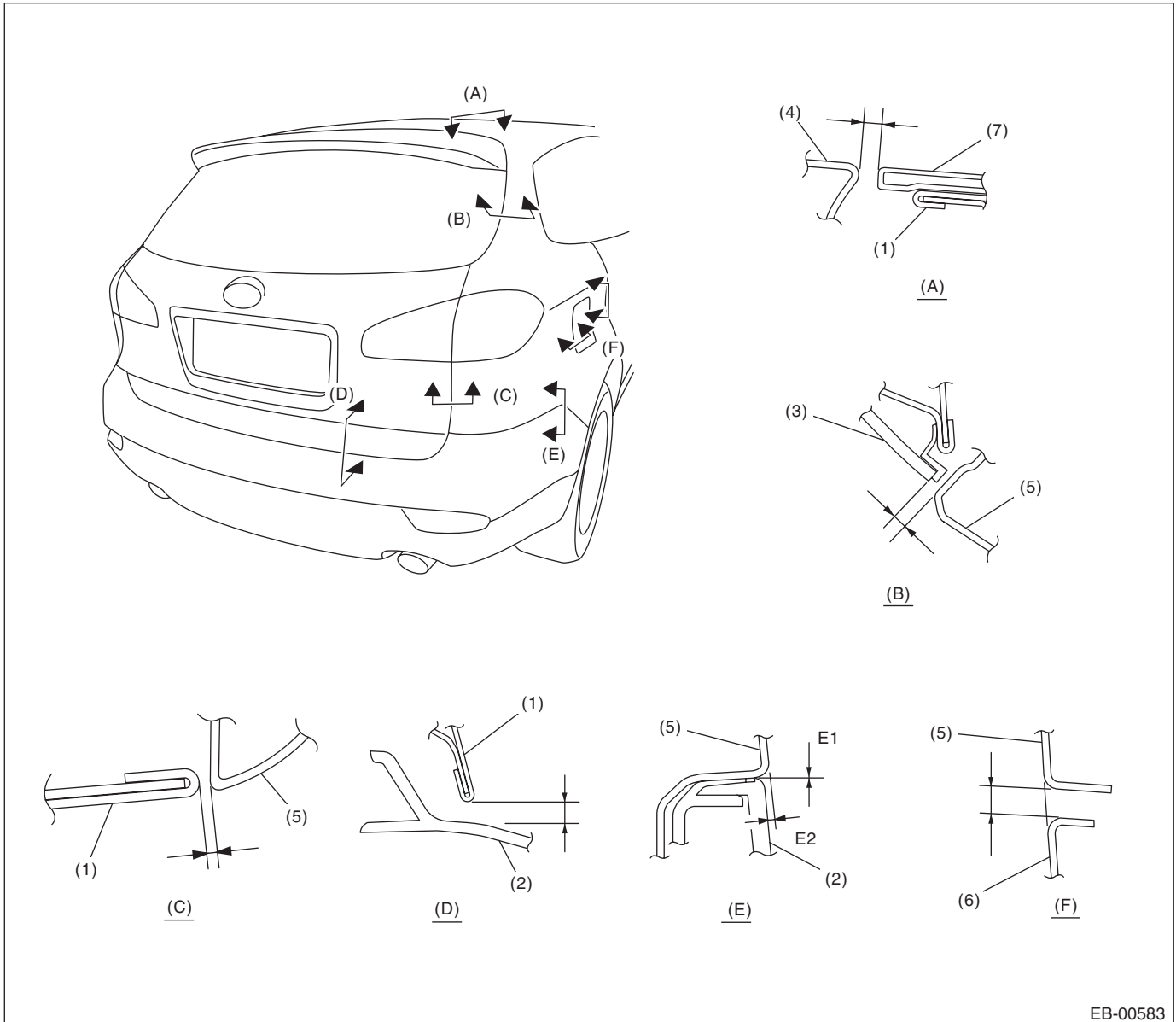
## EXTERIOR BODY PANELS



- |                        |                       |                          |
|------------------------|-----------------------|--------------------------|
| (1) Front fender panel | (5) Door garnish      | (9) Rear quarter garnish |
| (2) Front door panel   | (6) Side sill garnish | (10) Protector film      |
| (3) Rear door panel    | (7) Door sash         | (11) Rear quarter glass  |
| (4) Rear quarter panel | (8) Roof panel        |                          |

Section	Part	Standard
(A)	Front fender panel to Front door panel	4.0±1.0 mm (0.16±0.04 in)
(B)	Door sash to Roof panel	B1: 5.0±1.0 mm (0.20±0.04 in) B2: 4.0±1.0 mm (0.16±0.04 in)
(C)	Door garnish to Side sill garnish	8.0±1.5 mm (0.31±0.06 in)
(D)	Front door sash to Rear door sash	5.6±1.0 mm (0.22±0.04 in)
(E)	Front door panel to Rear door panel	4.6±1.0 mm (0.18±0.04 in)
(F)	Rear door panel to Rear quarter panel	4.0±1.0 mm (0.16±0.04 in)
(G)	Rear quarter garnish to Rear door panel	4.0±1.0 mm (0.16±0.04 in)
(H)	Rear quarter garnish to Rear door panel (monotone vehicle)	H1: 0.4±1.0 mm (0.02±0.04 in) H2: 3.6±1.0 mm (0.14±0.04 in)
(I)	Between rear door sash to Rear quarter glass	5.0±1.0 mm (0.20±0.04 in)

### 3. REAR



- (1) Rear gate panel
- (2) Rear bumper
- (3) Rear gate glass

- (4) Roof panel
- (5) Rear quarter panel

- (6) Fuel filler lid
- (7) Roof spoiler

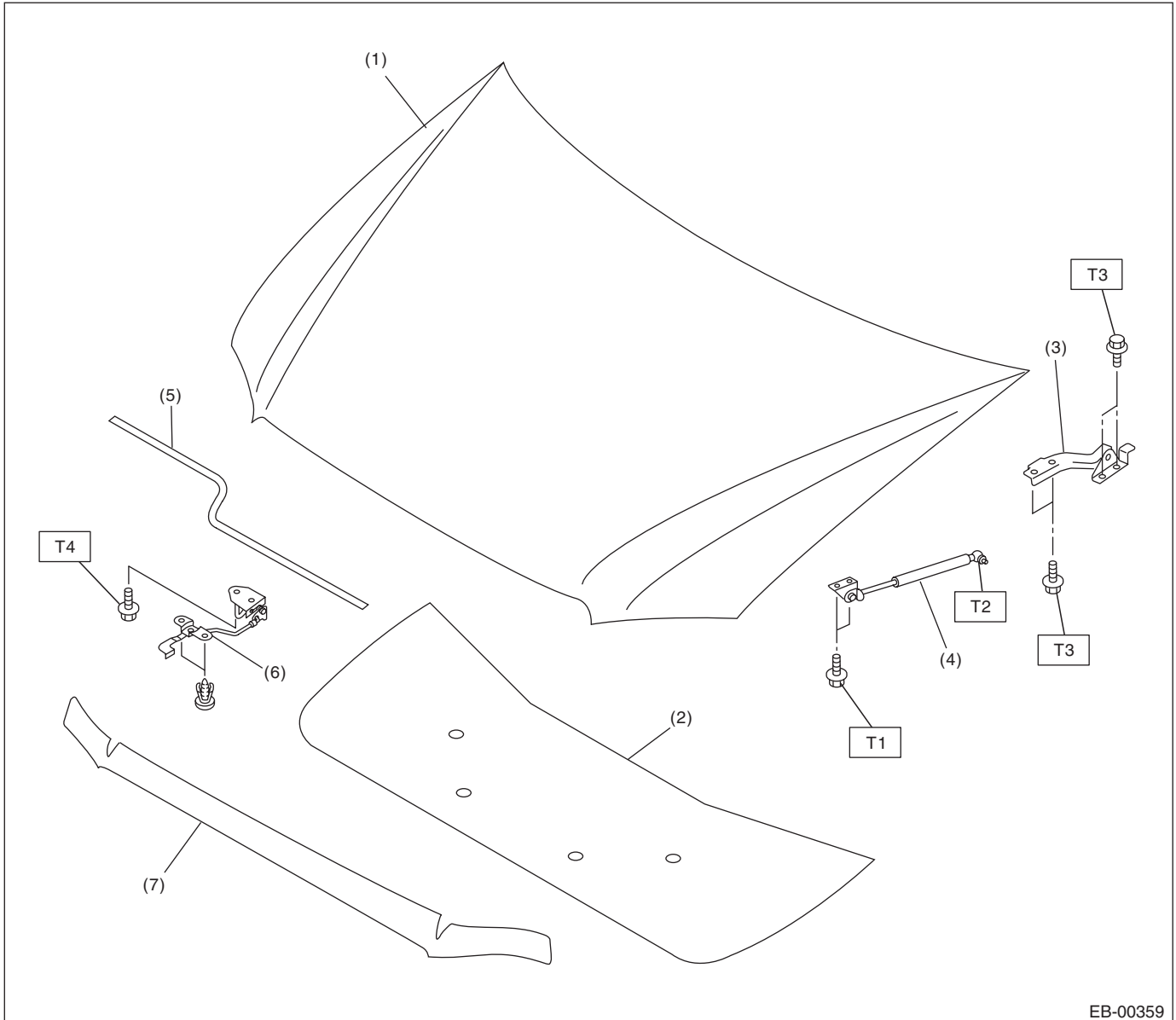
Section	Part	Standard
(A)	Roof panel to Roof spoiler	5.5±1.0 mm (0.22±0.04 in)
(B)	Rear gate glass to Rear quarter panel	5.5±1.5 mm (0.22±0.06 in)
(C)	Rear gate panel to Rear quarter panel	4.0±1.0 mm (0.16±0.04 in)
(D)	Rear gate panel to Rear bumper	7.7±1.5 mm (0.30±0.06 in)
(E)	Rear quarter panel to Rear bumper	E1: 0.3+0.7, -0.3 mm (0.012+0.028, -0.012 in) E2: 0.7+0.5, -0.7 mm (0.028+0.02, -0.028 in)
(F)	Area around the fuel filler lid to Quarter panel	3.5±0.5 mm (0.14±0.02 in)

# General Description

## EXTERIOR BODY PANELS

### B: COMPONENT

#### 1. FRONT HOOD



- |                          |                                    |
|--------------------------|------------------------------------|
| (1) Front hood panel     | (5) Front hood seal                |
| (2) Front hood insulator | (6) Front hood release handle ASSY |
| (3) Front hood hinge     | (7) Front grille seal              |
| (4) Front hood damper    |                                    |

**Tightening torque: N·m (kgf·m, ft·lb)**

**T1: 7.5 (0.76, 5.5)**

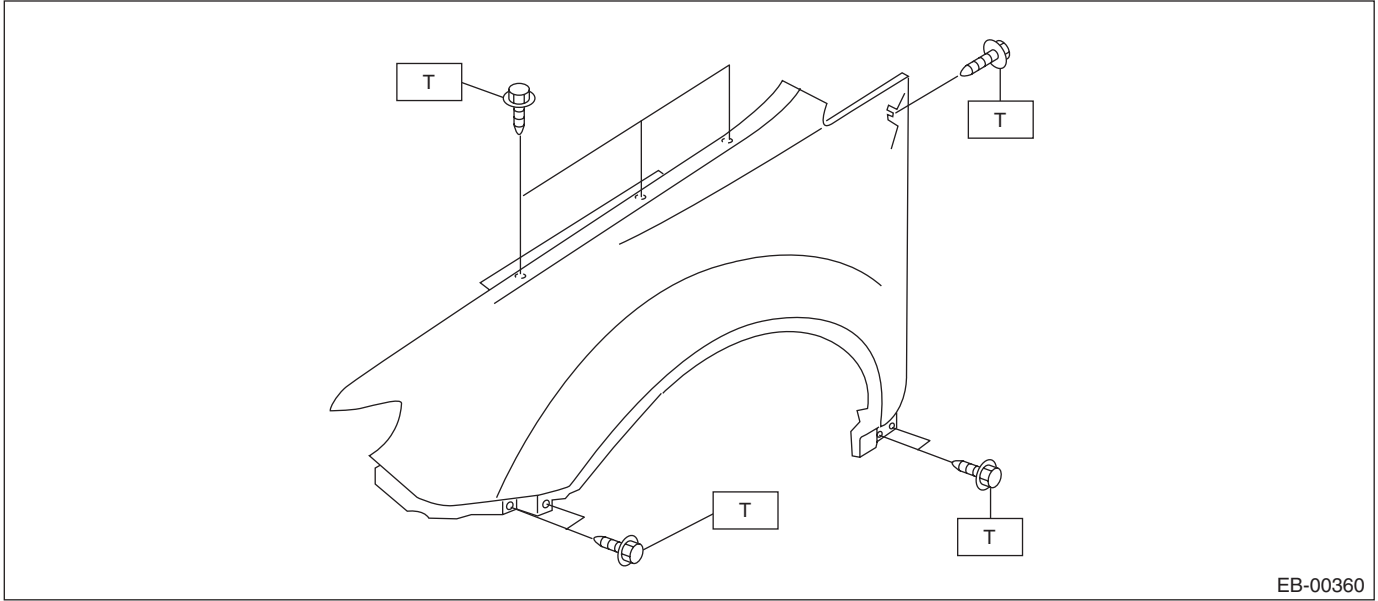
**T2: 20 (2.04, 14.5)**

**T3: 24.5 (2.5, 18.1)**

**T4: 33 (3.4, 24.5)**



## 2. FRONT FENDER PANEL



EB-00360

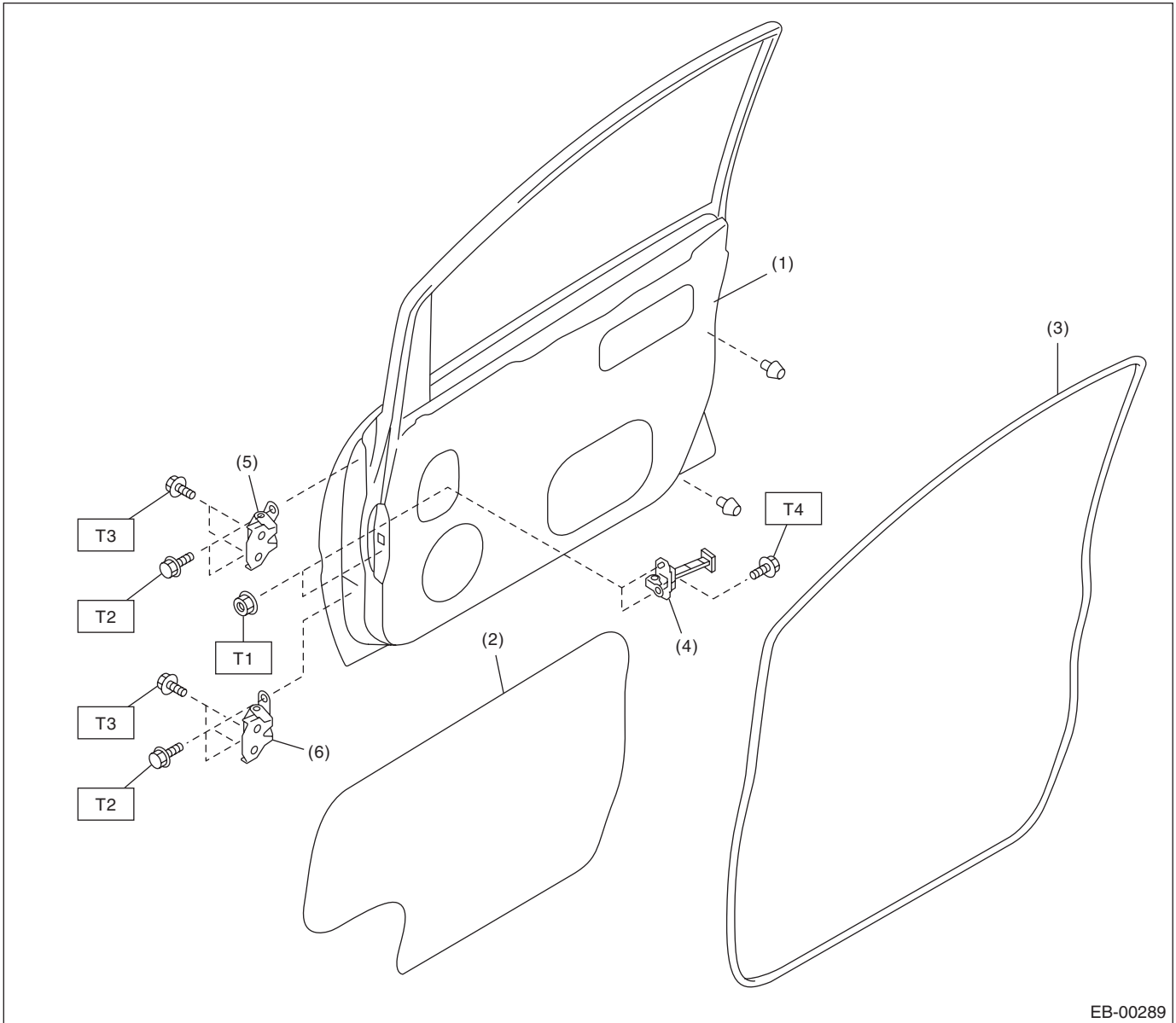
**Tightening torque: N·m (kgf·m, ft·lb)**

**T: 7.4 (0.75, 5.5)**

# General Description

## EXTERIOR BODY PANELS

### 3. FRONT DOOR PANEL



EB-00289

- |                              |                 |
|------------------------------|-----------------|
| (1) Front door panel         | (4) Checker     |
| (2) Sealing cover            | (5) Upper hinge |
| (3) Front door weather strip | (6) Lower hinge |

---

**Tightening torque: N·m (kgf·m, ft·lb)**

**T1: 7.4 (0.75, 5.5)**

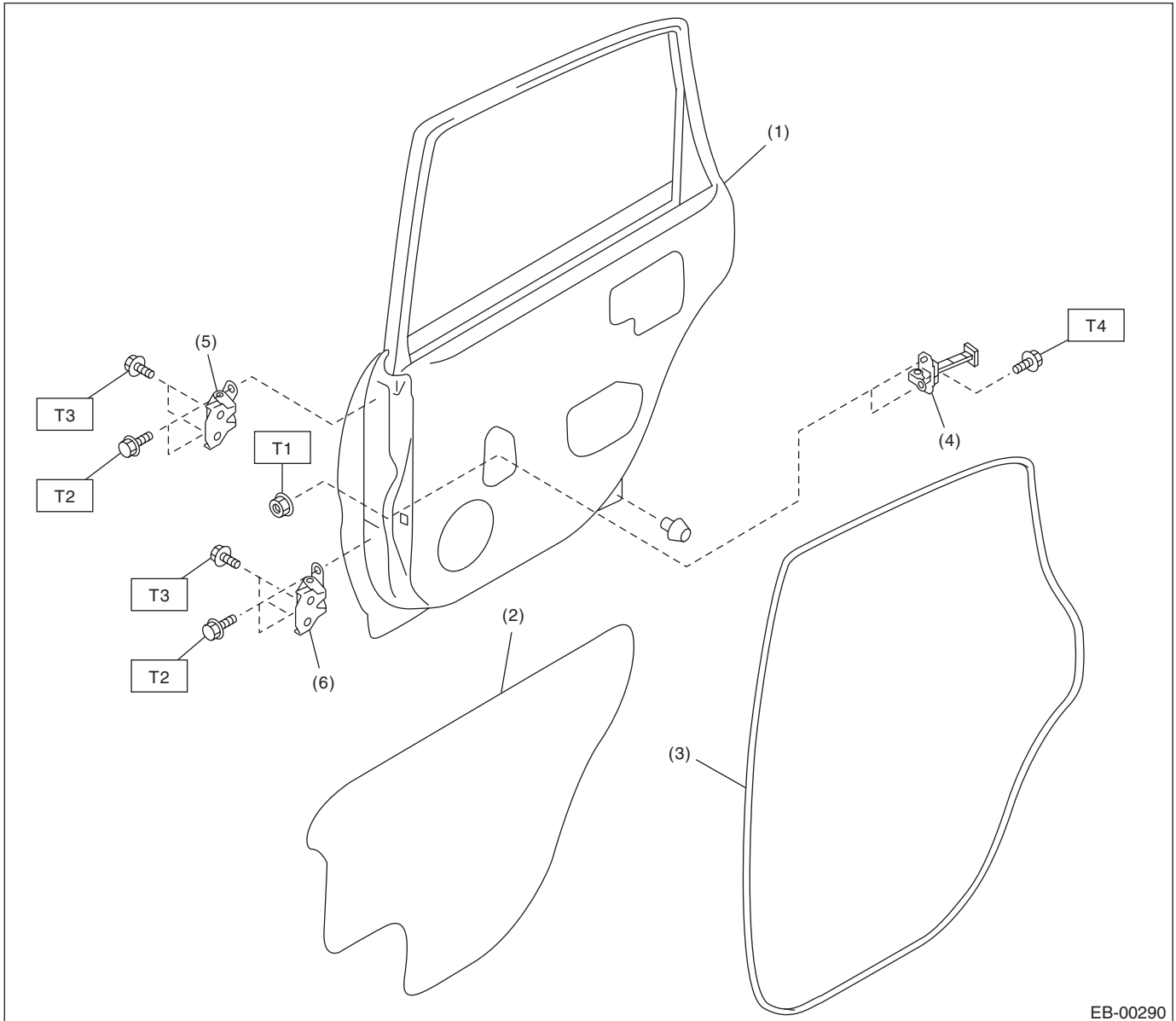
**T2: 24.5 (2.5, 18.1)**

**T3: 29.4 (3.0, 21.7)**

**T4: 32.3 (3.3, 23.8)**

---

## 4. REAR DOOR PANEL



EB-00290

- |                             |                 |
|-----------------------------|-----------------|
| (1) Rear door panel         | (4) Checker     |
| (2) Sealing cover           | (5) Upper hinge |
| (3) Rear door weather strip | (6) Lower hinge |

**Tightening torque: N·m (kgf·m, ft·lb)**

**T1: 7.4 (0.75, 5.5)**

**T2: 24.5 (2.5, 18.1)**

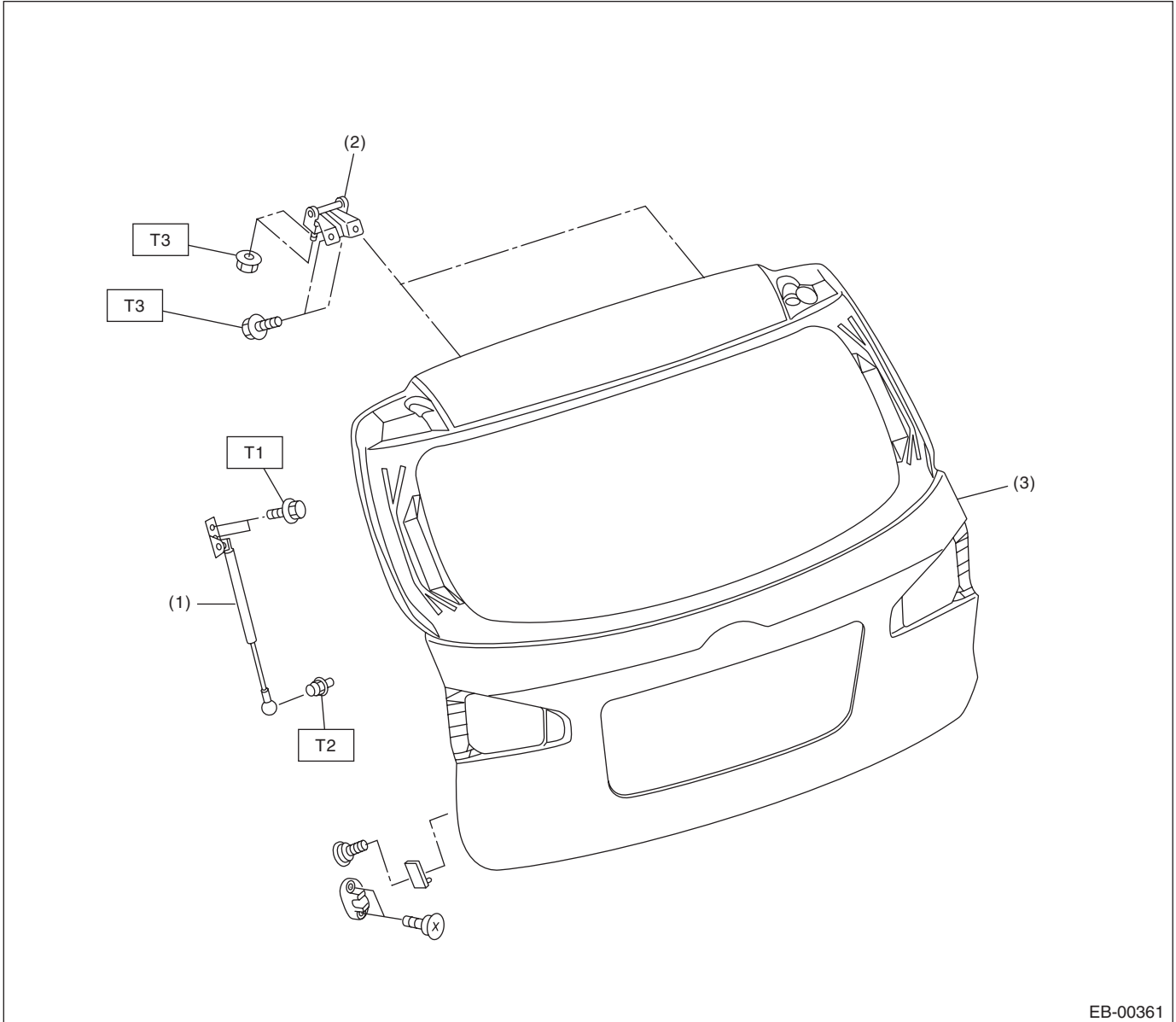
**T3: 29.4 (3.0, 21.7)**

**T4: 32.3 (3.3, 23.8)**

# General Description

## EXTERIOR BODY PANELS

### 5. REAR GATE PANEL



- (1) Rear gate damper stay
- (2) Hinge
- (3) Rear gate panel

**Tightening torque: N·m (kgf·m, ft·lb)**

**T1: 16 (1.63, 11.5)**

**T2: 20 (2.04, 14.5)**

**T3: 25 (2.6, 18.4)**

# General Description

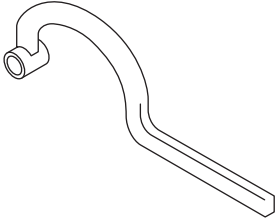
EXTERIOR BODY PANELS

## C: CAUTION

- 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

### 1. SPECIAL TOOL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-925610000	925610000	WRENCH	Used for removing and installing door hinge.

### 2. GENERAL TOOL

TOOL NAME	REMARKS
Support jack	Used for supporting door panel.
Clip remover	Used for removing various types of clips

# Front Hood

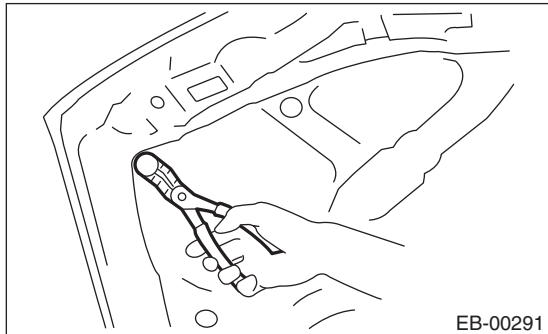
## EXTERIOR BODY PANELS

### 2. Front Hood

#### A: REMOVAL

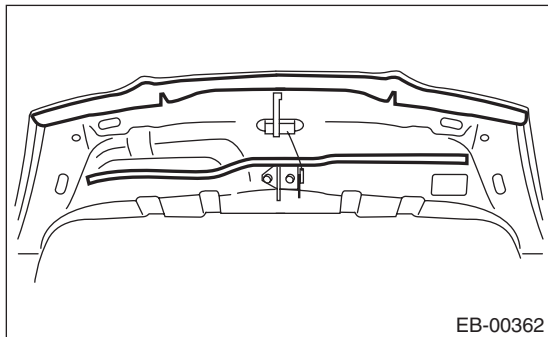
##### 1. FRONT HOOD INSULATOR

1) Release the clips to remove the front hood insulator.



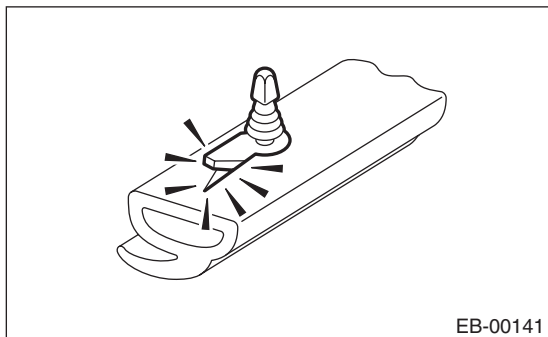
##### 2. FRONT HOOD SEAL

1) Remove the front hood seal.



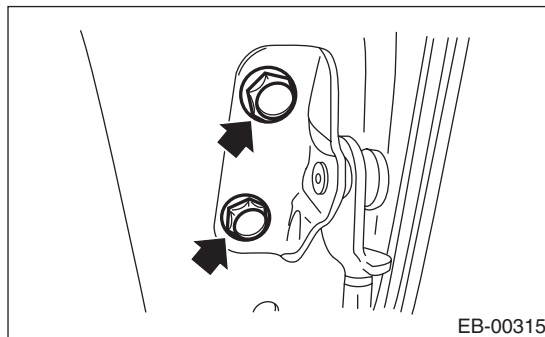
#### NOTE:

If the front hood clip is removed with excessive force, the seal may be damaged. Be sure to use clip remover to remove.

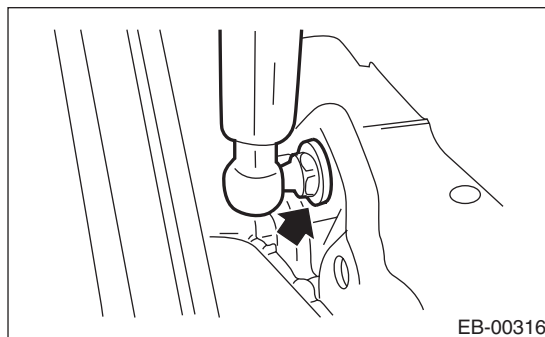


##### 3. FRONT HOOD DAMPER

1) Remove the mounting bolts, and remove the damper stay.

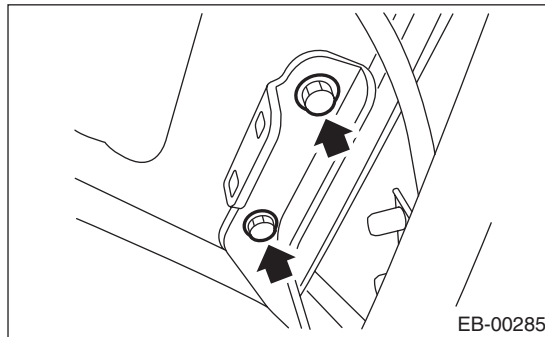


2) Remove the mounting bolt of front hood damper stay.

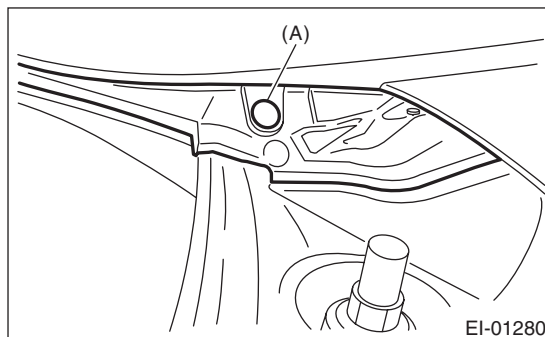


##### 4. FRONT HOOD HINGE

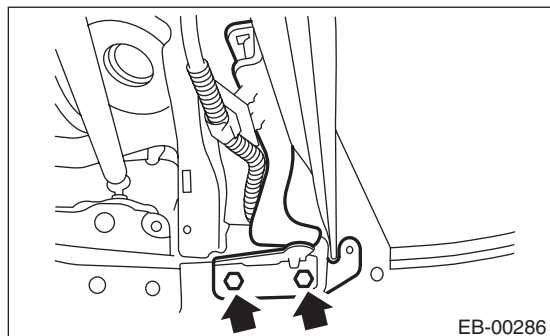
1) Remove the front hood damper.  
2) Remove the bolt, and remove the front hood panel.



3) Remove the clip (A) and remove the cowl side panel front.



- 4) Remove the front fender. <Ref. to EB-14, REMOVAL, Front Fender.>
- 5) Remove the bolts of front hood hinge.

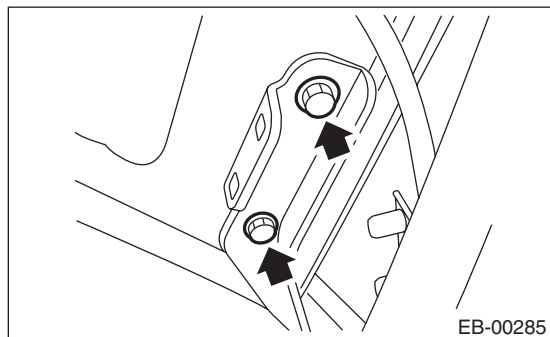


## 5. FRONT HOOD STRIKER

Refer to the front hood lock assembly of SL section. <Ref. to SL-39, Front Hood Lock Assembly.>

## 6. FRONT HOOD PANEL

- 1) Open the front hood to remove the front hood insulator.
- 2) Disconnect the window washer hose.
- 3) Remove the front hood weather strip.
- 4) Remove the hood lock assembly. <Ref. to SL-39, REMOVAL, Front Hood Lock Assembly.>
- 5) Remove the window washer hose and nozzle. <Ref. to WW-18, REMOVAL, Front Washer Nozzle.>
- 6) Remove the front hood damper.
- 7) Remove the bolt, and remove the front hood panel from the front hood hinge.



## B: INSTALLATION

Install in the reverse order of removal.

### NOTE:

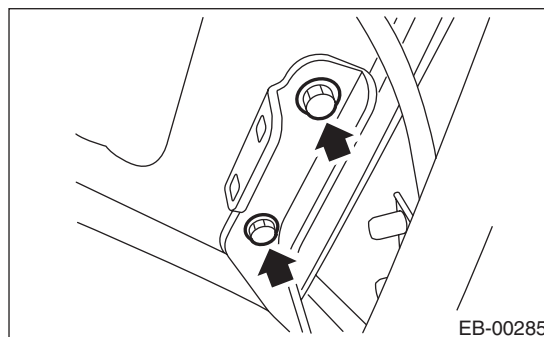
Be careful not to catch the window washer hose in.

### Tightening torque:

Refer to "COMPONENT" of "General Description". <Ref. to EB-6, FRONT HOOD, COMPONENT, General Description.>

## C: ADJUSTMENT

- 1) Adjust the clearance between front hood panel and front fender panel. Clearance must be equal at both sides. For the dimension of clearance, refer to "SPECIFICATION" in "General Description". <Ref. to EB-2, SPECIFICATION, General Description.>
- 2) Use the hinge mounting bolts to align the front hood longitudinal and lateral position.



- 3) Adjust the height at the front end of hood. <Ref. to SL-39, ADJUSTMENT, Front Hood Lock Assembly.>
- 4) Rotate the hood buffer to adjust lateral height.



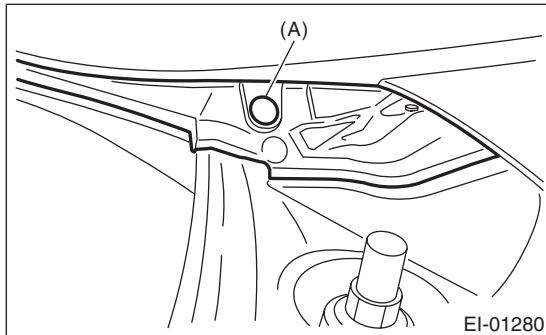
## D: DISPOSAL

For the disposal procedures of front hood damper stay, refer to the disposal procedures of rear gate damper stay. <Ref. to EB-23, REAR GATE DAMPER STAY, DISPOSAL, Rear Gate.>

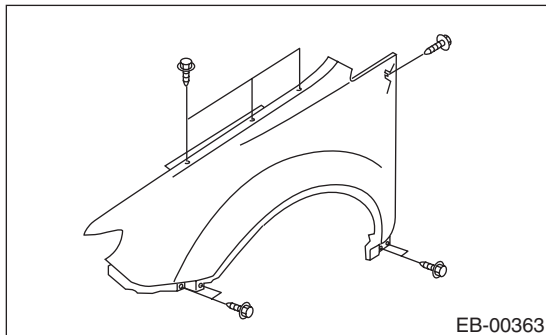
### 3. Front Fender

#### A: REMOVAL

- 1) Disconnect the ground cable from battery.
- 2) Remove the side sill garnish. <Ref. to EI-32, REMOVAL, Side Garnish.>
- 3) Remove the front bumper. <Ref. to EI-22, REMOVAL, Front Bumper.>
- 4) Remove the headlight assembly. <Ref. to LI-14, REMOVAL, Headlight Assembly.>
- 5) Remove the mud guard. <Ref. to EI-20, REMOVAL, Mud Guard.>
- 6) Remove the clip (A) and remove the cowl panel side.



- 7) Remove the bolt, and remove the front fender panel.



#### B: INSTALLATION

- 1) Install in the reverse order of removal.
- 2) Install with attention to make uniform clearance between front fender panel and front hood panel. For the dimension of clearance, refer to "SPECIFICATION" in "General Description". <Ref. to EB-2, SPECIFICATION, General Description.>

#### **Tightening torque:**

**7.4 N·m (0.75 kgf-m, 5.5 ft-lb)**



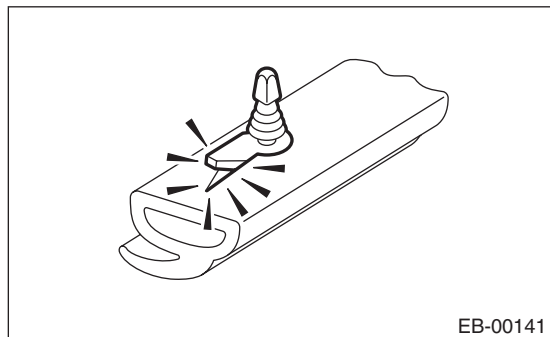
## 4. Front Door

### A: REMOVAL

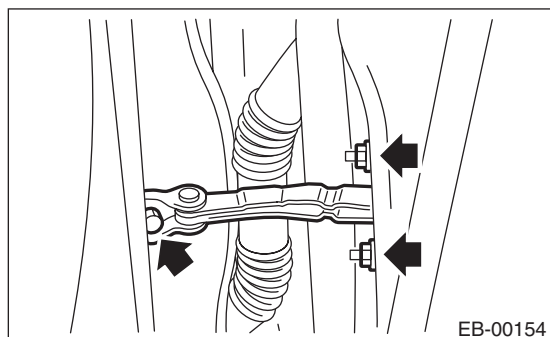
- 1) Disconnect the ground cable from battery.
- 2) Remove the front door trim. <Ref. to EI-36, REMOVAL, Door Trim.>
- 3) Remove the outer mirror assembly. <Ref. to GW-14, REMOVAL, Outer Mirror Assembly.>
- 4) Remove the front door speaker. <Ref. to ET-14, REMOVAL, Front Speaker.>
- 5) Remove the sealing cover. <Ref. to EB-17, REMOVAL, Front Sealing Cover.>
- 6) Remove the front door glass. <Ref. to GW-10, REMOVAL, Front Door Glass.>
- 7) Remove the door sash, and remove the front door regulator and motor assembly. <Ref. to GW-11, REMOVAL, Front Regulator and Motor Assembly.>
- 8) Remove the front inner remote. <Ref. to SL-29, REMOVAL, Front Inner Remote.>
- 9) Remove the front door latch assembly. <Ref. to SL-31, REMOVAL, Front Door Latch and Door Lock Actuator Assembly.>
- 10) Remove the front outer handle. <Ref. to SL-30, REMOVAL, Front Outer Handle.>
- 11) Remove the front door weather strip.

#### NOTE:

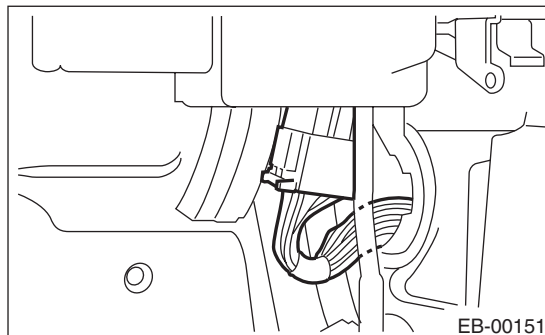
If the weather strip clip is removed with excessive force, the weather strip may be damaged. Be sure to use clip remover to remove.



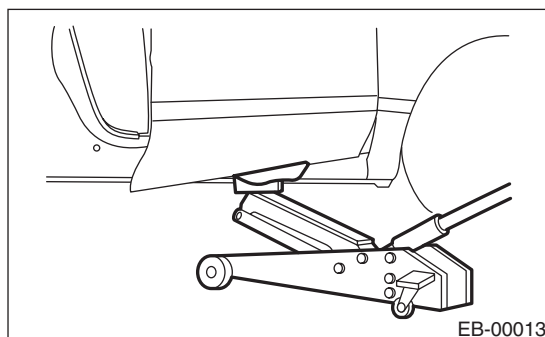
- 12) Remove the bolts and nuts to remove the door checker.



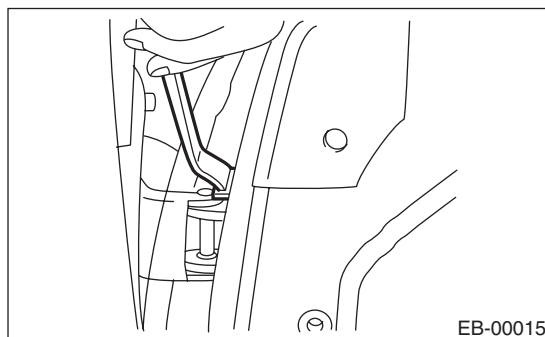
- 13) Remove the instrument panel lower cover or glove box lower cover. <Ref. to EI-37, REMOVAL, Instrument Panel Lower Cover.> or <Ref. to EI-38, REMOVAL, Glove Box.>
- 14) Disconnect the connector of door harness from body harness.



- 15) Put a wooden block on jack and place jack under the front door. Support the door with a jack to protect it from damage.



- 16) Remove the door-side bolts for upper and lower hinges to remove front door panel.



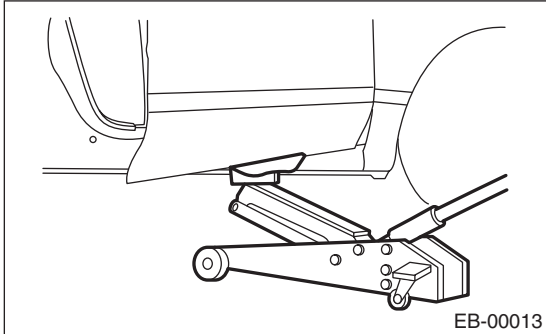
- 17) Remove the door hinge from vehicle.

# Front Door

## EXTERIOR BODY PANELS

### B: INSTALLATION

1) Put a wooden block on jack and place the front door on that.



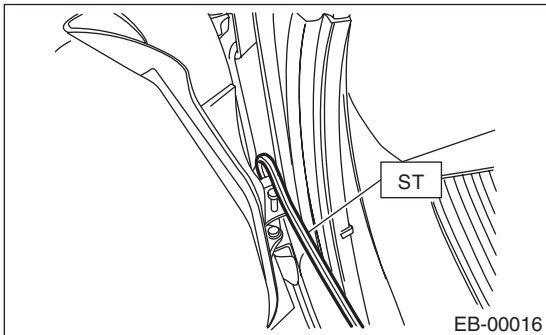
- 2) Apply grease to the sliding area of door hinges, and install the door hinge to vehicle.
- 3) Install the front door to upper hinge and lower hinge adjusting by jack.
- 4) Tighten bolt of door checker.
- 5) Connect door harness connector, and install the instrument panel lower cover.
- 6) Install the front pillar lower trim.

#### **Tightening torque:**

**Refer to "COMPONENT" of "General Description". <Ref. to EB-8, FRONT DOOR PANEL, COMPONENT, General Description.>**

### C: ADJUSTMENT

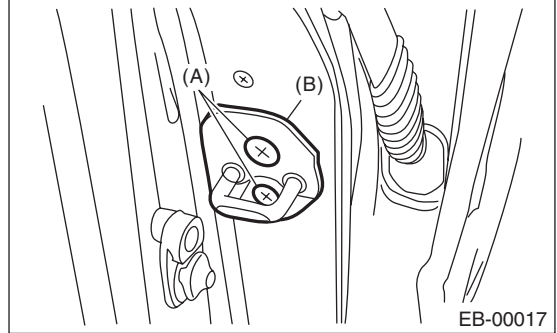
1) Using the ST, loosen the body-side bolts of upper and lower hinges to align the position for vertical and horizontal direction of the front door panel.  
ST 925610000 DOOR HINGE WRENCH



2) Loosen the screw (A) and tap striker (B) using plastic hammer to adjust the gap between rear end surface of front door panel and front end surface of rear door.

#### **CAUTION:**

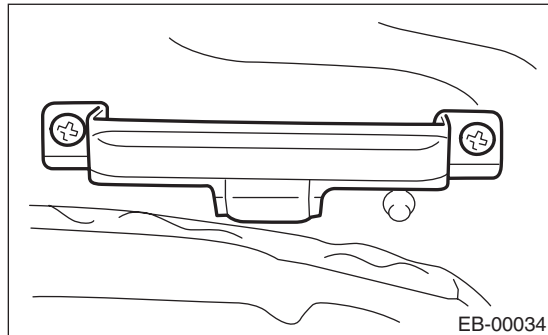
**Do not use an impact wrench. Welding area on the striker nut plate is easily broken.**



## 5. Front Sealing Cover

### A: REMOVAL

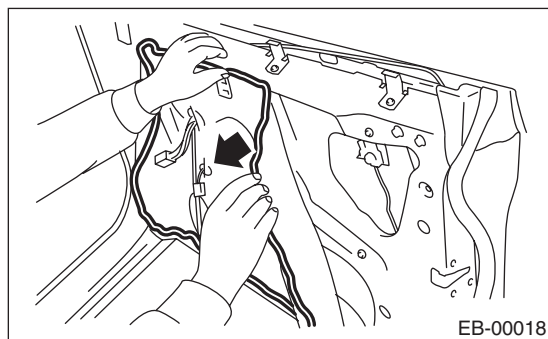
- 1) Disconnect the ground cable from the battery.
- 2) Remove the front door trim. <Ref. to EI-36, REMOVAL, Door Trim.>
- 3) Remove the door trim bracket.



- 4) Remove the sealing cover.

#### NOTE:

- Carefully remove the butyl tape. Excessive force will easily break the cover.
- If cover gets broken, replace it with a new part.



### B: INSTALLATION

- 1) Install in the reverse order of removal.
- 2) When replacing the sealing cover, use the butyl tape.
- 3) Press the butyl tape-applied area firmly to prevent any floating on surface.

#### **Butyl tape:**

**3M 8626 or equivalent**

#### NOTE:

- Apply a uniform bead of butyl tape.
- Attach the sealing cover, keeping it from becoming wrinkled.
- Breaks in the bead will allow water leakage and contamination.

### C: INSPECTION

If the sealing cover gets damaged, replace it with a new part.

# Rear Door

## EXTERIOR BODY PANELS

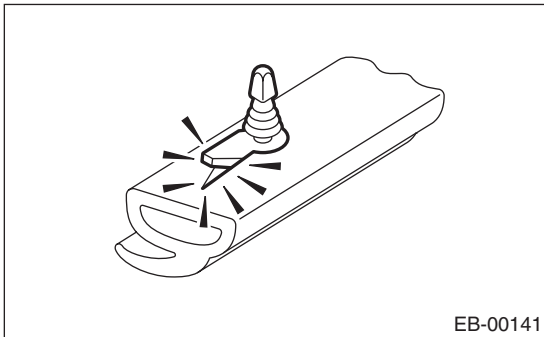
### 6. Rear Door

#### A: REMOVAL

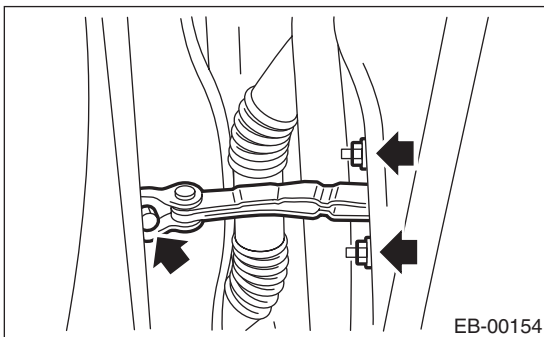
- 1) Disconnect the ground cable from battery.
- 2) Remove the rear door trim. <Ref. to EI-36, REMOVAL, Door Trim.>
- 3) Remove the rear speaker. <Ref. to ET-17, REMOVAL, Rear Speaker.>
- 4) Remove the sealing cover. <Ref. to EB-20, NOTE, Rear Sealing Cover.>
- 5) Remove the rear door glass. <Ref. to GW-17, REMOVAL, Rear Door Glass.>
- 6) Remove the door sash and rear door regulator and motor assemblies. <Ref. to GW-18, REMOVAL, Rear Regulator and Motor Assembly.>
- 7) Remove the rear inner remote. <Ref. to SL-33, REMOVAL, Rear Inner Remote.>
- 8) Remove the rear door latch. <Ref. to SL-35, REMOVAL, Rear Door Latch and Door Lock Actuator Assembly.>
- 9) Remove the rear outer handle. <Ref. to SL-34, REMOVAL, Rear Outer Handle.>
- 10) Remove the rear door weather strip.

#### NOTE:

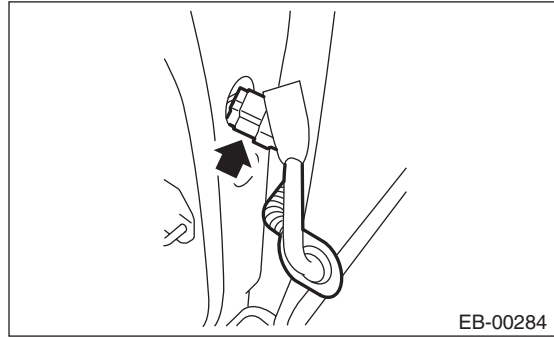
If the weather strip clip is removed with excessive force, the weather strip may be damaged. Be sure to use clip remover to remove.



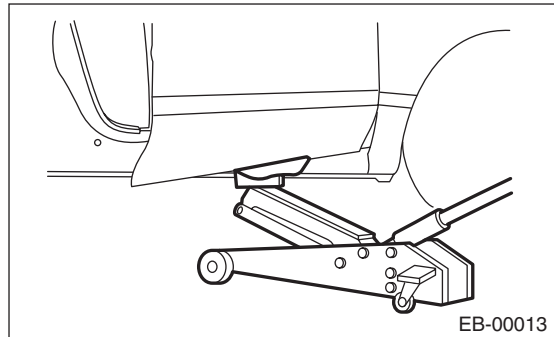
- 11) Remove the bolts and nuts to remove the door checker.



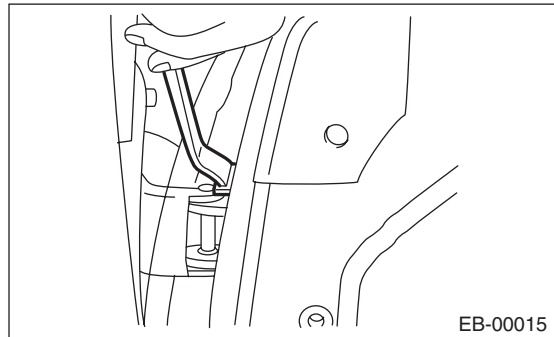
- 12) Pull the door harness connector inside the center pillar, then disconnect the connector.



- 13) Put a wooden block on jack and place jack under the rear door. Support the rear door with the jack to protect it from damage.



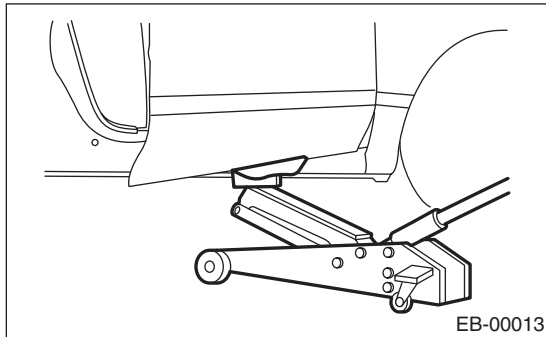
- 14) Remove the door-side bolts for upper and lower hinges to remove the rear door panel.



- 15) Remove the door hinge from vehicle.

**B: INSTALLATION**

1) Put a wooden block on jack and place the rear door on that.



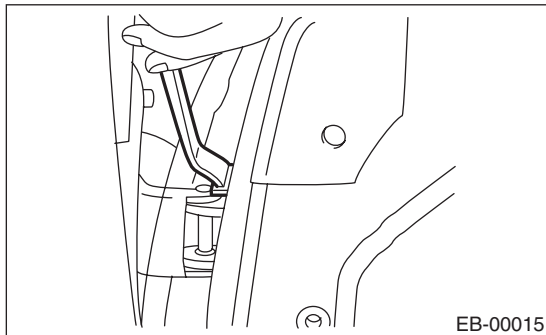
- 2) Apply grease to the moving part of door hinges.
- 3) Install the rear door to upper hinge and lower hinge adjusting by jack.
- 4) Tighten bolt of door checker.
- 5) Connect the door harness connector.

**Tightening torque:**

**Refer to "COMPONENT" of "General Description". <Ref. to EB-9, REAR DOOR PANEL, COMPONENT, General Description.>**

**C: ADJUSTMENT**

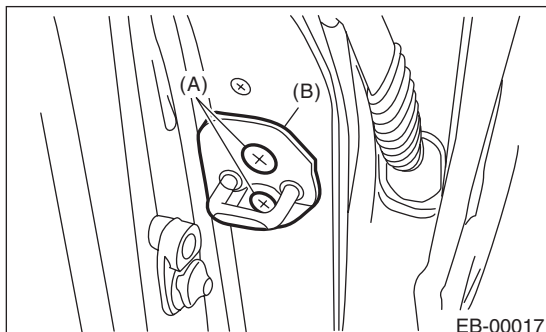
1) Open the rear door, loosen the door-side bolts of upper and lower hinges to align the position for vertical and horizontal direction of rear door panel.



2) Loosen the screw (A) and tap striker (B) using plastic hammer to adjust the gap between rear end surface of rear door panel and body surface.

**CAUTION:**

**Do not use an impact wrench. Welding area on the striker nut plate is easily broken.**



### 7. Rear Sealing Cover

#### A: NOTE

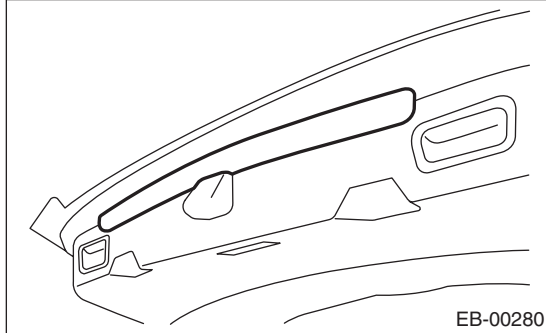
Refer to the front sealing cover for the operation procedures. <Ref. to EB-17, Front Sealing Cover.>

## 8. Rear Gate

### A: REMOVAL

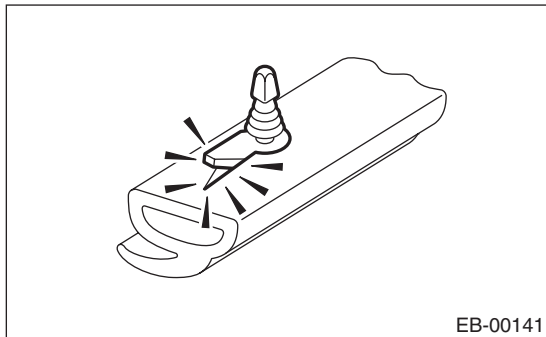
#### 1. REAR GATE PANEL

1) Remove the weather strip clip, and remove the rear gate panel weather strip.



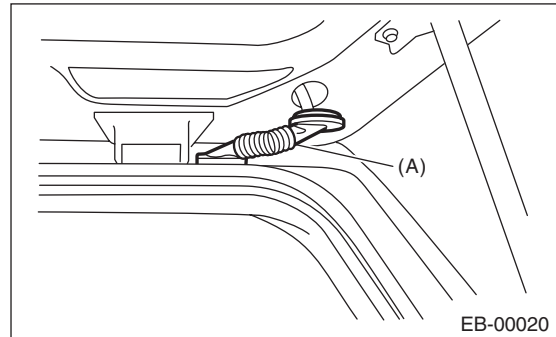
**NOTE:**

If the weather strip clip is removed with excessive force, the weather strip may be damaged. Be sure to use clip remover to remove.



- 2) Remove the rear gate trim. <Ref. to EI-52, REMOVAL, Rear Gate Trim.>
- 3) Remove the rear wiper arm. <Ref. to WW-19, REMOVAL, Rear Wiper Arm.>
- 4) Remove the rear wiper motor. <Ref. to WW-20, REMOVAL, Rear Wiper Motor.>
- 5) Remove the rear gate latch assembly. <Ref. to SL-38, REMOVAL, Rear Gate Latch Assembly.>
- 6) Remove the roof spoiler. <Ref. to EI-31, REMOVAL, Roof Spoiler.>
- 7) Remove the roof trim, and disconnect connector from the rear gate harness connector. <Ref. to EI-51, REMOVAL, Roof Trim.>
- 8) Disconnect the ground cable from battery.
- 9) Remove harness clip of each connector from the rear gate panel.

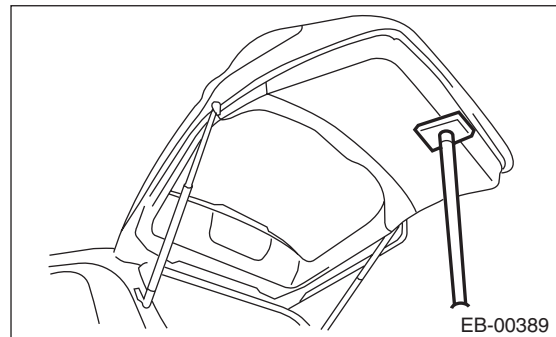
10) Remove the rubber duct (A) connection, and pull out the harness and washer hose from the rear gate.



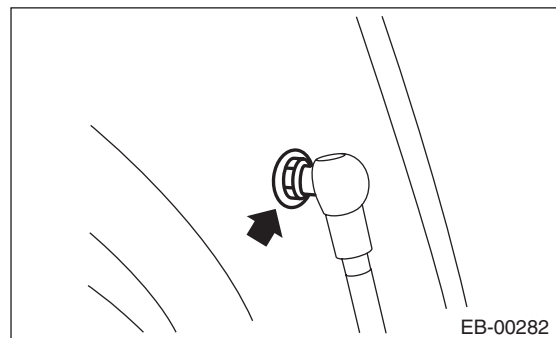
11) Before removing the rear gate damper stay, prevent the rear gate from closing using prop or the like.

**CAUTION:**

If the prop comes off, operators may get injured and vehicle may get damaged. Make sure to support the rear gate with secure material to prevent injury or damage.



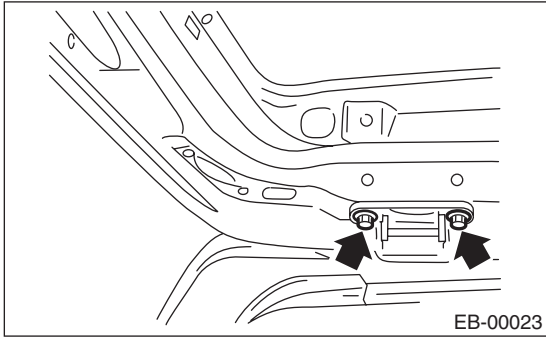
12) Remove the mounting bolt of rear gate damper stay.



# Rear Gate

## EXTERIOR BODY PANELS

13) Remove the rear gate hinge bolt, and remove the rear gate panel.



14) Remove the rear gate hinge from the vehicle.

## 2. REAR GATE DAMPER STAY

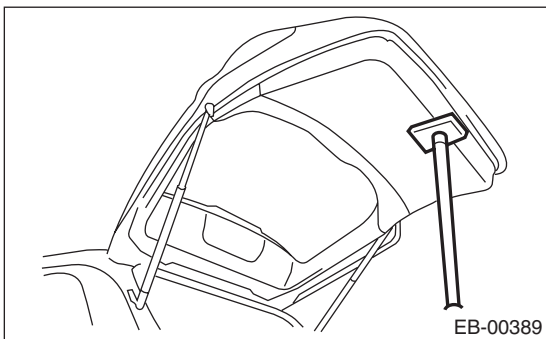
### CAUTION:

- Do not damage piston rods and oil seals.
- While removing/installing, hold the cylinder part only. Do not touch the stroking portion of the rod to avoid foreign particles on. If touched with cotton work gloves etc., fiber may attach to them and cause the gas leakage.
- Do not apply pressure from lateral direction. This may break the damper.
- Never disassemble cylinders: They contain gas.
- To avoid the rear gate panel lowering, hold it while working.

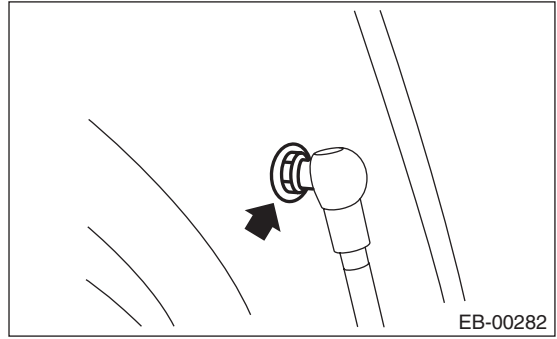
1) Before removing the rear gate damper stay, prevent the rear gate from closing using prop or the like.

### CAUTION:

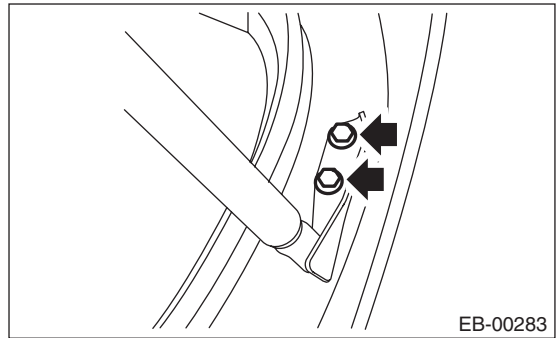
If the prop comes off, operators may get injured and vehicle may get damaged. Make sure to support the rear gate with secure material to prevent injury or damage.



2) Remove the mounting bolt of rear gate damper stay.



3) Remove mounting bolt, and remove the damper stay.



## B: INSTALLATION

### 1. REAR GATE PANEL

- 1) Install in the reverse order of removal.
- 2) Install with attention to make uniform clearance between rear gate panel and body. For the dimension of clearance, refer to "SPECIFICATION" in "General Description". <Ref. to EB-2, SPECIFICATION, General Description.>

### Tightening torque:

**25 N·m (2.6 kgf·m, 18.4 ft·lb)**

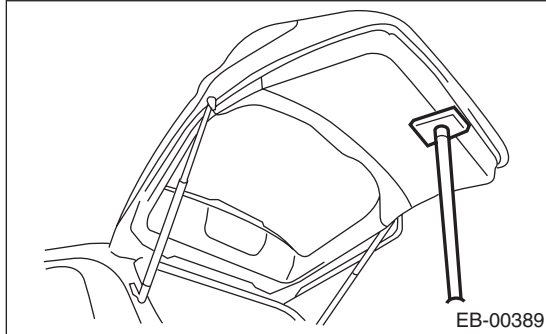


## 2. REAR GATE DAMPER STAY

1) Prevent the rear gate from closing using prop or the like.

**CAUTION:**

**If the prop comes off, operators may get injured and vehicle may get damaged. Make sure to support the rear gate with secure material to prevent injury or damage.**



2) Install in the reverse order of removal.

**Tightening torque:**

**Refer to "COMPONENT" of "General Description". <Ref. to EB-10, REAR GATE PANEL, COMPONENT, General Description.>**

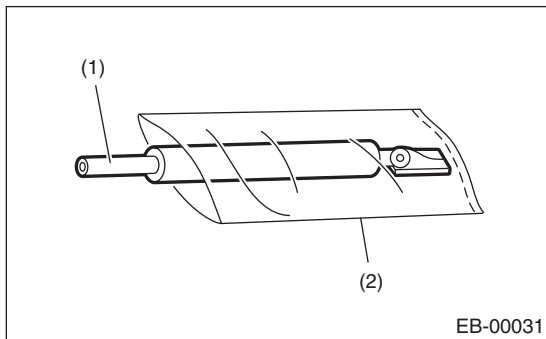
## C: DISPOSAL

### 1. REAR GATE DAMPER STAY

**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 sack as shown in the figure.

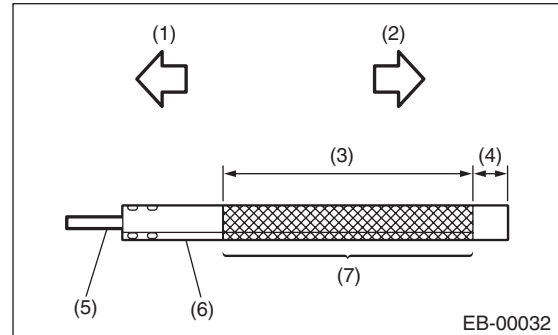


- (1) Rear gate damper stay
- (2) Vinyl sack

**NOTE:**

Prevent the vinyl sack from being caught by drill cutting edge.

2) Lift the body side slightly with piston rods fully extended, and secure the body side with vise. 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 rear gate damper stay gas completely.



- (1) Door side
- (2) Body side
- (3) 190 mm (7.48 in)
- (4) 10 mm (0.39 in)
- (5) Piston rod
- (6) Cylinder
- (7) Portion to be drilled

# Rear Gate

EXTERIOR BODY PANELS

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# CRUISE CONTROL SYSTEM

# CC

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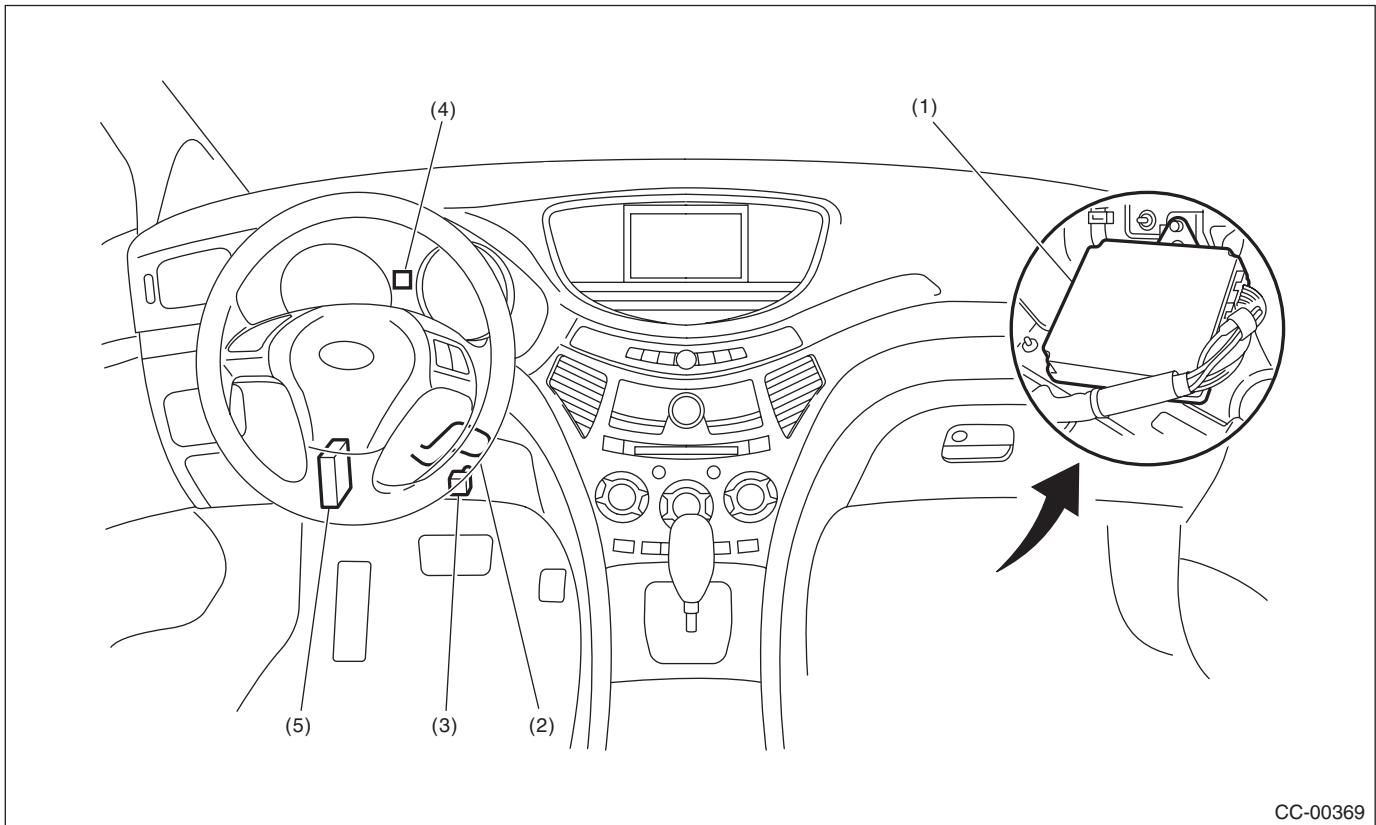
	<b>Page</b>
1. General Description .....	2
2. Cruise Control Module .....	3
3. Cruise Control Command Switch .....	4
4. Combination Meter .....	5
5. Stop Light & Brake Switch .....	6
6. Transmission Control Module (TCM) .....	7
7. Inhibitor Switch .....	8

# General Description

## CRUISE CONTROL SYSTEM

### 1. General Description

#### A: COMPONENT



CC-00369

- |                                   |   |                                       |
|-----------------------------------|---|---------------------------------------|
| (1) Engine control module (ECM)   | (3) Stop light & brake switch                             | (5) Transmission control module (TCM) |
| (2) Cruise control command switch | (4) Cruise indicator light and cruise set indicator light |                                       |

#### B: CAUTION

- Before disassembling or reassembling parts, always disconnect the battery ground cable from battery. When repairing the audio, control module, etc. which are provided with memory functions, record the memory contents before disconnecting the ground cable from battery. Otherwise, the memory will be cleared.
- Reassemble the parts in the reverse order of disassembly unless otherwise indicated.
- Adjust the parts to specifications specified in this manual.
- Connect the connectors securely during reassembly.
- After reassembly, ensure functional parts operate properly.

#### C: PREPARATION TOOL

TOOL NAME	REMARKS
Circuit tester	Used for measuring resistance and voltage.

## 2. Cruise Control Module

### A: NOTE

The control of cruise control system is carried out in engine control module (ECM).

Refer to engine section for removal and installation.  
<Ref. to FU(H6DO)-52, Engine Control Module (ECM).>

# Cruise Control Command Switch

## CRUISE CONTROL SYSTEM

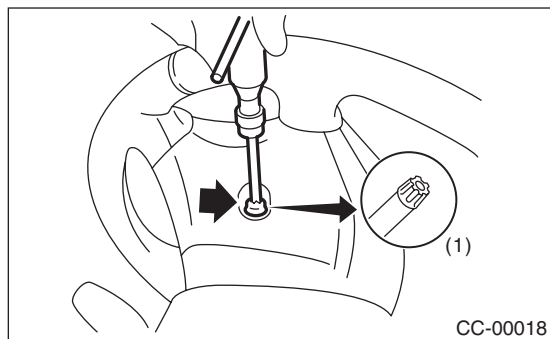
### 3. Cruise Control Command Switch

#### A: REMOVAL

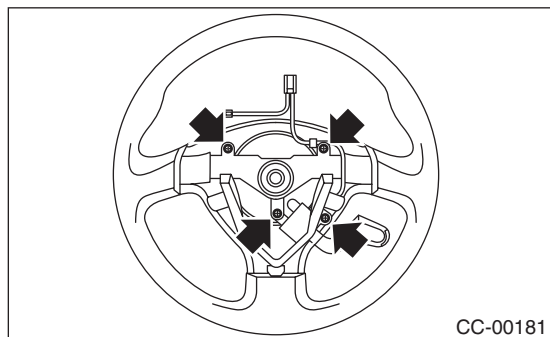
##### CAUTION:

Before servicing, be sure to read the notes in the "AB" section for proper handling of the driver's airbag module. <Ref. to AB-4, CAUTION, General Description.>

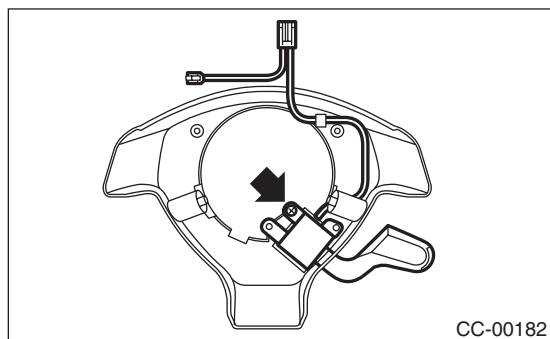
- 1) Set the front wheels in straight ahead position.
- 2) Turn the ignition switch to OFF.
- 3) Disconnect the ground cable from battery and wait for at least 60 seconds before starting work.
- 4) Using TORX® bit T30 (1), loosen two TORX® bolts which secure the driver's airbag module.



- 5) Disconnect the airbag module connector on back of the airbag module.
- 6) Remove the steering wheel. <Ref. to PS-12, REMOVAL, Steering Wheel.>
- 7) Remove the four screws to remove the lower cover from steering wheel.



- 8) Remove one screw to remove the cruise control command switch from lower cover.

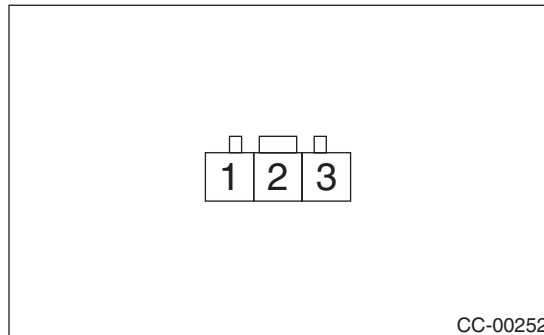


#### B: INSTALLATION

Install in the reverse order of removal.

#### C: INSPECTION

Measure the cruise control command switch resistance.



Switch	Area	Terminal No.	Standard
CANCEL SET/COAST RESUME/ ACCEL	All OFF	2 and 3	Approx. 4 k $\Omega$
CANCEL	ON	2 and 3	Less than 1 $\Omega$
SET/COAST	ON	2 and 3	Approx. 250 $\Omega$
RESUME/ ACCEL	ON	2 and 3	Approx. 1500 $\Omega$
MAIN	OFF	1 and 2	1 M $\Omega$ or more
	ON	1 and 2	Less than 1 $\Omega$

If NG, replace the cruise control command switch.

## 4. Combination Meter

### A: NOTE

Refer to IDI section for combination meter. <Ref. to IDI-11, Combination Meter.>

## Stop Light & Brake Switch

CRUISE CONTROL SYSTEM

---

### 5. Stop Light & Brake Switch

#### A: NOTE

Refer to BR section for stop light & brake switch.  
<Ref. to BR-39, Stop Light Switch.>



## 6. Transmission Control Module (TCM)

### A: NOTE

Refer to the following section for transmission control module (TCM). <Ref. to 5AT-54, Transmission Control Module (TCM).>

## 7. Inhibitor Switch

### A: NOTE

Inhibitor switch cannot be removed and checked, because the inhibitor switch is installed on control valve assembly.

When a malfunction occurs, refer to 5AT (diag) section. <Ref. to 5AT(diag)-34, DTC P0705 TRANSMISSION RANGE SENSOR CIRCUIT (PRNDL INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

# CRUISE CONTROL SYSTEM (DIAGNOSTICS)

# *CC(diag)*

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# Basic Diagnostic Procedure

## CRUISE CONTROL SYSTEM (DIAGNOSTICS)

### 1. Basic Diagnostic Procedure

#### A: PROCEDURE

	Step	Check	Yes	No
1	<b>CHECK MALFUNCTION INDICATOR LIGHT.</b> Make sure the malfunction indicator light illuminates.	Does the malfunction indicator light illuminate?	Go to step 5.	Go to step 2.
2	<b>CHECK CRUISE INDICATOR LIGHT.</b> Make sure the cruise indicator light blinks.	Does the cruise indicator light blink?	Go to step 7.	Go to step 3.
3	<b>CHECK CRUISE CONTROL MAIN SWITCH OPERATION.</b> Check cruise control main switch operation. (Ensure the cruise indicator light illuminates.)	Is the cruise control main switch turned on? (Does the cruise indicator light illuminate?)	Go to step 4.	Go to phenomenon 1. <Ref. to CC(diag)-9, DIAGNOSTIC PROCEDURE WITH PHENOMENON, Diagnostics with Phenomenon.>
4	<b>CHECK CRUISE CONTROL SET OPERATION.</b> Check the cruise control setting operation.	Can the cruise control be set while driving at 40 km/h (25 MPH) or more?	Go to step 8.	Go to step 7.
5	<b>CHECK DTC.</b> Read all DTCs using the Subaru Select Monitor.	Is an engine or ABS/VDC related DTC displayed?	Go to step 6.	Go to phenomenon 2. <Ref. to CC(diag)-9, DIAGNOSTIC PROCEDURE WITH PHENOMENON, Diagnostics with Phenomenon.>
6	<b>CHECK FREEZE FRAME DATA.</b> Using the Subaru Select Monitor, check the Freeze Frame Data or Information in Trouble State.	Was the Freeze Frame Data or Information in Trouble State recorded?	Record the data. Perform the diagnosis according to the engine or ABS/VDC related DTC.	Perform the diagnosis according to the engine or ABS/VDC related DTC.
7	<b>CHECK CANCEL CODE.</b> Using the Subaru Select Monitor, read the cancel codes.  NOTE: • Do not turn the ignition switch to OFF after the cruise control is deactivated. • Do not operate the cruise control command switch after the cruise control is deactivated. If the above is performed, the cancel code will be cleared.	Is it possible to read the cancel codes?	Perform the diagnosis according to the cancel code. <Ref. to CC(diag)-11, LIST, List of Cancel Code.>	Go to step 8.
8	<b>CHECK CRUISE SET INDICATOR LIGHT.</b> Make sure the cruise set indicator light illuminates.	Does the cruise set indicator light illuminate?	Go to step 9.	Go to phenomenon 3. <Ref. to CC(diag)-9, DIAGNOSTIC PROCEDURE WITH PHENOMENON, Diagnostics with Phenomenon.>
9	<b>CHECK VEHICLE SPEED IS HELD WITHIN SET SPEED.</b> Make sure the vehicle speed is held within set speed.	Is the vehicle speed kept within setting speed $\pm 3$ km/h ( $\pm 2$ MPH)? (Make sure that on a level road.)	Go to step 10.	Go to phenomenon 4. <Ref. to CC(diag)-9, DIAGNOSTIC PROCEDURE WITH PHENOMENON, Diagnostics with Phenomenon.>

# Basic Diagnostic Procedure

## CRUISE CONTROL SYSTEM (DIAGNOSTICS)

Step	Check	Yes	No
<b>10</b> <b>CHECK RESUME/ACCEL OPERATION.</b> Check the RESUME/ACCEL switch operation.	Does the vehicle speed increase or return to set speed after RESUME/ACCEL switch has been pressed?	Go to step 11.	Go to phenomenon 5. <Ref. to CC(diag)-9, DIAGNOSTIC PROCEDURE WITH PHENOMENON, Diagnostics with Phenomenon.>
<b>11</b> <b>CHECK SET/COAST OPERATION.</b> Check the SET/COAST switch operation.	Does the vehicle speed decrease after SET/COAST switch has been pressed?	Go to step 12.	Go to phenomenon 6. <Ref. to CC(diag)-9, DIAGNOSTIC PROCEDURE WITH PHENOMENON, Diagnostics with Phenomenon.>
<b>12</b> <b>CANCEL OPERATION CHECK.</b> Check the CANCEL switch operation.	Is the cruise control released after CANCEL switch has been pressed?	Go to step 13.	Go to phenomenon 7. <Ref. to CC(diag)-9, DIAGNOSTIC PROCEDURE WITH PHENOMENON, Diagnostics with Phenomenon.>
<b>13</b> <b>CHECK CRUISE CONTROL RELEASE OPERATION.</b> Check the cruise control release operation.	Is the cruise control released after brake pedal has been depressed?	Go to step 14.	Go to phenomenon 8. <Ref. to CC(diag)-9, DIAGNOSTIC PROCEDURE WITH PHENOMENON, Diagnostics with Phenomenon.>
<b>14</b> <b>CHECK CRUISE CONTROL RELEASE OPERATION.</b> Check the cruise control release operation.	Is the cruise control released after shifting to the neutral position?	Finish the diagnosis.	Go to phenomenon 9. <Ref. to CC(diag)-9, DIAGNOSTIC PROCEDURE WITH PHENOMENON, Diagnostics with Phenomenon.>

# General Description

## CRUISE CONTROL SYSTEM (DIAGNOSTICS)

### 2. General Description

#### A: CAUTION

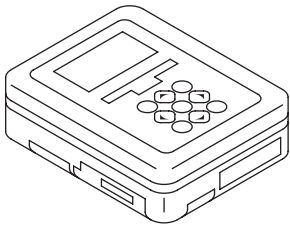
Airbag system wiring harness is routed near the cruise control command switch.

#### CAUTION:

- Do not use the electrical test equipment on the airbag system wiring harnesses and connector circuits.
- Be careful not to damage the airbag system wiring harness when servicing the cruise control command switch. Airbag system wiring harness is routed near the cruise control command switch.

#### B: PREPARATION TOOL

##### 1. SPECIAL TOOL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST1B022XU0	1B022XU0	SUBARU SELECT MONITOR III KIT	Used for troubleshooting the electrical system.

##### 2. GENERAL TOOL

TOOL NAME	REMARKS
Circuit tester	Used for measuring resistance, voltage and current.

#### C: INSPECTION

Measure the battery voltage and specific gravity of electrolyte.

#### **Standard voltage:**

**12 V or more**

#### **Specific gravity:**

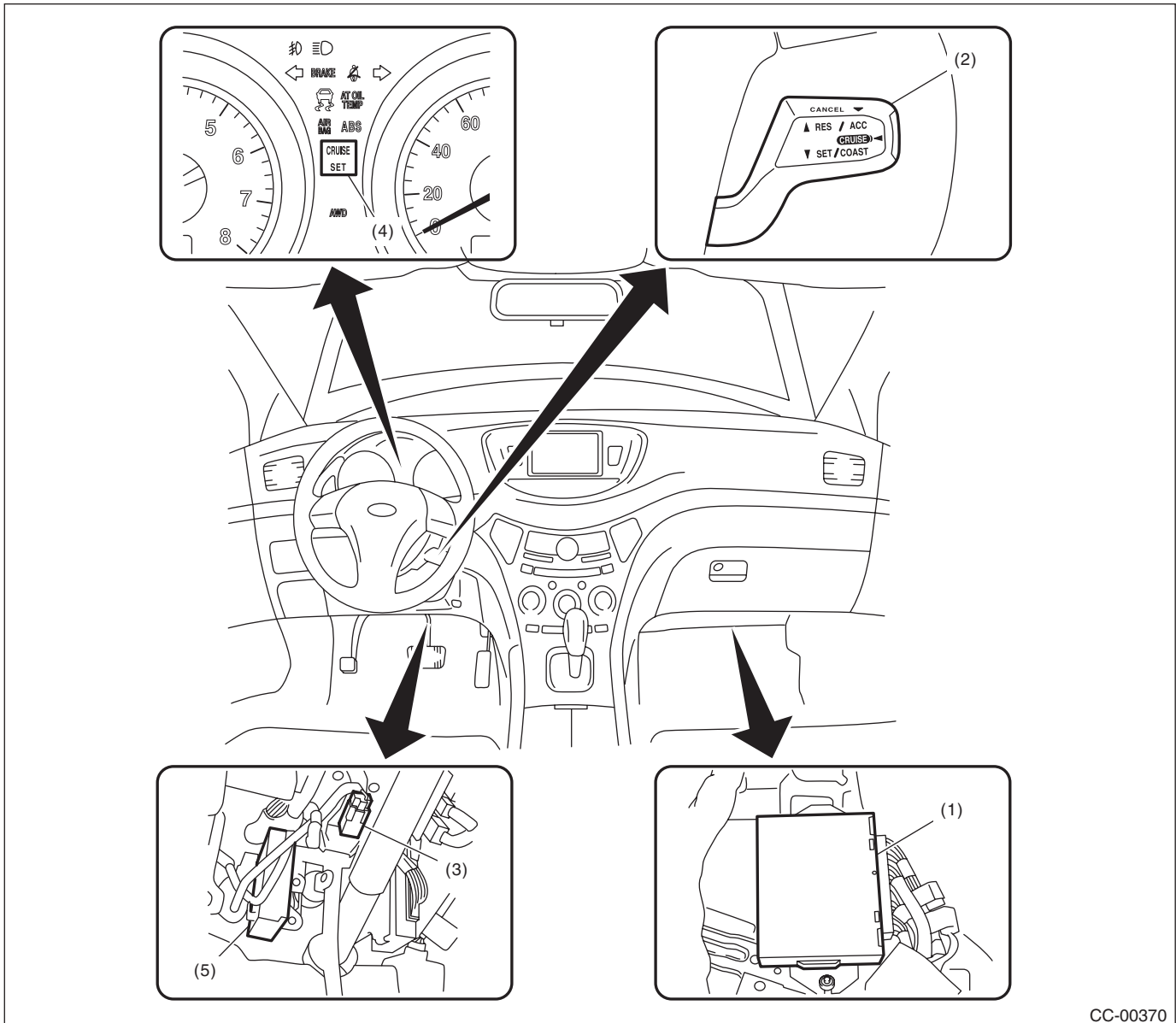
**1.260 or more**

# Electrical Component Location

## CRUISE CONTROL SYSTEM (DIAGNOSTICS)

### 3. Electrical Component Location

#### A: LOCATION



(1) Engine control module (ECM)

(3) Stop light and brake switch

(5) Transmission control module (TCM)

(2) Cruise control command switch

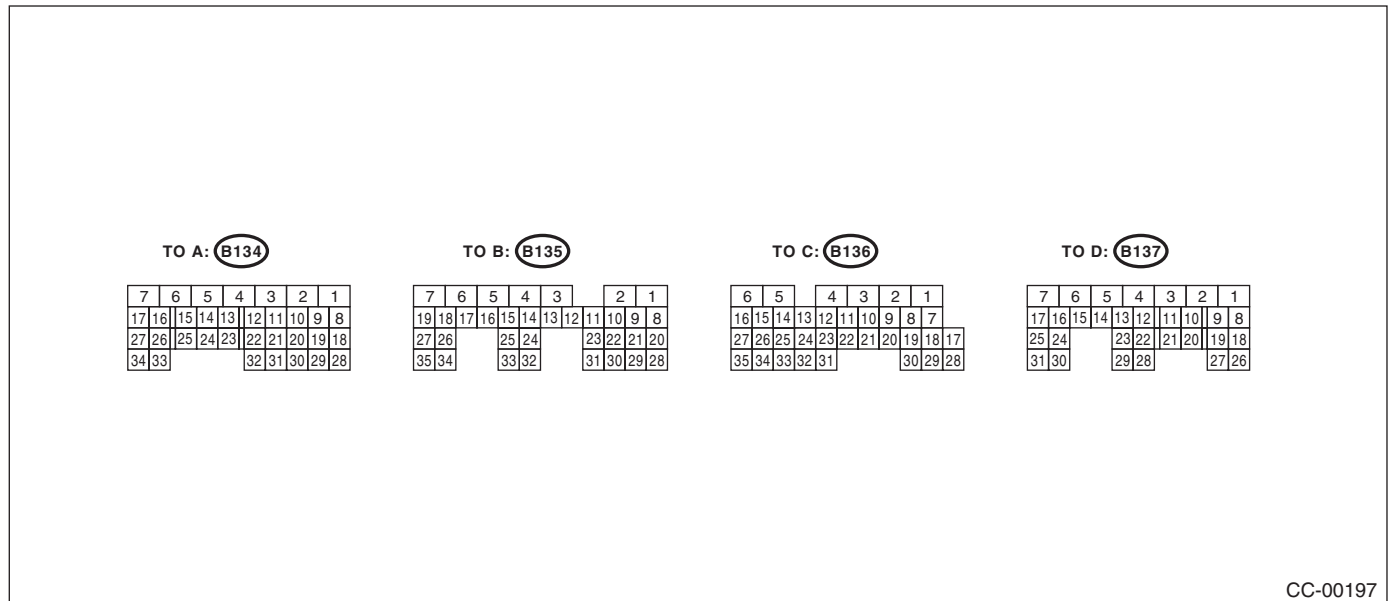
(4) Cruise indicator light and cruise set indicator light

# Engine Control Module (ECM) I/O Signal

## CRUISE CONTROL SYSTEM (DIAGNOSTICS)

### 4. Engine Control Module (ECM) I/O Signal

#### A: ELECTRICAL SPECIFICATION



CC-00197

Content		Terminal No.	Measurement condition and I/O signal (Idling with ignition ON: except for cruise set light)
Main power supply	VB (CONTROL 1) VB (CONTROL 2)	C1 D7	<ul style="list-style-type: none"> <li>Battery voltage is detected when the main power is turned ON.</li> <li>"0 V" is detected when the main power is turned OFF.</li> </ul>
Command switch		C12	<ul style="list-style-type: none"> <li>"0 V" is detected when the command switch is in CANCEL position.</li> <li>"Approx. 1 V" is detected when the command switch is in SET/COAST position.</li> <li>"Approx. 3 V" is detected when the command switch is in RESUME/ACCEL position.</li> <li>"Approx. 4 V" is detected when the command switch is released.</li> </ul>
Brake switch 1 (Brake switch)		C15	<ul style="list-style-type: none"> <li>Battery voltage is detected when the brake pedal is released.</li> <li>"0 V" is detected when brake pedal is depressed.</li> </ul>
Brake switch 2 (Stop light switch)		C3	<ul style="list-style-type: none"> <li>Battery voltage is detected when brake pedal is depressed.</li> <li>"0 V" is detected when the brake pedal is released.</li> </ul>
Main switch		C13	<ul style="list-style-type: none"> <li>"0 V" is detected while the main switch is pressed or turned ON.</li> <li>"5 V" is present when the main switch is OFF.</li> </ul>
Ground	GND (CONTROL)	A6	—
Ignition switch		C30	<ul style="list-style-type: none"> <li>Battery voltage is detected when the ignition switch is turned ON.</li> <li>"0 V" is detected when the ignition switch is turned OFF.</li> </ul>
Neutral signal		C35	<ul style="list-style-type: none"> <li>Battery voltage is detected when the shift lever is in any position except for "P" or "N".</li> <li>"0 V" is detected when the shift lever is in "P" or "N" position.</li> </ul>

#### B: WIRING DIAGRAM

<Ref. to WI-75, WIRING DIAGRAM, Cruise Control System.>



### 5. Subaru Select Monitor

#### A: OPERATION

##### 1. GENERAL DESCRIPTION

The on-board diagnosis function of the cruise control system uses Subaru Select Monitor.

The on-board diagnosis function operates in two categories, which are used depending on the type of problems;

##### 1) Cruise Control 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 memory in ECM stores the cancel code which occurred during driving. When there are multiple cancel code, 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 latest memory content (latest code) is cleared when ignition switch is turned to OFF. However, memory contents set by the diagnosis of faulty switches related to the system and cruise control will remain as trouble history (memory code) after the ignition switch is turned to OFF.**

##### 2) Real-time Diagnosis:

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 when the problem occurs in the cruise control system or relevant circuits.

(2) Monitor the signal conditions from switches and sensors.

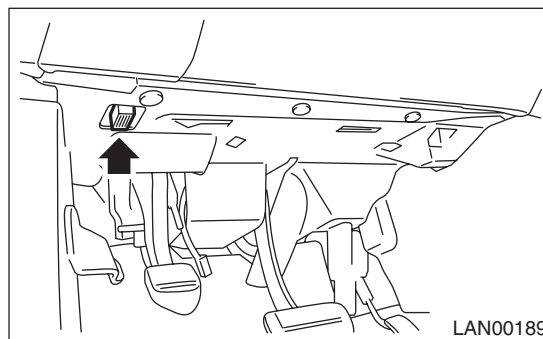
##### 2. CRUISE CONTROL CANCEL CONDITIONS DIAGNOSIS

1) Prepare the Subaru Select Monitor kit.

2) Connect the diagnosis cable to Subaru Select Monitor.

3) Connect the Subaru Select Monitor to data link connector.

(1) Data link connector is located in the lower portion of the instrument panel (on the driver's side).



(2) Connect the diagnosis cable to data link connector.

4) Start the engine and turn the cruise control main switch to ON.

5) Run the Subaru Select Monitor.

6) On «Main Menu» display, select {Each System Check}.

On «System Selection Menu» display, select {Engine Control System}. Select [OK] after the engine type information is displayed.

7) Drive vehicle at 40 km/h (25 MPH) or more and set the cruise control.

#### CAUTION:

- **When performing diagnosis, observe the legal speed limit on the road.**

- **The cancel code will be also appear when cruise control is cancelled by the driver's operation. Do not confuse them.**

- **Be sure to get an assistant to support the diagnosis while driving, and have him/her operate the select monitor.**

# Subaru Select Monitor

## CRUISE CONTROL SYSTEM (DIAGNOSTICS)

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8) When the set speed is canceled by itself (without any cancel operations) or when the cruise control cannot be set after the set operation, cancel code will be displayed on the screen after selecting the {Cancel Code(s) Display} on the engine malfunction diagnosis screen.

### NOTE:

The cancel code has a {Latest Diagnostic Code(s)} and {Memorized Diagnostic Code(s)}. {Latest Diagnostic Code(s)} displays the latest code that occurred in this check drive, and {Memorized Diagnostic Code(s)} displays the code recorded in the previous driving condition. Cancel codes by the diagnosis of faulty switches relating to the system and cruise control are also displayed in the {Memorized Diagnostic Code(s)}.

9) Perform Engine DTC Clear Memory operation. <Ref. to EN(H6DO)(diag)-58, OPERATION, Clear Memory Mode.>

Cancel codes for switches relating to the system and cruise control are deleted by clearing memory on the engine side.

### NOTE:

The latest code will be cleared by turning ignition switch to OFF.

## 3. REAL-TIME DIAGNOSIS

- 1) Connect the Subaru Select Monitor.
- 2) Turn the ignition switch and cruise control main switch to ON.
- 3) Run the Subaru Select Monitor.
- 4) On «Main Menu» display, select {Each System Check}.
- 5) On «System Selection Menu» display, select {Engine Control System}.
- 6) Select [OK] after engine type information is displayed.
- 7) On «Cruise Control Diagnosis» display, select {Current Data Display & Save}.
- 8) Make sure that normal display is shown when operated as follows:
  - Depress and release the brake pedal. (Stop light switch and brake switch are turned to ON.)
  - Turn the main switch to ON.
  - Turn the “CANCEL” switch to ON.
  - Turn the “SET/COAST” switch to ON.
  - Turn the “RESUME/ACCEL” switch to ON.
  - Place the shift lever in any position other than neutral.

### NOTE:

- For details concerning the operation procedure, refer to “PC application help for Subaru Select Monitor”.
- For detailed concerning cancel codes, refer to the “List of Cancel Codes”. <Ref. to CC(diag)-11, List of Cancel Code.>

## 6. Diagnostics with Phenomenon

### A: DIAGNOSTIC PROCEDURE WITH PHENOMENON

Phenomenon		Check item	Index
1	Cruise control main switch is not turned to ON. (Cruise indicator light does not illuminate.) Or cruise control is cancelled without operating the cruise control command switch.	(1) Perform cruise cancel conditions diagnosis.	Perform the diagnosis according to displayed cancel code.
		(2) Perform the real-time diagnosis.	Check the input signal of cruise control system.
		(3) Check the cruise control command switch.	<Ref. to CC(diag)-14, 11, Diagnostic Procedure with Cancel Code.>
		(4) Check the cruise indicator light.	<Ref. to CC(diag)-10, CHECK CRUISE INDICATOR LIGHT AND CRUISE SET INDICATOR LIGHT, Diagnostics with Phenomenon.>
2	Cruise control cannot be set. Or cruise control is cancelled without releasing operation.	(1) Perform cruise cancel conditions diagnosis.	Perform the diagnosis according to displayed cancel code.
		(2) Perform the real-time diagnosis.	Check the input signal of cruise control system.
		(3) Check the cruise control command switch.	<Ref. to CC(diag)-14, 11, Diagnostic Procedure with Cancel Code.>
		(4) Check stop light switch and brake switch.	<Ref. to BR-38, Brake Pedal.> <Ref. to CC(diag)-16, 12, Diagnostic Procedure with Cancel Code.>
		(5) Check the neutral position switch.	<Ref. to CC(diag)-18, 14, Diagnostic Procedure with Cancel Code.> <Ref. to CC(diag)-22, 62, Diagnostic Procedure with Cancel Code.>
		(6) Check vehicle speed sensor.	<Ref. to CC(diag)-21, 22, Diagnostic Procedure with Cancel Code.>
3	Cruise set indicator light does not illuminate.	Check the cruise set indicator light.	<Ref. to CC(diag)-10, CHECK CRUISE INDICATOR LIGHT AND CRUISE SET INDICATOR LIGHT, Diagnostics with Phenomenon.>
4	Vehicle speed is not held within set speed $\pm 3$ km/h ( $\pm 2$ MPH).	Check the vehicle speed sensor.	<Ref. to CC(diag)-21, 22, Diagnostic Procedure with Cancel Code.>
5	Vehicle speed does not increase or does not return to set speed after RESUME/ACCEL switch has been pressed.	(1) Perform the real-time diagnosis.	Check the input signal of cruise control system.
		(2) Check the RESUME/ACCEL switch.	<Ref. to CC(diag)-14, 11, Diagnostic Procedure with Cancel Code.>
6	Vehicle speed does not decrease after SET/COAST switch has been pressed.	(1) Perform the real-time diagnosis.	Check the input signal of cruise control system.
		(2) Check the SET/COAST switch.	<Ref. to CC(diag)-14, 11, Diagnostic Procedure with Cancel Code.>
7	Cruise control is not released after CANCEL switch has been pressed.	(1) Perform the real-time diagnosis.	Check the input signal of cruise control system.
		(2) Check the CANCEL switch.	<Ref. to CC(diag)-14, 11, Diagnostic Procedure with Cancel Code.>
8	Cruise control is not released after brake pedal has been depressed.	(1) Perform the real-time diagnosis.	Check the input signal of cruise control system.
		(2) Check stop light switch and brake switch.	<Ref. to CC(diag)-16, 12, Diagnostic Procedure with Cancel Code.> <Ref. to BR-39, INSTALLATION, Stop Light Switch.>
9	Cruise control is not released after shifting to the neutral position.	(1) Perform the real-time diagnosis.	Check the input signal of cruise control system.
		(2) Check the neutral position switch.	<Ref. to CC(diag)-18, 14, Diagnostic Procedure with Cancel Code.>

## Diagnostics with Phenomenon

### CRUISE CONTROL SYSTEM (DIAGNOSTICS)

#### **B: CHECK CRUISE INDICATOR LIGHT AND CRUISE SET INDICATOR LIGHT**

##### **TROUBLE SYMPTOM:**

Cruise control can be set, but the cruise indicator light and cruise set indicator light do not illuminate.

<b>Step</b>	<b>Check</b>	<b>Yes</b>	<b>No</b>
<b>1</b> <b>CHECK CRUISE INDICATOR LIGHT AND CRUISE SET INDICATOR LIGHT.</b> 1) Perform the self-diagnosis of combination meter. <Ref. to IDI-4, SELF-DIAGNOSIS, INSPECTION, Combination Meter System.> 2) Check the cruise indicator light and cruise set indicator light if they illuminate.	Do the cruise indicator light and cruise set indicator light illuminate?	Go to step 2.	Replace the meter case assembly. <Ref. to IDI-11, Combination Meter.>
<b>2</b> <b>CHECK DTC OF LAN COMMUNICATION CIRCUIT.</b> 1) Complete self-diagnosis, and turn the ignition switch to ON again. 2) Read the DTC of body integrated unit using Subaru Select Monitor.	Is DTC of LAN system displayed?	Check the LAN communication circuit. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>	Replace the ECM. <Ref. to FU(H6DO)-52, Engine Control Module (ECM).>

# List of Cancel Code

CRUISE CONTROL SYSTEM (DIAGNOSTICS)

## 7. List of Cancel Code

### A: LIST

#### NOTE:

- The cancel code is registered even when cancel is performed intentionally by the driver.
- Cancel codes are cleared if the ignition switch is turned to OFF.
- If a different cancel code is input after a cancel code (latest code) has been input, the latest code is overwritten.
- If the cruise indicator light is flashing, a malfunction is occurring in the system or cruise control related switch. The cancel code at this time is saved even after ignition switch is OFF as a memory code of a past malfunction.
- To display a cancel code, use the Subaru Select Monitor to read the code after the cruise control is deactivated during a driving test.

Cancel code	Item	Contents of diagnosis	Index
11	Main Switch	Main switch of cruise control command switch is turned to OFF, and then the cruise control is released.	This code is displayed without operating the main switch. <Ref. to CC(diag)-14, 11, Diagnostic Procedure with Cancel Code.>
12	Stop Light & Brake Switch	Stop light switch or brake switch is turned to ON, and then the cruise control is released.	This code is displayed without depressing the brake pedal. <Ref. to CC(diag)-16, 12, Diagnostic Procedure with Cancel Code.>
14	Neutral Position Switch	Neutral position switch is turned to ON, and then the cruise control is released.	This code is displayed without shifting to neutral position. <Ref. to CC(diag)-18, 14, Diagnostic Procedure with Cancel Code.>
15	Cancel Switch	Cancel switch is turned to ON, and then the cruise control is released.	This code is displayed without operating the cancel switch. <Ref. to CC(diag)-19, 15, Diagnostic Procedure with Cancel Code.>
16	Ignition switch	Ignition switch is turned to OFF, and then the cruise control is released.	This code is displayed without operating the ignition switch. <Ref. to CC(diag)-20, 16, Diagnostic Procedure with Cancel Code.>
21	Cruise control switch malfunction when ignition switch is turned to ON	When the ignition switch is turned to ON, each switch of cruise control command switch is already turned to ON.	This code is displayed when the ignition switch is turned to ON without operating the cruise control command switch. <Ref. to CC(diag)-20, 21, Diagnostic Procedure with Cancel Code.>
22	Abnormality of change in vehicle speed	Malfunction of vehicle speed signal variation is detected.	<Ref. to CC(diag)-21, 22, Diagnostic Procedure with Cancel Code.>

## List of Cancel Code

### CRUISE CONTROL SYSTEM (DIAGNOSTICS)

Cancel code	Item	Contents of diagnosis	Index
24	Abnormality of switches related to cruise control	Open circuit of the cruise control switch is detected during cruise driving. (The system is judged as model without cruise control.)	This code is displayed with normal operation. <Ref. to CC(diag)-21, 24, Diagnostic Procedure with Cancel Code.>
31	Abnormal engine speed Signal	<ul style="list-style-type: none"> <li>Abnormal increase of engine speed is detected.</li> <li>Gear is placed in Neutral, 1st or Reverse position.</li> </ul>	Cruise in 2nd shift position or more. <Ref. to CC(diag)-21, 31, Diagnostic Procedure with Cancel Code.>
32	Cruise Control out of Range	<ul style="list-style-type: none"> <li>Controlled vehicle speed decreased under the limit during cruising.</li> <li>Set operation was performed at vehicle speed unavailable for setting.</li> <li>RESUME operation was performed without memorized vehicle speed.</li> </ul>	This code is displayed, though the vehicle speed is increased to the speed available for cruise set and set operation was performed again. <Ref. to CC(diag)-21, 32, Diagnostic Procedure with Cancel Code.>
34	Prohibition of cruise control at continuing big Accel. angle	The vehicle has been driven at higher speed than set vehicle speed for an abnormally long time (approximately 10 minutes) during cruise driving.	This code is displayed when driving for a long period of time at higher speed than appropriate cruise set vehicle speed by operating accelerator pedal. In this case, the cruise setting is deactivated. <Ref. to CC(diag)-21, 34, Diagnostic Procedure with Cancel Code.>
35	Prohibition of cruise control at vehicle speed F/B malfunction	Set vehicle speed cannot be kept because of some reasons (steep uphill, parking brake, abnormal decrease of engine output, etc.) during cruise driving.	This code is displayed when driving condition is not suitable for cruise control. Perform cruise set operation again after clearing the possible cause. <Ref. to CC(diag)-21, 35, Diagnostic Procedure with Cancel Code.>
41	VDC/TCS Operating	Vehicle dynamics control (VDC) or TCS is operated during cruise driving or cruise setting.	This code is displayed when driving condition is not suitable for cruise control. Perform cruise set operation again after clearing the possible cause. <Ref. to CC(diag)-21, 41, Diagnostic Procedure with Cancel Code.>
43	ABS/VDC Failure	ABS or Vehicle dynamics control (VDC) system malfunction is detected during cruise driving or cruise setting.	<Ref. to CC(diag)-22, 43, Diagnostic Procedure with Cancel Code.>
44	Body Integrated unit Failure	Body integrated unit system malfunction is detected during cruise driving or cruise setting.	<Ref. to CC(diag)-22, 44, Diagnostic Procedure with Cancel Code.>
45	Meter Failure	Combination meter malfunction is detected during cruise driving or cruise setting.	<Ref. to CC(diag)-22, 45, Diagnostic Procedure with Cancel Code.>

# List of Cancel Code

## CRUISE CONTROL SYSTEM (DIAGNOSTICS)

Cancel code	Item	Contents of diagnosis	Index
49	TCM Failure	Transmission control module (TCM) malfunction is detected during cruise driving or cruise setting.	<Ref. to CC(diag)-22, 49, Diagnostic Procedure with Cancel Code.>
61	Brake switch abnormal	Malfunction in the stop light & brake switch is detected.	<Ref. to CC(diag)-22, 61, Diagnostic Procedure with Cancel Code.>
62	Neutral Switch Failure	Neutral position switch malfunction is detected.	<Ref. to CC(diag)-22, 62, Diagnostic Procedure with Cancel Code.>
63	Abnormality of change in vehicle speed	Malfunction of vehicle speed signal variation is detected.	<Ref. to CC(diag)-22, 63, Diagnostic Procedure with Cancel Code.>
64	Engine Sensor Failure 1	Malfunction related to engine is detected.	<Ref. to CC(diag)-22, 64, Diagnostic Procedure with Cancel Code.>
65	Abnormality 1 of switches related to cruise control	Cruise control command switch malfunction is detected. (When the switch is pressed ON for a long time (approximately two minutes), stuck ON condition is detected.)	<Ref. to CC(diag)-22, 65, Diagnostic Procedure with Cancel Code.>
66	Cruise Control Calculation Error	Cruise control calculation (microcomputer) malfunction is detected.	<Ref. to CC(diag)-22, 66, Diagnostic Procedure with Cancel Code.>

# Diagnostic Procedure with Cancel Code

## CRUISE CONTROL SYSTEM (DIAGNOSTICS)

### 8. Diagnostic Procedure with Cancel Code

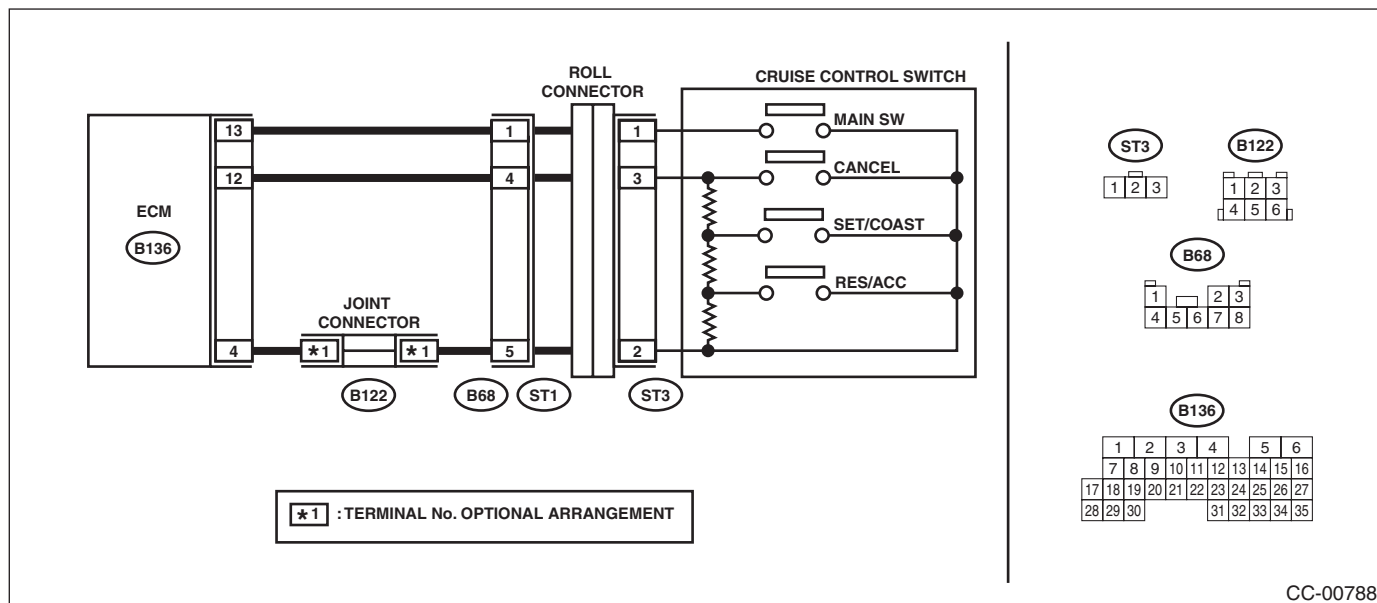
#### A: 11

Detected when main switch is pressed or malfunction related to the main switch occurs.

#### TROUBLE SYMPTOM:

- Cruise control cannot be set. (Cancelled immediately.)
- Cruise control cannot be released.

#### WIRING DIAGRAM:



Step	Check	Yes	No
<b>1</b> <b>CHECK CRUISE CONTROL COMMAND SWITCH CIRCUIT.</b> 1) Remove the driver's airbag module. <Ref. to AB-14, REMOVAL, Driver's Airbag Module.> 2) Disconnect the harness connector of cruise control command switch. 3) Turn the ignition switch to ON. 4) Measure the voltage between harness connector terminal and chassis ground. <b>Connector &amp; terminal</b> <i>(ST3) No. 1 (+) — Chassis ground (-):</i> <i>(ST3) No. 3 (+) — Chassis ground (-):</i>	Is the voltage 5 V or more?	Go to step 2.	Check the harness between cruise control command switch and ECM, and the steering roll connector for open or short circuit, or for poor contact.
<b>2</b> <b>CHECK CRUISE CONTROL COMMAND SWITCH CIRCUIT.</b> 1) Turn the ignition switch to OFF. 2) Remove the cruise control command switch. <Ref. to CC-4, REMOVAL, Cruise Control Command Switch.> 3) Measure the resistance between harness connector terminal and chassis ground. <b>Connector &amp; terminal</b> <i>(ST3) No. 2 — Chassis ground:</i>	Is the resistance less than 10 Ω?	Go to step 3.	Check for open between cruise control command switch and ECM and chassis ground, and check the ECM.
<b>3</b> <b>CHECK CRUISE CONTROL COMMAND SWITCH.</b> Measure the resistance between switch terminals when the cruise control command switch is not depressed. <b>Terminals</b> <i>No. 2 — No. 3:</i>	Is the resistance approx. 4 kΩ?	Go to step 4.	Replace the cruise control command switch. <Ref. to CC-4, Cruise Control Command Switch.>



# Diagnostic Procedure with Cancel Code

## CRUISE CONTROL SYSTEM (DIAGNOSTICS)

Step	Check	Yes	No
<b>4</b> <b>CHECK CANCEL SWITCH.</b> 1) Turn the ignition switch to OFF. 2) Remove the cruise control command switch. <Ref. to CC-4, REMOVAL, Cruise Control Command Switch.> 3) Measure the resistance between switch terminals with the CANCEL switch pressed. <i><b>Terminals</b></i> <i><b>No. 2 — No. 3:</b></i>	Is the resistance approx. less than 1 $\Omega$ when the CANCEL switch is pressed?	Go to step 5.	Replace the cruise control command switch. <Ref. to CC-4, Cruise Control Command Switch.>
<b>5</b> <b>CHECK SET/COAST SWITCH.</b> Measure the resistance between switch terminals with the SET/COAST switch pressed. <i><b>Terminals</b></i> <i><b>No. 2 — No. 3:</b></i>	Is the resistance approx. 250 $\Omega$ when SET/COAST switch is pressed?	Go to step 6.	Replace the cruise control command switch. <Ref. to CC-4, Cruise Control Command Switch.>
<b>6</b> <b>CHECK RESUME/ACCEL SWITCH CIRCUIT.</b> Measure the resistance between switch terminals with the RESUME/ACCEL switch pressed. <i><b>Terminals</b></i> <i><b>No. 2 — No. 3:</b></i>	Is the resistance approx. 1,500 $\Omega$ when RESUME/ACCEL switch is pressed?	Replace the ECM. <Ref. to FU(H6DO)-52, Engine Control Module (ECM).>	Replace the cruise control command switch. <Ref. to CC-4, Cruise Control Command Switch.>

# Diagnostic Procedure with Cancel Code

## CRUISE CONTROL SYSTEM (DIAGNOSTICS)

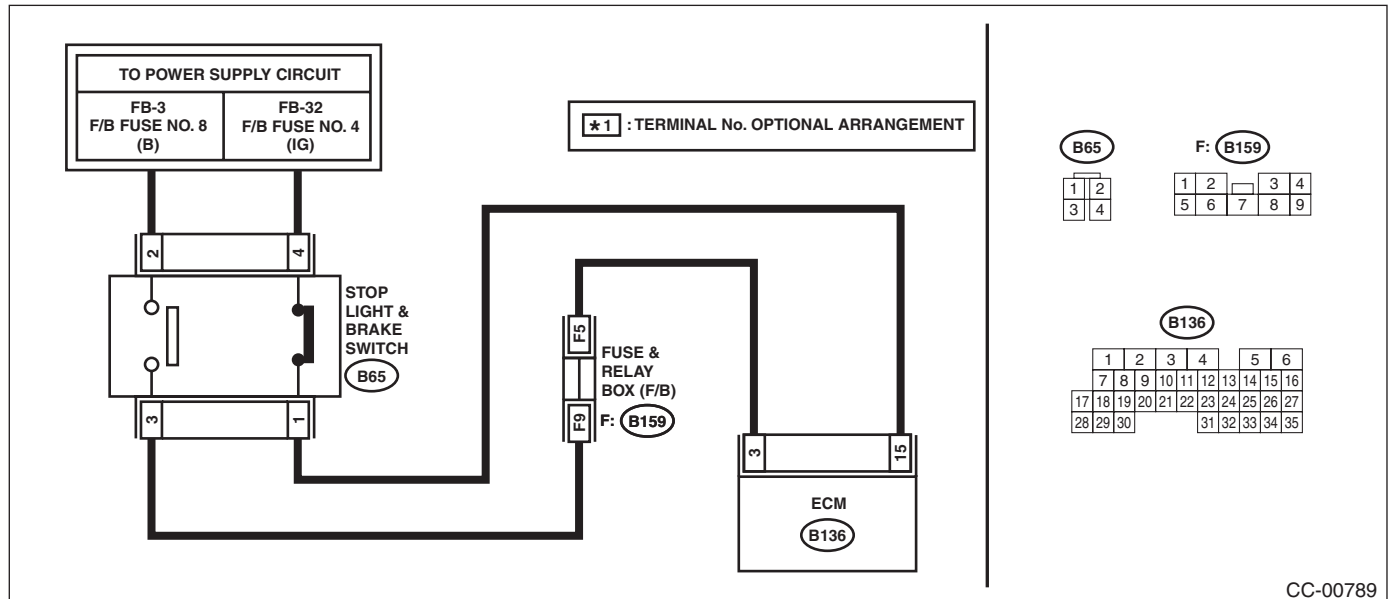
### B: 12

Detected when brake pedal is depressed or malfunction related to stop light & brake switch occurs.

#### TROUBLE SYMPTOM:

- Cruise control cannot be set.
- Cruise control cannot be released.

#### WIRING DIAGRAM:



Step	Check	Yes	No
<b>1</b> <b>CHECK STOP LIGHT SWITCH &amp; BRAKE SWITCH CIRCUIT.</b> Check the stop light switch & brake switch. <Ref. to CC-6, Stop Light & Brake Switch.>	Is the stop light switch & brake switch unit and installation position OK?	Go to step 2.	Replace the stop-light switch & brake switch. Or adjust the installation position.
<b>2</b> <b>CHECK STOP LIGHT SWITCH &amp; BRAKE SWITCH CIRCUIT.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the stop light switch & brake switch harness connector. 3) Turn the ignition switch to ON. 4) Measure the voltage between harness connector terminal and chassis ground. <b>Connector &amp; terminal</b> <b>(B65) No. 2 (+) — Chassis ground (-):</b>	Is the voltage 10 V or more?	Go to step 3.	<ul style="list-style-type: none"> <li>• Check fuse No. 8 (in fuse &amp; relay box).</li> <li>• Check for open or short in the harness between stop light &amp; brake switch and fuse &amp; relay box.</li> </ul>
<b>3</b> <b>CHECK STOP LIGHT SWITCH &amp; BRAKE SWITCH CIRCUIT.</b> Measure the voltage between harness connector terminal and chassis ground. <b>Connector &amp; terminal</b> <b>(B65) No. 4 (+) — Chassis ground (-):</b>	Is the voltage 10 V or more?	Go to step 4.	<ul style="list-style-type: none"> <li>• Check fuse No. 4 (in fuse &amp; relay box).</li> <li>• Check for open or short in the harness between stop light &amp; brake switch and fuse &amp; relay box.</li> </ul>

# Diagnostic Procedure with Cancel Code

CRUISE CONTROL SYSTEM (DIAGNOSTICS)

Step	Check	Yes	No
<b>4</b> <b>CHECK STOP LIGHT SWITCH &amp; BRAKE SWITCH CIRCUIT.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the harness connector of ECM. 3) Measure the resistance between ECM harness connector terminal and stop light switch & brake switch harness connector terminal. <b>Connector &amp; terminal</b> <b>(B136) No. 3 — (B65) No. 3:</b> <b>(B136) No. 15 — (B65) No. 1:</b>	Is the resistance less than 10 $\Omega$ ?	Replace the ECM. <Ref. to FU(H6DO)-52, Engine Control Module (ECM).>	Repair the harness.

# Diagnostic Procedure with Cancel Code

## CRUISE CONTROL SYSTEM (DIAGNOSTICS)

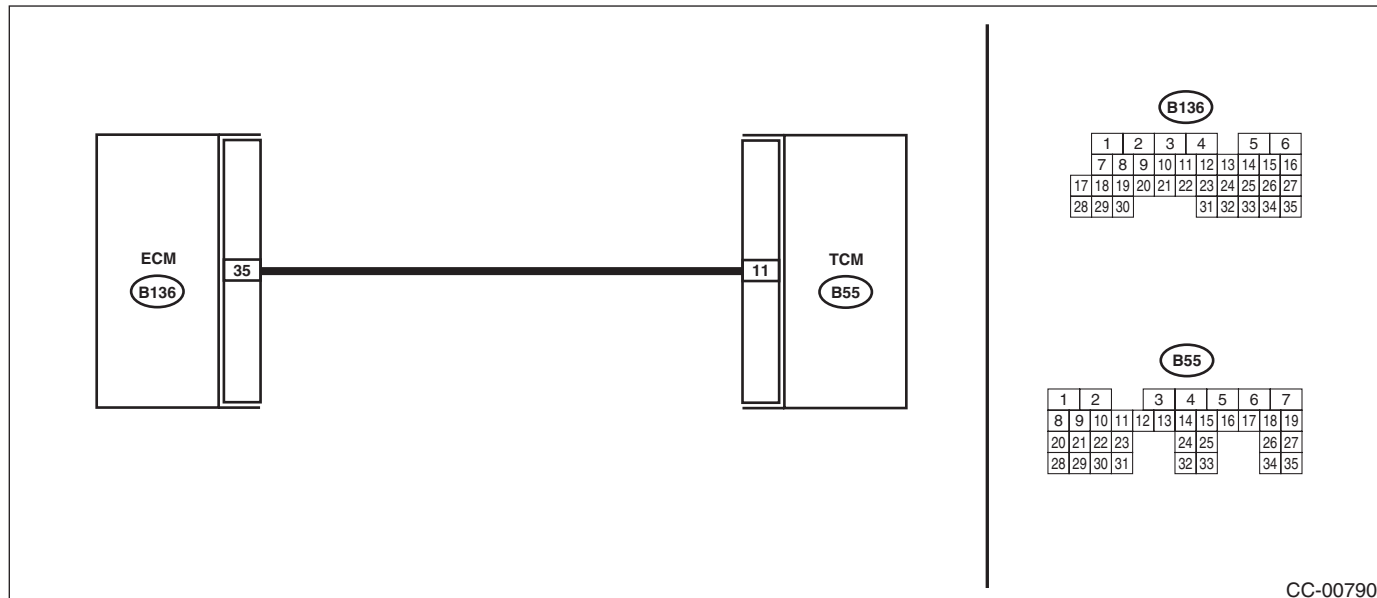
### C: 14

Detected when select lever is set in the neutral position, or when malfunction related to neutral position switch occurs.

#### TROUBLE SYMPTOM:

Cruise control cannot be set.

#### WIRING DIAGRAM:



Step	Check	Yes	No
1	<b>CHECK NEUTRAL POSITION SWITCH SIGNAL.</b> 1) Connect the Subaru Select Monitor to data link connector. 2) Turn the ignition switch to ON and run the Subaru Select Monitor. 3) Select {Engine Control System} from the main menu. 4) Then, select the {Current Data Display & Save}. 5) Shift the select lever to "P" or "N" range, and check the signal of the neutral position switch.	Replace the ECM. <Ref. to FU(H6DO)-52, Engine Control Module (ECM).>	Go to step 2.
2	<b>CHECK TCM OUTPUT VOLTAGE.</b> 1) Turn the ignition switch to ON. 2) Measure the voltage between TCM harness connector terminal and chassis ground. <b>Connector &amp; terminal</b> <b>(B55) No. 11 (+) — Chassis ground (-):</b>	Go to step 3.	Check the TCM. <Ref. to 5AT(diag)-2, Basic Diagnostic Procedure.>
3	<b>CHECK HARNESS BETWEEN TCM AND ECM.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the harness connector from TCM and ECM. 3) Measure the resistance between TCM harness connector terminal and ECM harness connector terminal. <b>Connector &amp; terminal</b> <b>(B136) No. 35 — (B55) No. 11:</b>	Replace the ECM. <Ref. to FU(H6DO)-52, Engine Control Module (ECM).>	Repair the wiring harness.

## Diagnostic Procedure with Cancel Code

CRUISE CONTROL SYSTEM (DIAGNOSTICS)

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### **D: 15**

This DTC is detected when the cancel switch is pressed or problem relating to the main switch occurs.  
Refer to DTC 11 for diagnostic procedure.

<Ref. to CC(diag)-14, 11, Diagnostic Procedure with Cancel Code.>

# Diagnostic Procedure with Cancel Code

## CRUISE CONTROL SYSTEM (DIAGNOSTICS)

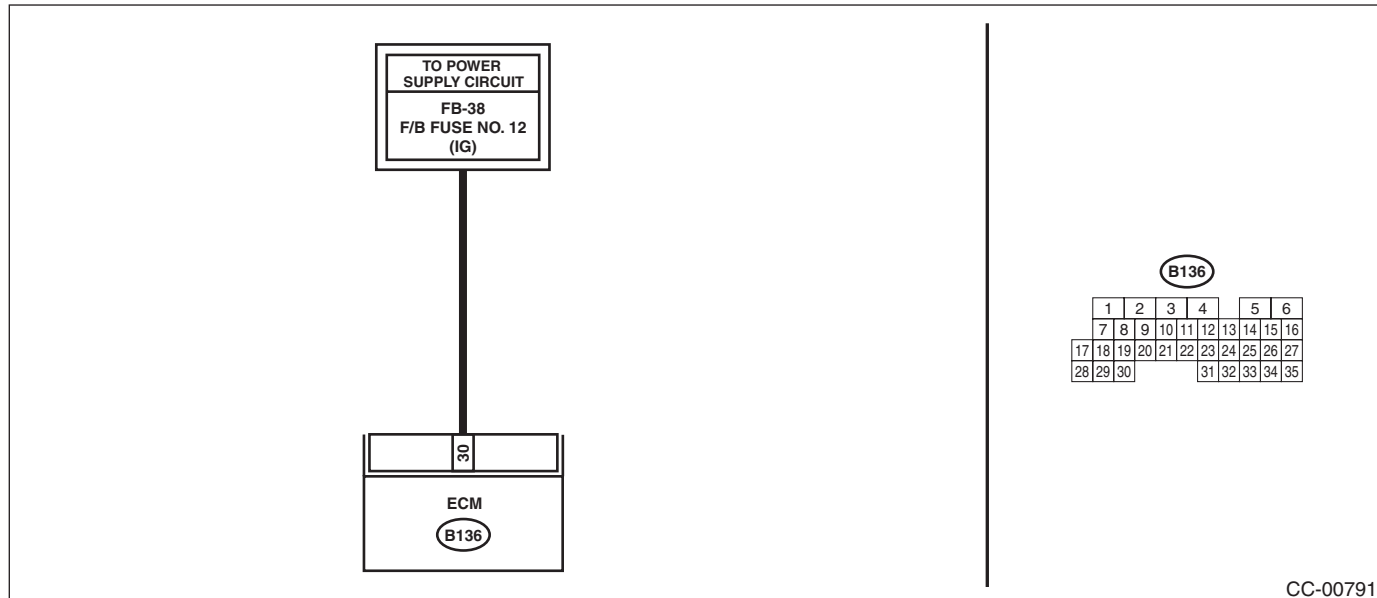
### E: 16

Detected when ignition switch is turned to OFF or malfunction related to the ignition switch occurs.

#### TROUBLE SYMPTOM:

Cruise control cannot be set.

#### WIRING DIAGRAM:



CC-00791

	Step	Check	Yes	No
1	<p><b>CHECK IGNITION SWITCH CIRCUIT.</b></p> <ol style="list-style-type: none"> <li>1) Turn the ignition switch to OFF.</li> <li>2) Disconnect the ECM harness connector.</li> <li>3) Turn the ignition switch to ON.</li> <li>4) Measure the voltage between harness connector terminal and chassis ground.</li> </ol> <p><b>Connector &amp; terminal</b> <b>(B136) No. 30 (+) — Chassis ground (-):</b></p>	Is the voltage 10 V or more?	Check for poor contact of ECM connector.	<ul style="list-style-type: none"> <li>• Check fuse No. 12 (in fuse &amp; relay box).</li> <li>• Check the harness for open or short circuit between ignition switch and ECM.</li> </ul>

### F: 21

Cruise control command switch malfunction is detected.

Refer to DTC 11 for diagnostic procedure.

<Ref. to CC(diag)-14, 11, Diagnostic Procedure with Cancel Code.>

# Diagnostic Procedure with Cancel Code

CRUISE CONTROL SYSTEM (DIAGNOSTICS)

## G: 22

Malfunction related to vehicle speed sensor is detected.

### DIAGNOSIS:

Open or shorted circuit in vehicle speed sensor system.

### TROUBLE SYMPTOM:

Cruise control cannot be set. (Cancelled immediately.)

	Step	Check	Yes	No
1	<b>CHECK ABS WARNING LIGHT.</b> 1) Turn the ignition switch to ON. 2) After the initial operation of combination meter is completed, check if VDC warning light continues to illuminate.	Does the VDC warning light continue to illuminate?	Check the VDCCM. <Ref. to VDC(diag)-2, Basic Diagnostic Procedure.>	Go to step 2.
2	<b>CHECK DTC OF LAN COMMUNICATION CIRCUIT.</b> Read the DTC of body integrated unit using Subaru Select Monitor.	Is DTC of LAN system displayed?	Check the LAN communication circuit. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>	Replace the ECM. <Ref. to FU(H6DO)-52, Engine Control Module (ECM).>

## H: 24

Malfunction in cruise control-related switch is detected.

Refer to DTC 11 for diagnostic procedure.

<Ref. to CC(diag)-14, 11, Diagnostic Procedure with Cancel Code.>

## I: 31

Malfunction of the engine speed signal is detected.

Abnormal increase of engine speed is detected.

Gear is placed in 1st or Reverse position.

After driving at the 2nd gear position or more, perform the cruise setting again. If the cancel code is not detected, it is normal.

## J: 32

This DTC is detected out of vehicle speed range.

Refer to DTC 22 for diagnostic procedure.

<Ref. to CC(diag)-21, 22, Diagnostic Procedure with Cancel Code.>

## K: 34

Malfunction of acceleration opening duration is detected.

The vehicle has been driven at a speed higher than set speed for a long time (approximately 10 minutes) during cruise driving.

Cancel code is detected when driving for a long period of time at higher speed than appropriate cruise speed by operating accelerator pedal.

Cancel the cruise setting. If the DTC is not detected again, it is normal.

## L: 35

Detected when it is impossible to perform the vehicle speed feedback.

Set vehicle speed cannot be kept for some reasons (steep uphill, unreleased parking brake, etc.) during cruise driving.

Cancel code is detected when driving condition is not suitable for cruise control.

Perform cruise set operation again after clearing the possible cause.

## M: 41

VDC/TCS has operated.

Vehicle dynamics control (VDC) or TCS is operated during cruise driving or cruise setting.

<Ref. to VDC(diag)-2, PROCEDURE, Basic Diagnostic Procedure.>

# Diagnostic Procedure with Cancel Code

## CRUISE CONTROL SYSTEM (DIAGNOSTICS)

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### **N: 43**

Malfunction of ABS/VDC is detected.

VDC malfunction is detected during cruise driving or cruise setting.

<Ref. to VDC(diag)-2, PROCEDURE, Basic Diagnostic Procedure.>

### **O: 44**

Body integrated unit malfunction is detected.

Body integrated unit system malfunction is detected during cruise driving or cruise setting.

<Ref. to LAN(diag)-2, PROCEDURE, Basic Diagnostic Procedure.>

### **P: 45**

Combination meter malfunction is detected.

Combination meter malfunction is detected during cruise driving or cruise setting.

<Ref. to LAN(diag)-2, PROCEDURE, Basic Diagnostic Procedure.>

### **Q: 49**

Transmission control module malfunction is detected.

Transmission control module malfunction is detected during cruise driving or cruise setting.

<Ref. to 5AT(diag)-2, PROCEDURE, Basic Diagnostic Procedure.>

### **R: 61**

Malfunction in the stop light & brake switch is detected.

Refer to DTC 12 for diagnostic procedure.

<Ref. to CC(diag)-16, 12, Diagnostic Procedure with Cancel Code.>

### **S: 62**

Neutral position switch malfunction is detected.

Refer to DTC 14 for diagnostic procedure.

<Ref. to CC(diag)-18, 14, Diagnostic Procedure with Cancel Code.>

### **T: 63**

Malfunction of vehicle speed signal variation is detected.

Refer to DTC 22 for diagnostic procedure.

<Ref. to CC(diag)-21, 22, Diagnostic Procedure with Cancel Code.>

### **U: 64**

Malfunction related to engine is detected.

Refer to the Engine Diagnostic Procedure for diagnostic procedure.

<Ref. to EN(H6DO)(diag)-2, PROCEDURE, Basic Diagnostic Procedure.>

### **V: 65**

Cruise control command switch malfunction is detected.

While the command switch is pressed ON for a long time (approximately two minutes), stuck ON open circuit is detected.

Refer to DTC 11 for diagnostic procedure.

<Ref. to CC(diag)-14, 11, Diagnostic Procedure with Cancel Code.>

### **W: 66**

Cruise control calculation malfunction is detected.

Refer to the Engine Diagnostic Procedure for diagnostic procedure.

<Ref. to EN(H6DO)(diag)-2, PROCEDURE, Basic Diagnostic Procedure.>



# IMMOBILIZER (DIAGNOSTICS)

# *IM(diag)*

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# Basic Diagnostic Procedure

## IMMOBILIZER (DIAGNOSTICS)

### 1. Basic Diagnostic Procedure

#### A: PROCEDURE

Step	Check	Yes	No
<b>1 CHECK SECURITY INDICATOR LIGHT.</b> 1) Turn the ignition switch to "OFF" or "ACC". 2) Wait at least 60 seconds.	Does the security indicator light blink?	Go to step 2.	Check the security indicator light circuit. <Ref. to IM(diag)-11, CHECK SECURITY INDICATOR LIGHT CIRCUIT, INSPECTION, Diagnostics Chart for Security Indicator Light.>
<b>2 CHECK KEY SWITCH.</b> Remove the key from ignition switch.	Does the security indicator light begin to blink within 1 second after the key is removed?	Go to step 3.	Check the key switch circuit. <Ref. to IM(diag)-13, CHECK KEY SWITCH CIRCUIT, INSPECTION, Diagnostics Chart for Security Indicator Light.>
<b>3 CHECK SECURITY INDICATOR LIGHT.</b> Turn the ignition switch to ON.	Does the security indicator light go off?	Go to step 5.	Go to step 4.
<b>4 CHECK ENGINE START.</b> Turn the ignition switch to START.	Does the starter operate?	Check the LAN communication system. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>	Go to step 7.
<b>5 CHECK ENGINE START.</b> Turn the ignition switch to START.	Does the starter operate?	Go to step 6.	Check the LAN communication system. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>
<b>6 CHECK ENGINE START.</b> Turn the ignition switch to START.	Does the engine start?	Immobilizer system is normal.	Go to step 8.
<b>7 CHECK DTC.</b> Read the DTC of body integrated unit using Subaru Select Monitor. <Ref. to IM(diag)-8, Subaru Select Monitor.>	Is the DTC displayed on screen?	Go to step 10.	Replace the body integrated unit <Ref. to SL-48, Body Integrated Unit.>, register all ignition keys (transponders). Refer to the "PC application help for Subaru Select Monitor".
<b>8 CHECK DTC.</b> Read the DTC relating the ECM using the Subaru Select Monitor. <Ref. to IM(diag)-8, Subaru Select Monitor.>	Is the DTC displayed on screen?	Go to step 9.	Perform the diagnosis for engine system. <Ref. to EN(H6DO)(diag)-70, PROCEDURE, Diagnostics for Engine Starting Failure.>

# Basic Diagnostic Procedure

IMMOBILIZER (DIAGNOSTICS)

Step	Check	Yes	No
<b>9</b> <b>CHECK FREEZE FRAME DATA.</b> Using the Subaru Select Monitor, check the Freeze Frame Data.	Was the Freeze Frame Data recorded?	Record the data. Go to step <b>10</b> .	Go to step <b>10</b> .
<b>10</b> <b>PERFORM DIAGNOSIS.</b> 1) Inspect using the "Diagnostic Procedure with Diagnostic Trouble Code (DTC)". <Ref. to IM(diag)-16, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> 2) Repair the trouble cause. 3) Perform the Clear Memory Mode. 4) Read DTC's again.	Is the DTC displayed on screen?	Inspect using the "Diagnostic Procedure with Diagnostic Trouble Code (DTC)". <Ref. to IM(diag)-16, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Finish the diagnosis.

# General Description

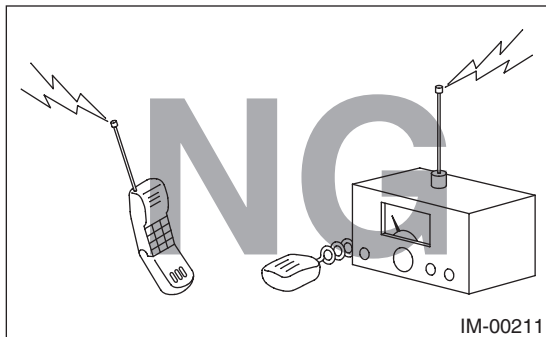
## IMMOBILIZER (DIAGNOSTICS)

### 2. General Description

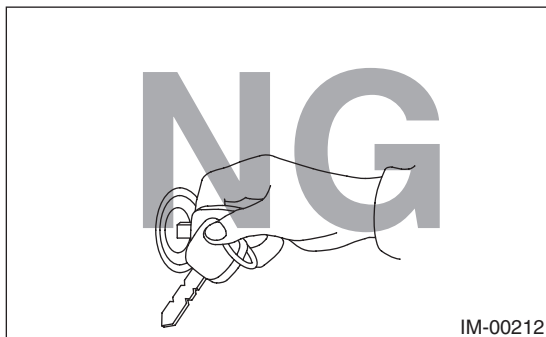
#### A: CAUTION

##### CAUTION:

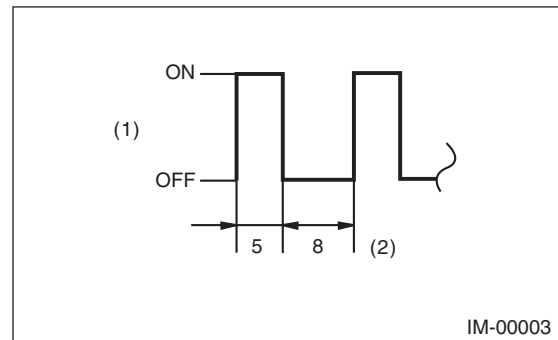
- Do not use the electrical test equipment on the airbag system wiring harnesses and connector circuits.
- Be careful not to damage the airbag system wiring harness.
- While diagnostic items are being checked, do not operate radios, portable telephones, etc. which emit electromagnetic waves near or inside the vehicle.



- When turning the ignition switch to ON or OFF while diagnostic items are being checked, do not allow keys with different ID codes close to the ignition switch. If the ignition key is on a key holder, remove it from the key holder before performing diagnoses.



- When repeatedly turning the ignition switch to 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.



- (1) Ignition switch position
- (2) Sec.

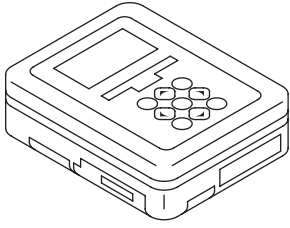
- If the engine fails to start with a registered ignition key, detach the ignition key from ignition switch and wait for approx. 1 second until security indicator light begins to flash. And then start the engine again.
- Before performing the diagnostics, obtain all keys for the vehicle from the owner.
- Do not install or register the body integrated unit which is already registered to another vehicle, just for diagnosing failures or inspecting functions.

# General Description

IMMOBILIZER (DIAGNOSTICS)

## B: PREPARATION TOOL

### 1. SPECIAL TOOL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST1B022XU0	1B022XU0	SUBARU SELECT MONITOR III KIT	Troubleshooting for the electrical system.

### 2. GENERAL TOOL

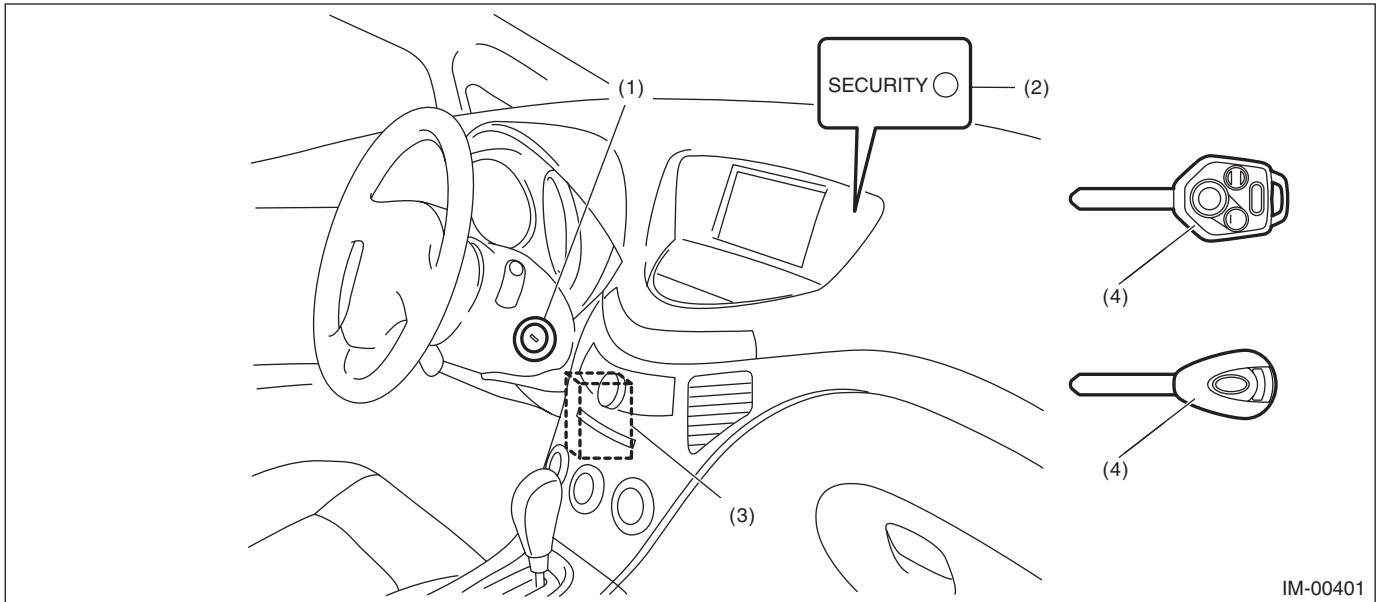
TOOL NAME	REMARKS
Circuit tester	Used for measuring resistance, voltage and current.

# Electrical Component Location

IMMOBILIZER (DIAGNOSTICS)

## 3. Electrical Component Location

### A: LOCATION



IM-00401

(1) Antenna

(3) Body integrated unit

(4) Transponder

(2) Security indicator light (LED bulb)

## 4. Immobilizer Control Module I/O Signal

### A: WIRING DIAGRAM

#### 1. IMMOBILIZER

<Ref. to WI-74, WIRING DIAGRAM, Immobilizer System.>

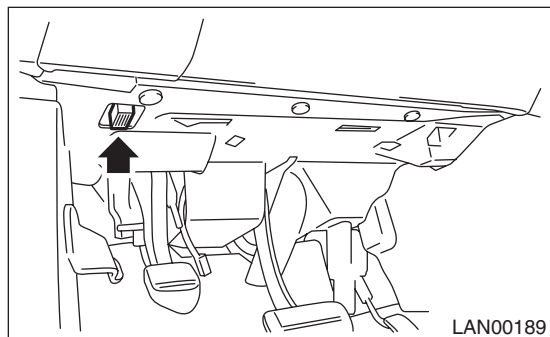
### 5. Subaru Select Monitor

#### A: OPERATION

##### 1. HOW TO USE SUBARU SELECT MONITOR

- 1) Prepare the Subaru Select Monitor kit.
- 2) Connect the diagnosis cable to Subaru Select Monitor.
- 3) Connect the Subaru Select Monitor to data link connector.

(1) Data link connector is located in the lower portion of the instrument panel (on the driver's side).



(2) Connect the diagnosis cable to data link connector.

#### CAUTION:

**Do not connect the scan tools other than the Subaru Select Monitor.**

- 4) Turn the ignition switch to ON and run the Subaru Select Monitor.
- 5) Using the Subaru Select Monitor, call up DTCs and various data, then record them.

##### 2. READ DIAGNOSTIC TROUBLE CODE (DTC) FOR ENGINE AND BODY INTEGRATED UNIT

Refer to "Read Diagnostic Trouble Code" for information about how to indicate DTC. <Ref. to IM(diag)-9, Read Diagnostic Trouble Code (DTC).>

##### 3. COMMUNICATION LINE CHECK

#### NOTE:

The communication line between ECM and body integrated unit can be checked in "System Operation Check Mode". This is referred to as "Communication line check".

- 1) Connect the Subaru Select Monitor.
- 2) On the «Main Menu» display, select {Each System Check}.
- 3) On the «System Selection Menu», select {Engine Control System}.
- 4) After engine type information is displayed, select [OK].
- 5) On the «Engine Diagnosis» display, select {System Operation Check Mode}.
- 6) On the «System Operation Check Mode» display, select the {Immobilizer System}.
- 7) Start the communication line check.
- 8) Is «OK» displayed on screen?  
If displayed, go to step 9).  
If not, go to step 10).
- 9) After diagnostic results, it is determined that the circuit is not shorted. Finish the communication line check.
- 10) If a problem is detected, repair the trouble cause. <Ref. to IM(diag)-20, DTC P1572 IMM CIRCUIT FAILURE (EXCEPT ANTENNA CIRCUIT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>



## 6. Read Diagnostic Trouble Code (DTC)

### A: OPERATION

#### 1. ECM

- 1) On the «Main Menu» display, select {Each System Check}.
- 2) On the «System Selection Menu», select {Engine Control System}.
- 3) After engine type information is displayed, select [OK].
- 4) On the «Engine Diagnosis», select {Diagnostic Code(s) Display}.
- 5) On the «Diagnostic Code(s) Display», select {Current DTC} or {Past DTC}.

#### NOTE:

- For detailed operation procedure, refer to the “PC application help for Subaru Select Monitor”.
- For detailed concerning DTC, refer to the List of Diagnostic Trouble Codes (DTC). <Ref. to IM(diag)-14, LIST, List of Diagnostic Trouble Code (DTC).>

#### 2. BODY INTEGRATED UNIT

- 1) On the «Main Menu» display, select {Each System Check}.
- 2) On the «System Selection Menu», select {Integ. Unit Mode}.
- 3) After {Integ. Unit Mode} is displayed, select [OK].
- 4) On the «Integ. unit mode failure diag», select {Diagnostic Code(s) Display}.

#### NOTE:

- For detailed operation procedure, refer to the “PC application help for Subaru Select Monitor”.
- For detailed concerning DTC, refer to the List of Diagnostic Trouble Codes (DTC). <Ref. to IM(diag)-14, LIST, List of Diagnostic Trouble Code (DTC).>

## 7. Clear Memory Mode

### A: OPERATION

#### 1. ECM

- 1) On the «Main Menu» display, select {Each System Check}.
- 2) On the «System Selection Menu», select {Engine Control System}.
- 3) After engine type information is displayed, select [OK].
- 4) On the «Engine Diagnosis», select {Clear Memory}.
- 5) When “Done” is displayed on the display screen, end the Subaru Select Monitor and turn the ignition switch to OFF.

#### NOTE:

- Initial diagnosis of electronic throttle control is performed after memory clearance. Wait for 10 seconds or more after turning the ignition switch to ON, and then start the engine.
- For detailed operation procedure, refer to the “PC application help for Subaru Select Monitor”.

#### 2. BODY INTEGRATED UNIT

- 1) On the «Main Menu» display, select {Each System Check}.
- 2) On the «System Selection Menu», select {Integ. Unit Mode}.
- 3) After {Integ. Unit Mode} is displayed, select [OK].
- 4) On the «Integ. unit mode», select {Clear Memory}.
- 5) When “Done” is displayed on the display screen, end the Subaru Select Monitor and turn the ignition switch to OFF.

#### NOTE:

For detailed operation procedure, refer to the “PC application help for Subaru Select Monitor”.

# Diagnostics Chart for Security Indicator Light

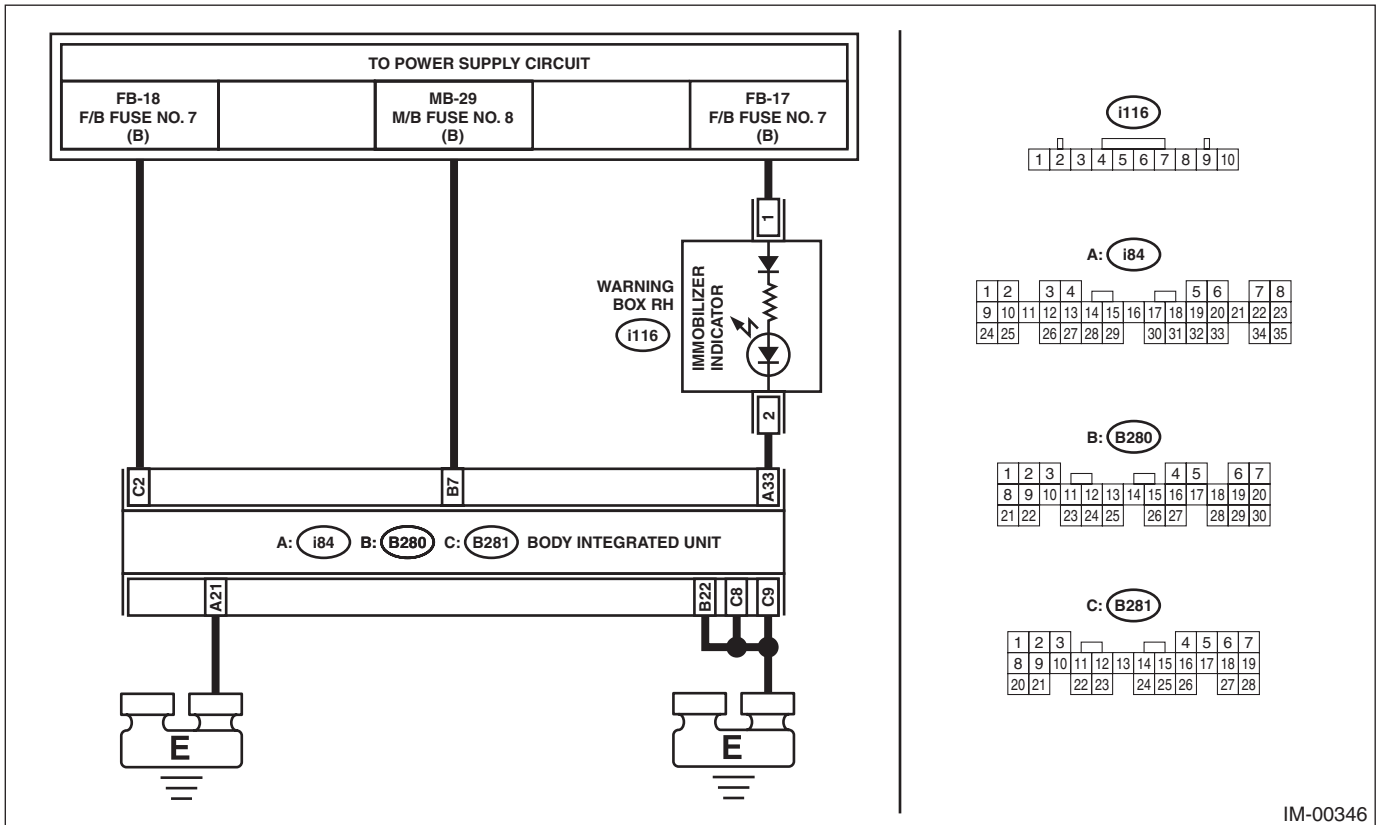
IMMOBILIZER (DIAGNOSTICS)

## 8. Diagnostics Chart for Security Indicator Light

### A: INSPECTION

#### 1. CHECK SECURITY INDICATOR LIGHT CIRCUIT

#### WIRING DIAGRAM:



IM-00346

Step	Check	Yes	No
<b>1 CHECK FUSE.</b> 1) Turn the ignition switch to OFF, and remove the ignition key from the ignition switch. 2) Check the fuse M/B No. 8.	Is the fuse OK?	Go to step 2.	Replace the fuse. If the replaced fuse blows out easily, repair the short circuit in the harness between the fuse and body integrated unit.
<b>2 CHECK SECURITY INDICATOR LIGHT.</b> 1) Disconnect the harness connector from body integrated unit. 2) Connect the resistor (100 Ω) between the body integrated unit harness connector terminal (i84) No. 33 and chassis ground.	Does the security indicator light illuminate?	Go to step 3.	Go to step 5.
<b>3 CHECK BODY INTEGRATED UNIT GROUND CIRCUIT.</b> Measure the resistance between body integrated unit harness connector terminal and chassis ground. <b>Connector &amp; terminal</b> (B280) No. 22 — Chassis ground: (B281) No. 8 — Chassis ground: (B281) No. 9 — Chassis ground: (i84) No. 21 — Chassis ground:	Is the resistance less than 10 Ω?	Go to step 4.	Repair the open circuit of the body integrated unit ground circuit.

# Diagnostics Chart for Security Indicator Light

## IMMOBILIZER (DIAGNOSTICS)

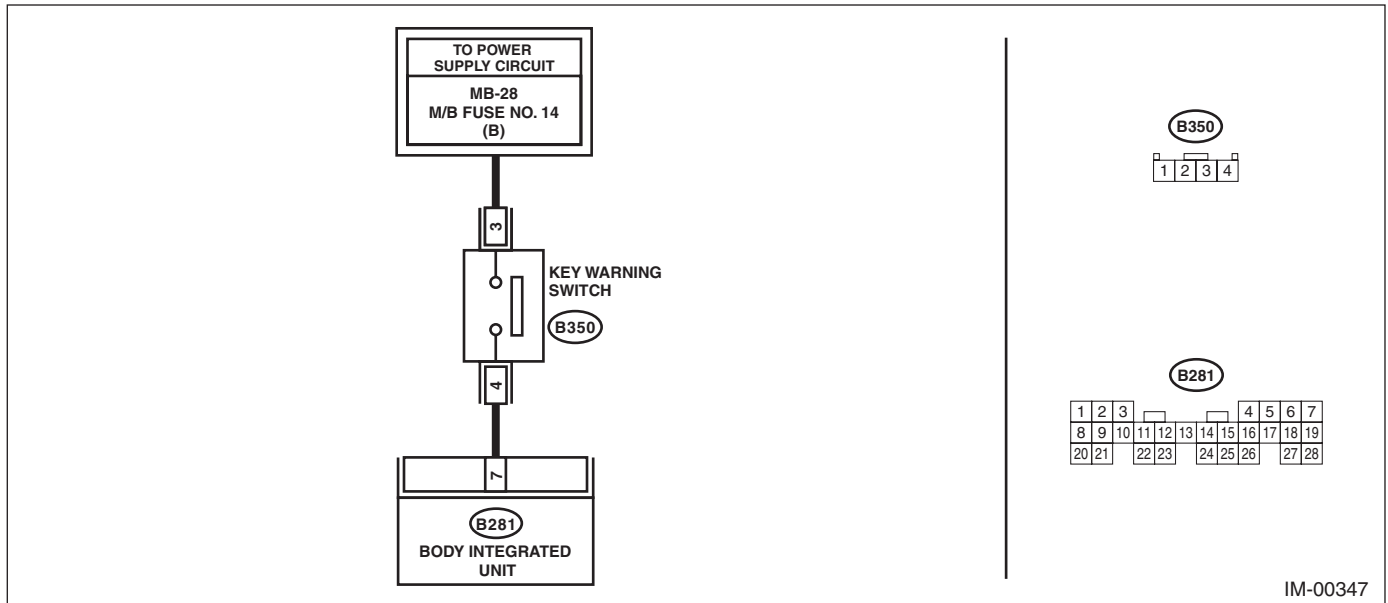
Step	Check	Yes	No
<p><b>4</b></p> <p><b>CHECK BODY INTEGRATED UNIT POWER SUPPLY CIRCUIT.</b>                      Measure the voltage between the body integrated unit harness connector terminal and chassis ground.</p> <p><b>Connector &amp; terminal</b>  <i>(B280) No. 7 (+) — Chassis ground (-):</i>  <i>(B281) No. 2 (+) — Chassis ground (-):</i></p>	Is the voltage 10 V or more?	Replace the body integrated unit <Ref. to SL-48, Body Integrated Unit.>, replace all the ignition keys (transponders). Execute the registration procedure next. Refer to the "PC application help for Subaru Select Monitor".	Check the harness for open or short circuit between body integrated unit and fuse.
<p><b>5</b></p> <p><b>CHECK WARNING BOX CIRCUIT.</b>                      1) Remove the warning box. &lt;Ref. to IDI-16, REMOVAL, Warning box.&gt;                      2) Measure the voltage between the warning box harness connector terminal and chassis ground.</p> <p><b>Connector &amp; terminal</b>  <i>(i116) No. 1 (+) — Chassis ground (-):</i></p>	Is the voltage 10 V or more?	Go to step 6.	Check the harness for open or short circuits between warning box and fuse.
<p><b>6</b></p> <p><b>CHECK WARNING BOX CIRCUIT.</b>                      Measure the resistance between body integrated unit harness connector terminal and warning box harness connector terminal.</p> <p><b>Connector &amp; terminal</b>  <i>(i84) No. 33 — (i116) No. 2:</i></p>	Is the resistance less than 10 $\Omega$ ?	LED bulb is defective. Replace the warning box. <Ref. to IDI-16, REMOVAL, Warning box.>	Repair the harness or connector.

# Diagnostics Chart for Security Indicator Light

IMMOBILIZER (DIAGNOSTICS)

## 2. CHECK KEY SWITCH CIRCUIT

### WIRING DIAGRAM:



Step	Check	Yes	No
<b>1 CHECK POWER SUPPLY CIRCUIT.</b> 1) Disconnect the harness connector from key warning switch. 2) Measure the voltage between key warning switch harness connector terminal and chassis ground. <b>Connector &amp; terminal</b> <b>(B350) No. 3 (+) — Chassis ground (-):</b>	Is the voltage 10 V or more?	Go to step 2.	Check the harness for an open or short between the key warning switch and fuse.
<b>2 CHECK KEY WARNING SWITCH.</b> 1) Insert the ignition key in the ignition switch. (OFF or ACC) 2) Measure the resistance between key warning switch connector terminals. <b>Connector &amp; terminal</b> <b>No. 3 — No. 4:</b>	Is the resistance less than 1 $\Omega$ ?	Go to step 3.	Replace the key warning switch.
<b>3 CHECK KEY WARNING SWITCH.</b> 1) Remove the ignition key from ignition switch. 2) Measure the resistance between key warning switch connector terminals. <b>Connector &amp; terminal</b> <b>No. 3 — No. 4:</b>	Is the resistance 1 M $\Omega$ or more?	Go to step 4.	Replace the key warning switch.
<b>4 CHECK HARNESS BETWEEN KEY WARNING SWITCH AND BODY INTEGRATED UNIT.</b> 1) Disconnect the harness connector from body integrated unit. 2) Measure the resistance between key warning switch harness connector terminal and body integrated unit harness connector terminal. <b>Connector &amp; terminal</b> <b>(B350) No. 4 — (B281) No. 7:</b>	Is the resistance less than 10 $\Omega$ ?	Replace the body integrated unit <Ref. to SL-48, Body Integrated Unit.>, replace all the ignition keys (transponders). Execute the registration procedure next. Refer to the "PC application help for Subaru Select Monitor".	Repair the harness between key warning switch and body integrated unit.

## List of Diagnostic Trouble Code (DTC)

### IMMOBILIZER (DIAGNOSTICS)

## 9. List of Diagnostic Trouble Code (DTC)

### A: LIST

#### 1. ECM

DTC	Item	Contents of diagnosis	Index No.
P0513	Incorrect Immobilizer Key	Incorrect immobilizer key (Use of unregistered key in body integrated unit)	<Ref. to IM(diag)-16, DTC P0513 INCORRECT IMMOBILIZER KEY, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1570	Antenna	Faulty antenna	<Ref. to IM(diag)-17, DTC P1570 ANTENNA, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1571	Reference Code Incompatibility	Reference code incompatibility between body integrated unit and ECM	<Ref. to IM(diag)-19, DTC P1571 REFERENCE CODE INCOMPATIBILITY, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1572	IMM Circuit Failure (Except Antenna Circuit)	Communication failure between body integrated unit and ECM	<Ref. to IM(diag)-20, DTC P1572 IMM CIRCUIT FAILURE (EXCEPT ANTENNA CIRCUIT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1574	Key Communication Failure	Communication failure between key and body integrated unit	<Ref. to IM(diag)-22, DTC P1574 KEY COMMUNICATION FAILURE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1576	EGI Control Module EEPROM	ECM malfunctioning	<Ref. to IM(diag)-23, DTC P1576 EGI CONTROL MODULE EEPROM, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1577	IMM Control Module EEPROM	Body integrated unit malfunctioning	<Ref. to IM(diag)-23, DTC P1577 IMM CONTROL MODULE EEPROM, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1578	Meter Failure	<ul style="list-style-type: none"> <li>• Reference code incompatibility between combination meter and body integrated unit</li> <li>• Communication failure between body integrated unit and ECM</li> </ul>	<Ref. to IM(diag)-24, DTC P1578 METER FAILURE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

#### NOTE:

Perform diagnosis of engine DTC when a DTC other than an immobilizer DTC is detected. <Ref. to EN(H6DO)(diag)-84, List of Diagnostic Trouble Code (DTC).>

# List of Diagnostic Trouble Code (DTC)

IMMOBILIZER (DIAGNOSTICS)

## 2. BODY INTEGRATED UNIT

DTC	Item	Contents of diagnosis	Index No.	Relation between ECM and DTC
B1401	M Collation NG	Reference code incompatibility between combination meter and body integrated unit	<Ref. to IM(diag)-24, DTC B1401 M COLLATION NG, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	P1578
B1402	Immobilizer Key Collation NG	<ul style="list-style-type: none"><li>• Incorrect immobilizer key (Use of unregistered key in body integrated unit)</li><li>• Faulty antenna</li></ul>	<Ref. to IM(diag)-24, DTC B1402 IMMOBILIZER KEY COLLATION NG, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	<ul style="list-style-type: none"><li>• P0513</li><li>• P1570</li><li>• P1574</li></ul>
B1403	E/G request NG	Communication failure between body integrated unit and ECM	<Ref. to IM(diag)-24, DTC B1403 E/G REQUEST NG, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	P1572

### NOTE:

The starter relay control is performed in immobilizer system. When the body integrated unit detects a non-conformity of reference code, it immediately outputs a starter relay cut signal to ECM, and then ECM stops the starter relay operation. In this case, engine does not start, and DTC is not recorded in ECM. Check that the engine does not start on the DTC of body integrated unit.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

IMMOBILIZER (DIAGNOSTICS)

## 10. Diagnostic Procedure with Diagnostic Trouble Code (DTC)

### A: DTC P0513 INCORRECT IMMOBILIZER KEY

#### DTC DETECTING CONDITION:

Incorrect immobilizer key (Use of unregistered key in body integrated unit)

	Step	Check	Yes	No
1	<b>PERFORM REGISTRATION ON IGNITION KEY.</b> Perform registration on all keys of the vehicle. Refer to the "PC application help for Subaru Select Monitor".	Is registration for all keys complete?	End.	Replace ignition keys (including transponder) which cannot be registered. Go to step 2.
2	<b>PERFORM REGISTRATION ON IGNITION KEY.</b> Perform registration on all keys of the vehicle. Refer to the "PC application help for Subaru Select Monitor".	Is registration for all keys complete?	End.	Replace the body integrated unit <Ref. to SL-48, Body Integrated Unit.>, replace all the ignition keys (transponders). Execute the registration procedure next. Refer to the "PC application help for Subaru Select Monitor".

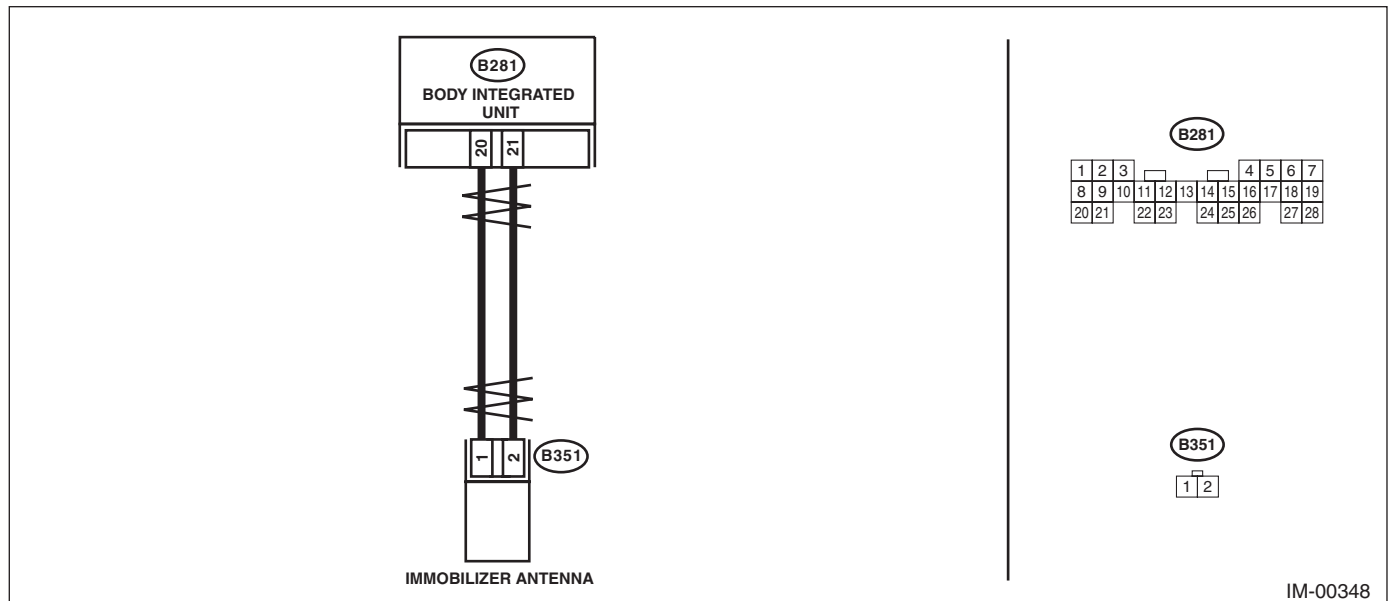


## B: DTC P1570 ANTENNA

### DTC DETECTING CONDITION:

Faulty antenna

### WIRING DIAGRAM:



Step	Check	Yes	No
<b>1 CHECK ANTENNA CIRCUIT.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the harness connector from the antenna. <Ref. to SL-52, Immobilizer Antenna.> 3) Measure the resistance of antenna circuit. <b>Connector &amp; terminal</b> <b>(B351) No. 1 — No. 2:</b>	Is the resistance less than 10 Ω?	Go to step 2.	Replace the antenna. <Ref. to SL-52, Immobilizer Antenna.>
<b>2 CHECK ANTENNA CIRCUIT.</b> 1) Disconnect the harness connector from body integrated unit. 2) Measure the resistance between harness connectors. <b>Connector &amp; terminal</b> <b>(B281) No. 21 — (B351) No. 2:</b> <b>(B281) No. 20 — (B351) No. 1:</b>	Is the resistance less than 10 Ω?	Go to step 3.	Repair the harness.
<b>3 CHECK ANTENNA CIRCUIT.</b> Measure the voltage between body integrated unit and chassis ground. <b>Connector &amp; terminal</b> <b>(B281) No. 21 (+) — Chassis ground (-):</b> <b>(B281) No. 20 (+) — Chassis ground (-):</b>	Is the resistance 1 MΩ or more?	Go to step 4.	Repair the harness between body integrated unit and antenna.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## IMMOBILIZER (DIAGNOSTICS)

Step	Check	Yes	No
<p><b>4</b></p> <p><b>CHECK BODY INTEGRATED UNIT FUNCTION.</b></p> <p>1) Connect the antenna connector.</p> <p>2) Connect the harness connector to body integrated unit.</p> <p>3) Insert the key into the ignition switch, then use an oscilloscope to measure changes in voltage between the antenna harness connectors.</p> <p><b>Connector &amp; terminal</b>  <b>(B281) No. 20 (+) — Chassis ground (-):</b></p>	<p>Is the maximum voltage more than 40 V? (Approx. 0.1 second after inserting the key) Is the voltage 0 V? (Approx. 1 second after inserting the key)</p>	<p>Go to step 5.</p>	<p>Replace the body integrated unit &lt;Ref. to SL-48, Body Integrated Unit.&gt;, replace all the ignition keys (transponders). Execute the registration procedure next. Refer to the "PC application help for Subaru Select Monitor".</p>
<p><b>5</b></p> <p><b>CHECK IGNITION KEY (TRANSPONDER).</b></p> <p>1) Remove the key from ignition switch.</p> <p>2) Start the engine using other key which is already registered.</p>	<p>Does the engine start?</p>	<p>Replace the ignition key (transponder). Execute the registration procedure next. Refer to the "PC application help for Subaru Select Monitor".</p>	<p>Replace the body integrated unit &lt;Ref. to SL-48, Body Integrated Unit.&gt;, replace all the ignition keys (transponders). Execute the registration procedure next. Refer to the "PC application help for Subaru Select Monitor".</p>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

IMMOBILIZER (DIAGNOSTICS)

## C: DTC P1571 REFERENCE CODE INCOMPATIBILITY

### DTC DETECTING CONDITION:

Reference code incompatibility between body integrated unit and ECM

Step	Check	Yes	No
<b>1</b> <b>PERFORM REGISTRATION ON IGNITION KEY.</b> Perform registration on all keys of the vehicle. Refer to the "PC application help for Subaru Select Monitor".	Is registration for all keys complete?	End.	Go to step 2.
<b>2</b> <b>CHECK FOR ANY OTHER DTC ON DISPLAY.</b>	Is any other immobilizer DTC displayed?	Check the appropriate DTC using the "List of Diagnostic Trouble Code (DTC)". <Ref. to IM(diag)-14, List of Diagnostic Trouble Code (DTC).> Execute the registration procedure next. Refer to the "PC application help for Subaru Select Monitor".	Replace the ECM. <Ref. to FU(H6DO)-52, Engine Control Module (ECM).> Body integrated unit <Ref. to SL-48, Body Integrated Unit.>, and replace all the ignition keys (transponders). Execute the registration procedure next. Refer to the "PC application help for Subaru Select Monitor".

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

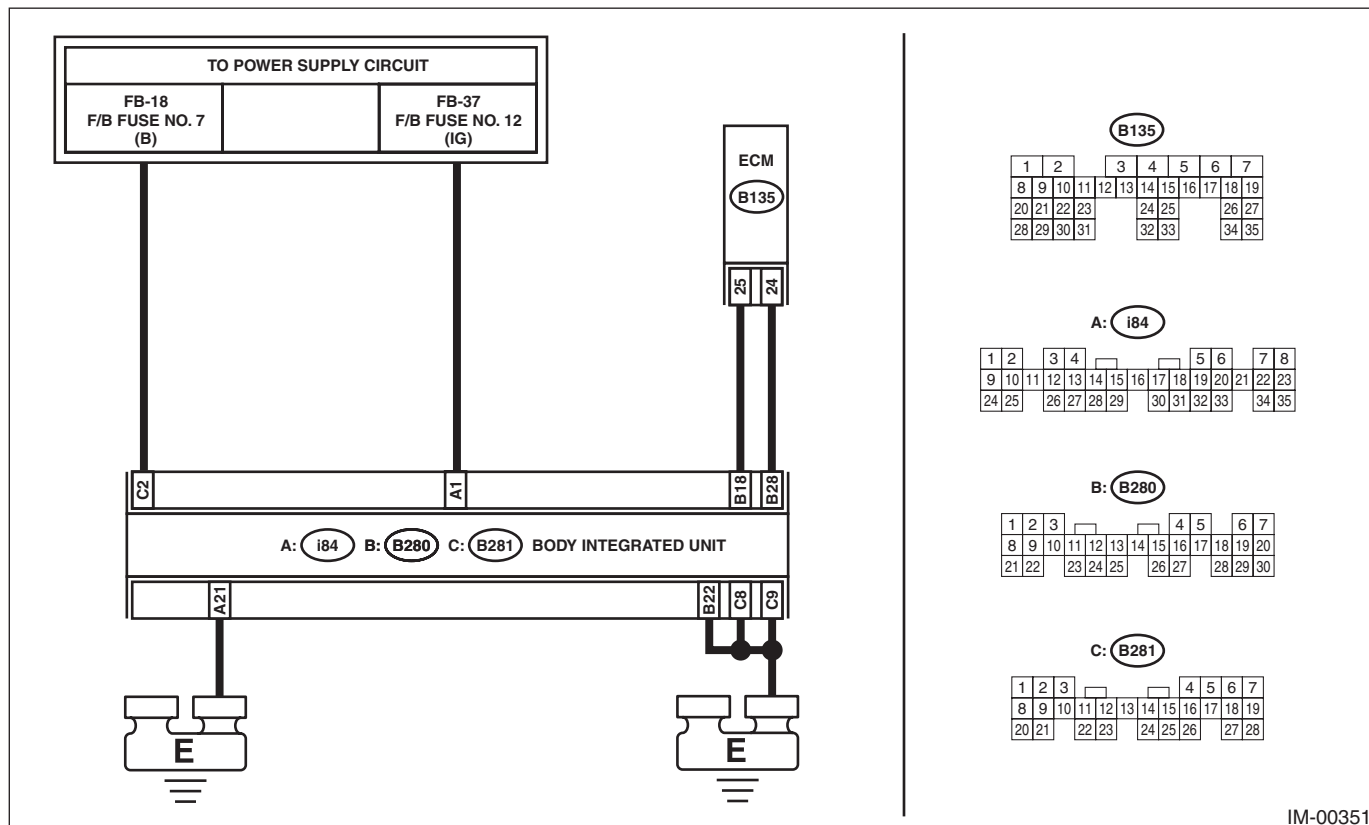
## IMMOBILIZER (DIAGNOSTICS)

### D: DTC P1572 IMM CIRCUIT FAILURE (EXCEPT ANTENNA CIRCUIT)

#### DTC DETECTING CONDITION:

Communication failure between body integrated unit and ECM

#### WIRING DIAGRAM:



Step	Check	Yes	No	
1	<p><b>CHECK BODY INTEGRATED UNIT POWER SUPPLY CIRCUIT.</b></p> <p>1) Turn the ignition switch to OFF.</p> <p>2) Disconnect the harness connector from body integrated unit.</p> <p>3) Measure the voltage between the body integrated unit harness connector terminal and chassis ground.</p> <p><b>Connector &amp; terminal</b> <b>(B281) No. 2 (+) — Chassis ground (-):</b></p>	Is the voltage 10 V or more?	Go to step 2.	Check the harness for open or short circuit between body integrated unit and fuse.
2	<p><b>CHECK BODY INTEGRATED UNIT POWER SUPPLY CIRCUIT.</b></p> <p>1) Turn the ignition switch to ON.</p> <p>2) Measure the voltage between the body integrated unit harness connector terminal and chassis ground.</p> <p><b>Connector &amp; terminal</b> <b>(i84) No. 1 (+) — Chassis ground (-):</b></p>	Is the voltage 10 V or more?	Go to step 3.	Check the harness for open or short circuit between the body integrated unit and ignition switch.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

IMMOBILIZER (DIAGNOSTICS)

Step	Check	Yes	No
<b>3 CHECK BODY INTEGRATED UNIT GROUND CIRCUIT.</b> 1) Turn the ignition switch to OFF. 2) Measure the resistance between body integrated unit harness connector terminal and chassis ground. <b>Connector &amp; terminal</b> <b>(B280) No. 22 — Chassis ground:</b> <b>(B281) No. 8 — Chassis ground:</b> <b>(B281) No. 9 — Chassis ground:</b> <b>(i84) No. 21 — Chassis ground:</b>	Is the resistance less than 10 Ω?	Go to step 4.	Repair the open circuit of the body integrated unit ground circuit.
<b>4 CHECK GROUND CIRCUIT FOR ECM.</b> Measure the resistance between the ECM ground terminal and engine ground.	Is the resistance less than 10 Ω?	Go to step 5.	Repair the ECM ground circuit.
<b>5 CHECK HARNESS BETWEEN BODY INTEGRATED UNIT AND ECM.</b> 1) Disconnect the harness connector from the ECM and body integrated unit. 2) Measure the resistance between body integrated unit harness connector terminal and ECM harness connector terminal. <b>Connector &amp; terminal</b> <b>(B280) No. 18 — (B135) No. 25:</b> <b>(B280) No. 28 — (B135) No. 24:</b>	Is the resistance less than 10 Ω?	Go to step 6.	Repair the open circuit of the harness between the body integrated unit and ECM.
<b>6 CHECK COMMUNICATION CIRCUIT HARNESS.</b> 1) Turn the ignition switch to ON. 2) Measure the voltage between the body integrated unit harness connector terminal and chassis ground. <b>Connector &amp; terminal</b> <b>(B280) No. 18 (+) — Chassis ground (-):</b> <b>(B280) No. 28 (+) — Chassis ground (-):</b>	Is the voltage 6 V or more?	Repair the harness between body integrated unit and ECM.	Go to step 7.
<b>7 CHECK COMMUNICATION CIRCUIT HARNESS.</b> Measure the voltage between ECM harness connector terminal and engine ground. <b>Connector &amp; terminal</b> <b>(B135) No. 25 (+) — Engine ground (-):</b> <b>(B135) No. 24 (+) — Engine ground (-):</b>	Is the voltage 6 V or more?	Repair the harness between body integrated unit and ECM.	Go to step 8.
<b>8 CHECK ECM BY COMMUNICATION LINE CHECK.</b> 1) Connect the harness connector to ECM. 2) Disconnect the harness connector from body integrated unit. 3) Start the communication line short check. <Ref. to IM(diag)-8, COMMUNICATION LINE CHECK, OPERATION, Subaru Select Monitor.>	Is the communication line check OK?	Replace the body integrated unit <Ref. to SL-48, Body Integrated Unit.>, replace all the ignition keys (transponders). Execute the registration procedure next. Refer to the "PC application help for Subaru Select Monitor".	Replace the ECM. <Ref. to FU(H6DO)-52, Engine Control Module (ECM).> Perform the registration procedure next. Refer to the "PC application help for Subaru Select Monitor".

**NOTE:**

Refer to the following inspection when DTC is detected after inspection above. <Ref. to IM(diag)-24, DTC P1578 METER FAILURE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

IMMOBILIZER (DIAGNOSTICS)

## E: DTC P1574 KEY COMMUNICATION FAILURE

### DTC DETECTING CONDITION:

Failure of body integrated unit to verify key (transponder) ID code or transponder key failure

Step	Check	Yes	No
<b>1</b> <b>CHECK BODY INTEGRATED UNIT FUNCTION.</b> Insert the key into the ignition switch (LOCK position), then measure changes in voltage between the antenna connectors. <b>Connector &amp; terminal</b> <b>(B351) No. 1 (+) — Chassis ground (-):</b>	Is the maximum voltage more than 40 V? (Approx. 0.1 second after inserting the key) Is the voltage 0 V? (Approx. 1 second after inserting the key)	Go to step 2.	Replace the body integrated unit <Ref. to SL-48, Body Integrated Unit.>, replace all the ignition keys (transponders). Execute the registration procedure next. Refer to the "PC application help for Subaru Select Monitor".
<b>2</b> <b>CHECK IGNITION KEY (TRANSPONDER).</b> 1) Remove the key from ignition switch. 2) Start the engine using other key which is already registered.	Does the engine start?	Replace the ignition key (transponder). Execute the registration procedure next. Refer to the "PC application help for Subaru Select Monitor".	Replace the body integrated unit <Ref. to SL-48, Body Integrated Unit.>, replace all the ignition keys (transponders). Execute the registration procedure next. Refer to the "PC application help for Subaru Select Monitor".

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

IMMOBILIZER (DIAGNOSTICS)

## F: DTC P1576 EGI CONTROL MODULE EEPROM

### DTC DETECTING CONDITION:

- ECM malfunctioning
- Inaccessible ROM in ECM during key registration

Step	Check	Yes	No
<b>1</b> <b>PERFORM REGISTRATION ON IGNITION KEY.</b> Perform registration on all keys of the vehicle. Refer to the "PC application help for Subaru Select Monitor".	Is registration for all keys complete?	Make sure it is possible to start the engine with all keys that have been taught. This completes the work.	Go to step 2.
<b>2</b> <b>PERFORM REGISTRATION ON IGNITION KEY.</b> Perform registration on all keys of the vehicle. Refer to the "PC application help for Subaru Select Monitor".	Is registration for all keys complete?	Make sure it is possible to start the engine with all keys that have been taught. This completes the work.	Go to step 3.
<b>3</b> <b>PERFORM REGISTRATION ON IGNITION KEY.</b> Perform registration on all keys of the vehicle. Refer to the "PC application help for Subaru Select Monitor".	Is registration for all keys complete?	Make sure it is possible to start the engine with all keys that have been taught. This completes the work.	Replace the ECM. <Ref. to FU(H6DO)-52, Engine Control Module (ECM).>

## G: DTC P1577 IMM CONTROL MODULE EEPROM

### DTC DETECTING CONDITION:

- Body integrated unit malfunctioning
- Failed to access ROM inside the body integrated unit

Step	Check	Yes	No
<b>1</b> <b>PERFORM REGISTRATION ON IGNITION KEY.</b> Perform registration on all keys of the vehicle. Refer to the "PC application help for Subaru Select Monitor".	Is registration for all keys complete?	Make sure it is possible to start the engine with all keys that have been taught. This completes the work.	Go to step 2.
<b>2</b> <b>PERFORM REGISTRATION ON IGNITION KEY.</b> Perform registration on all keys of the vehicle. Refer to the "PC application help for Subaru Select Monitor".	Is registration for all keys complete?	Make sure it is possible to start the engine with all keys that have been taught. This completes the work.	Go to step 3.
<b>3</b> <b>PERFORM REGISTRATION ON IGNITION KEY.</b> Perform registration on all keys of the vehicle. Refer to the "PC application help for Subaru Select Monitor".	Is registration for all keys complete?	Make sure it is possible to start the engine with all keys that have been taught. This completes the work.	Replace the body integrated unit <Ref. to SL-48, Body Integrated Unit.>, replace all the ignition keys (transponders). Execute the registration procedure next. Refer to the "PC application help for Subaru Select Monitor".

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## IMMOBILIZER (DIAGNOSTICS)

### H: DTC P1578 METER FAILURE

#### DTC DETECTING CONDITION:

- Reference code incompatibility between combination meter and body integrated unit
- Communication failure between body integrated unit and ECM

Step	Check	Yes	No
<b>1</b> <b>CHECK DTC.</b> Read the DTC of body integrated unit using Subaru Select Monitor.	Is DTC B1401 detected?	Go to step 2.	<Ref. to IM(diag)-20, DTC P1572 IMM CIRCUIT FAILURE (EXCEPT ANTENNA CIRCUIT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
<b>2</b> <b>CHECK LAN COMMUNICATION SYSTEM.</b> Inspect LAN communication system. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>	Is DTC U1300, U1301, U1302, B1100 or B1101 of the body integrated unit displayed?	Perform the diagnosis according to the DTC. <Ref. to LAN(diag)-31, List of Diagnostic Trouble Code (DTC).>	Go to step 3.
<b>3</b> <b>CHECK COMBINATION METER.</b> 1) Perform the registration of immobilizer. Refer to the "PC application help for Subaru Select Monitor". 2) Start the engine.	Does the engine start?	System is normal.	Replace the combination meter. <Ref. to IDI-11, REMOVAL, Combination Meter.>

#### NOTE:

- When the combination meter has been replaced, be sure to perform the registration procedure of immobilizer.
- When the combination meter and body integrated unit are replaced at a time, the immobilizer can not be registered. In this case, it is necessary to rewrite the security ID into the body integrated unit.

### I: DTC B1401 M COLLATION NG

#### NOTE:

Refer to DTC P1578 "METER FAILURE" for diagnostic procedure. <Ref. to IM(diag)-24, DTC P1578 METER FAILURE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

### J: DTC B1402 IMMOBILIZER KEY COLLATION NG

#### NOTE:

For diagnostic procedures, refer to the following items.

- DTC P0513 "INCORRECT IMMOBILIZER KEY" <Ref. to IM(diag)-16, DTC P0513 INCORRECT IMMOBILIZER KEY, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
- DTC P1570 "ANTENNA" <Ref. to IM(diag)-17, DTC P1570 ANTENNA, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
- DTC P1574 "KEY COMMUNICATION FAILURE" <Ref. to IM(diag)-22, DTC P1574 KEY COMMUNICATION FAILURE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

### K: DTC B1403 E/G REQUEST NG

#### NOTE:

For diagnostic procedures, refer to DTC P1572 "IMM CIRCUIT FAILURE (EXCEPT ANTENNA CIRCUIT)". <Ref. to IM(diag)-20, DTC P1572 IMM CIRCUIT FAILURE (EXCEPT ANTENNA CIRCUIT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>



# LAN SYSTEM (DIAGNOSTICS)

# *LAN(diag)*

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# Basic Diagnostic Procedure

LAN SYSTEM (DIAGNOSTICS)

## 1. Basic Diagnostic Procedure

### A: PROCEDURE

#### CAUTION:

- **Subaru Select Monitor is required for reading DTC, performing diagnosis and reading current data.**
- **Remove foreign matter (dust, water, oil, etc.) from the body integrated unit connector during removal and installation.**
- **For model with immobilizer, registration of immobilizer may be needed after the replacement of controller etc. For details, refer to the “PC application help for Subaru Select Monitor”.**

#### NOTE:

- To check harness for open or short circuits, shake the suspected trouble spot or connector.
- Check List for Interview <Ref. to LAN(diag)-3, Check List for Interview.>

Step	Check	Yes	No
<b>1 CHECK PRE-INSPECTION.</b> Ask the customer when and how the trouble occurred using the interview check list. <Ref. to LAN(diag)-3, Check List for Interview.>	Did you interview the customer?	Go to step 2.	Interview the customer.
<b>2 BASIC INSPECTION.</b> Check components which might affect body control. <Ref. to LAN(diag)-5, INSPECTION, General Description.>	Is the component that might influence the body control problem normal?	Go to step 3.	Repair or replace each component.
<b>3 CHECK INDICATION OF DTC.</b> 1) Read DTC of all systems. <Ref. to LAN(diag)-12, READ DIAGNOSTIC TROUBLE CODE (DTC), OPERATION, Subaru Select Monitor.> NOTE: <ul style="list-style-type: none"> <li>• The LAN system is for the overall vehicle, so read the DTC of all systems.</li> <li>• If the communication function of the Subaru Select Monitor cannot be executed properly, check the communication circuit. &lt;Ref. to LAN(diag)-24, COMMUNICATION FOR INITIALIZING IMPOSSIBLE, INSPECTION, Subaru Select Monitor.&gt;</li> </ul> 2) Record all DTC.	Is DTC displayed on Subaru Select Monitor?	Refer to the DTC related table. <Ref. to LAN(diag)-33, DTC TABLE, LIST, List of Diagnostic Trouble Code (DTC).> Go to step 5.	Go to step 4.
<b>4 PERFORM GENERAL DIAGNOSTICS.</b> Inspect using the “General Diagnostics Table”. <Ref. to LAN(diag)-79, General Diagnostic Table.>	Is result of inspection OK?	LAN system is normal.	Go to step 5.
<b>5 PERFORM DIAGNOSIS.</b> 1) Correct the cause of trouble. 2) Perform the Clear Memory Mode. <Ref. to LAN(diag)-21, CLEAR MEMORY MODE, OPERATION, Subaru Select Monitor.> 3) Read the DTC. <Ref. to LAN(diag)-12, READ DIAGNOSTIC TROUBLE CODE (DTC), OPERATION, Subaru Select Monitor.>	Is DTC displayed?	Repeat step 5 until DTC is not shown.	Finish the diagnosis.

# Check List for Interview

LAN SYSTEM (DIAGNOSTICS)

## 2. Check List for Interview

### A: CHECK

Inspect the following item about the vehicle's state.

#### 1. DISPLAY OF COMMUNICATION ERROR

Communication error is displayed in odo/trip meter.	When and how often are they displayed? <input type="checkbox"/> Always <input type="checkbox"/> Sometimes <input type="checkbox"/> Only once
	Which communication error is displayed? (Record them all) <input type="checkbox"/> Er IU (Fail in the body integrated unit) <input type="checkbox"/> Er HC (Fail of high-speed CAN) <input type="checkbox"/> Er LC (Fail of low-speed CAN) <input type="checkbox"/> Er — (Fails of both high-speed and low-speed CAN) <input type="checkbox"/> Er EG (Fail of EGI communication data) <input type="checkbox"/> Er TC (Fail of TCM communication data) <input type="checkbox"/> Er Ab (Fail of vehicle dynamics control (VDC)/ABS communication data) <input type="checkbox"/> Er bb (Fail of brake vacuum system)
Ignition key position	<input type="checkbox"/> OFF <input type="checkbox"/> ACC <input type="checkbox"/> ON (Before starting engine) <input type="checkbox"/> START <input type="checkbox"/> ON (After starting engine, while engine is running) <input type="checkbox"/> ON (After starting engine, engine is stopped)
Timing	<input type="checkbox"/> Immediately after turning the ignition ON. <input type="checkbox"/> Immediately after turning the ignition to START.

#### 2. DISPLAY STATUS OF THE INDICATOR

Display status in the combination meter	a) Engine coolant temperature gauge display	<input type="checkbox"/> OK / <input type="checkbox"/> NG
	b) Fuel gauge display	<input type="checkbox"/> OK / <input type="checkbox"/> NG
Display of other indicators	c) Malfunction indicator light	<input type="checkbox"/> ON / <input type="checkbox"/> OFF
	d) SPORT indicator light (AT warning light)	<input type="checkbox"/> ON / <input type="checkbox"/> OFF
	e) ABS warning light/Vehicle dynamics control (VDC) warning light	<input type="checkbox"/> ON / <input type="checkbox"/> OFF
	f) Security indicator light	<input type="checkbox"/> ON / <input type="checkbox"/> Blink / <input type="checkbox"/> OFF
	g) Seat belt warning light (Driver's seat)	<input type="checkbox"/> ON / <input type="checkbox"/> OFF
	h) Seat belt warning light (Passenger's seat)	<input type="checkbox"/> ON / <input type="checkbox"/> OFF

## Check List for Interview

LAN SYSTEM (DIAGNOSTICS)

### 3. SYMPTOM

Vehicle condition	Key cannot be removed from key cylinder.	<input type="checkbox"/> Yes / <input type="checkbox"/> No
	Key can be removed from any other than parking range.	<input type="checkbox"/> Yes / <input type="checkbox"/> No
	Shift lever can not be operated.	<input type="checkbox"/> Yes / <input type="checkbox"/> No
	Shift lock does not operate.	<input type="checkbox"/> Yes / <input type="checkbox"/> No
	Driver's seat belt warning light does not illuminate.	<input type="checkbox"/> Yes / <input type="checkbox"/> No
	Passenger's seat belt warning light does not illuminate.	<input type="checkbox"/> Yes / <input type="checkbox"/> No
	Seat belt warning alarm does not sound.	<input type="checkbox"/> Yes / <input type="checkbox"/> No
	Illumination volume control is not available.	<input type="checkbox"/> Yes / <input type="checkbox"/> No
	Key illumination does not illuminate	<input type="checkbox"/> Yes / <input type="checkbox"/> No
	Key illumination is blinking	<input type="checkbox"/> Yes / <input type="checkbox"/> No
	Room light does not interlock with doors.	<input type="checkbox"/> Yes / <input type="checkbox"/> No
	Room light blinks.	<input type="checkbox"/> Yes / <input type="checkbox"/> No
	Map light does not interlock with doors	<input type="checkbox"/> Yes / <input type="checkbox"/> No
	Map light blinks.	<input type="checkbox"/> Yes / <input type="checkbox"/> No
	Luggage light blinks.	<input type="checkbox"/> Yes / <input type="checkbox"/> No
	Wiper deicer does not operate.	<input type="checkbox"/> Yes / <input type="checkbox"/> No
	Rear defogger does not operate.	<input type="checkbox"/> Yes / <input type="checkbox"/> No
	Meter does not dim when headlights are ON.	<input type="checkbox"/> Yes / <input type="checkbox"/> No
	Rear wiper does not operate.	<input type="checkbox"/> Yes / <input type="checkbox"/> No
	Can not be locked/unlocked with central door lock switch.	<input type="checkbox"/> Yes / <input type="checkbox"/> No
	Can not be locked/unlocked with keyless entry system.	<input type="checkbox"/> Yes / <input type="checkbox"/> No
	Rear gate does not open with rear gate release switch.	<input type="checkbox"/> Yes / <input type="checkbox"/> No
	Hazard answer-back does not operate.	<input type="checkbox"/> Yes / <input type="checkbox"/> No
	Engine does not start.	<input type="checkbox"/> Yes / <input type="checkbox"/> No

### 4. CONDITIONS UNDER WHICH TROUBLE OCCURS

Driving condition	<input type="checkbox"/> At standstill (While idling)			
	<input type="checkbox"/> When the vehicle is running	Vehicle speed	km/h (MPH)	
	<input type="checkbox"/> While accelerating	Acceleration	km/h (MPH) to	km/h (MPH)
	<input type="checkbox"/> While decelerating (With braking)	Deceleration	km/h (MPH) to	km/h (MPH)
	<input type="checkbox"/> While decelerating (Without braking)	Deceleration	km/h (MPH) to	km/h (MPH)
	<input type="checkbox"/> Flat road			
	<input type="checkbox"/> Uphill			
	<input type="checkbox"/> Downhill			
	<input type="checkbox"/> Gravel road			
	<input type="checkbox"/> Bumpy road			
<input type="checkbox"/> Snowy road				
	Does it occur when operating any part? Operated part: Trouble symptom			
	Are there any other troubles occurred? From where: Trouble symptom			

## 3. General Description

### A: CAUTION

#### 1. SUPPLEMENTAL RESTRAINT SYSTEM “AIRBAG”

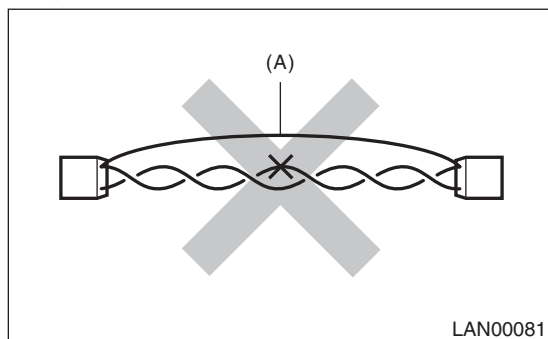
Airbag system wiring harness is routed near the body integrated unit and twisted pair line.

#### CAUTION:

- Do not use electrical test equipment on any airbag system wiring harnesses.
- Be careful not to damage the airbag system wiring harness when servicing the body integrated unit and LAN system.
- When disconnecting the airbag system connectors, refer to the cautions regarding the airbag system. <Ref. to AB-4, CAUTION, General Description.>

#### 2. LAN SYSTEM

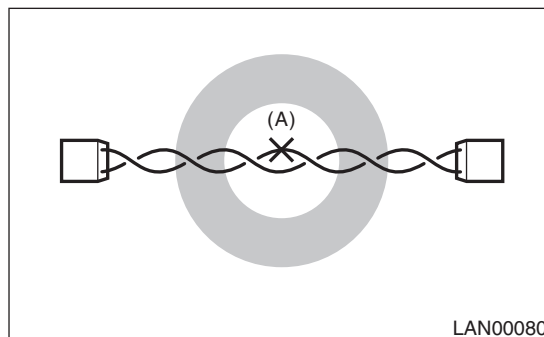
- Bus line of LAN system is twisted pair line. Be careful not to bypass or partly unbind the twisted pair line.
- Do not make clearance between bus lines (CAN High, CAN Low).
- Difference of bus line length should be within 10 cm (3.94 in).
- Fray near the connector should be within 8 cm (3.14 in).



(A) Bypass wire connection

- If the characteristics of the twisted pair line are changed, it may extremely weaken against noise.

- When repairing the harness, connect the wires using soldering and protect it with insulating tape etc.



(A) Soldering and protection with insulating tape

### B: INSPECTION

Before performing diagnostics, check the following item which might affect body integrated unit malfunctions.

- 1) Measure the battery voltage and check electrolyte.

**Standard voltage: 12 V or more**

**Specific gravity: Above 1.260**

- 2) Check the fuse condition. (Includes the backup fuse.)

Make sure that ampere of the fuse is setting value, and it is not blown out.

- 3) Check the connecting condition of harness and harness connector.

4) Confirm that a setting that does not match the vehicle equipment, is not set in the body integrated unit. <Ref. to LAN(diag)-19, REGISTRATION BODY INTEGRATED UNIT (EQUIPMENT SETTING), OPERATION, Subaru Select Monitor.>

5) Make sure that a setting that does not match the vehicle equipment, is not set in the function setting (ECM customizing) of the body integrated unit. <Ref. to LAN(diag)-21, FUNCTION SETTING (ECM CUSTOMIZING), OPERATION, Subaru Select Monitor.>

6) Confirm “Factory or Market setting” of body integrated unit registrations is “Market”.

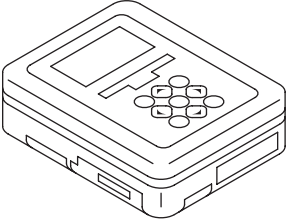
7) Confirm key illumination does not blink with ignition switch turned to ON.

# General Description

LAN SYSTEM (DIAGNOSTICS)

## C: PREPARATION TOOL

### 1. SPECIAL TOOL

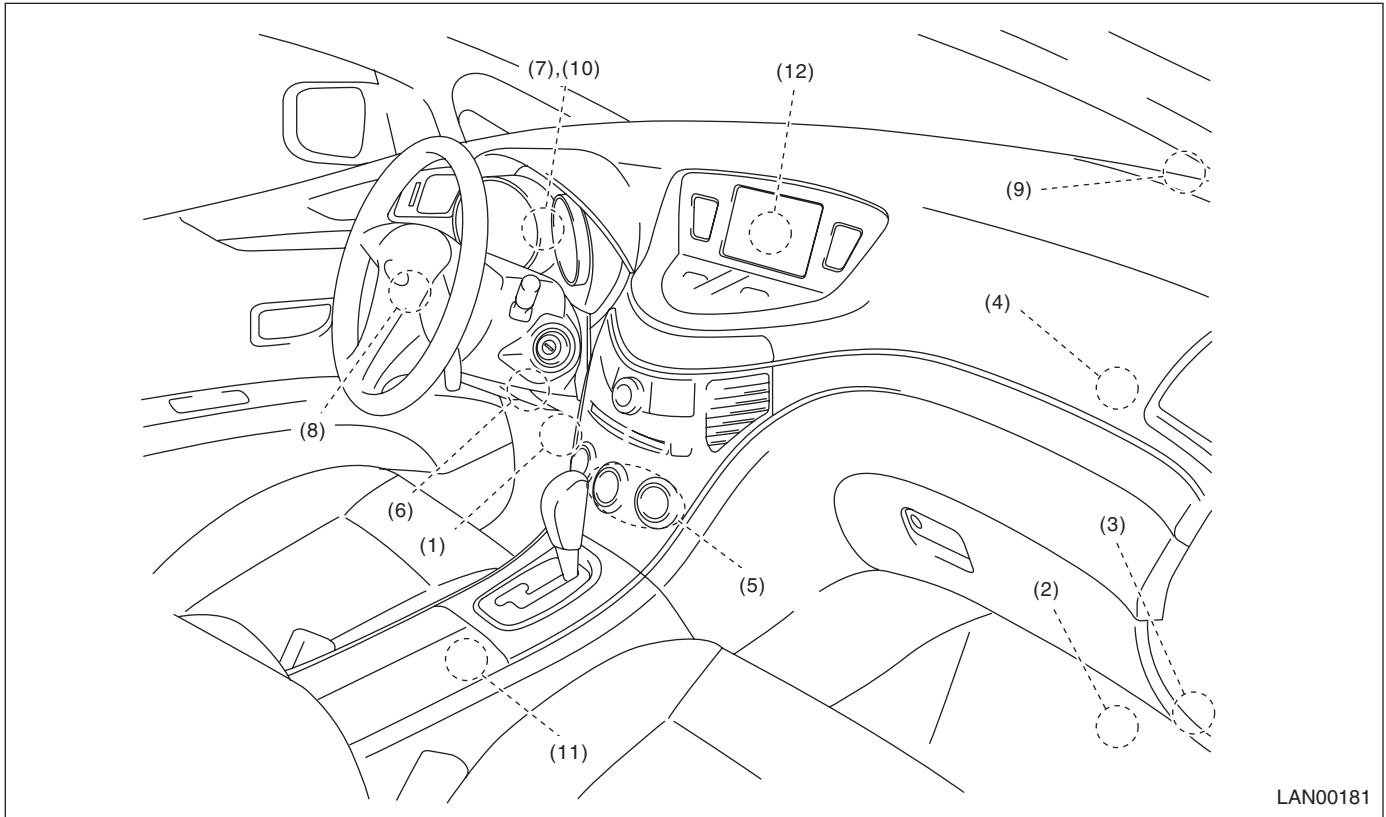
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST1B022XU0	1B022XU0	SUBARU SELECT MONITOR III KIT	Used for troubleshooting the electrical system.

### 2. GENERAL TOOL

TOOL NAME	REMARKS
Circuit tester	Used for measuring resistance, voltage and current.

## 4. Electrical Component Location

### A: LOCATION

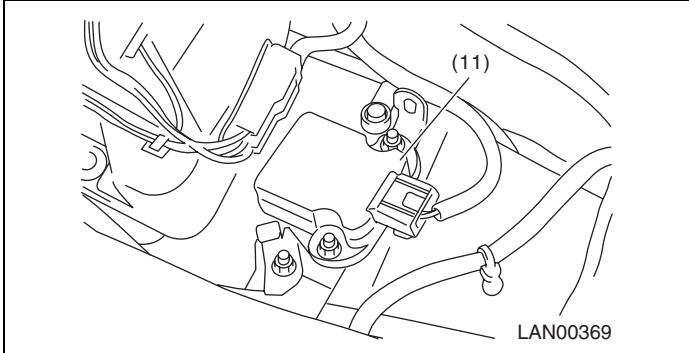
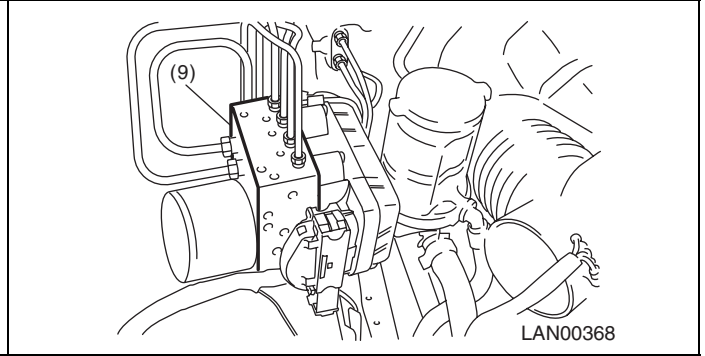
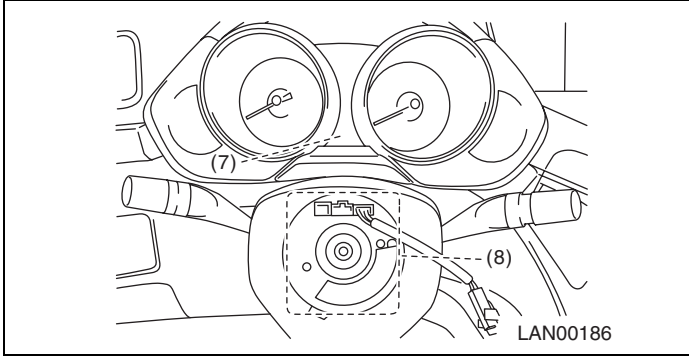
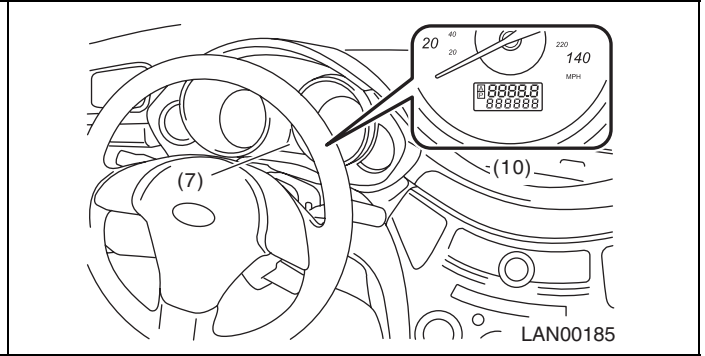
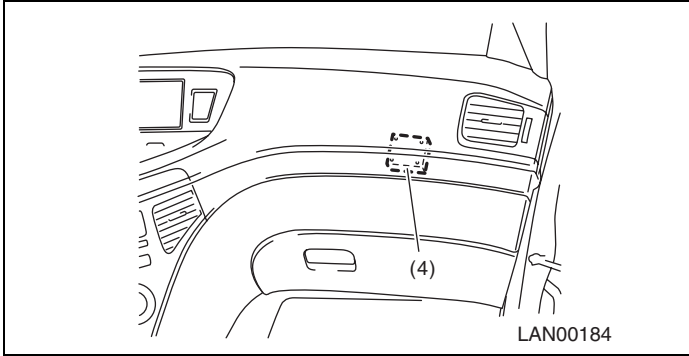
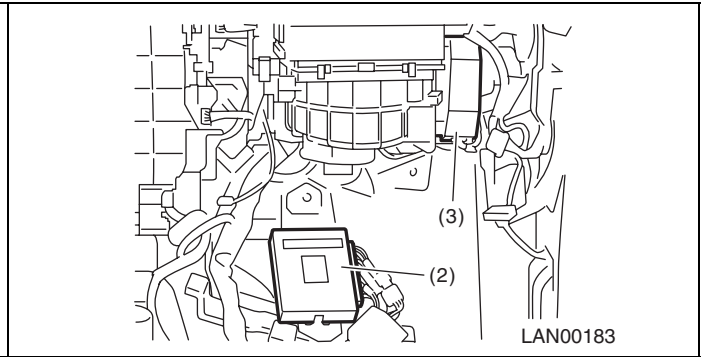
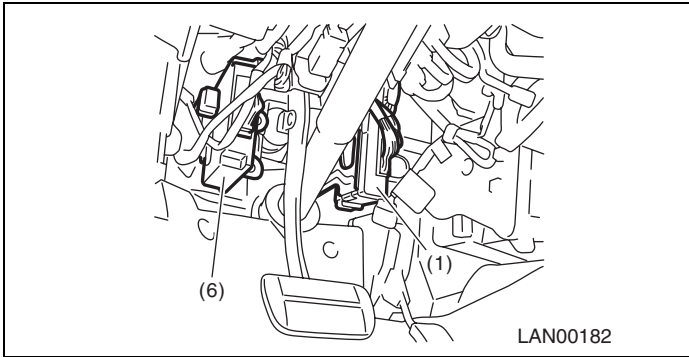


LAN00181

- |  |                                       |  |
|--|---------------------------------------|--|
| (1) Body integrated unit                   | (5) A/C control panel                 | (9) VDCCM&H/U (in engine compartment)    |
| (2) Engine control module (ECM)            | (6) Transmission control module (TCM) | (10) Odo/trip meter                      |
| (3) Auto A/C control module                | (7) Combination meter                 | (11) Yaw rate & G sensor                 |
| (4) Keyless entry control module (antenna) | (8) Steering angle sensor             | (12) Display (navigation monitor or MFD) |

# Electrical Component Location

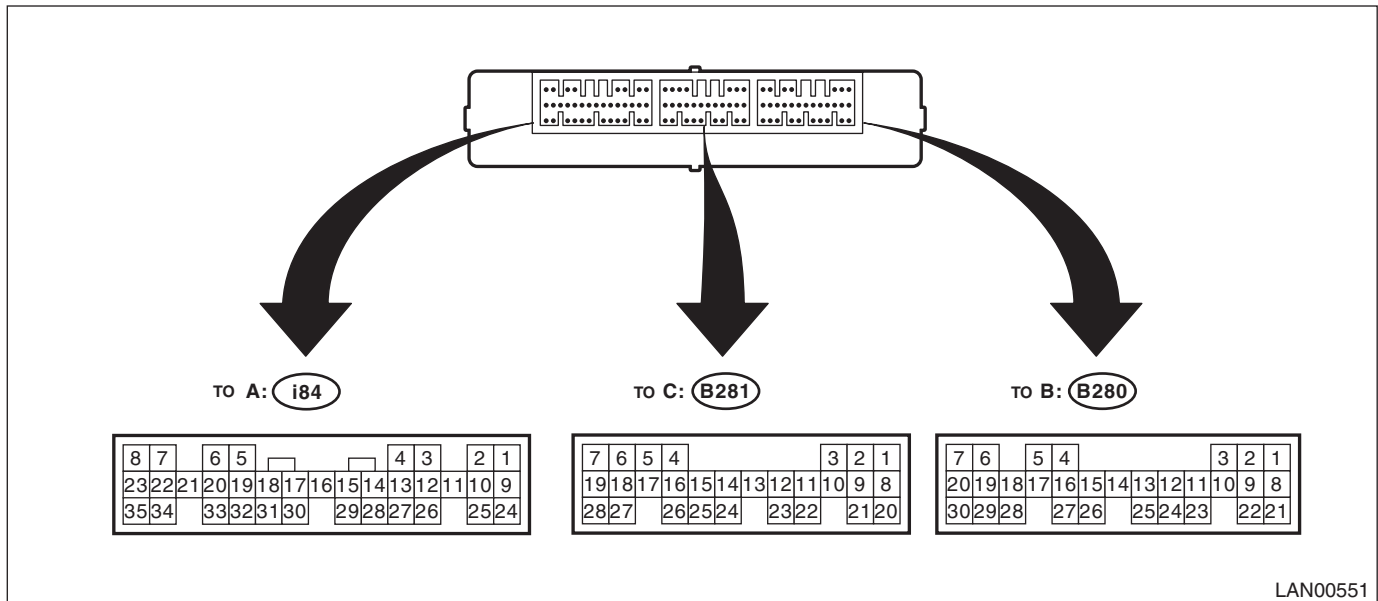
## LAN SYSTEM (DIAGNOSTICS)





## 5. Control Module I/O Signal

### A: ELECTRICAL SPECIFICATION



Description	Connector No.	Terminal No.	Signal (V)	Note
			Ignition switch ON	
System control power supply	B281	2	10 — 13 V	Always
Backup power supply	B280	7	10 — 13 V	Always
Ignition power supply	i84	1	10 — 13 V	Ignition ON
ACC power supply	i84	24	10 — 13 V	ACC ON
Ground	i84	21	0 V	Always
	B281	9		
	B281	8		
	B280	22		
Key warning switch	B281	7	10 — 13 V	When ignition key inserted
Stop light switch	B281	23	10 — 13 V	When brake pedal is depressed
Illumination control switch	i84	30	10 — 13 V (at dimmer ON)	Dim the clock and audio illumination
Illumination volume (Vi1)	i84	10	4.5 — 5.5 V	Small light ON
Illumination volume (Vi2)	i84	2	0.5 — 4.5 V	—
Illumination volume (Vi3)	i84	25	0 V	Ground circuit
Illumination output	i84	5	10 — 13 V	Small light ON
Front fog light input	B281	17	10 — 13 V	Front fog light ON
Door switch input Driver's seat	i84	19	Less than 1 V (10 — 13 V at OFF)	Driver's door open (ON)
Door switch input Passenger's seat	i84	32	Less than 1 V (10 — 13 V at OFF)	Passenger's door open (ON)
Door switch input Rear RH seat	i84	18	Less than 1 V (10 — 13 V at OFF)	Rear RH door open (ON)
Door switch input Rear LH seat	i84	31	Less than 1 V (10 — 13 V at OFF)	Rear LH door open (ON)

## Control Module I/O Signal

### LAN SYSTEM (DIAGNOSTICS)

Description	Connector No.	Terminal No.	Signal (V)	Note
			Ignition switch ON	
Door switch Rear gate	i84	17	Less than 1 V (10 — 13 V at OFF)	Rear gate open (ON)
Manual switch (LOCK)	i84	15	Less than 1 $\Omega$	Door lock switch ON
Manual switch (UNLOCK)	i84	29	Less than 1 $\Omega$	Door unlock switch ON
Door lock power supply	i84	34	10 — 13 V	Always
All door lock output	i84	7	10 — 13 V	Manual lock switch, door key switch ON
Driver's door UNLOCK output	i84	23	10 — 13 V	Driver's seat unlock signal ON
All door UNLOCK output	i84	8	10 — 13 V	ALL door unlock signals ON
Rear gate UNLOCK output	i84	22	10 — 13 V	When the rear gate release switch is ON with all seats unlocked
Rear gate release switch	B281	22	0 V	Rear gate release switch ON
Key/shift lock power supply	B281	1	10 — 13 V	Always
Shift lock output	B280	6	10 — 13 V	Key warning switch ON, ignition ON, shift position "P" range, foot brake ON (AT only)
Key locking output	B280	5	10 — 13 V	Other than "P" range, ignition switch ON
Wiper deicer switch	i84	14	0 V	Wiper deicer switch ON
Wiper deicer relay output	B280	14	0 V	Wiper deicer relay ON
Rear defogger switch	i84	28	0 V	Rear defogger switch ON
Rear defogger relay output	B280	16	0 V	Rear defogger relay ON
Shift switch (ON)	B281	26	0 V	At Manual mode
Shift switch (UP)	B281	15	0 V	At Manual mode UP
Shift switch (DOWN)	B281	25	0 V	At Manual mode DOWN
Shift button switch	B281	14	0 V	When operating the shift lever release button
P range switch	B281	13	0 V	Shift range P position
Impact sensor	B281	5	8 V or more	Impact sensor ON (model with impact sensor)
Fuel level sensor	B281	19	0 — 102.3 $\Omega$	Resistance differs according to the fuel level (displays resistance combining level gauge main and sub)
Ambient sensor	B281	3	0.5 — 4.5 V	SIG
	B281	10	0 V	GND
Seat belt switch (driver's seat)	i84	4	0 V	When driver's seat belt is worn
Seat belt switch (passenger's seat)	i84	13	0 V	When passenger's seat belt is worn
Seat belt warning light (driver's seat)	i84	20	0 V	When driver's seat belt is worn
Seat belt warning light (passenger's seat)	B280	27	0 V	When passenger's seat belt is worn
Rear wiper switch (ON)	B281	6	0 V	Rear wiper switch ON
Rear wiper switch (INT)	B281	18	0 V	Rear wiper switch ON
Rear washer switch	B281	27	0 V	Rear washer switch ON

# Control Module I/O Signal

LAN SYSTEM (DIAGNOSTICS)

Description	Connector No.	Terminal No.	Signal (V)	Note
			Ignition switch ON	
Rear wiper power supply	B280	21	10 — 13 V	ACC switch ON
Rear wiper ON output	B280	1	10 — 13 V	Rear wiper switch ON
Rear wiper return	B280	8	0 V	At wiper reversing
		1 — 8	0 V	
Room light output	B280	3	0 V	When LOCK, UNLOCK with keyless entry
Map light output	B280	2	0 V	During map light linked operation
		9	0 V	During map light linked operation
Key ring illumination output	B280	4	0 V	Ignition key removed, driver's door open
Turn hazard output	B280	12	0 V	When operating keyless entry answer back
Keyless buzzer output	i84	6	10 — 13 V	When operating keyless entry answer back
Security horn output	B280	11	0 V	When operating security horn
Security indicator light	i84	33	0 V	At ignition key removed, immobilizer operating
Keyless communication	i84	9	Serial communication	At keyless entry signal received
High speed CAN circuit (Hi)	B280	20	Between B20 — B30 Serial communication	At communicating (sending and receiving)
High speed CAN circuit (Lo)	B280	30		
Low-speed CAN circuit 1 (Hi)	i84	27	Between A26 — A27 Serial communication	At communicating (sending and receiving)
Low-speed CAN circuit 1 (Lo)	i84	26		
Low-speed CAN circuit 2 (Hi)	B280	26	Between B25 — B26 Serial communication	At communicating (sending and receiving) (model with auto A/C)
Low-speed CAN circuit 2 (Lo)	B280	25		
Immobilizer antenna	B281	20 — 21	Between B20 — B21 Serial communication	
Immobilizer communication (main)	B280	18 (Back-up 28)	Serial communication	
Subaru Select Monitor communication	B280	19	Serial communication	

## B: WIRING DIAGRAM

Refer to the electrical wiring diagram. <Ref. to WI-78, WIRING DIAGRAM, CAN Communication System.>

### 6. Subaru Select Monitor

#### A: OPERATION

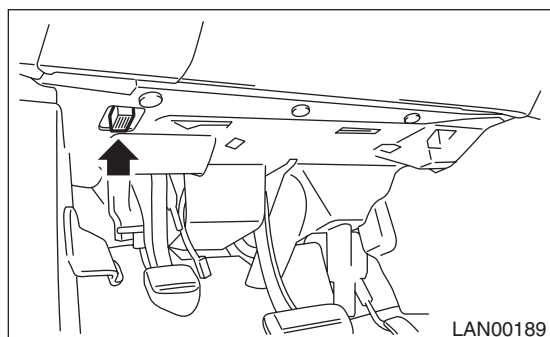
##### 1. READ DIAGNOSTIC TROUBLE CODE (DTC)

###### NOTE:

- DTC is displayed in the sequence of inputting. (When entering two DTCs or more simultaneously, they are displayed in the sequence of priority.)
- When more than one DTC is displayed, perform the diagnosis of top one.

- 1) Prepare the Subaru Select Monitor kit.
- 2) Connect the diagnosis cable to Subaru Select Monitor.
- 3) Connect the Subaru Select Monitor to data link connector.

Data link connector is located in the lower portion of instrument panel (on the driver's side).



###### CAUTION:

**Do not connect scan tools other than the Subaru Select Monitor.**

- 4) Turn the ignition switch to ON and run the Subaru Select Monitor.
- 5) On «Main Menu» display, select {Each System Check}.
- 6) On «System Selection Menu» display, select {Integ. unit mode}.
- 7) On «Integ. unit mode» display, select {Diagnostic Code(s) Display}.

###### NOTE:

It is possible to read the DTC at the {Check all diagnosis codes} on the «Main Menu», and then find the contents to check from the DTC table. <Ref. to LAN(diag)-33, DTC TABLE, LIST, List of Diagnostic Trouble Code (DTC).>

###### NOTE:

- For details concerning the operation procedure, refer to “PC application help for Subaru Select Monitor”.
- For details concerning DTCs, refer to the List of Diagnostic Trouble Code (DTC). <Ref. to LAN(diag)-31, List of Diagnostic Trouble Code (DTC).>

##### 2. READ CURRENT DATA

- 1) Select {Each System Check} in «Main Menu» display screen.
  - 2) On the «System Selection Menu» display screen, select the {Integ. unit mode}.
  - 3) On the «Integ. unit mode failure diag.» display screen, select the {Current Data Display & Save}.
  - 4) Using the scroll key, scroll the display screen up or down until the desired data is shown.
- A support list contains both of analog and digital data, and they are shown in the following table.

## 3. DISPLAY OF CURRENT DATA

Items to be displayed	Unit of measure	Remarks	Index
BATT voltage (control)	10 — 15 V	Body integrated unit input value	Always
BATT voltage (BACKUP)	10 — 15 V	Body integrated unit input value	Always
IG power supply voltage	10 — 15 V	Body integrated unit input value	Ignition switch ON
ACC voltage	10 — 15 V	Body integrated unit input value	Ignition switch ACC
Illumination VR Voltage	0 — 5 V	Body integrated unit output value	Illumination volume input value
Illumi. output d-ratio	0 — 100%	Body integrated unit input value	Small light ON Illumination volume is other than bright.
ambient temp sensor V	0 — 5 V	Body integrated unit input value	Ignition switch ON
Ambient Temperature	-40 — 87.5°C	Body integrated unit output value	Ignition switch ON
Fuel level voltage	0 — 8 V	Body integrated unit input value	Ignition switch ON
Fuel level resistance	0 — 102.3 Ω	Body integrated unit input value	Ignition switch ON
key-lock solenoid V	6 — 12 V	Body integrated unit output value	Key warning switch ON, other than parking range Ignition ON
number of regist.	0 — 4	Number of keyless key registered	
Front Wheel Speed	km/h	CAN data input value	Reception from VDC module
VDC/ABS latest f-code	DTC display (Temporarily)	CAN data input value	It is normal when DTC is not been input even if this code is displayed. Reception from VDC
Blower Fan Steps	0 — 2 levels	CAN data input value	0: OFF, 1: Low, 2: 2 levels or more Reception from air conditioner CM
Fuel level resistance 2	0 — 102.3 Ω	CAN data output value	Reception from body integrated unit
Fuel consumption	cc/s	CAN data input value	Reception from ECM
Coolant Temp.	-40 — 130°C	CAN data input value	Reception from ECM
Vehicle longitudinal G	m/s <sup>2</sup>	CAN data input value	Reception from VDC module
SPORT Shift Stages	0 — 7 levels	CAN data input value	Manual mode operation information (0: Light OFF; 1 — 5: Gear display; 6: Fail; 7: ATF temperature High/Low) Reception from TCM
Shift Position	0 — 7 levels	CAN data input value	0: 1, 1: 2, 2: 3, 3: 4, 4: D, 5: N, 6: R, 7: P shift position (8 indicates no input) 8 is displayed in manual mode Reception from TCM
VDC/ABS condition	0 — 4	CAN data input value	Reception from VDC/ABS and transmission to combination meter
Destination	0 — 16	CAN data input value	Reception from combination meter
Touch SW	0 — 64	CAN data input value	Number is displayed when navigation monitor touch switch is operated. Reception from monitor (except MFD)
key-lock warning SW	ON/OFF	Body integrated unit input value	ON when ignition key inserted
Stop Light Switch	ON/OFF	Body integrated unit input value	ON when brake pedal is depressed
Front fog lamp SW input	ON/OFF	Body integrated unit input value	When front fog light switch is ON
TPMS input	ON/OFF	Body integrated unit input value	ON when TPMS registration completed
Door unlock SW input	ON/OFF	Body integrated unit input value	ON when door key cylinder turned to UNLOCK
Driver's door SW input	ON/OFF	Body integrated unit input value	ON when driver's door is open
P-door SW input	ON/OFF	Body integrated unit input value	ON when passenger's door is open
Rear right door SW input	ON/OFF	Body integrated unit input value	ON when rear right door is open
Rear left door SW input	ON/OFF	Body integrated unit input value	ON when rear left door is open

# Subaru Select Monitor

## LAN SYSTEM (DIAGNOSTICS)

Items to be displayed	Unit of measure	Remarks	Index
R Gate SW input	ON/OFF	Body integrated unit input value	ON when rear gate opened
Manual lock SW input	ON/OFF	Body integrated unit input value	Manual lock switch ON
Manual unlock SW input	ON/OFF	Body integrated unit input value	Manual unlock switch ON
Bright SW input	ON/OFF	Body integrated unit input value	ON when bright switch is ON Auto A/C excluded
Shift Button SW Input	ON/OFF	Body integrated unit input value	ON when shift lever lock button operated
Tiptronic Mode Switch	ON/OFF	Body integrated unit input value	SPORT shift mode ON
TIP UPSW input	ON/OFF	Body integrated unit input value	ON when SPORT shift ON and UP operation
TIP DOWN SW input	ON/OFF	Body integrated unit input value	ON when SPORT shift ON and DOWN operation
P SW	ON/OFF	Body integrated unit input value	ON when shift range is in parking Shift lever P switch signal
R wiper ON SW input	ON/OFF	Body integrated unit input value	Rear wiper switch ON
R wiper INT SW input	ON/OFF	Body integrated unit input value	Rear wiper switch (INT ON)
R washer SW input	ON/OFF	Body integrated unit input value	Rear washer switch ON
wiper deicer SW input	ON/OFF	Body integrated unit input value	Wiper deicer switch ON
Rear Defogger SW	ON/OFF	Body integrated unit input value	Rear defogger switch ON
Driver's Seat SW input	ON/OFF	Body integrated unit input value	Driver's seat buckle switch ON
P seatbelt SW input	ON/OFF	Body integrated unit input value	Passenger's seat occupied and buckle switch ON
Fr wiper input	ON/OFF	Body integrated unit input value	ON when front wiper is operating
Rr defogger output	ON/OFF	Body integrated unit output value	ON when rear defogger relay is operating
lock actuat. LOCK output	ON/OFF	Body integrated unit output value	ON when LOCK signal is output
All seat UNLOCK output	ON/OFF	Body integrated unit output value	ON when unlock signal is output
D-seat UNLOCK output	ON/OFF	Body integrated unit output value	ON when unlock signal is output
R gate/trunk UNLK output	ON/OFF	Body integrated unit output value	ON when rear gate unlock signal output
R wiper output	ON/OFF	Body integrated unit output value	ON when rear wiper motor is operating
Shift Lock Solenoid	ON/OFF	Body integrated unit output value	ON when shift lock solenoid is operating
Key locking output	ON/OFF	Body integrated unit output value	N/A
wiper deicer output	ON/OFF	Body integrated unit output value	ON when wiper deicer relay is operating
Starter cutting output	ON/OFF	Body integrated unit output value	ON when immobilizer is operating
Hazard Output	ON/OFF	Body integrated unit output value	ON when keyless answer-back signal is received or when hazard is operating
Keyless Buzzer Output	ON/OFF	Body integrated unit output value	ON when keyless lock/unlock signal is received
Horn Output	ON/OFF	Body integrated unit output value	ON when security warning is operating
Siren Output	ON/OFF	Body integrated unit output value	ON when siren equipped, customize setting enable, and security warning in operation
D-belt warning light O/P	ON/OFF	Body integrated unit output value	ON when ignition switch is turned to ON, and buckle switch is turned OFF

# Subaru Select Monitor

## LAN SYSTEM (DIAGNOSTICS)

Items to be displayed	Unit of measure	Remarks	Index
P-belt warning light O/P	ON/OFF	Body integrated unit output value	ON when ignition switch is turned to ON, occupant is seated, and buckle switch is turned OFF (KA model only)
Illumination lamp O/P	ON/OFF	Body integrated unit output value	ON when illumination is illuminated
Room lamp output	ON/OFF	Body integrated unit output value	ON when keyless lock/unlock signal is received (when key in switch connector is removed)
key illumi. lamp o/p	ON/OFF	Body integrated unit output value	ON when key illumination light is illuminated
Immobilizer lamp output	ON/OFF	Body integrated unit output value	ON when immobilizer pilot light blinks
Keyless operation 1	Regist./Normal	Body integrated unit input value	When keyless ID registration: Registration
Keyless operation 2	Deletion/Normal	Body integrated unit input value	N/A
CC Main Lamp	ON/OFF	CAN data input value	Cruise control switch ON Reception from ECM and transmission to combination meter
CC Set Lamp	ON/OFF	CAN data input value	ON when cruise control vehicle speed is set Reception from ECM and transmission to combination meter
SPORT Lamp	ON/OFF	CAN data input value	SPORT mode switch ON Reception from TCM and transmission to combination meter
SPORT Blink	Blink/OFF	CAN data input value	TCM malfunction signal reception ON Reception from TCM and transmission to combination meter
ATF Temperature Lamp	ON/OFF	CAN data input value	N/A
ATF Blink	Blink/OFF	CAN data input value	Blinks when there is an AT failure Reception from TCM and transmission to combination meter
Tire diameter abnormal 1	ON/OFF	CAN data input value	N/A
Tire diameter abnormal 2	Blink/OFF	CAN data input value	Blinks when the difference in rotation between front and rear wheels is 4% or more Reception from TCM and transmission to combination meter
Shift Up Indication	UP/OFF	Body integrated unit input value	ON when shift lever up-operation is possible
Shift Down Indication	DOWN/OFF	Body integrated unit input value	ON when shift lever down-operation is possible
SPORT Shift (buzzer 1)	ON/OFF	CAN data input value	ON while the shift change prohibited warning buzzer is operating Reception from TCM and transmission to combination meter
SPORT Shift (buzzer 2)	ON/OFF	CAN data input value	ON when the ATF high temperature warning buzzer is operating Reception from TCM and transmission to combination meter
ABS/VDC Judging	ABS/VDC	CAN data input value	Transmission from vehicle dynamics control (VDC) to high speed control module
Small Light SW	ON/OFF	Body integrated unit input value	ON when small light is illuminated
DRL	ON/OFF	Body integrated unit input value	ON when DRL illuminates

# Subaru Select Monitor

## LAN SYSTEM (DIAGNOSTICS)

Items to be displayed	Unit of measure	Remarks	Index
Rr Defogger SW	ON/OFF	Body integrated unit output value	Rear defogger switch ON
Australia Judging Flag	Australia/Others	Body integrated unit output value	For U.S. models, set to Others.
Large diameter tire	large Tire/Others	Body integrated unit output value	Large tire when the standard tire is 18 in Reception from combination meter
Number of cylinders	4 Cylinder/6 Cylinder	CAN data input value	6 Cylinder
Cam shaft specification	SOHC/DOHC	CAN data input value	DOHC
Turbo	Turbo/Non-turbo	CAN data input value	OFF
E/G displacement (2.5L)	2.5 L/ OFF	CAN data input value	OFF
E/G displacement (3.0L)	3.0 L/ OFF	CAN data input value	OFF
AT Vehicle ID Signal	ON/OFF	CAN data input value	AT
Blower fan information	ON/OFF	CAN data input value	ON when blower fan is operating Reception from ECM
Keyless buzzer	ON/OFF	Body integrated unit output value	ON when keyless answer-back buzzer is operating (when key in switch connector is removed)
Bright Request	ON/OFF	CAN data input value	ON when small light is ON and illumination switch or BRIGHT switch is operating
Center display failure	OK/NG	CAN data input value	NG when there is a center display failure Reception from center display (NAVI monitor and MFD)
NAVI Failure	OK/NG	CAN data input value	NG when there is a navigation system failure Reception from center display
IE Bus failure	Can not use	CAN data input value	Reception from center display
Auto A/C failure	OK/NG	CAN data input value	NG when there is a failure in auto air conditioning system Reception from auto A/C module
EBD Warning Light	ON/OFF	CAN data input value	ON when EBD warning light is illuminated Reception from VDC/ABS and transmission to combination meter
ABS Warning Light	ON/OFF	CAN data input value	ON when ABS warning light is illuminated Reception from VDC/ABS and transmission to combination meter
VDC OFF flag	ON/OFF	CAN data input value	Vehicle dynamics control OFF SW is ON Reception from VDC/ABS and transmission to combination meter
VDC/ABS OK B	OK/NG	CAN data input value	NG when there is an error in VDC/ABS system Reception from VDC/ABS
Off delay time	OFF, Short, Normal, Long	Body integrated unit setting items	Customize setting
Auto lock time	OFF, 20, 30, 40, 50, 60 seconds	Body integrated unit setting items	Customize setting
Outside Temp. Offset	0 — 8	Body integrated unit setting items	Customize setting
Rr defogger op. mode	Continuous/Normal	Body integrated unit setting items	Customize setting
Wiper deicer op. mode	Continuous/Normal	Body integrated unit setting items	Customize setting



# Subaru Select Monitor

LAN SYSTEM (DIAGNOSTICS)

Items to be displayed	Unit of measure	Remarks	Index
Security Alarm Setup	ON/OFF	Body integrated unit setting items	Customize setting
Impact Sensor Setup	ON/OFF	Body integrated unit setting items	Customize setting
Alarm delay setup	ON/OFF	Body integrated unit setting items	Customize setting
Lockout prevention	ON/OFF	Body integrated unit setting items	Customize setting
Impact sensor	ON/OFF	Body integrated unit setting items	Customize setting
Answer-back buzzer setup	ON/OFF	Body integrated unit setting items	Customize setting
Hazard answer-back setup	ON/OFF	Body integrated unit setting items	Customize setting
Automatic locking setup	ON/OFF	Body integrated unit setting items	Customize setting
Ans.-back Buzzer	ON/OFF	Body integrated unit setting items	Customize setting
Auto locking	ON/OFF	Body integrated unit setting items	Customize setting
Select unlock switch	Selection/ALL	Body integrated unit setting items	Customize setting
Door open warning	ON/OFF	Body integrated unit setting items	Customize setting
Map Light Setting	ON/OFF	Body integrated unit setting items	Customize setting
Belt Warning Switch	ON/OFF	Body integrated unit setting items	Customize setting
Monitoring History Clear	ON/OFF	Body integrated unit setting items	Customize setting
A/C ECM setting	ON/OFF	Body integrated unit setting items	Customize setting
wiperdeicer	ON/OFF	Body integrated unit setting items	Customize setting
Rear fog light setting	ON/OFF	Body integrated unit setting items	Customize setting
Factory or Market setting	Market/Factory	Body integrated unit setting items	Customize setting

**NOTE:**

For details concerning the operation procedure, refer to “PC application help for Subaru Select Monitor”.

# Subaru Select Monitor

## LAN SYSTEM (DIAGNOSTICS)

### 4. CONFIRMATION OF CURRENT SETTING

- 1) On «Main Menu» display, select {Each System Check}.
- 2) On «System Selection Menu» display, select {Integ. unit mode}.
- 3) On «Integ. unit mode failure diag.» display, select {Current Data Display & Save}.
- 4) On the «Current Data Display & Save» display screen, select the {Data Display}.
- 5) Using the scroll key, scroll the display screen up or down until the desired data is shown.
- 6) Display the following item and record the settings.

Required items for new registration (Except for system not equipped)

Item	Item to confirm				Remarks
	1	2	3	4	
# of reg key	1	2	3	4	Registered ID type
Off delay time	OFF	Long	Normal	Short	Setting for lighting off time
Auto lock time	60, 50, 40, 30, 20		OFF		Not applicable for U.S. models (Unit: second)
Rr defogger op. mode	Normal		Continuous		Normal: OFF after 15-minute operation Continuous: From switch ON to OFF
Wiper deicer op. mode	Normal		Continuous		Normal: OFF after 15-minute operation Continuous: Repeat ON (for 15 minutes) and OFF (for 2 minutes) from switch ON to OFF.
Security Alarm Setup	ON		OFF		ON: Security alarm operable OFF: Security alarm not in operation
Impact Sensor Setup	ON		OFF		ON: Impact sensor operable OFF: Impact sensor not in operation For vehicles without impact sensor, set to OFF.
Alarm delay setup	ON		OFF		ON: Observation mode starts after a certain period of time from keyless lock signal reception. OFF: Observation mode starts right after keyless lock signal reception.
Lockout prevention	ON		OFF		Not applicable for U.S. models
Impact sensor	Support		No support		Support: Impact sensor equipped No support: Impact sensor not equipped For vehicles without sensor, set to No support.
Siren setting	Support		No support		Not applicable for U.S. models
Answer-back buzzer setup	ON		OFF		ON: Answer-back buzzer operable OFF: Answer-back buzzer not in operation
Hazard answer-back setup	ON		OFF		ON: Hazard answer-back buzzer operable OFF: Hazard answer-back buzzer not in operation
Automatic locking setup	ON		OFF		Not applicable for U.S. models
Ans.-back Buzzer	Support		No support		Support: Vehicles with answer-back buzzer No support: Vehicles without answer-back buzzer
Auto locking	Support		No support		Not applicable for U.S. models (set to No support)
Passive Alarm	ON		OFF		
Door open warning (battery run-out prevention)	Support		No support		Support: If detecting door open for 10 minutes, door interlocked room light is turned to off. No support: Room light continues to illuminate until the door is shut properly.
Dome Light Alarm Setting	Support		No support		Support: Room light continues to illuminate while the alarm is operated. No support: Room light illuminates then goes off regardless of alarm operation.
Map Light Setting	Support		No support		Support: Map light illuminates in accordance with the door interlocked room light. No support: Does not illuminate in accordance with the door interlocked room light.
Belt Warning Switch	ON		OFF		ON: Normal use status OFF: Stops the belt warning buzzer beep and warning light illumination.

Item	Item to confirm		Remarks
A/C ECM setting	Support	No support	Models with auto A/C (set to Support.)
wiperdeicer	Support	No support	Support: Vehicles with wiper deicer No support: Vehicles without wiper deicer
Rear fog light setting	Support	No support	Not applicable for U.S. models (set to No support)
Factory initial setting	Factory	Market	Do not change to Factory mode. For normal use, set to Market.

## 5. REGISTRATION BODY INTEGRATED UNIT (EQUIPMENT SETTING)

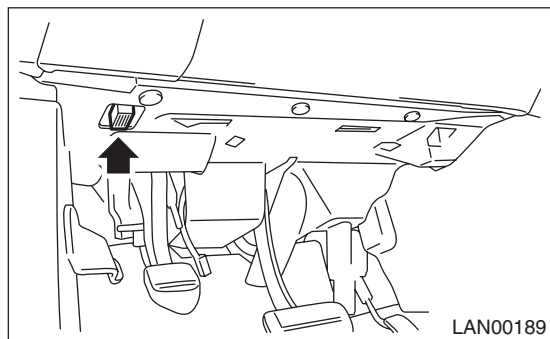
### CAUTION:

Body integrated unit is core of LAN system, and also can select the function of all vehicle system control. It is possible to control the original functions of vehicle when registrations of body integrated unit and function setting are corresponded to vehicle equipment.

If registrations and function setting are different from vehicle equipment, vehicle system does not operate normally and diagnosis cannot be performed correctly. Pay attention to following item.

- Be sure to correspond registrations and function settings to vehicle equipment.
- Do not change the settings of vehicle improperly.
- Confirm key illumination does not blink or “Factory or Market setting” of body integrated unit registrations is “Market”. If “Factory initial setting” is set to “Factory,” key illumination blinks when ignition key is ON, to notify that the settings are unconfirmed.
- Key illumination does not blink with ignition switch turned to ON and go off with door closed.
- Be sure to register immobilizer if body integrated unit is replaced with a new part. (models with immobilizer)
- Make a registration of immobilizer when the parts related to immobilizer have been replaced. Refer to the “PC application help for Subaru Select Monitor”.
- Do not install or register an immobilizer related module of other registered vehicles in order to diagnose failures or inspect functions.

- 1) Turn the ignition switch to OFF.
- 2) Connect the Subaru Select Monitor to data link connector.



- 3) Turn the ignition switch to ON and run the Subaru Select Monitor.
- 4) On «Main Menu» display, select {Each System Check}.
- 5) On «Each System Check» display, select {Integ. unit mode} and then select the «ECM customizing».

# Subaru Select Monitor

## LAN SYSTEM (DIAGNOSTICS)

6) Change the setting with UP/DOWN key and select the [OK].

Also, it is possible to set by changing to factory mode and pressing the wiper deicer switch, rear defogger switch, rear fog light switch and door lock switch.

- List of body integrated unit registration item

### NOTE:

Setting is different depending on the grade and equipment of the vehicle.

Data	Initial setting	Registration	Remarks
A/C ECM setting	OFF	ON	Illumination control does not operate if A/C ECM setting is set to "OFF" in case of model with auto A/C.
		OFF	If A/C ECM setting is set to "ON" in case of model without auto A/C, illumination change to night illumination and it is difficult to be recognized.
wiperdeicer	OFF	ON	ON signal does not output with operation of wiper deicer switch if wiper deicer is set to "OFF" in models with a wiper deicer.
		OFF	
Rear fog light setting	OFF	ON	Set to "OFF".
		OFF	
Factory or Market setting (Reset of body integrated unit)	Factory	Factory (Reset)	If Factory or Market setting is set to "Factory", registrations of items above is changed to "OFF". After changing settings, be sure to set to "Market".
		Market (Confirmed)	

### CAUTION:

- **To perform normal operation of vehicle and diagnosis, above settings must match the actual vehicle equipment.**
- **When body integrated unit is a new part or "Factory" mode, key illumination blinks to show equipment settings have not been completed.**
- **Be sure not to change Factory or Market setting except when installing a new body integrated unit.**

### NOTE:

"Factory" mode:

- Body integrated unit has not been set yet. It can be recognized by key illumination blinking with ignition switch turned to ON.
- All replacement body integrated units are set to "Factory" mode. When replacing a body integrated unit, be sure to perform the registration operation.

"Market" mode:

Each settings have been set. It can be recognized by key illumination coming on in concocting with room light and going off with ignition switch turned to ON.

7) Perform the Factory or Market setting. On the «ECM customizing» display screen of Subaru Select Monitor, select the {Factory or Market setting}.

8) Change the mode from Factory to Market.

9) Register the immobilizer key.

10) Perform procedures according to the "PC application help for Subaru Select Monitor".

11) After registering the key, perform feature settings (unit customization). <Ref. to LAN(diag)-21, FUNCTION SETTING (ECM CUSTOMIZING), OPERATION, Subaru Select Monitor.>

## 6. CLEAR MEMORY MODE

- 1) On «Main Menu» display, select {Each System Check}.
- 2) On «System Selection Menu» display, select {Integ. unit mode}.
- 3) Select the [OK] after the information of body integrated unit type is displayed.
- 4) On «Integ. unit mode failure diag» display, select {Clear Memory}.

Display	Contents to be displayed
Clear Memory ?	Clear function of DTC and freeze frame data

- 5) When “Done” is shown on the display screen, turn the ignition switch to OFF.

**NOTE:**

For details concerning the operation procedure, refer to “PC application help for Subaru Select Monitor”.

## 7. FUNCTION SETTING (ECM CUSTOMIZING)

- 1) On «Main Menu» display, select {Each System Check}.
- 2) On «System Selection Menu» display, select {Integ. unit mode}.
- 3) On «Integ. unit mode failure diag» display, select {Unit Customizing}.
- 4) Change the setting.
  - List of function setting item (ECM customizing)

**NOTE:**

Even if items that are not equipped are changed, contents of the change will not be confirmed, and will not operate.

Data	Initial setting value	Customize setting	Remarks	Destination Specifications	
Off delay time	Normal		Delay time below can be selected by setting.		
			After door closed		After keyless unlock
		OFF	0 seconds		0 seconds
		Short	12 seconds		35 seconds
		Normal	22 seconds		
	Long	32 seconds			
Auto lock time	30 seconds	0 — 60 sec.	Workable when Auto locking is set to “ON” and Automatic locking setup is “ON”. Time can be changed by 10 seconds: 0 (OFF) — 60 (maximum).	Not applicable for U.S. models	
Rr defogger op. mode	15 min	15 min	Automatically stops in 15 minutes after switch is turned to ON.		
		Continuous	Repeats active condition for 15 minutes and inactive condition for 2 minutes until switch is turned to OFF.		
Wiper deicer op. mode	15 min	15 min	Automatically stops in 15 minutes after switch is turned to ON.		
		Continuous	Repeats active condition for 15 minutes and inactive condition for 2 minutes until switch is turned to OFF.		
Security Alarm Setup	ON	ON	Security alarm (hazard, horn or siren) in active condition		
		OFF	Security alarm in inactive condition		
Impact Sensor Setup	OFF	ON	Workable when impact sensor setup is set to “ON” Impact sensor function becomes activated.		
		OFF	Impact sensor in inactive condition (Set to “OFF” in models without sensors.)		
Alarm delay setup	ON		After the keyless lock operation, the alarm monitor starts after the following delay time has passed.		
		ON	Delay time is 30 seconds.		
		OFF	Delay time is 0 seconds.		

# Subaru Select Monitor

## LAN SYSTEM (DIAGNOSTICS)

Data	Initial setting value	Customize setting	Remarks	Destination Specifications
Lockout prevention	ON	ON	Lockout prevention in active condition. (The function does not operate if safety knob is locked by hand.)	
		OFF	Lockout prevention in inactive condition	
Impact sensor	OFF	ON	Vehicle is controlled in impact sensor equipped mode. (Make sure to set to "OFF" for models without the impact sensor. When "ON", hazard, horn or siren become activated by keyless lock (alarm monitor start).)	When optional impact sensor is installed, set to "ON".
		OFF	Vehicle is controlled in no impact sensor mode.	
Siren setting	OFF	ON	When security alarm is in operation, siren is operating. (Make sure to set to "OFF" for models without siren. If set to "ON", horn does not operate when security alarm in operation.)	Not applicable for U.S. models
		OFF	When security alarm is in operation, horn is operating.	
Answer-back buzzer setup	ON	ON	Workable when answer-back buzzer setup is set to "ON". When lock/unlock is selected by keyless entry system operation, buzzer operates.	
		OFF	When lock/unlock is selected by keyless entry system operation, buzzer does not operate.	
Hazard answer-back setup	ON	ON	Workable when hazard answer-back setup is set to "ON" When lock/unlock is selected by keyless entry system operation, buzzer operates.	
		OFF	When lock/unlock is selected by keyless entry system operation, buzzer does not operate.	
Automatic locking setup	ON	ON	Workable when automatic locking is set to "ON". Automatic locking operates.	Not applicable for U.S. models
		OFF	Automatic locking does not operate.	
Ans.-back Buzzer	ON	ON	Vehicle is controlled in answer-back buzzer equipped mode.	Not applicable for U.S. models
		OFF	Vehicle is controlled in answer-back buzzer non-equipped mode. (Make sure to set to "OFF" for models without answer-back buzzer.)	
Auto locking	ON	ON	Vehicle is controlled in auto locking equipped mode.	Not applicable for U.S. models
		OFF	Vehicle is controlled in auto locking non-equipped mode. (Make sure to set to "OFF" for models without auto locking.)	
Initial keyless setting	—	—	—	
		Execution	Settings of keyless entry system are initialized. (Time of auto locking: 30 sec, answer-back buzzer setting: ON, hazard answer-back setting: ON, auto locking setting: ON, answer-back buzzer setting: ON)	
Initial button setting	—	—	—	(Off delay time: Normal, rear defogger operation mode: 15 min, wiper deicer operation mode: 15 min, lockout prevention: ON)
		Execution	Settings of each function are initialized.	
Passive Alarm	OFF	ON	Enable when passive alarm is set to "ON".	
		OFF		
Door open warning (battery run-out prevention)	OFF	ON	If detecting door open for 10 minutes, room light, key ring illumination and door warning light that are related to doors are turned off to prevent battery run-out.	
		OFF	Room light, key illumination and door warning light are not turned off.	

# Subaru Select Monitor

LAN SYSTEM (DIAGNOSTICS)

Data	Initial setting value	Customize setting	Remarks	Destination Specifications
Dome Light Alarm Setting	OFF	ON	The room light lights by being interlocked with the activation of the alarm.	
		OFF	Room light does not illuminate regardless of alarm operation.	

5) After setting, make sure that vehicle equipment is same as the setting changed in the {Current Data Display & Save}.

## CAUTION:

- **The above settings must match the actual vehicle equipment for proper operation.**
- **Do not change settings except for setting above while setting the functions.**
- **Be sure not to change Factory or Market setting except when installing a new body integrated unit.**

## NOTE:

For details concerning the operation procedure, refer to "PC application help for Subaru Select Monitor".

## 8. FUNCTION CHECK

In order to check the body integrated unit function, inspect the body integrated unit and actuator using Subaru Select Monitor without operating switches.

- 1) On «Main Menu» display, select {Each System Check}.
- 2) On «System Selection Menu» display, select {Integ. unit mode}.
- 3) On «Integ. unit mode failure diag» display, select {Function check}.
- 4) Select the item to be operated on the «Function check» display screen and select the [OK].
- 5) Pressing [OK] starts, [NO] cancels the operation and [OK] returns to the System Operation Check Mode display screen.

## NOTE:

If not equipped (based on area or condition), process will not go on.

# Subaru Select Monitor

LAN SYSTEM (DIAGNOSTICS)

## B: INSPECTION

### 1. COMMUNICATION FOR INITIALIZING IMPOSSIBLE

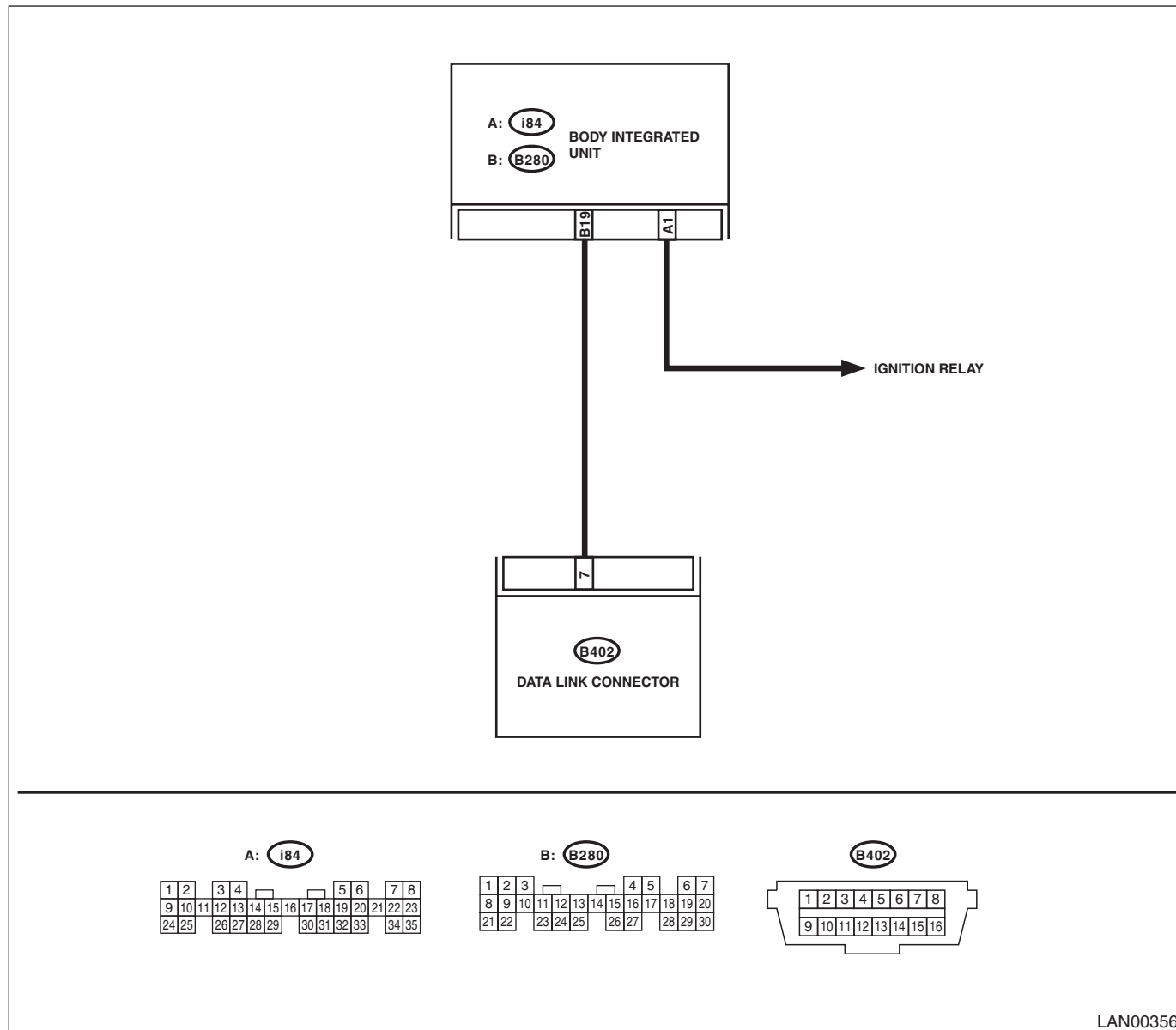
#### DETECTING CONDITION:

Defective harness connector

#### TROUBLE SYMPTOM:

Not communicable with Subaru Select Monitor.

#### WIRING DIAGRAM:



LAN00356

Step	Check	Yes	No
1 <b>CHECK IGNITION SWITCH.</b>	Is the ignition switch ON?	Go to step 2.	Turn the ignition switch to ON, and select Integ. unit mode using Subaru Select Monitor.
2 <b>CHECK BATTERY.</b> 1) Turn the ignition switch to OFF. 2) Measure the battery voltage.	Is the voltage 11 V or more?	Go to step 3.	Charge or replace the battery.



# Subaru Select Monitor

LAN SYSTEM (DIAGNOSTICS)

Step	Check	Yes	No	
<b>3</b>	<b>CHECK BATTERY TERMINAL.</b>	Is there poor contact at battery terminal?	Repair or tighten the battery terminal.	Go to step 4.
<b>4</b>	<b>CHECK COMMUNICATION OF SUBARU SELECT MONITOR.</b> 1) Turn the ignition switch to ON. 2) Using the Subaru Select Monitor, check whether communication to other systems can be executed normally.	Is the system name displayed?	Go to step 7.	Go to step 5.
<b>5</b>	<b>CHECK COMMUNICATION OF SUBARU SELECT MONITOR.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the body integrated unit connector. 3) Turn the ignition switch to ON. 4) Check whether communication to other systems can be executed normally.	Is the system name displayed?	Go to step 7.	Go to step 6.
<b>6</b>	<b>CHECK HARNESS CONNECTOR BETWEEN EACH CONTROL MODULE AND SUBARU SELECT MONITOR.</b> 1) Turn the ignition switch to ON. 2) Disconnect the body integrated unit connector. 3) Measure the resistance between data link connector and chassis ground. <b>Connector &amp; terminal</b> <b>(B402) No. 7 — Chassis ground:</b>	Is the resistance 1 M $\Omega$ or more?	Go to step 7.	Repair the harness and connector between each control unit and Subaru Select Monitor.
<b>7</b>	<b>CHECK OUTPUT SIGNAL TO BODY INTEGRATED UNIT.</b> 1) Turn the ignition switch to ON. 2) Measure the voltage between body integrated unit and chassis ground. <b>Connector &amp; terminal</b> <b>(B402) No. 7 (+) — Chassis ground (-):</b>	Is the voltage less than 1 V?	Go to step 8.	Repair the harness and connector between each control unit and Subaru Select Monitor.
<b>8</b>	<b>CHECK HARNESS CONNECTOR BETWEEN BODY INTEGRATED UNIT AND DATA LINK CONNECTOR.</b> Measure the resistance between body integrated unit and data link connector. <b>Connector &amp; terminal</b> <b>(B402) No. 7 — (B280) No. 19:</b>	Is the resistance less than 1 $\Omega$ ?	Go to step 9.	Repair the harness and connector between body integrated unit and Subaru Select Monitor.
<b>9</b>	<b>CHECK INSTALLATION OF BODY INTEGRATED UNIT CONNECTOR.</b> Turn the ignition switch to OFF.	Is the body integrated unit connector inserted into body integrated unit until the clamp locks onto it?	Go to step 10.	Insert the body integrated unit connector into body integrated unit.
<b>10</b>	<b>CHECK POWER SUPPLY CIRCUIT.</b> 1) Turn the ignition switch to ON. 2) Measure the ignition voltage between body integrated unit connector and chassis ground. <b>Connector &amp; terminal</b> <b>(i84) No. 1 (+) — Chassis ground (-):</b>	Is the voltage 10 V or more?	Go to step 11.	Repair the open circuit of harness between body integrated unit and battery.

# Subaru Select Monitor

## LAN SYSTEM (DIAGNOSTICS)

Step	Check	Yes	No
<b>11</b> <b>CHECK HARNESS CONNECTOR BETWEEN BODY INTEGRATED UNIT AND CHASSIS GROUND.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connector from body integrated unit. 3) Measure the resistance of harness between the body integrated unit and chassis ground. <b>Connector &amp; terminal</b> <b>(B280) No. 19 — Chassis ground:</b>	Is the resistance 1 MΩ or more?	Go to step 12.	Repair the poor contact of harness between body integrated unit and ground.
<b>12</b> <b>CHECK POOR CONTACT OF CONNECTORS.</b>	Is there poor contact at control unit ground and Subaru Select Monitor?	Repair the poor contact of connector.	Replace the body integrated unit. <Ref. to SL-48, Body Integrated Unit.>

**CAUTION:**

**When replacing body integrated unit on the model with immobilizer system, refer to the “PC application help for Subaru Select Monitor”**

## 7. Read Diagnostic Trouble Code (DTC)

### A: OPERATION

For details concerning DTC reading procedure, refer to "Subaru Select Monitor". <Ref. to LAN(diag)-12, READ DIAGNOSTIC TROUBLE CODE (DTC), OPERATION, Subaru Select Monitor.>

### **8. Clear Memory Mode**

#### **A: OPERATION**

For details concerning DTC clear operation, refer to "Subaru Select Monitor". <Ref. to LAN(diag)-21, CLEAR MEMORY MODE, OPERATION, Subaru Select Monitor.>

## 9. Read Current Data

### A: OPERATION

- 1) On «Main Menu» display, select {Each System Check}.
- 2) On «System Selection Menu» display, select {Integ. unit mode}.
- 3) On «Integ. unit mode failure diag» display, select {Current Data Display & Save}.
- 4) On «Data Display Menu» display, select {Data Display}.
- 5) Using the scroll key, scroll the display screen up or down until the desired data is shown.  
<Ref. to LAN(diag)-13, DISPLAY OF CURRENT DATA, OPERATION, Subaru Select Monitor.>  
<Ref. to LAN(diag)-18, CONFIRMATION OF CURRENT SETTING, OPERATION, Subaru Select Monitor.>

### 10.Function Setting (Customize)

#### A: OPERATION

For detailed procedures of function setting (ECM customizing), refer to "Subaru Select Monitor".  
<Ref. to LAN(diag)-21, FUNCTION SETTING (ECM CUSTOMIZING), OPERATION, Subaru Select Monitor.>

# List of Diagnostic Trouble Code (DTC)

LAN SYSTEM (DIAGNOSTICS)

## 11. List of Diagnostic Trouble Code (DTC)

### A: LIST

DTC	Item	Content of diagnosis	Note
B1100	Integ. Unit System Error	Body integrated unit internal error	<Ref. to LAN(diag)-35, DTC B1100 INTEG. UNIT SYSTEM ERROR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
B1101	BATT P/Supply Malfunction Cont	<ul style="list-style-type: none"> <li>• Open or short in battery power supply control circuit</li> <li>• Voltage malfunction caused by poor contact</li> </ul>	<Ref. to LAN(diag)-36, DTC B1101 BATT P/SUPPLY MALFUNCTION CONT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
B1102	BATT P/Supply Malfunction Backup	Voltage malfunction caused by poor contact of battery power supply backup circuits	<Ref. to LAN(diag)-37, DTC B1102 BATT P/SUPPLY MALFUNCTION BACKUP, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
B1103	Ignition Power Failure	Voltage malfunction caused by poor contact of IGN power supply circuits	<Ref. to LAN(diag)-38, DTC B1103 IGNITION POWER FAILURE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
B1104	ACC Power Failure	Voltage malfunction caused by poor contact of ACC power supply circuits	<Ref. to LAN(diag)-39, DTC B1104 ACC POWER FAILURE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
B1105	Key Interlock Circuit Abnormal	Ground short of key interlock circuit	<Ref. to LAN(diag)-40, DTC B1105 KEY INTERLOCK CIRCUIT ABNORMAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
B1106	Shift Lock Circuit Failure	Open or short in shift lock circuit	<Ref. to LAN(diag)-42, DTC B1106 SHIFT LOCK CIRCUIT FAILURE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
U1201	CAN-HS Counter Abnormal	Communication is unstable because of high speed CAN communication error.	<Ref. to LAN(diag)-44, DTC U1201 CAN-HS COUNTER ABNORMAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
U1202	CAN-HS Bus Off	Integrated unit communication is shut down because of high speed CAN communication error.	<Ref. to LAN(diag)-48, DTC U1202 CAN-HS BUS OFF, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
U1211	CAN-HS ECM Data Abnormal	Error data is received from ECM.	<Ref. to LAN(diag)-51, DTC U1211 CAN-HS ECM DATA ABNORMAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
U1212	CAN-HS TCM Data Abnormal	Error data is received from TCM.	<Ref. to LAN(diag)-53, DTC U1212 CAN-HS TCM DATA ABNORMAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
U1213	CAN-HS VDC/ABS Data Abnormal	Error data is received from VDC/ABS module.	<Ref. to LAN(diag)-55, DTC U1213 CAN-HS VDC/ABS DATA ABNORMAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
U1221	CAN-HS ECM No-Receive Data	Data does not arrive from ECM.	<Ref. to LAN(diag)-57, DTC U1221 CAN-HS ECM NO-RECEIVE DATA, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
U1222	CAN-HS TCM No-Receive Data	Data does not arrive from TCM.	<Ref. to LAN(diag)-60, DTC U1222 CAN-HS TCM NO-RECEIVE DATA, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
U1223	CAN-HS VDC/ABS No-Receive Data	Data does not arrive from VDC/ABS CM.	<Ref. to LAN(diag)-62, DTC U1223 CAN-HS VDC/ABS NO-RECEIVE DATA, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
U1300	CAN-LS Malfunction	Low speed CAN circuit is open or shorted.	<Ref. to LAN(diag)-64, DTC U1300 CAN-LS MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

## List of Diagnostic Trouble Code (DTC)

### LAN SYSTEM (DIAGNOSTICS)

DTC	Item	Content of diagnosis	Note
U1301	CAN-LS Counter Abnormal	Communication is unstable because of low speed CAN communication error.	<Ref. to LAN(diag)-67, DTC U1301 CAN-LS COUNTER ABNORMAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
U1302	CAN-LS Bus Off	Integrated unit communication is shut down because of low speed CAN communication error.	<Ref. to LAN(diag)-70, DTC U1302 CAN-LS BUS OFF, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
U1311	CAN-LS Meter Unit Data Abnormal	Error data is received from meter.	<Ref. to LAN(diag)-73, DTC U1311 CAN-LS METER UNIT DATA ABNORMAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
U1321	CAN-LS Meter No-Receive Data	Data does not arrive from meter.	<Ref. to LAN(diag)-75, DTC U1321 CAN-LS METER NO-RECEIVE DATA, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
B1401	M Collation NG	Malfunction related immobilizer	<Ref. to IM(diag)-14, List of Diagnostic Trouble Code (DTC).>
B1402	Immobilizer Key Collation NG	Malfunction related immobilizer	<Ref. to IM(diag)-14, List of Diagnostic Trouble Code (DTC).>
B1403	E/G Request NG	Malfunction related immobilizer	<Ref. to IM(diag)-14, List of Diagnostic Trouble Code (DTC).>
B1500	Keyless UART Com. Malfunction	Open or short circuit in keyless UART circuit	<Ref. to LAN(diag)-77, DTC B1500 KEYLESS UART COM. MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>



# List of Diagnostic Trouble Code (DTC)

LAN SYSTEM (DIAGNOSTICS)

## 1. DTC TABLE

### NOTE:

When more than two DTC codes are recorded, referring to their combination will make it easy to identify the possible cause. Refer to the list for typical examples.

DTC to Check	Diagnostic Code that was displayed.					Probable cause
	Body integrated unit	ECM	TCM	VDC/ABS CM	Combination meter display	
B1100 <Ref. to LAN(diag)-35, DTC B1100 INTEG. UNIT SYSTEM ERROR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	B1100	—	—	—	Er IU	There could be a problem in the body integrated unit.
B1101 <Ref. to LAN(diag)-36, DTC B1101 BATT P/SUPPLY MALFUNCTION CONT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	B1101	—	—	—	Er IU	There is a possible drop in power supply voltage (battery or generator failure).
B1102 <Ref. to LAN(diag)-37, DTC B1102 BATT P/SUPPLY MALFUNCTION BACKUP, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	B1102	—	—	—	Er IU	
B1103 <Ref. to LAN(diag)-38, DTC B1103 IGNITION POWER FAILURE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	B1103	—	—	—	Er IU	
B1104 <Ref. to LAN(diag)-39, DTC B1104 ACC POWER FAILURE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	B1104	—	—	—	Er IU	
U1221 <Ref. to LAN(diag)-57, DTC U1221 CAN-HS ECM NO-RECEIVE DATA, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	U1221	—	P1718	C0047	Er HC	It is possible that the ECM is faulty.
U1222 <Ref. to LAN(diag)-60, DTC U1222 CAN-HS TCM NO-RECEIVE DATA, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	U1222	U0101	—	C0047	Er HC	It's possible that there is an internal problem in the TCM, and a open circuit in the harness.

## List of Diagnostic Trouble Code (DTC)

### LAN SYSTEM (DIAGNOSTICS)

DTC to Check	Diagnostic Code that was displayed.					Probable cause
	Body integrated unit	ECM	TCM	VDC/ABS CM	Combination meter display	
U1223 <Ref. to LAN(diag)-62, DTC U1223 CAN-HS VDC/ABS NO-RECEIVE DATA, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	U1223	U0122	P1718	—	Er HC	It is possible that the VDC/ABS CM is faulty.
U1321 <Ref. to LAN(diag)-75, DTC U1321 CAN-LS METER NO-RECEIVE DATA, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	U1321	—	—	—	—	It is possible that the combination meter is faulty.
B1500 <Ref. to LAN(diag)-77, DTC B1500 KEYLESS UART COM. MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	B1500	—	—	—	—	It is possible that the keyless entry module is faulty.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

LAN SYSTEM (DIAGNOSTICS)

## 12. Diagnostic Procedure with Diagnostic Trouble Code (DTC)

### A: DTC B1100 INTEG. UNIT SYSTEM ERROR

#### DTC DETECTING CONDITION:

System error in body integrated unit

#### TROUBLE SYMPTOM:

LAN communication or immobilizer function may not be executed normally.

	Step	Check	Yes	No
1	<b>CHECK DTC.</b> Check DTC indicated by body integrated unit. <Ref. to LAN(diag)-27, Read Diagnostic Trouble Code (DTC).>	Is the DTC B1100 displayed current malfunction?	Go to step 2.	Temporary EEPROM access error occurred.
2	<b>CHECK CONNECTOR.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the body integrated unit connector. 3) Connect the disconnected connectors. 4) Turn the ignition switch to ON. 5) Read the DTC of body integrated unit using Subaru Select Monitor.	Is the DTC B1100 displayed current malfunction?	Replace the body integrated unit. <Ref. to SL-48, Body Integrated Unit.>	Temporary EEPROM access error occurred.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

LAN SYSTEM (DIAGNOSTICS)

## B: DTC B1101 BATT P/SUPPLY MALFUNCTION CONT

### DTC DETECTING CONDITION:

- Battery power supply circuit is open or shorted.
- Battery voltage is too high or too low.

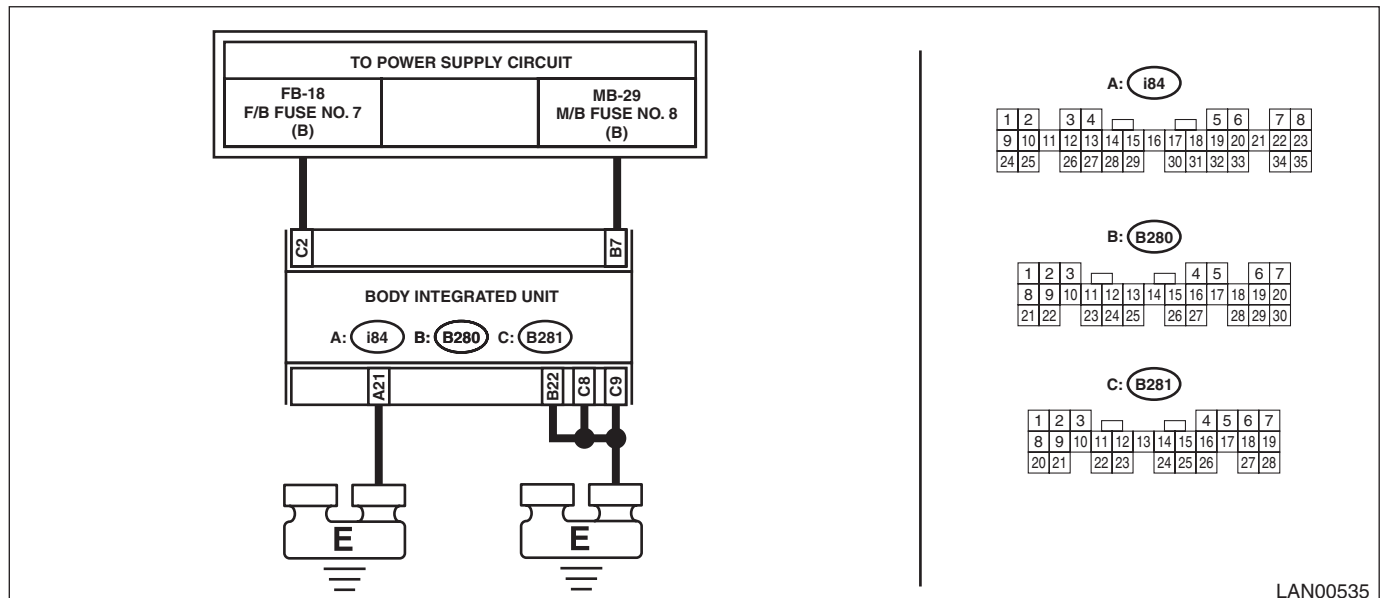
### TROUBLE SYMPTOM:

Each function stops operation.

### NOTE:

When B1102 BATT p/supply malfunction backup is output at the same time, all the function of body integrated unit may not operate.

### WIRING DIAGRAM:



LAN00535

Step	Check	Yes	No
1	<b>CHECK DTC.</b> Read the DTC of body integrated unit using Subaru Select Monitor. <Ref. to LAN(diag)-27, Read Diagnostic Trouble Code (DTC).>	Go to step 2.	Go to step 5.
2	<b>CHECK DTC.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connector from body integrated unit and reconnect. 3) Wait approx. 2 minutes. 4) Turn the ignition switch to ON. 5) Read the DTC of body integrated unit using Subaru Select Monitor.	Go to step 3.	Go to step 5.
3	<b>CHECK FUSE.</b> 1) Turn the ignition switch to OFF. 2) Inspect the fuse.	Go to step 4.	Replace the defective fuse.
4	<b>CHECK HARNESS.</b> 1) Disconnect the body integrated unit connector (B281). 2) Measure the voltage between body integrated unit connector and chassis ground using tester.  <b>Connector &amp; terminal</b> <b>(B281) No. 2 (+) — Chassis ground (-):</b>	Replace the body integrated unit. <Ref. to SL-48, Body Integrated Unit.>	Repair or replace the open or shorted circuit between body integrated unit and fuse.
5	<b>CHECK CONNECTOR.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the body integrated unit connector (B281).	Repair or replace the poor contact of connector.	A temporary change of voltage occurred.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

LAN SYSTEM (DIAGNOSTICS)

## C: DTC B1102 BATT P/SUPPLY MALFUNCTION BACKUP

### DTC DETECTING CONDITION:

Back-up power supply circuit input voltage is too high or too low.

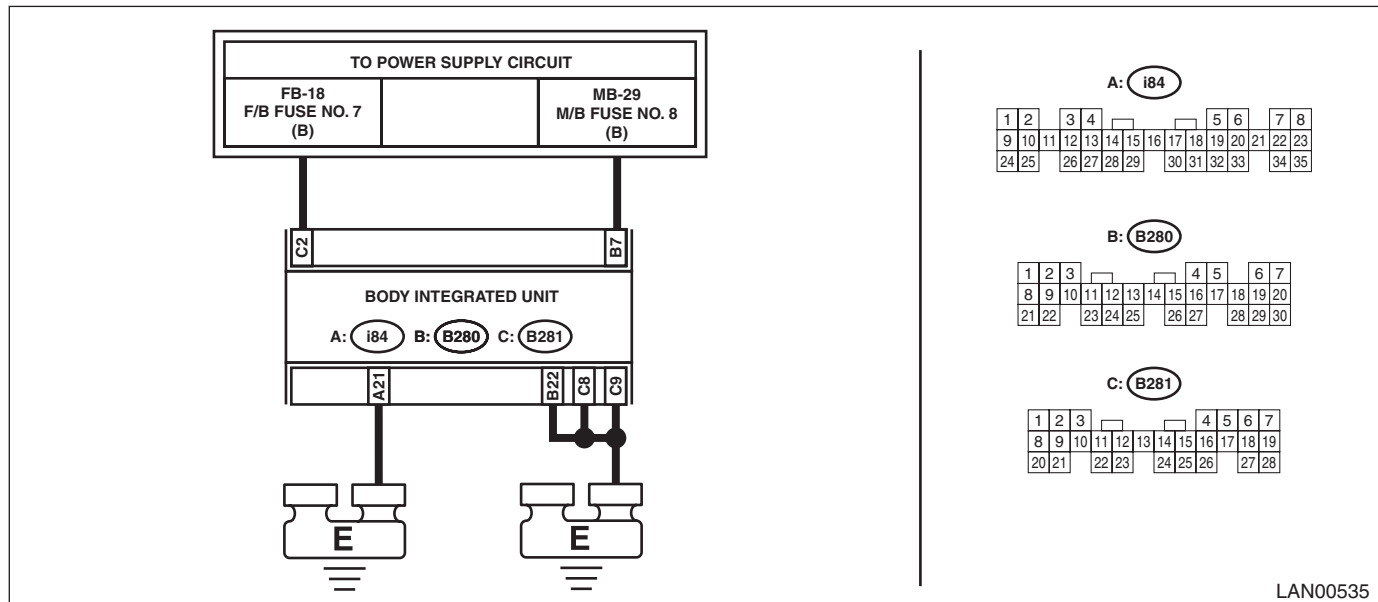
### TROUBLE SYMPTOM:

No influence.

### NOTE:

When B1101 BATT p/supply malfunction cont are output at the same time, all function of body integrated unit may not operate.

### WIRING DIAGRAM:



Step	Check	Yes	No
1	<b>CHECK DTC.</b> Read the DTC of body integrated unit using Subaru Select Monitor. <Ref. to LAN(diag)-27, Read Diagnostic Trouble Code (DTC).>	Go to step 2.	Go to step 5.
2	<b>CHECK DTC.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connector from body integrated unit and reconnect. 3) Wait approx. 2 minutes. 4) Turn the ignition switch to ON. 5) Read the DTC of body integrated unit using Subaru Select Monitor.	Go to step 3.	Go to step 5.
3	<b>CHECK FUSE.</b> 1) Turn the ignition switch to OFF. 2) Inspect the fuse.	Go to step 4.	Replace the defective fuse.
4	<b>CHECK HARNESS.</b> 1) Disconnect the body integrated unit connector (B280). 2) Measure the voltage between body integrated unit connector and chassis ground using tester. <b>Connector &amp; terminal (B280) No. 7 (+) — Chassis ground (-):</b>	Replace the body integrated unit. <Ref. to SL-48, Body Integrated Unit.>	Repair or replace the open or shorted circuit between body integrated unit and fuse.
5	<b>CHECK CONNECTOR.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the body integrated unit connector (B280).	Repair or replace the poor contact of connector.	A temporary change of voltage occurred.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

LAN SYSTEM (DIAGNOSTICS)

## D: DTC B1103 IGNITION POWER FAILURE

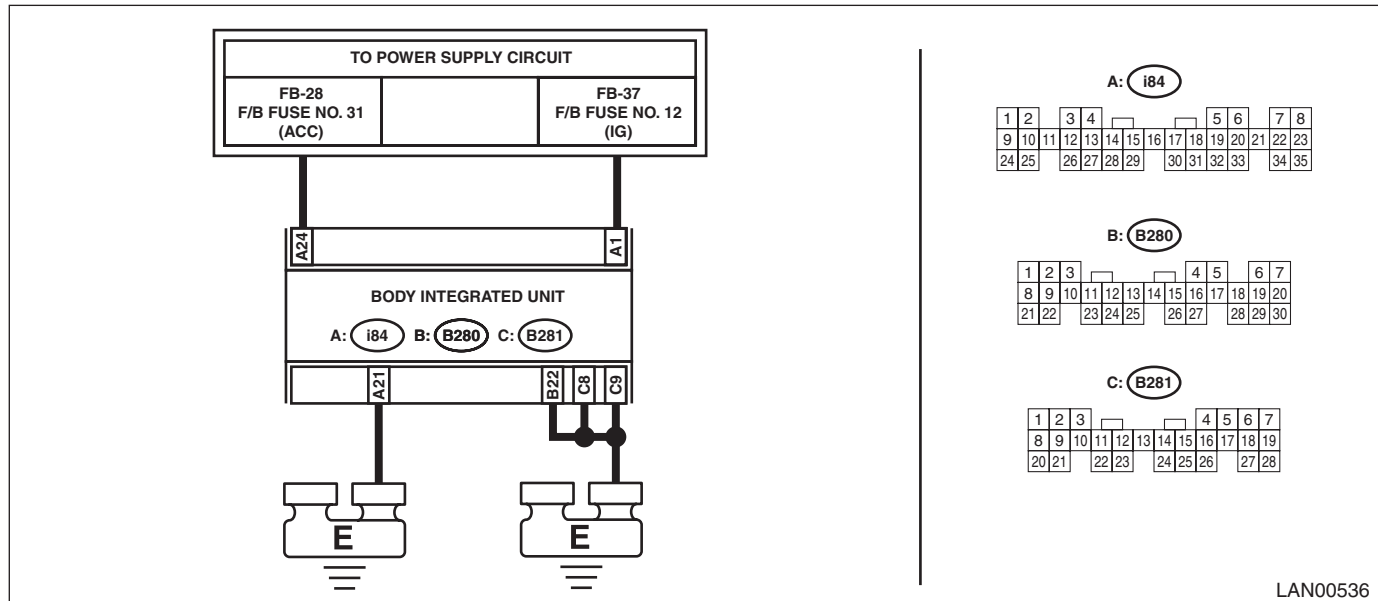
### DTC DETECTING CONDITION:

IGN power supply circuit input voltage is too high or too low.

### TROUBLE SYMPTOM:

Error related to LAN system will not be detected.

### WIRING DIAGRAM:



Step	Check	Yes	No	
1	<b>CHECK DTC.</b> Read the DTC of body integrated unit using Subaru Select Monitor. <Ref. to LAN(diag)-27, Read Diagnostic Trouble Code (DTC).>	Is B1103 a current malfunction?	Go to step 2.	Go to step 5.
2	<b>CHECK DTC.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connector from body integrated unit and reconnect. 3) Turn the ignition switch to ON. 4) Wait approx. 2 minutes. 5) Read the DTC of body integrated unit using Subaru Select Monitor.	Is B1103 a current malfunction?	Go to step 3.	Go to step 5.
3	<b>CHECK FUSE.</b> 1) Turn the ignition switch to OFF. 2) Inspect the fuse.	Is the fuse OK?	Go to step 4.	Replace the defective fuse.
4	<b>CHECK HARNESS.</b> 1) Disconnect the body integrated unit connector (i84). 2) Turn the ignition switch to ON. 3) Measure the voltage between body integrated unit connector and chassis ground using tester. <b>Connector &amp; terminal (i84) No. 1 (+) — Chassis ground (-):</b>	Is the voltage 8.5 — 16.5 V?	Replace the body integrated unit. <Ref. to SL-48, Body Integrated Unit.>	Repair or replace the open or shorted circuit between body integrated unit and fuse.
5	<b>CHECK CONNECTOR.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the body integrated unit connector (i84).	Is there poor contact of connector?	Repair or replace the poor contact of connector.	A temporary change of voltage occurred.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

LAN SYSTEM (DIAGNOSTICS)

## E: DTC B1104 ACC POWER FAILURE

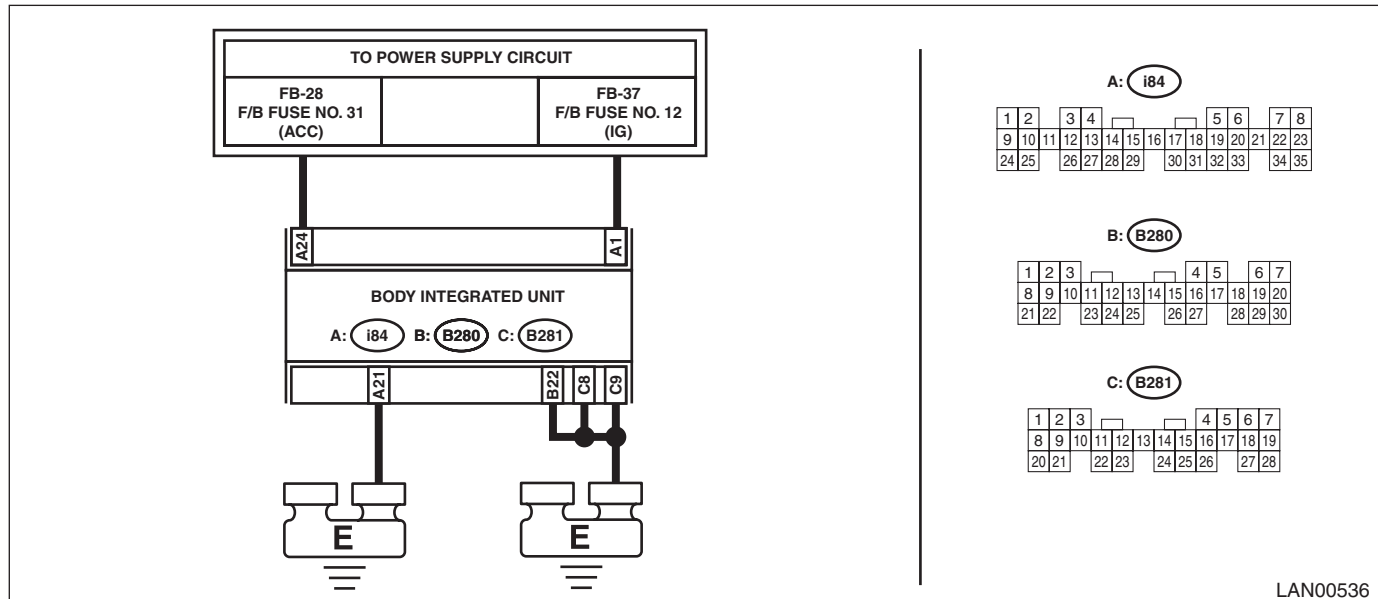
### DTC DETECTING CONDITION:

ACC power supply circuit input voltage is too high or too low.

### TROUBLE SYMPTOM:

Rear wiper may not operate at ACC position.

### WIRING DIAGRAM:



LAN00536

Step	Check	Yes	No
1	<b>CHECK DTC.</b> Read the DTC of body integrated unit using Subaru Select Monitor. <Ref. to LAN(diag)-27, Read Diagnostic Trouble Code (DTC).>	Is B1104 a current malfunction?	Go to step 2. / Go to step 5.
2	<b>CHECK DTC.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connector from body integrated unit and reconnect. 3) Turn the ignition switch to ACC. 4) Wait approx. 2 minutes. 5) Turn the ignition switch to ON. 6) Read the DTC of body integrated unit using Subaru Select Monitor.	Is B1104 a current malfunction?	Go to step 3. / Go to step 5.
3	<b>CHECK FUSE.</b> 1) Turn the ignition switch to OFF. 2) Inspect the fuse.	Is the fuse OK?	Go to step 4. / Replace the defective fuse.
4	<b>CHECK HARNESS.</b> 1) Disconnect the body integrated unit connector (i84). 2) Turn the ignition switch to ACC. 3) Measure the voltage between body integrated unit connector and chassis ground using tester. <b>Connector &amp; terminal (i84) No. 24 (+) — Chassis ground (-):</b>	Is the voltage 8.5 — 16.5 V?	Replace the body integrated unit. <Ref. to SL-48, Body Integrated Unit.> / Repair or replace the open or shorted circuit between body integrated unit and fuse.
5	<b>CHECK CONNECTOR.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the body integrated unit connector (i84).	Is there poor contact of connector?	Repair or replace the poor contact of connector. / A temporary change of voltage occurred.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

LAN SYSTEM (DIAGNOSTICS)

## F: DTC B1105 KEY INTERLOCK CIRCUIT ABNORMAL

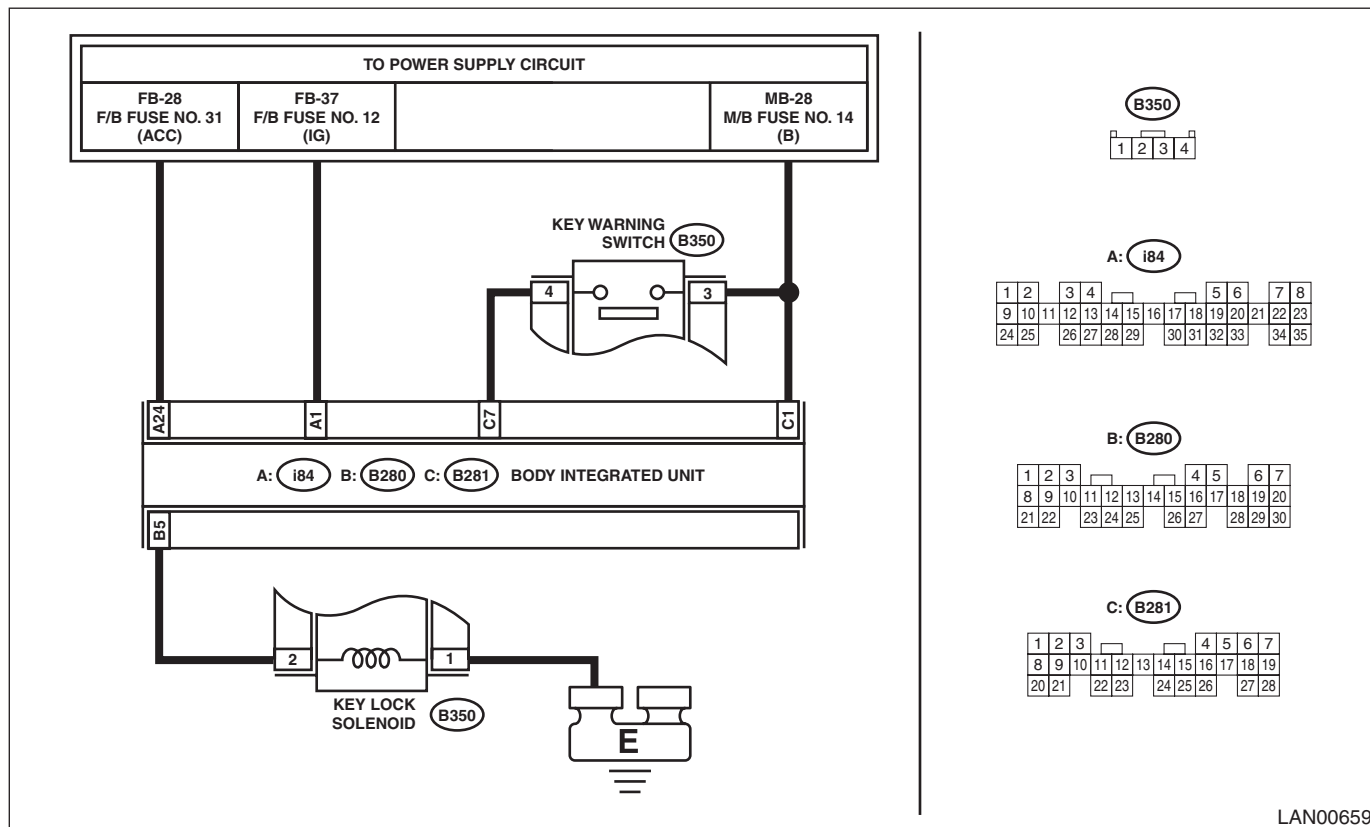
### DTC DETECTING CONDITION:

Key interlock circuit is shorted to ground.

### TROUBLE SYMPTOM:

- There is no key interlock power supply.
- Key interlock does not release or does not keep lock condition.

### WIRING DIAGRAM:



LAN00659

Step	Check	Yes	No
<b>1 CHECK DTC.</b> 1) Insert the ignition key. 2) Shift to the Neutral range. 3) Read the DTC of body integrated unit using Subaru Select Monitor. <Ref. to LAN(diag)-27, Read Diagnostic Trouble Code (DTC).>	Is B1105 current malfunction?	Go to step 2.	Go to step 8.
<b>2 CHECK DTC.</b> 1) Remove the ignition key. 2) Disconnect the key lock solenoid connector (B350) and body integrated unit connector (B280). 3) Connect the disconnected connectors. 4) Insert the key and shift into Neutral. 5) Turn the ignition switch to ON. 6) Read the DTC of body integrated unit using Subaru Select Monitor.	Is B1105 current malfunction?	Go to step 3.	Go to step 8.
<b>3 CHECK KEY LOCK SOLENOID.</b> 1) Disconnect the key lock solenoid connector (B350). 2) Measure the resistance between the key lock solenoid connector. <b>Connector &amp; terminal (B350) No. 1 — No. 2:</b>	Is the resistance 12 — 14.5 Ω?	Go to step 4.	Replace the key lock solenoid.



# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

LAN SYSTEM (DIAGNOSTICS)

Step	Check	Yes	No
<b>4 CHECK KEY LOCK SOLENOID.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the key lock solenoid connector. 3) Connect the battery terminal to key lock solenoid. <b>Terminals</b> <b>(B350) No. 2 — positive terminal:</b> <b>(B350) No. 1 — ground terminal:</b>	Is the solenoid activated and then key locked?	Go to step 5.	Replace the key lock solenoid.
<b>5 CHECK HARNESS.</b> 1) Disconnect the body integrated unit connector (B280). 2) Measure the resistance between body integrated unit and key lock solenoid using tester. <b>Connector &amp; terminal</b> <b>(B350) No. 2 — (B280) No. 5:</b>	Is the resistance less than 10 $\Omega$ ?	Go to step 6.	Repair or replace the open circuit of harness.
<b>6 CHECK HARNESS.</b> Measure the resistance between body integrated unit and chassis ground using tester. <b>Connector &amp; terminal</b> <b>(B280) No. 5 — Chassis ground:</b>	Is the resistance 1 M $\Omega$ or more?	Go to step 7.	Repair or replace the short circuit of the harness.
<b>7 CHECK HARNESS.</b> 1) Turn the ignition switch to ON. 2) Measure the voltage between body integrated unit and chassis ground using tester. <b>Connector &amp; terminal</b> <b>(B280) No. 5 (+) — Chassis ground (-):</b>	Is the voltage 1.5 V or more?	Repair or replace the short circuit of the harness.	Replace the body integrated unit. <Ref. to SL-48, Body Integrated Unit.>
<b>8 CHECK CONNECTOR.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the body integrated unit connector (B280) and key lock solenoid connector (B350).	Is there poor contact at disconnected connector terminal?	Repair the terminal where poor contact exists, or replace harness.	It is possible that temporary poor contact occurs.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

LAN SYSTEM (DIAGNOSTICS)

## G: DTC B1106 SHIFT LOCK CIRCUIT FAILURE

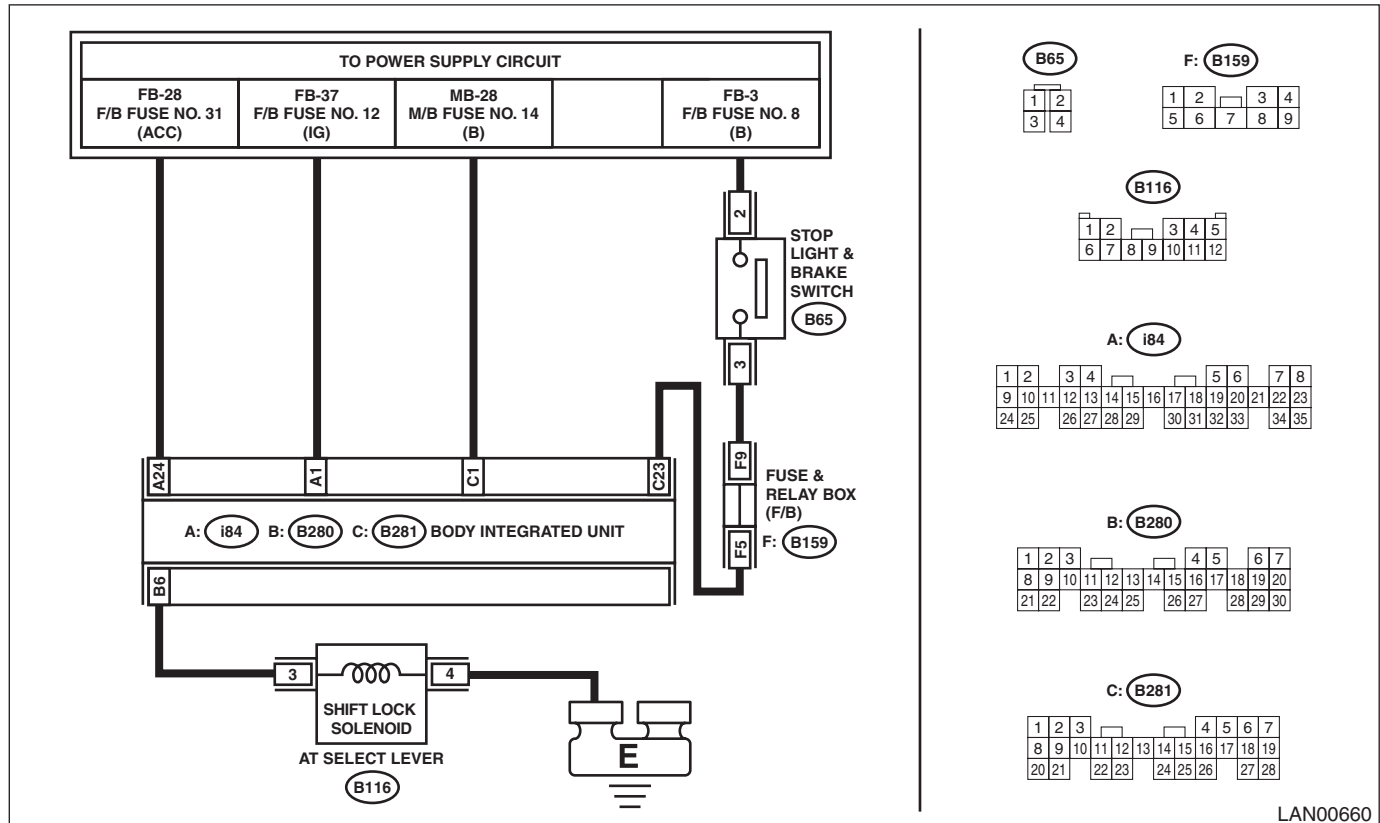
### DTC DETECTING CONDITION:

Shift lock circuit is shorted to ground.

### TROUBLE SYMPTOM:

Shift lock does not be released or remain locked.

### WIRING DIAGRAM:



LAN00660

Step	Check	Yes	No
<b>1 CHECK DTC.</b> 1) Turn the ignition switch to ON. 2) Keep the Parking range for approx. 5 seconds. 3) Read the DTC of body integrated unit using Subaru Select Monitor. <Ref. to LAN(diag)-27, Read Diagnostic Trouble Code (DTC).>	Is B1106 current malfunction?	Go to step 2.	Go to step 7.
<b>2 CHECK DTC.</b> 1) Disconnect the body integrated unit connector (B280) and shift lock solenoid connector (B116). 2) Connect the disconnected connectors. 3) Turn the ignition switch to ON, then keep the Parking range for approx. 5 seconds. 4) Read the DTC of body integrated unit using Subaru Select Monitor.	Is B1106 current malfunction?	Go to step 3.	Repair or replace the open or short circuit of harness.
<b>3 CHECK HARNESS.</b> 1) Disconnect the shift lock solenoid connector (B116). 2) Measure the resistance between shift lock solenoid and chassis ground using tester. <b>Connector &amp; terminal (B116) No. 4 — Chassis ground:</b>	Is the resistance less than 10 Ω?	Go to step 4.	Repair the open circuit of harness or replace harness.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

LAN SYSTEM (DIAGNOSTICS)

Step	Check	Yes	No
<b>4 CHECK SHIFT LOCK SOLENOID.</b> 1) Disconnect the shift lock solenoid connector. 2) Measure the resistance between the shift lock solenoid connector. <b>Connector &amp; terminal</b> <b>(B116) No. 4 — No. 3:</b>	Is the resistance 19 — 25 Ω?	Go to step 5.	Replace the shift lock solenoid.
<b>5 CHECK SHIFT LOCK SOLENOID.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the shift lock solenoid connector. 3) Connect the battery terminal to shift lock solenoid. <b>Terminals</b> <b>(B116) No. 3 — positive terminal:</b> <b>(B116) No. 4 — ground terminal:</b>	Is the solenoid activated, and then the shift lock released?	Go to step 6.	Replace the shift lock solenoid.
<b>6 CHECK HARNESS.</b> 1) Disconnect the body integrated unit connector (B280). 2) Measure the resistance between body integrated unit connector (B280) and chassis ground. <b>Connector &amp; terminal</b> <b>(B280) No. 6 — Chassis ground:</b>	Is the resistance 1 MΩ or more?	Replace the body integrated unit. <Ref. to SL-48, Body Integrated Unit.>	Repair the short circuit of harness or replace harness.
<b>7 CHECK DTC.</b> 1) Turn the ignition switch to ON. 2) With Parking range, depress the brake pedal and keep it at depressed condition. 3) Read the DTC of body integrated unit using Subaru Select Monitor.	Is B1106 current malfunction?	Go to step 8.	Go to step 9.
<b>8 CHECK DTC.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the body integrated unit connector (B280) and shift lock solenoid connector (B116). 3) Connect the disconnected connectors. 4) Turn the ignition switch to ON. 5) Shift into Parking range, then depress the brake pedal. 6) Read the DTC of body integrated unit using Subaru Select Monitor.	Is B1106 current malfunction?	Go to step 4.	Go to step 9.
<b>9 CHECK CONNECTOR.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the body integrated unit connector (B280) and shift lock solenoid connector (B116).	Is there poor contact of connector terminal?	Repair the poor contact of the terminal or replace the harness.	It is possible that temporary poor contact occurs.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## LAN SYSTEM (DIAGNOSTICS)

### H: DTC U1201 CAN-HS COUNTER ABNORMAL

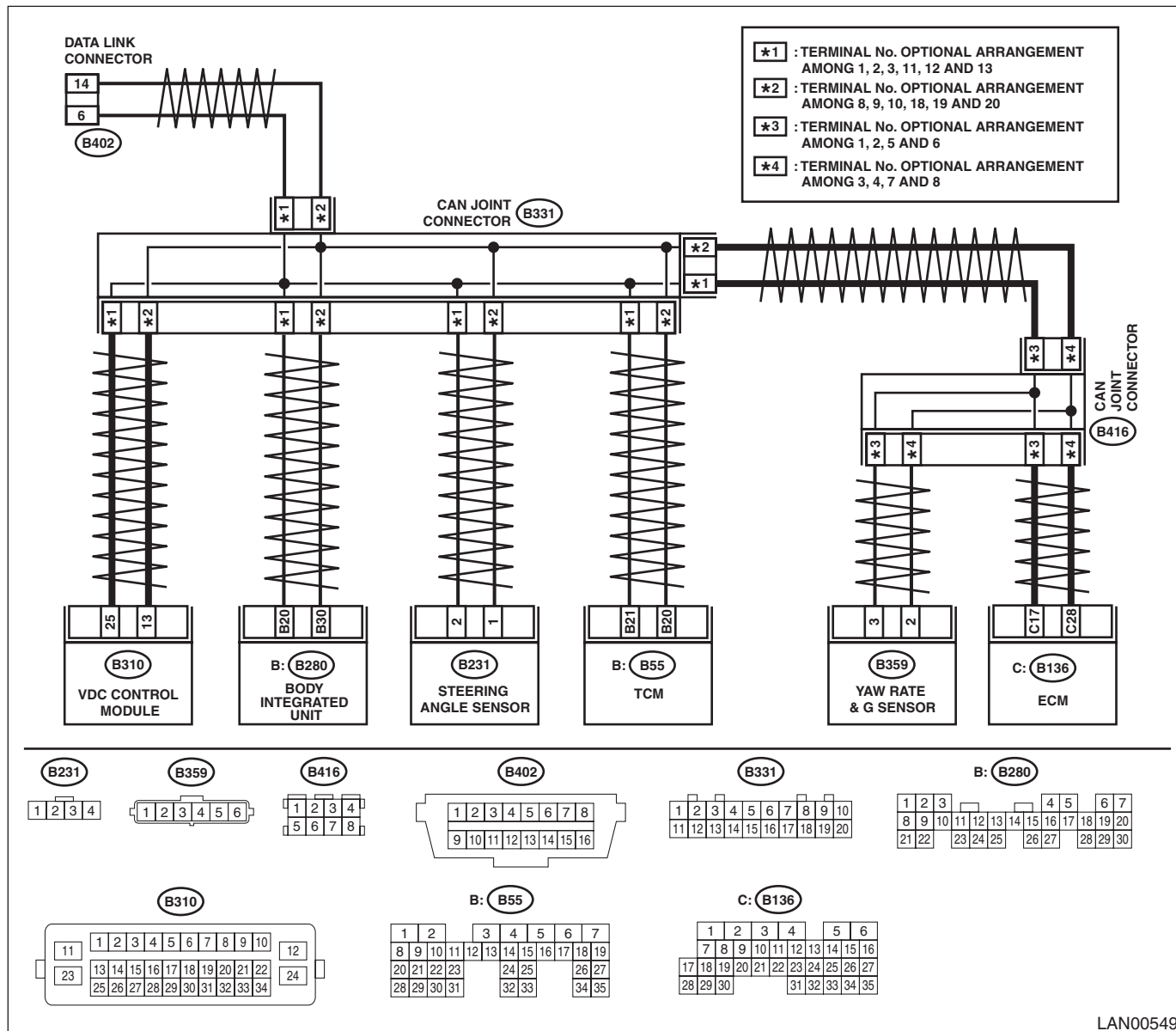
#### DTC DETECTING CONDITION:

High speed CAN communication becomes unstable.

#### TROUBLE SYMPTOM:

- CAN communication can not be executed normally.
- Malfunction indicator light illuminates.

#### WIRING DIAGRAM:



LAN00549

Step	Check	Yes	No
1	<b>CHECK DTC.</b> Read all DTCs using the Subaru Select Monitor. <Ref. to LAN(diag)-27, Read Diagnostic Trouble Code (DTC).>	Are there U1202 or DTCs other than for the body integrated unit?	Perform the diagnosis according to DTC. Go to step 2.
2	<b>CHECK DTC.</b> Check DTC indicated by body integrated unit.	Is U1201 a current malfunction?	Go to step 3. Go to step 14.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

LAN SYSTEM (DIAGNOSTICS)

Step	Check	Yes	No
<b>3 CHECK DTC.</b> 1) Turn the ignition switch to OFF. 2) Disconnect all connectors (B280, B310, B55, B136, B359, B231) that are connected to high speed CAN communication line. 3) Connect all the disconnected connectors. 4) Turn the ignition switch to ON. 5) Read the DTC of body integrated unit using Subaru Select Monitor.	Is U1201 a current malfunction?	Go to step 4.	Go to step 14.
<b>4 CHECK TCM.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the TCM connector (B55). 3) Turn the ignition switch to ON. 4) Read the DTC of body integrated unit using Subaru Select Monitor.	Is U1201 a current malfunction?	Go to step 5.	Go to step 16.
<b>5 CHECK STEERING ANGLE SENSOR.</b> 1) Turn the ignition switch to OFF. 2) Connect the TCM connector. 3) Disconnect the steering angle sensor connector (B231). 4) Turn the ignition switch to ON. 5) Read the DTC of body integrated unit using Subaru Select Monitor.	Is U1201 a current malfunction?	Go to step 6.	Go to step 17.
<b>6 CHECK YAW RATE SENSOR.</b> 1) Turn the ignition switch to OFF. 2) Connect the steering angle sensor connector. 3) Disconnect the yaw rate sensor connector (B359). 4) Turn the ignition switch to ON. 5) Read the DTC of body integrated unit using Subaru Select Monitor.	Is U1201 a current malfunction?	Go to step 7.	Go to step 18.
<b>7 CHECK VDC CM.</b> 1) Turn the ignition switch to OFF. 2) Connect the yaw rate sensor connector. 3) Disconnect the VDC CM connector (B310). 4) Install the 120 Ω resistance to VDC CM connector terminals. <b>Terminals</b> <b>(B310) No. 13 — No. 25:</b> 5) Using the tester, measure the resistance between terminals of data link connector. <b>Terminals</b> <b>(B402) No. 6 — No. 14:</b>	Is the resistance 60 Ω?	Go to step 8.	Go to step 10.
<b>8 CHECK DTC.</b> 1) Turn the ignition switch to ON. 2) Read the DTC of body integrated unit using Subaru Select Monitor.	Is U1201 a current malfunction?	Go to step 9.	Go to step 10.
<b>9 CHECK DTC.</b> Read the DTC of body integrated unit using Subaru Select Monitor.	Is U1202 a current malfunction?	Replace the VDC CM. <Ref. to VDC-7, REMOVAL, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>	Go to step 10.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## LAN SYSTEM (DIAGNOSTICS)

Step	Check	Yes	No
<b>10 CHECK ECM.</b> 1) Turn the ignition switch to OFF. 2) Replace the VDCCM. 3) Disconnect the ECM connector (B136). 4) Install the 120 Ω resistance to ECM connector. <i>Terminals</i> <i>(B136) No. 17 — No. 28:</i> 5) Using the tester, measure the resistance between terminals of data link connector. <i>Connector &amp; terminal</i> <i>(B402) No. 6 — No. 14:</i>	Is the resistance 60 Ω?	Go to step 11.	Repair or replace the open circuit of harness.
<b>11 CHECK DTC.</b> 1) Turn the ignition switch to ON. 2) Read the DTC of body integrated unit using Subaru Select Monitor.	Is U1201 a current malfunction?	Go to step 12.	Go to step 13.
<b>12 CHECK DTC.</b> Read the DTC of body integrated unit using Subaru Select Monitor.	Is U1202 a current malfunction?	Replace the ECM. <Ref. to FU(H6DO)-52, Engine Control Module (ECM).>	Go to step 13.
<b>13 CHECK DTC.</b> 1) Reconnect all the disconnected connectors. 2) Turn the ignition switch to ON. 3) Read the DTC of body integrated unit using Subaru Select Monitor.	Is U1201 a current malfunction?	Replace the body integrated unit. <Ref. to SL-48, REMOVAL, Body Integrated Unit.>	Go to step 14.
<b>14 CHECK HARNESS.</b> 1) Shake the instrument harness and bulkhead harness, rear harness. 2) Read the DTC of body integrated unit using Subaru Select Monitor.	Is U1201 a current malfunction?	Repair or replace the harness.	Go to step 15.
<b>15 CHECK CONNECTOR.</b> 1) Disconnect the connector used for CAN circuit. 2) Check the connector terminal.	Is there poor contact of connector terminal?	Repair the connector terminal where poor contact exists, or replace harness.	Temporary poor contact occurs.
<b>16 CHECK HARNESS.</b> Using the tester, check for open or short (power supply-output short, GND-output short) in the harness between terminals of data link connector and TCM. <i>Connector &amp; terminal</i> <i>(B402) No. 14 — (B55) No. 20:</i> <i>(B402) No. 6 — (B55) No. 21:</i>	Is harness normal?	Replace the TCM. <Ref. to 5AT-54, REMOVAL, Transmission Control Module (TCM).>	Repair or replace the harness.
<b>17 CHECK HARNESS.</b> Using the tester, check for open or short (power supply-output short, GND-output short) in the harness between terminals of data link connector and steering angle sensor. <i>Connector &amp; terminal</i> <i>(B402) No. 14 — (B231) No. 1:</i> <i>(B402) No. 6 — (B231) No. 2:</i>	Is harness normal?	Replace the steering angle sensor. <Ref. to VDC-19, REPLACEMENT, Steering Angle Sensor.>	Repair or replace the harness.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

LAN SYSTEM (DIAGNOSTICS)

Step	Check	Yes	No
<p><b>18</b>    <b>CHECK HARNESS.</b> Using the tester, check for open or short (power supply-output short, GND-output short) in the harness between terminals of data link connector and yaw rate sensor. <b>Connector &amp; terminal</b> <b>(B402) No. 14 — (B359) No. 2:</b> <b>(B402) No. 6 — (B359) No. 3:</b></p>	<p>Is harness normal?</p>	<p>Replace the yaw rate sensor. &lt;Ref. to VDC-18, REMOVAL, Yaw Rate and G Sensor.&gt;</p>	<p>Repair or replace the harness.</p>

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## LAN SYSTEM (DIAGNOSTICS)

### I: DTC U1202 CAN-HS BUS OFF

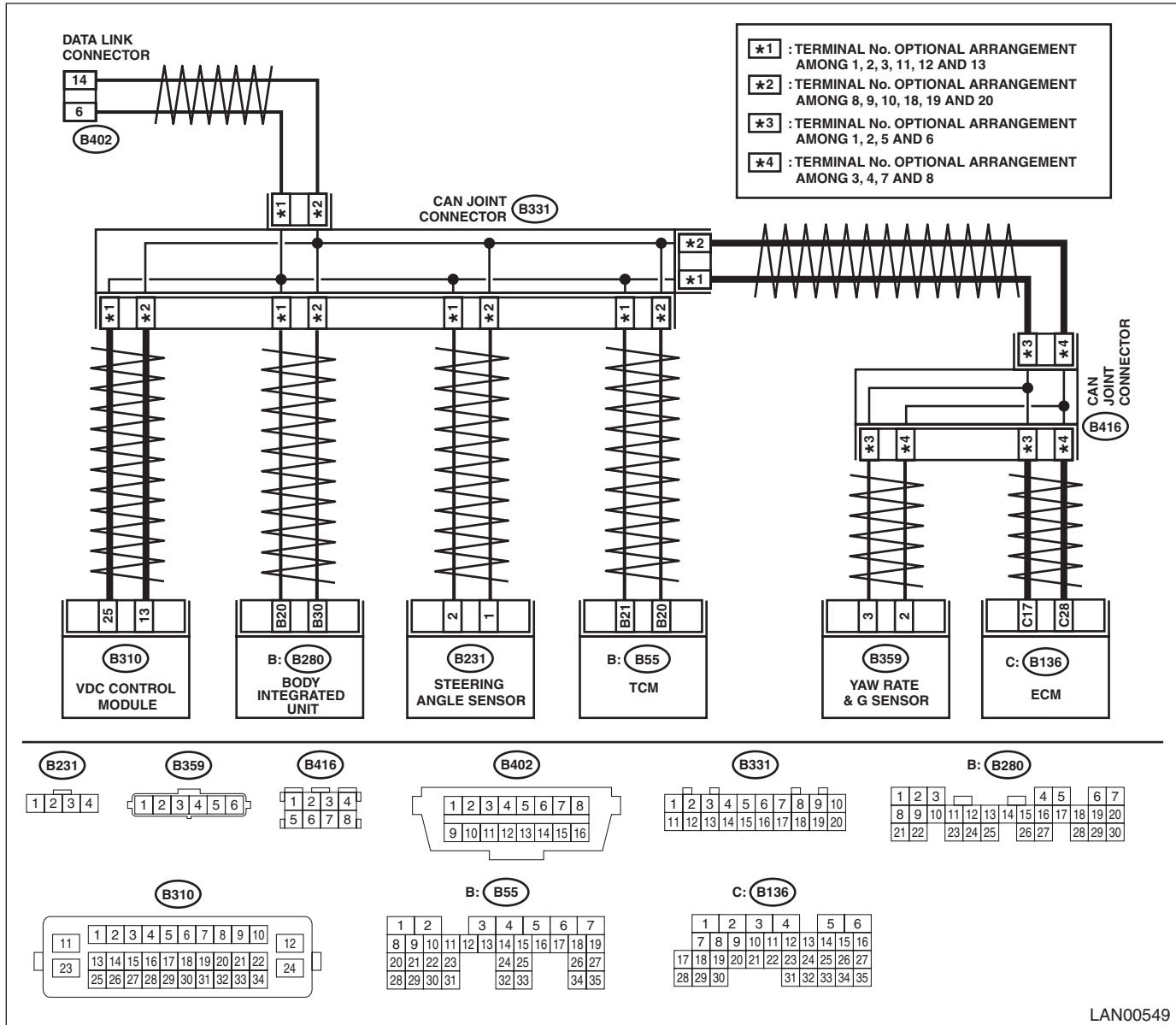
#### DTC DETECTING CONDITION:

Integrated unit communication is shut down because of high speed CAN error.

#### TROUBLE SYMPTOM:

CAN communication is not normal.

#### WIRING DIAGRAM:



LAN00549

Step	Check	Yes	No
1	<b>CHECK DTC.</b> Using the Subaru Select Monitor, confirm all DTCs. <Ref. to LAN(diag)-27, Read Diagnostic Trouble Code (DTC).>	Perform the diagnosis according to displayed DTC.	Go to step 2.
2	<b>CHECK DTC.</b> 1) Turn the ignition switch to OFF. 2) Read the DTC of body integrated unit using Subaru Select Monitor.	Go to step 3.	Go to step 10.



# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

LAN SYSTEM (DIAGNOSTICS)

Step	Check	Yes	No
<b>3</b> <b>CHECK DTC.</b> 1) Turn the ignition switch to OFF. 2) Disconnect all connectors (B280, B310, B55, B136, B359, B231) that are connected to high speed CAN communication line. 3) Connect the disconnected connectors. 4) Turn the ignition switch to ON. 5) Read the DTC of body integrated unit using Subaru Select Monitor.	Is U1202 a current malfunction?	Go to step 4.	Go to step 10.
<b>4</b> <b>CHECK HARNESS.</b> 1) Disconnect all connectors (B280, B310, B55, B136, B359, B231) that are connected to high speed CAN communication line. 2) Using the tester, check for open, short (power supply-output short, GND-output short) in the harness. <b>Connector &amp; terminal</b> (B402) No. 6 — (B136) No. 17: (B402) No. 6 — (B310) No. 25: (B402) No. 6 — (B359) No. 3: (B402) No. 6 — (B231) No. 2: (B402) No. 6 — (B55) No. 21: (B402) No. 6 — (B280) No. 20:	Is harness normal?	Go to step 5.	Repair or replace the harness.
<b>5</b> <b>CHECK HARNESS.</b> Using the tester, check for open, short (power supply-output short, GND-output short) in the harness. <b>Connector &amp; terminal</b> (B402) No. 14 — (B136) No. 28: (B402) No. 14 — (B310) No. 13: (B402) No. 14 — (B359) No. 2: (B402) No. 14 — (B231) No. 1: (B402) No. 14 — (B55) No. 20: (B402) No. 14 — (B280) No. 30:	Is harness normal?	Go to step 6.	Repair or replace the harness.
<b>6</b> <b>CHECK ECM.</b> 1) Connect the ECM. 2) Using the tester, measure the resistance between terminals of data link connector. <b>Connector &amp; terminal</b> (B402) No. 6 — No. 14:	Is the resistance 120±5 Ω?	Go to step 7.	Inspect the ECM. <Ref. to EN(H6DO)(diag)-36, HOW TO USE THE SUBARU SELECT MONITOR, OPERATION, Subaru Select Monitor.>
<b>7</b> <b>CHECK VDC/ABS CM.</b> 1) Disconnect the ECM connector (B136). 2) Connect the VDC/ABS CM. 3) Using the tester, measure the resistance between terminals of data link connector. <b>Connector &amp; terminal</b> (B402) No. 6 — No. 14:	Is the resistance 120±5 Ω?	Go to step 8.	Replace the VDC/ABS CM. <Ref. to VDC-7, REMOVAL, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>
<b>8</b> <b>CHECK HARNESS.</b> 1) Connect the disconnected connectors. 2) Using the tester, measure the resistance between terminals of data link connector and chassis ground. <b>Connector &amp; terminal</b> (B402) No. 6 — Chassis ground: (B402) No. 14 — Chassis ground:	Is the resistance 1 MΩ or more?	Go to step 9.	Go to step 12.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## LAN SYSTEM (DIAGNOSTICS)

Step	Check	Yes	No
<b>9</b> <b>CHECK HARNESS.</b> 1) Turn the ignition switch to ON. 2) Using the tester, measure the voltage between terminals of data link connector and chassis ground. <b>Connector &amp; terminal</b> <i>(B402) No. 6 (+) — Chassis ground (-):</i> <i>(B402) No. 14 (+) — Chassis ground (-):</i>	Is the voltage less than 6 V?	Replace the body integrated unit. <Ref. to SL-48, Body Integrated Unit.>	Go to step 13.
<b>10</b> <b>CHECK HARNESS.</b> 1) Shake the harness. 2) Read the DTC of body integrated unit using Subaru Select Monitor.	Is U1202 a current malfunction?	Repair or replace the harness.	Go to step 11.
<b>11</b> <b>CHECK CONNECTOR.</b> Disconnect the connector used for high speed CAN circuit.	Is there poor contact of connector terminal?	Repair the connector terminal, or replace harness.	It is possible that temporary poor communication occurs.
<b>12</b> <b>CHECK CONTROL MODULE.</b> With the tester connected, disconnect each control module connector.	Is there any control module whose resistance has changed?	Replace the control module whose resistance has changed.	Repair or replace the open or short circuit of the harness.
<b>13</b> <b>CHECK ECM.</b> With the tester connected, disconnect each control module connector.	Is there any control module whose voltage has changed?	Replace the control module whose voltage has changed.	Repair or replace the short circuit of the harness.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

LAN SYSTEM (DIAGNOSTICS)

## J: DTC U1211 CAN-HS ECM DATA ABNORMAL

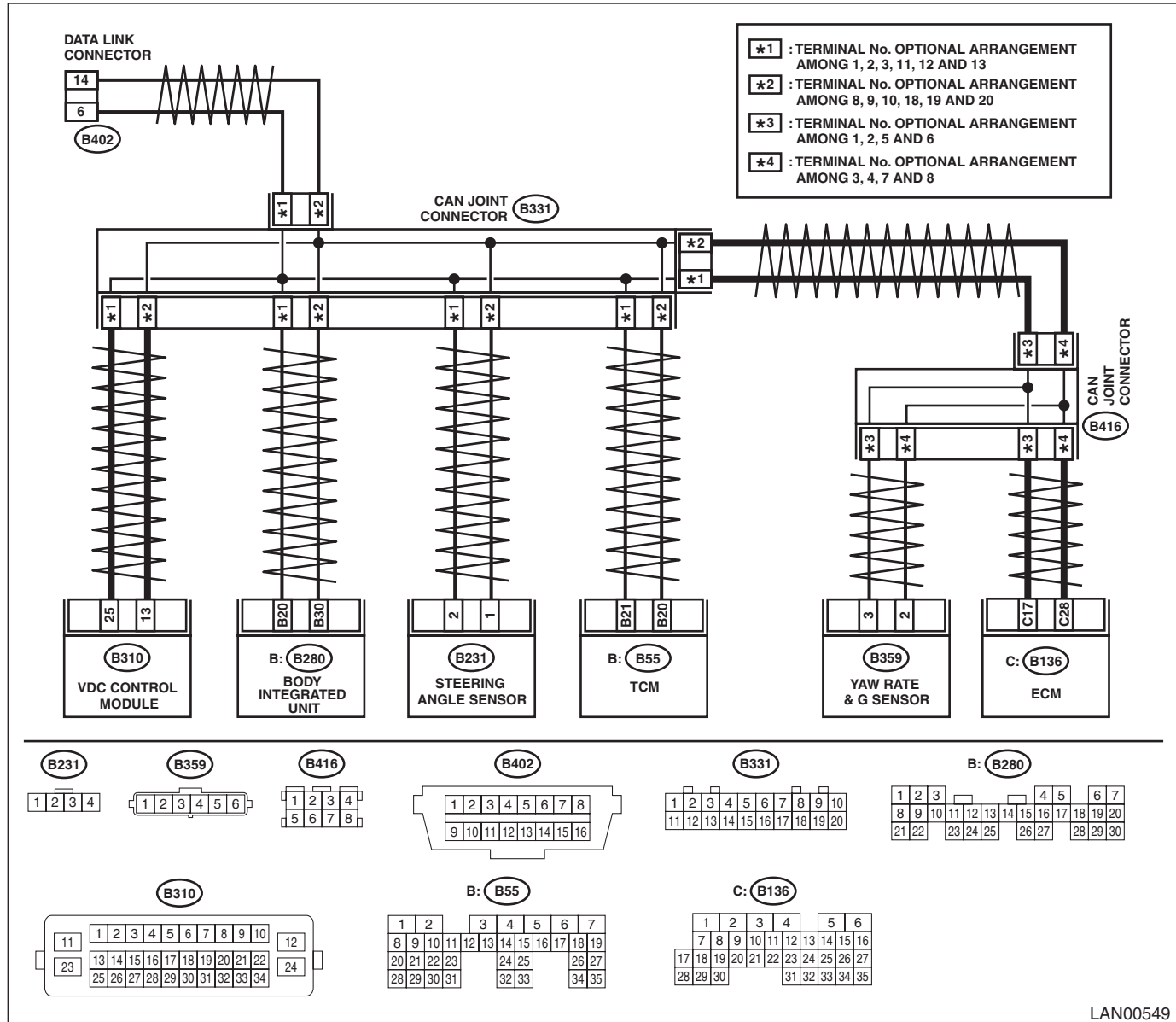
### DTC DETECTING CONDITION:

Received error data from ECM.

### TROUBLE SYMPTOM:

"Er EG" is displayed in odo/trip meter.

### WIRING DIAGRAM:



Step	Check	Yes	No
1	<b>CHECK DTC.</b> Read all DTCs using the Subaru Select Monitor. <Ref. to LAN(diag)-27, Read Diagnostic Trouble Code (DTC).>	Is there U1202, or any DTC other than for the body integrated unit?	Perform the diagnosis according to DTC. Go to step 2.
2	<b>CHECK DTC.</b> Check DTC indicated by body integrated unit.	Is U1211 a current malfunction?	Go to step 3. Go to step 4.

## Diagnostic Procedure with Diagnostic Trouble Code (DTC)

### LAN SYSTEM (DIAGNOSTICS)

Step	Check	Yes	No
<b>3</b> <b>CHECK DTC.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Connect the disconnected connectors. 4) Turn the ignition switch to ON. 5) Read the DTC of body integrated unit using Subaru Select Monitor.	Is U1211 a current malfunction?	Replace the ECM. <Ref. to FU(H6DO)-52, Engine Control Module (ECM).>	Go to step 4.
<b>4</b> <b>CHECK HARNESS.</b> 1) Shake the harness used for CAN communication circuit. 2) Read the DTC of body integrated unit using Subaru Select Monitor.	Is U1211 a current malfunction?	Repair the poor contact or temporary open circuit of harness.	Go to step 5.
<b>5</b> <b>CHECK CONNECTOR.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connector that is connected to high speed CAN circuit.	Is there poor contact of connector?	Repair the connector terminal where poor contact exists, or replace harness.	It is possible that temporary poor communication occurs.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

LAN SYSTEM (DIAGNOSTICS)

## K: DTC U1212 CAN-HS TCM DATA ABNORMAL

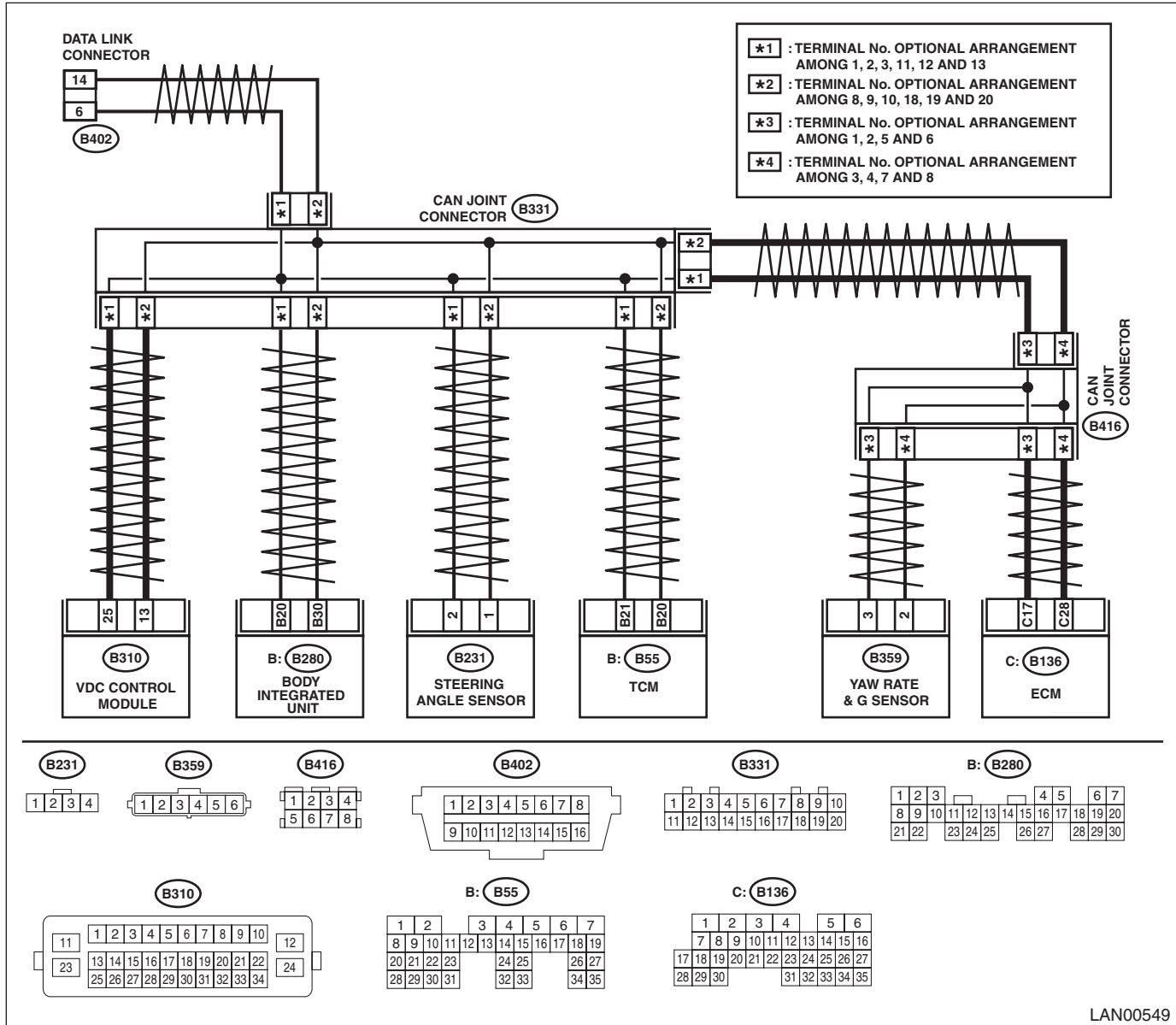
### DTC DETECTING CONDITION:

Received error data from TCM.

### TROUBLE SYMPTOM:

- SPORT indicator light blinks.
- "Er tC" is displayed in odo/trip meter.

### WIRING DIAGRAM:



LAN00549

Step	Check	Yes	No
1	<b>CHECK DTC.</b> Read all DTCs using the Subaru Select Monitor. <Ref. to LAN(diag)-27, Read Diagnostic Trouble Code (DTC).>	Is there U1202, or any DTC other than for the body integrated unit?	Perform the diagnosis according to DTC. Go to step 2.
2	<b>CHECK DTC.</b> Read the DTC of body integrated unit using Subaru Select Monitor.	Is U1212 a current malfunction?	Go to step 3. Go to step 4.

## Diagnostic Procedure with Diagnostic Trouble Code (DTC)

### LAN SYSTEM (DIAGNOSTICS)

Step	Check	Yes	No
<b>3</b> <b>CHECK DTC.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the TCM connector. 3) Connect the disconnected connectors. 4) Turn the ignition switch to ON. 5) Read the DTC of body integrated unit using Subaru Select Monitor.	Is U1212 a current malfunction?	Replace the TCM. <Ref. to 5AT-54, Transmission Control Module (TCM).>	Go to step 4.
<b>4</b> <b>CHECK HARNESS.</b> 1) Turn the ignition switch to OFF. 2) Shake the harness used for CAN communication circuit. 3) Turn the ignition switch to ON. 4) Read the DTC of body integrated unit using Subaru Select Monitor.	Is U1212 a current malfunction?	Repair or replace the harness.	Go to step 5.
<b>5</b> <b>CHECK CONNECTOR.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connector that is connected to high speed CAN circuit.	Is there poor contact of connector terminal?	Repair the connector terminal, or replace harness.	Temporary poor contact occurs.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

LAN SYSTEM (DIAGNOSTICS)

## L: DTC U1213 CAN-HS VDC/ABS DATA ABNORMAL

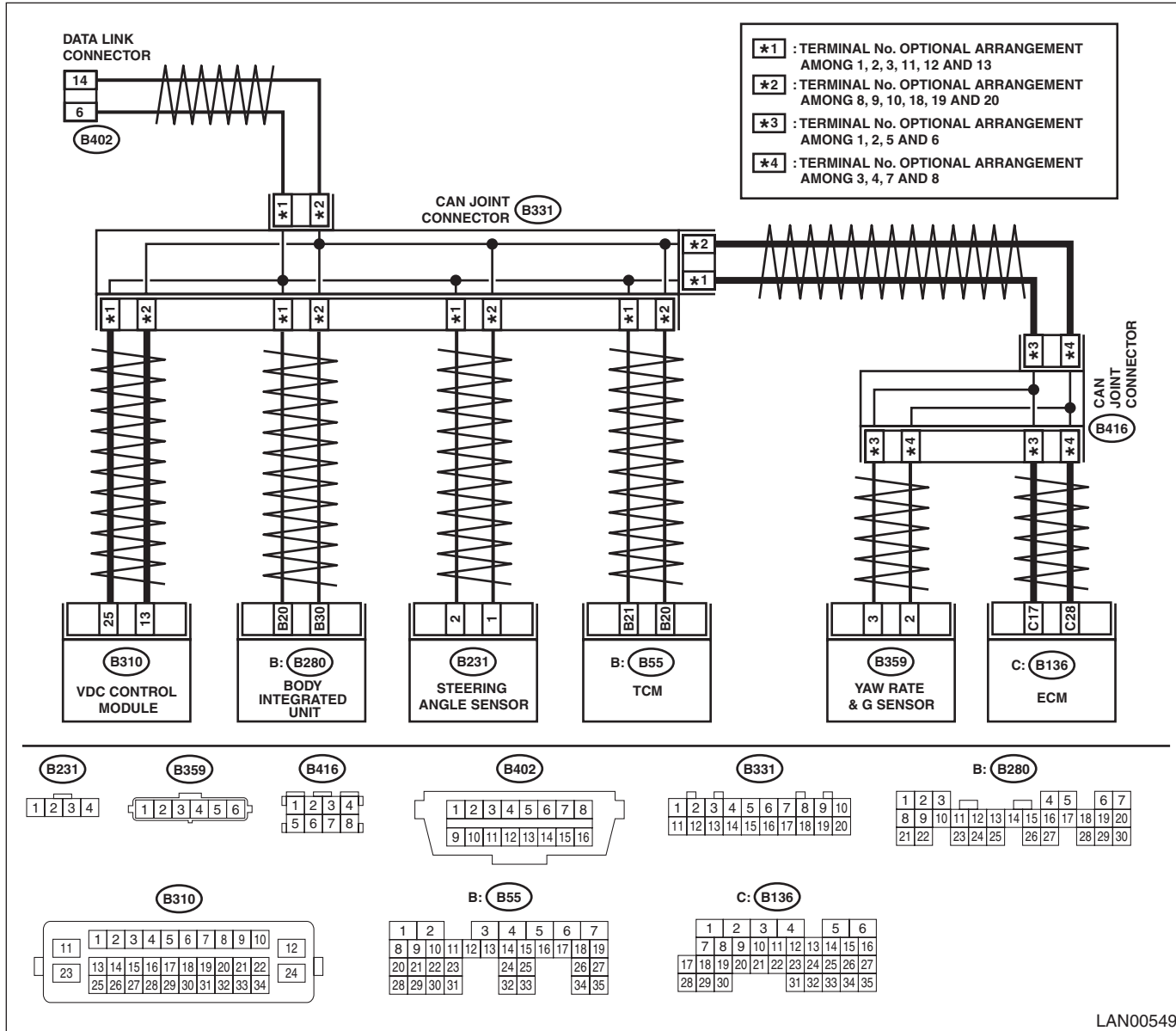
### DTC DETECTING CONDITION:

Received error data from VDC module.

### TROUBLE SYMPTOM:

- ABS warning light and VDC warning light illuminate.
- "Er Ab" is displayed in odo/trip meter.

### WIRING DIAGRAM:



LAN00549

Step	Check	Yes	No
1	<b>CHECK DTC.</b> Read all DTCs using the Subaru Select Monitor. <Ref. to LAN(diag)-27, Read Diagnostic Trouble Code (DTC).>	Is there U1202, or any DTC other than for the body integrated unit?	Perform the diagnosis according to DTC. Go to step 2.
2	<b>CHECK DTC.</b> Check DTC indicated by body integrated unit.	Is U1213 a current malfunction?	Go to step 3. Go to step 4.

## Diagnostic Procedure with Diagnostic Trouble Code (DTC)

### LAN SYSTEM (DIAGNOSTICS)

Step	Check	Yes	No
<b>3</b> <b>CHECK DTC.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the VDC/ABS CM connector. 3) Connect the disconnected connectors. 4) Turn the ignition switch to ON. 5) Read the DTC of body integrated unit using Subaru Select Monitor.	Is U1213 a current malfunction?	Replace the VDC CM. <Ref. to VDC-7, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>	Go to step 4.
<b>4</b> <b>CHECK HARNESS.</b> 1) Turn the ignition switch to OFF. 2) Shake the harness used for CAN communication circuit. 3) Turn the ignition switch to ON. 4) Read the DTC of body integrated unit using Subaru Select Monitor.	Is U1213 a current malfunction?	Repair or replace the harness.	Go to step 5.
<b>5</b> <b>CHECK CONNECTOR.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connector that is connected to high speed CAN circuit.	Is there poor contact of connector terminal?	Repair the connector terminal, or replace harness.	It is possible that temporary poor communication occurs.



# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

LAN SYSTEM (DIAGNOSTICS)

## M: DTC U1221 CAN-HS ECM NO-RECEIVE DATA

### DTC DETECTING CONDITION:

Not received data from ECM.

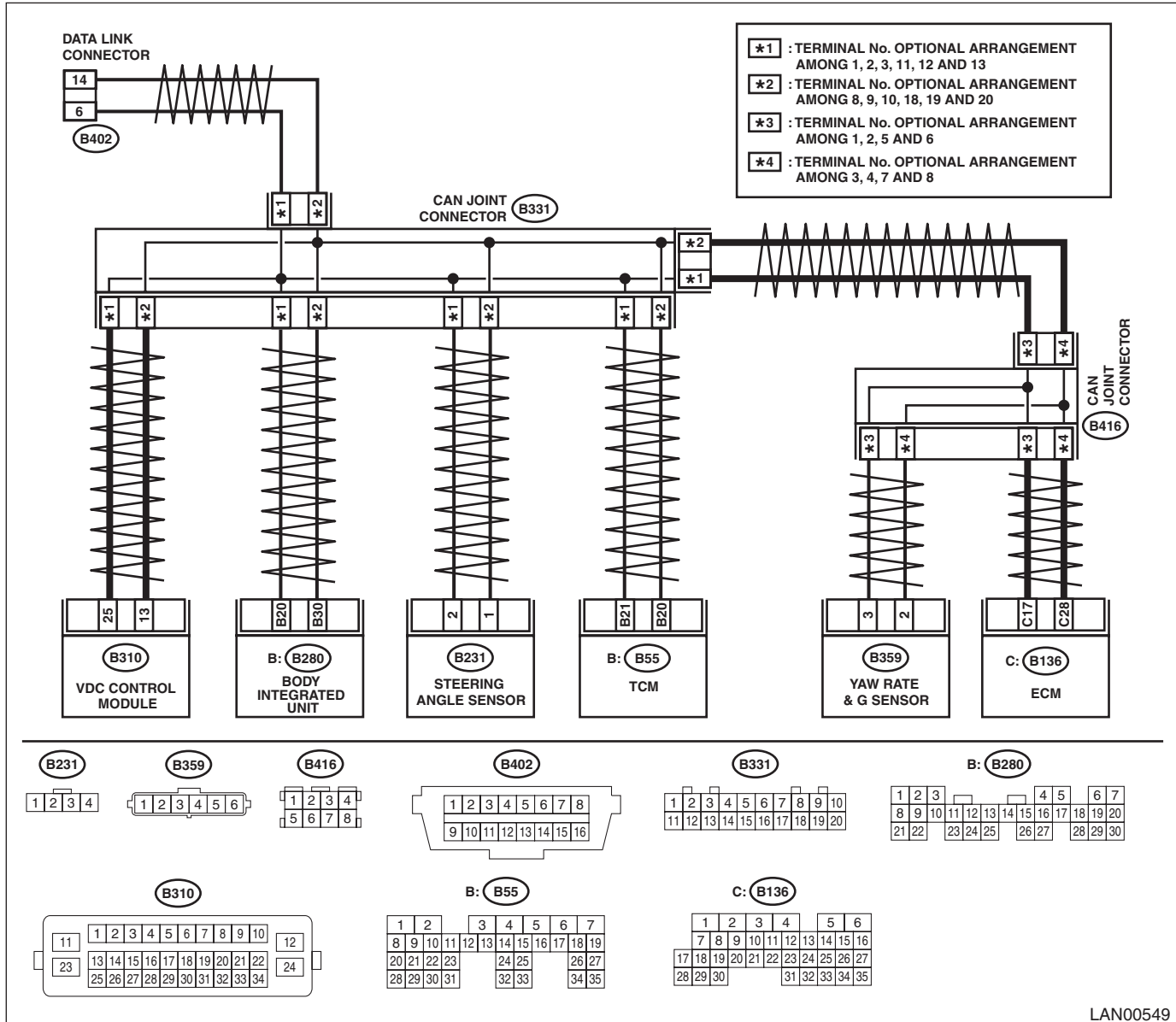
### NOTE:

When multiple DTC codes have occurred, <Ref. to LAN(diag)-33, DTC TABLE, LIST, List of Diagnostic Trouble Code (DTC).>

### TROUBLE SYMPTOM:

- Malfunction indicator light illuminates.
- "Er HC" is displayed in odo/trip meter.
- P1718 (TCM) and C0047 (VDCCM) is output.

### WIRING DIAGRAM:



LAN00549

Step	Check	Yes	No	
1	<b>CHECK DTC.</b> Read all DTCs using the Subaru Select Monitor. <Ref. to LAN(diag)-27, Read Diagnostic Trouble Code (DTC).>	Is there U1202, or any DTC other than for the body integrated unit?	Perform the diagnosis according to DTC.	Go to step 2.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## LAN SYSTEM (DIAGNOSTICS)

Step	Check	Yes	No
<b>2 CHECK DTC.</b> Check DTC indicated by body integrated unit.	Is U1221 a current malfunction?	Go to step 3.	Go to step 8.
<b>3 CHECK DTC.</b> 1) Turn the ignition switch to OFF. 2) Disconnect all connectors (B280, B310, B55, B136, B359, B231) that are connected to high speed CAN communication line. 3) Connect the disconnected connectors. 4) Turn the ignition switch to ON. 5) Read the DTC of body integrated unit using Subaru Select Monitor.	Is U1221 a current malfunction?	Go to step 4.	Go to step 8.
<b>4 CHECK HARNESS.</b> 1) Turn the ignition switch to OFF. 2) Disconnect all connectors (B280, B310, B55, B136, B359, B231) that are connected to high speed CAN communication line. 3) Using the tester, check for open, short (power supply-output short, GND-output short) in the harness. <b>Connector &amp; terminal</b> <i>(B402) No. 6 — (B136) No. 17:</i> <i>(B402) No. 6 — (B310) No. 25:</i> <i>(B402) No. 6 — (B359) No. 3:</i> <i>(B402) No. 6 — (B231) No. 2:</i> <i>(B402) No. 6 — (B55) No. 21:</i> <i>(B402) No. 6 — (B280) No. 20:</i>	Is harness normal?	Go to step 5.	Repair or replace the harness.
<b>5 CHECK HARNESS.</b> Using the tester, check for open, short (power supply-output short, GND-output short) in the harness. <b>Connector &amp; terminal</b> <b>VDC model:</b> <i>(B402) No. 14 — (B136) No. 28:</i> <i>(B402) No. 14 — (B310) No. 13:</i> <i>(B402) No. 14 — (B359) No. 2:</i> <i>(B402) No. 14 — (B231) No. 1:</i> <i>(B402) No. 14 — (B55) No. 20:</i> <i>(B402) No. 14 — (B280) No. 30:</i>	Is harness normal?	Go to step 6.	Repair or replace the harness.
<b>6 CHECK DTC.</b> 1) Turn the ignition switch to OFF. 2) Connect the disconnected connectors. 3) Start the engine and stop. 4) Turn the ignition switch to ON. 5) Read the DTC of body integrated unit using Subaru Select Monitor.	Is U1221 a current malfunction?	Go to step 7.	Go to step 8.
<b>7 CHECK DTC.</b> Read all DTCs using the Subaru Select Monitor.	Are DTCs P1718 or C0047 detected?	Replace the ECM. <Ref. to FU(H6DO)-52, Engine Control Module (ECM).>	Replace the body integrated unit. <Ref. to SL-48, Body Integrated Unit.>
<b>8 CHECK HARNESS.</b> 1) Turn the ignition switch to OFF. 2) Shake the harness used for CAN communication circuit. 3) Turn the ignition switch to ON. 4) Read the DTC of body integrated unit using Subaru Select Monitor.	Is U1221 a current malfunction?	Repair or replace the harness.	Go to step 9.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

LAN SYSTEM (DIAGNOSTICS)

	Step	Check	Yes	No
9	<b>CHECK CONNECTOR.</b> 1) Turn the ignition switch to OFF. 2) Disconnect all the connector that is connected to high speed CAN circuit.	Is there poor contact of connector terminal?	Repair the connector terminal where poor contact exists, or replace harness.	Temporary poor contact occurs.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

LAN SYSTEM (DIAGNOSTICS)

## N: DTC U1222 CAN-HS TCM NO-RECEIVE DATA

### DTC DETECTING CONDITION:

Not received data from TCM.

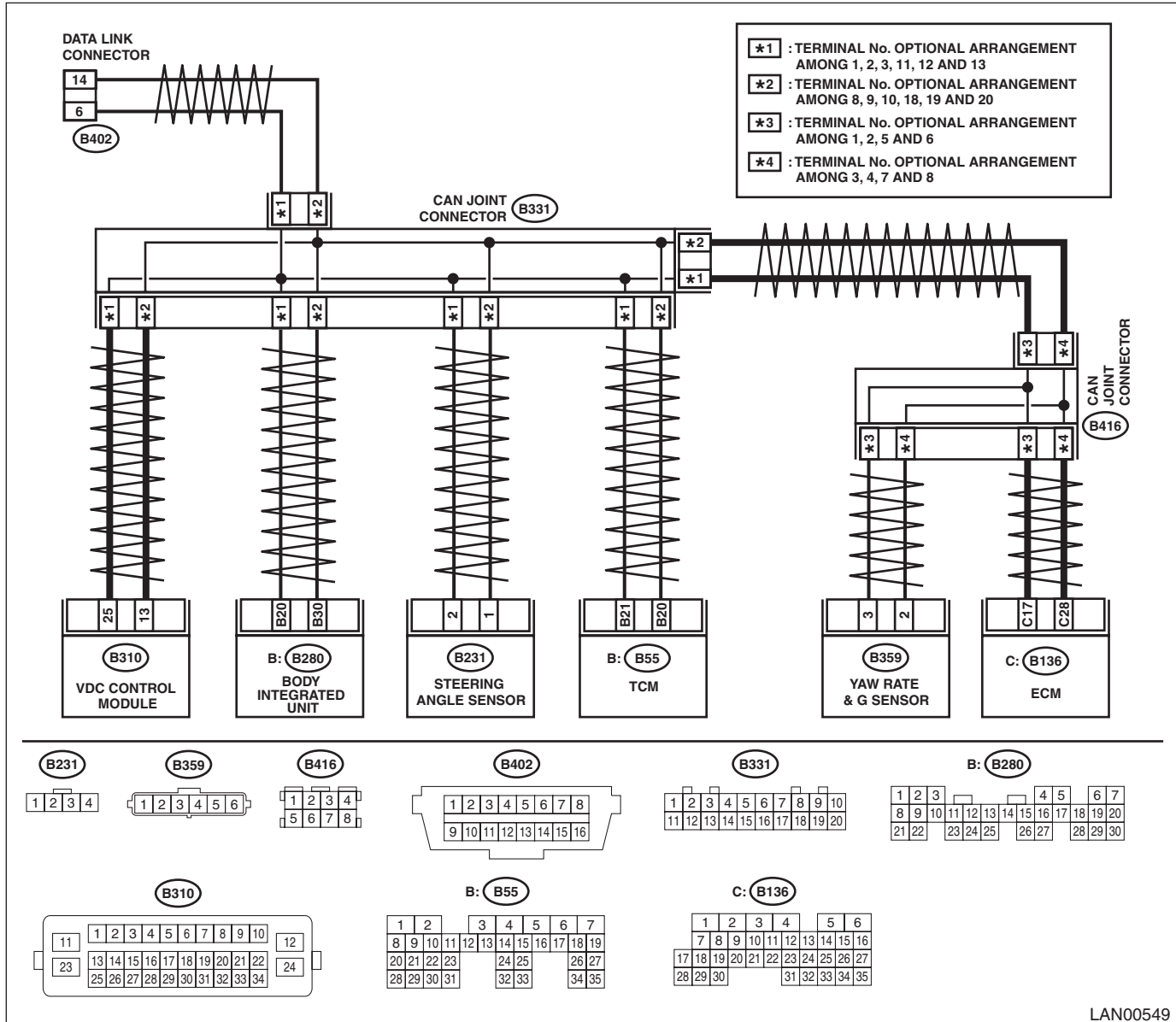
### NOTE:

When multiple DTC codes have occurred, <Ref. to LAN(diag)-33, DTC TABLE, LIST, List of Diagnostic Trouble Code (DTC).>

### TROUBLE SYMPTOM:

- Malfunction indicator light illuminates.
- "Er HC" is displayed in odo/trip meter.
- U0101 (ECM) and C0047 (VDCCM) is output.

### WIRING DIAGRAM:



LAN00549

Step	Check	Yes	No
1	<b>CHECK DTC.</b> Read all DTCs using the Subaru Select Monitor. <Ref. to LAN(diag)-27, Read Diagnostic Trouble Code (DTC).>	Is there U1202, or any DTC other than for the body integrated unit?	Perform the diagnosis according to DTC. Go to step 2.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

LAN SYSTEM (DIAGNOSTICS)

Step	Check	Yes	No
<b>2 CHECK DTC.</b> Read the DTC of body integrated unit using Subaru Select Monitor.	Is U1222 a current malfunction?	Go to step 3.	Go to step 7.
<b>3 CHECK DTC.</b> 1) Turn the ignition switch to OFF. 2) Disconnect all connectors (B280, B310, B55, B136, B359, B231) that are connected to high speed CAN communication line. 3) Connect the disconnected connectors. 4) Turn the ignition switch to ON. 5) Read the DTC of body integrated unit using Subaru Select Monitor.	Is U1222 a current malfunction?	Go to step 4.	Go to step 7.
<b>4 CHECK HARNESS.</b> 1) Disconnect all connectors (B280, B310, B55, B136, B359, B231) that are connected to high speed CAN communication line. 2) Using the tester, check for open, short (power supply-output short, GND-output short) in the harness. <b>Connector &amp; terminal</b> <b>(B55) No. 20 — (B402) No. 14:</b> <b>(B55) No. 21 — (B402) No. 6:</b>	Is harness normal?	Go to step 5.	Repair or replace the harness.
<b>5 CHECK DTC.</b> 1) Connect the disconnected connectors. 2) Start the engine and stop. 3) Turn the ignition switch to ON. 4) Read the DTC of body integrated unit using Subaru Select Monitor.	Is U1222 a current malfunction?	Go to step 6.	Go to step 7.
<b>6 CHECK DTC.</b> Using the Subaru Select Monitor, read all DTCs.	Is U0101 or C0047 displayed?	Replace the TCM. <Ref. to 5AT-54, Transmission Control Module (TCM).>	Replace the body integrated unit. <Ref. to SL-48, REMOVAL, Body Integrated Unit.>
<b>7 CHECK HARNESS.</b> 1) Shake the harness used for CAN communication circuit. 2) Read the DTC of body integrated unit using Subaru Select Monitor.	Is U1222 a current malfunction?	Repair or replace the harness.	Go to step 8.
<b>8 CHECK CONNECTOR.</b> 1) Turn the ignition switch to OFF. 2) Disconnect all the connector that is connected to high speed CAN circuit.	Is there poor contact of connector terminal?	Repair the connector terminal where poor contact exists, or replace harness.	Temporary poor contact occurs.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

LAN SYSTEM (DIAGNOSTICS)

## O: DTC U1223 CAN-HS VDC/ABS NO-RECEIVE DATA

### DTC DETECTING CONDITION:

Not received data from VDCCM.

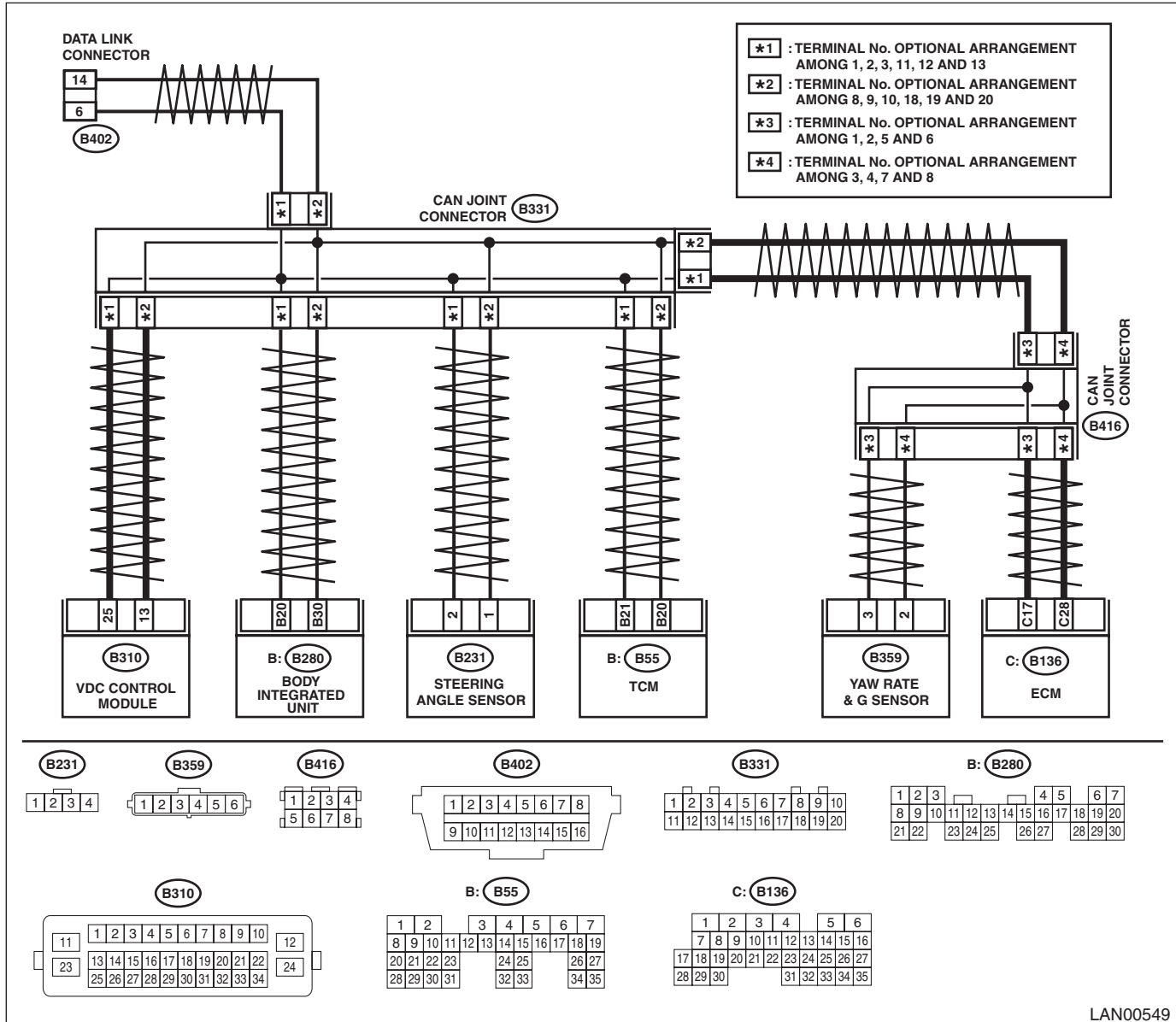
### NOTE:

When multiple DTCs have occurred, <Ref. to LAN(diag)-33, DTC TABLE, LIST, List of Diagnostic Trouble Code (DTC).>

### TROUBLE SYMPTOM:

- ABS warning light and VDC warning light illuminate.
- "Er HC" is displayed in odo/trip meter.
- U0122 (ECM) and P1718 (TCM) is output.

### WIRING DIAGRAM:



LAN00549

Step	Check	Yes	No	
1	<b>CHECK DTC.</b> Read all DTCs using the Subaru Select Monitor. <Ref. to LAN(diag)-27, Read Diagnostic Trouble Code (DTC).>	Is there U1202, or any DTC other than for the body integrated unit?	Perform the diagnosis according to DTC.	Go to step 2.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

LAN SYSTEM (DIAGNOSTICS)

Step	Check	Yes	No
<b>2</b> <b>CHECK DTC.</b> Check DTC indicated by body integrated unit.	Is U1223 a current malfunction?	Go to step 3.	Go to step 7.
<b>3</b> <b>CHECK DTC.</b> 1) Turn the ignition switch to OFF. 2) Disconnect all connectors (B280, B310, B55, B136, B359, B231) that are connected to high speed CAN communication line. 3) Connect the disconnected connectors. 4) Turn the ignition switch to ON. 5) Read the DTC of body integrated unit using Subaru Select Monitor.	Is U1223 a current malfunction?	Go to step 4.	Go to step 7.
<b>4</b> <b>CHECK HARNESS.</b> 1) Disconnect all connectors (B280, B310, B55, B136, B230, B231) that are connected to high speed CAN communication line. 2) Using the tester, check for open, short (power supply-output short, GND-output short) in the harness. <b>Connector &amp; terminal</b> <b>(B402) No. 6 — (B310) No. 25:</b> <b>(B402) No. 14 — (B310) No. 13:</b>	Is harness normal?	Go to step 5.	Repair or replace the harness.
<b>5</b> <b>CHECK DTC.</b> 1) Connect the disconnected connectors. 2) Start the engine and stop. 3) Turn the ignition switch to ON. 4) Read the DTC of body integrated unit using Subaru Select Monitor.	Is U1223 a current malfunction?	Go to step 6.	Go to step 7.
<b>6</b> <b>CHECK DTC.</b> Read all DTCs using the Subaru Select Monitor.	Is P1718 or U0122 displayed?	Replace the VDC/ABS CM. <Ref. to VDC-7, VDC Control Module and Hydraulic Control Unit (VDCCM&H/U).>	Replace the body integrated unit. <Ref. to SL-48, REMOVAL, Body Integrated Unit.>
<b>7</b> <b>CHECK HARNESS.</b> 1) Shake the harness used for CAN communication circuit. 2) Read the DTC of body integrated unit using Subaru Select Monitor.	Is U1223 a current malfunction?	Repair or replace the harness.	Go to step 8.
<b>8</b> <b>CHECK CONNECTOR.</b> 1) Turn the ignition switch to OFF. 2) Disconnect all connectors (B280, B310, B55, B136, B359, B231) that are connected to high speed CAN communication line.	Is there connector terminal where poor contact exists?	Repair the connector terminal where poor contact exists, or replace harness.	Temporary poor contact occurs.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## LAN SYSTEM (DIAGNOSTICS)

### P: DTC U1300 CAN-LS MALFUNCTION

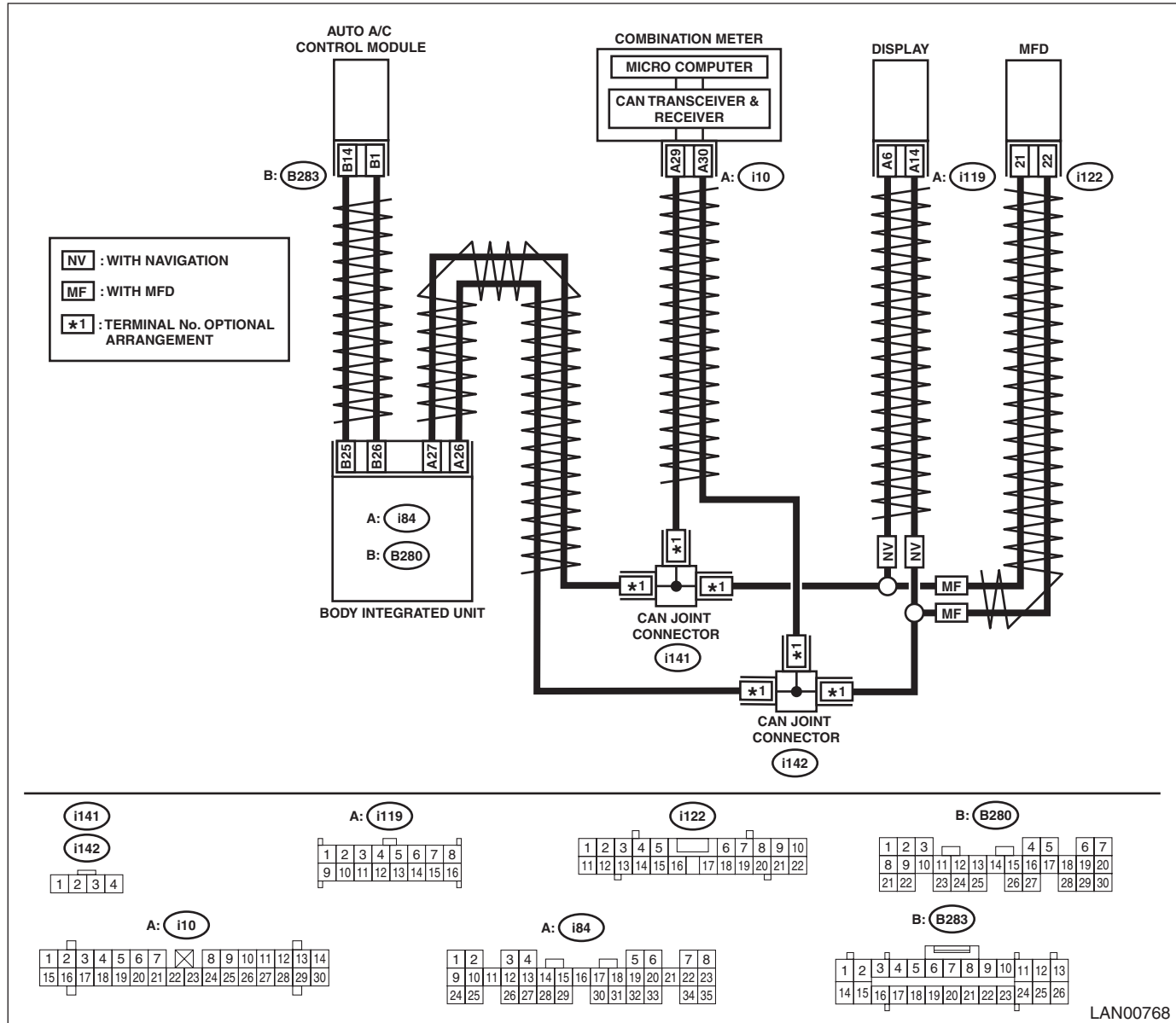
#### DTC DETECTING CONDITION:

Open or short in low speed CAN circuit

#### TROUBLE SYMPTOM:

“Er LC” is displayed in odo/trip meter, but communicating function is OK.

#### WIRING DIAGRAM:



LAN00768

Step	Check	Yes	No	
1	<b>CHECK DTC.</b> Read the DTC of body integrated unit using Subaru Select Monitor. <Ref. to LAN(diag)-27, Read Diagnostic Trouble Code (DTC).>	Is U1300 a current malfunction?	Go to step 2.	Go to step 7.



# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

LAN SYSTEM (DIAGNOSTICS)

Step	Check	Yes	No
<b>2 CHECK DTC.</b> 1) Disconnect all connectors for control module (i84 or B280, i10, B283, i119 or i122) that are connected to low speed CAN communication line. 2) Connect the disconnected connectors. 3) Turn the ignition switch to ON. 4) Read the DTC of body integrated unit using Subaru Select Monitor.	Is U1300 a current malfunction?	Go to step 3.	Go to step 7.
<b>3 CHECK HARNESS.</b> 1) Turn the ignition switch to OFF. 2) Disconnect all connectors for control module (i84 or B280, i10, B283, i119 or i122) that are connected to low speed CAN communication line. 3) Using the tester, inspect the open circuit of harness and short (power supply-output short, GND-output short). <b>Connector &amp; terminal</b> <i>(i84) No. 27 — (i10) No. 29 (combination meter):</i> <i>(i84) No. 26 — (i10) No. 30 (combination meter):</i> <i>(B280) No. 25 — (B283) No. 14 (auto A/C):</i> <i>(B280) No. 26 — (B283) No. 1 (auto A/C):</i> <i>(i84) No. 27 — (i122) No. 21 (MFD):</i> <i>(i84) No. 26 — (i122) No. 22 (MFD):</i> <i>(i84) No. 27 — (i119) No. 6 (navigation):</i> <i>(i84) No. 26 — (i119) No. 14 (navigation):</i>	Is harness normal?	Go to step 4.	Repair or replace the harness.
<b>4 CHECK MFD OR NAVIGATION.</b> 1) Connect the disconnected connectors. 2) Disconnect the connector of navigation (i119) or MFD (i122). 3) Turn the ignition switch to ON. 4) Read the DTC of body integrated unit using Subaru Select Monitor.	Is U1300 a current malfunction?	Go to step 5.	Replace the navigation or MFD. <Ref. to ET-27, REMOVAL, Navigation Body.>
<b>5 CHECK AUTO A/C CONTROL MODULE.</b> 1) Turn the ignition switch to OFF. 2) Connect the MFD or navigation connectors. 3) Disconnect the auto A/C control module connector (B283). 4) Turn the ignition switch to ON. 5) Read the DTC of body integrated unit using Subaru Select Monitor.	Is U1300 a current malfunction?	Go to step 6.	Replace the auto A/C control module. <Ref. to AC-33, REMOVAL, Control Unit (Auto A/C Model).>
<b>6 CHECK BODY INTEGRATED UNIT.</b> 1) Turn the ignition switch to OFF. 2) Connect the auto A/C control module. 3) Replace the body integrated unit of your vehicle with the body integrated unit from other vehicle, which is working normally. 4) Turn the ignition switch to ON. 5) Read the DTC of body integrated unit using Subaru Select Monitor.	Is U1300 a current malfunction?	Replace the combination meter. <Ref. to IDI-11, REMOVAL, Combination Meter.>	Replace the body integrated unit. <Ref. to SL-48, REMOVAL, Body Integrated Unit.>
<b>7 CHECK HARNESS.</b> 1) Turn the ignition switch to OFF. 2) Shake the harness used for CAN communication circuit. 3) Turn the ignition switch to ON. 4) Read the DTC of body integrated unit using Subaru Select Monitor.	Is U1300 a current malfunction?	Repair or replace the harness.	Go to step 8.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## LAN SYSTEM (DIAGNOSTICS)

	Step	Check	Yes	No
8	<b>CHECK CONNECTOR.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connector that is connected to low speed CAN circuit.	Is there poor contact at disconnected connector?	Repair the connector terminal, or replace harness.	Temporary communication failure occurs.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

LAN SYSTEM (DIAGNOSTICS)

## Q: DTC U1301 CAN-LS COUNTER ABNORMAL

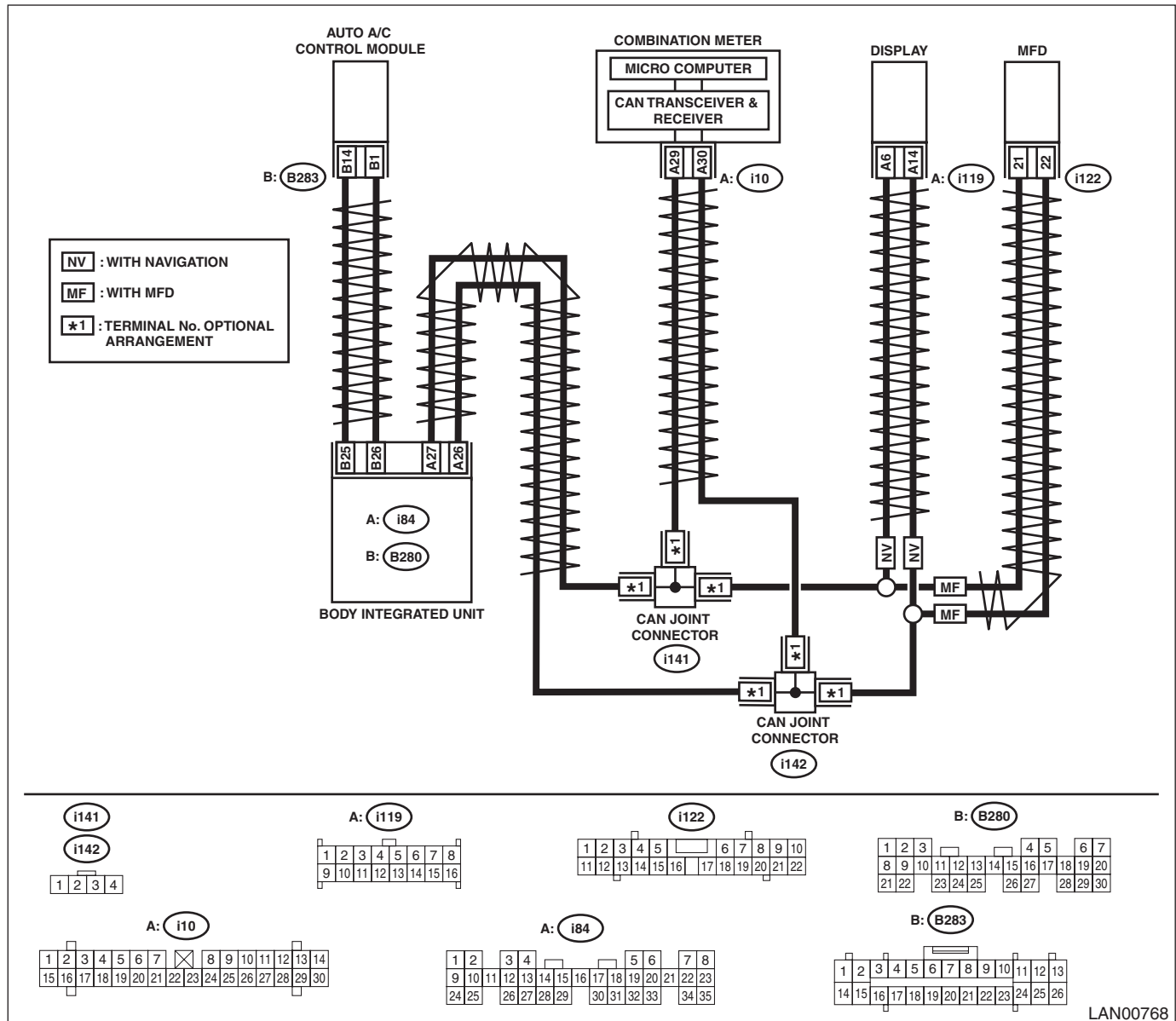
### DTC DETECTING CONDITION:

High speed CAN communication becomes unstable because of low speed CAN communication error.

### TROUBLE SYMPTOM:

Display error may occur in fuel gauge because the CAN communication is not transmitted (sending/receiving) normally.

### WIRING DIAGRAM:



LAN00768

Step	Check	Yes	No	
1	<b>CHECK DTC.</b> Read the DTC of body integrated unit using Subaru Select Monitor. <Ref. to LAN(diag)-27, Read Diagnostic Trouble Code (DTC).>	Are there DTC U1300 or U1302?	Perform the diagnosis according to DTC.	Go to step 2.
2	<b>CHECK DTC.</b> Read the DTC of body integrated unit using Subaru Select Monitor.	Is U1301 a current malfunction?	Go to step 3.	Go to step 9.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## LAN SYSTEM (DIAGNOSTICS)

Step	Check	Yes	No
<b>3 CHECK DTC.</b> 1) Turn the ignition switch to OFF. 2) Disconnect all control module connectors (i84, or B280, i10, B283, i119 or i122) that are connected to low speed CAN communication line. 3) Connect the disconnected connectors. 4) Turn the ignition switch to ON. 5) Read the DTC of body integrated unit using Subaru Select Monitor.	Is U1301 a current malfunction?	Go to step 4.	Go to step 9.
<b>4 CHECK HARNESS.</b> 1) Turn the ignition switch to OFF. 2) Disconnect all control module connectors (i84, or B280, i10, B283, i119 or i122) that are connected to low speed CAN communication line. 3) Using the tester, check for open, short (power supply-output short, GND-output short) in the harness.  <b>Connector &amp; terminal</b> <i>(i84) No. 27 — (i10) No. 29 (combination meter):</i> <i>(i84) No. 26 — (i10) No. 30 (combination meter):</i> <i>(B280) No. 25 — (B283) No. 14 (auto A/C):</i> <i>(B280) No. 26 — (B283) No. 1 (auto A/C):</i> <i>(i84) No. 27 — (i122) No. 21 (MFD):</i> <i>(i84) No. 26 — (i122) No. 22 (MFD):</i> <i>(i84) No. 27 — (i119) No. 6 (navigation):</i> <i>(i84) No. 26 — (i119) No. 14 (navigation):</i>	Is harness normal?	Go to step 5.	Repair or replace the harness.
<b>5 CHECK MFD OR NAVIGATION.</b> 1) Connect the disconnected connectors. 2) Disconnect the connector of navigation (i119) or MFD (i122). 3) Turn the ignition switch to ON. 4) Read the DTC of body integrated unit using Subaru Select Monitor.	Is U1301 a current malfunction?	Go to step 6.	Replace the MFD or navigation. <Ref. to ET-26, REMOVAL, Navigation Display.>
<b>6 CHECK AUTO A/C CONTROL MODULE.</b> 1) Turn the ignition switch to OFF. 2) Connect the audio or navigation module. 3) Disconnect the auto A/C control module connector (B283). 4) Turn the ignition switch to ON. 5) Read the DTC of body integrated unit using Subaru Select Monitor.	Is U1301 a current malfunction?	Go to step 7.	Replace the auto A/C control module. <Ref. to AC-33, REMOVAL, Control Unit (Auto A/C Model).>
<b>7 CHECK COMBINATION METER.</b> 1) Turn the ignition switch to OFF. 2) Connect the disconnected connectors. 3) Perform the self-diagnosis of combination meter.	Is the self-diagnosis of combination meter OK?	Go to step 8.	Replace the combination meter.
<b>8 CHECK BODY INTEGRATED UNIT.</b> 1) Turn the ignition switch to OFF. 2) Disconnect all control module connectors (i84, or B280, i10, B283, i119 or i122) that are connected to low speed CAN communication line. 3) Connect the disconnected connectors. 4) Turn the ignition switch to ON. 5) Read the DTC of body integrated unit using Subaru Select Monitor.	Is U1301 a current malfunction?	Replace the body integrated unit. <Ref. to SL-48, Body Integrated Unit.>	Go to step 9.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

LAN SYSTEM (DIAGNOSTICS)

Step	Check	Yes	No
<b>9</b> <b>CHECK HARNESS.</b> 1) Turn the ignition switch to OFF. 2) Shake the harness used for low speed CAN communication circuit. 3) Turn the ignition switch to ON. 4) Read the DTC of body integrated unit using Subaru Select Monitor.	Is U1301 a current malfunction?	Repair or replace the harness.	Go to step 10.
<b>10</b> <b>CHECK CONNECTOR.</b> 1) Turn the ignition switch to OFF. 2) Disconnect all control module connectors (i84, or B280, i10, B283, i119 or i122) that are connected to low speed CAN communication line.	Is there poor contact of connector terminal?	Repair the connector terminal, or replace harness.	Temporary communication failure occurs.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## LAN SYSTEM (DIAGNOSTICS)

### R: DTC U1302 CAN-LS BUS OFF

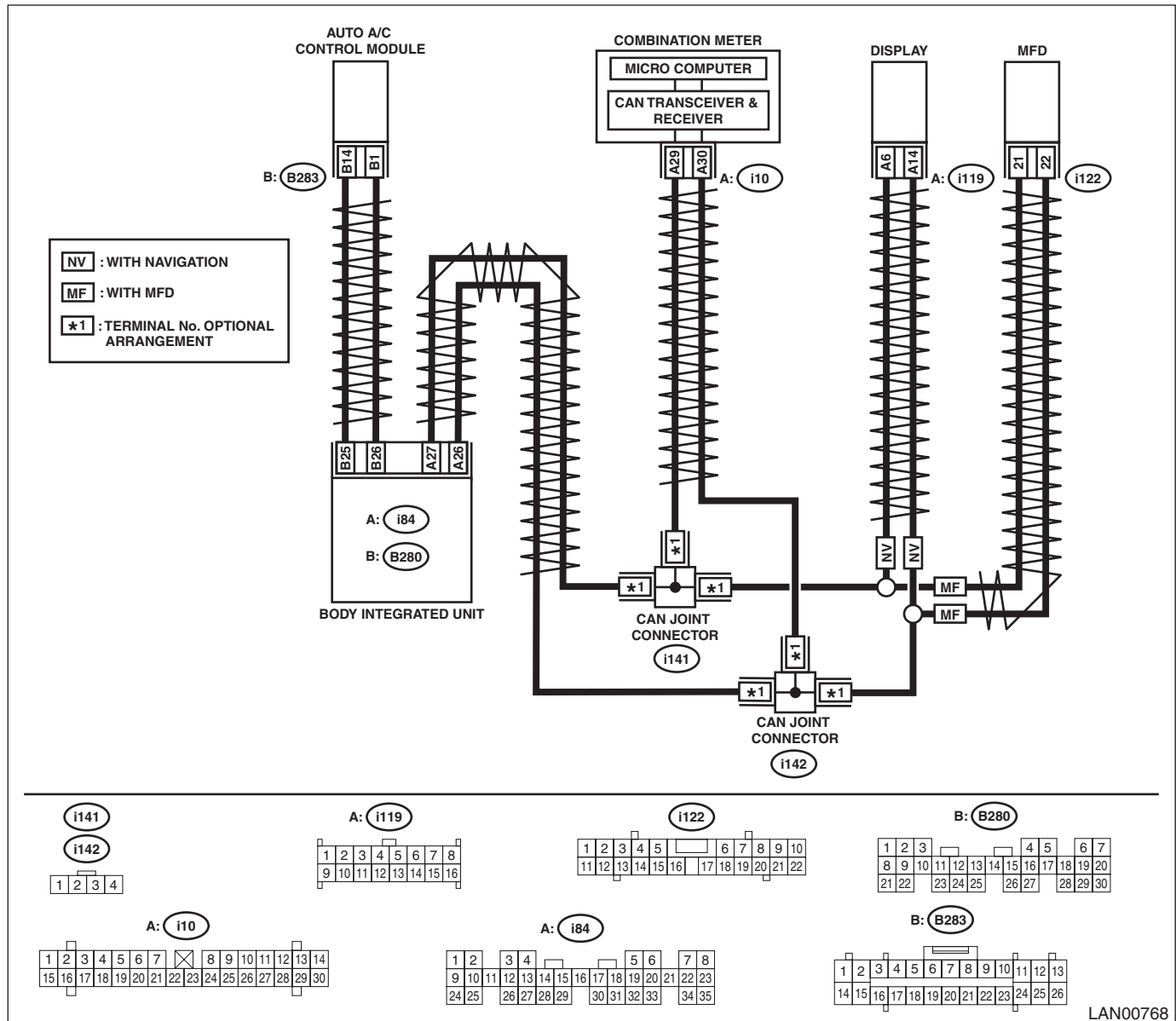
#### DTC DETECTING CONDITION:

Integrated unit communication is shut down because of low speed CAN communication error.

#### TROUBLE SYMPTOM:

Display error may occur in fuel system because the CAN communication is not transmitted (sending/receiving) normally.

#### WIRING DIAGRAM:



Step	Check	Yes	No	
1	<b>CHECK DTC.</b> Read the DTC of body integrated unit using Subaru Select Monitor. <Ref. to LAN(diag)-27, Read Diagnostic Trouble Code (DTC).>	Is U1302 a current malfunction?	Go to step 2.	Go to step 8.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

LAN SYSTEM (DIAGNOSTICS)

Step	Check	Yes	No
<b>2 CHECK DTC.</b> 1) Turn the ignition switch to OFF. 2) Disconnect all control module connectors (i84, or B280, i10, B283, i119 or i122) that are connected to low speed CAN communication line. 3) Connect the disconnected connectors. 4) Turn the ignition switch to ON. 5) Read the DTC of body integrated unit using Subaru Select Monitor.	Is U1302 a current malfunction?	Go to step 3.	Go to step 8.
<b>3 CHECK HARNESS.</b> 1) Disconnect all control module connectors (i84, or B280, i10, B283, i119 or i122) that are connected to low speed CAN communication line. 2) Using the tester, check for open, short (power supply-output short, GND-output short) in the harness. <b>Connector &amp; terminal</b> <i>(i84) No. 26 — (i10) No. 30 (combination meter):</i> <i>(i84) No. 27 — (i10) No. 29 (combination meter):</i> <i>(B280) No. 25 — (B283) No. 14 (auto A/C):</i> <i>(B280) No. 26 — (B283) No. 1 (auto A/C):</i> <i>(i84) No. 26 — (i85) No. 22 (MFD):</i> <i>(i84) No. 27 — (i85) No. 21 (MFD):</i> <i>(i84) No. 26 — (i50) No. 14 (navigation):</i> <i>(i84) No. 27 — (i50) No. 6 (navigation):</i>	Is harness normal?	Go to step 4.	Repair or replace the harness.
<b>4 CHECK HARNESS.</b> 1) Turn the ignition switch to OFF. 2) Connect the disconnected connectors. 3) Using the tester, measure the resistance between harness connector and chassis ground. <b>Connector &amp; terminal</b> <i>(i84) No. 26 — Chassis ground:</i> <i>(i84) No. 27 — Chassis ground:</i>	Is the resistance 1 MΩ or more?	Go to step 5.	Go to step 7.
<b>5 CHECK HARNESS.</b> 1) Turn the ignition switch to ON. 2) Using the tester, measure the voltage between harness connector and chassis ground. <b>Connector &amp; terminal</b> <i>(i84) No. 26 (+) — Chassis ground (-):</i> <i>(i84) No. 27 (+) — Chassis ground (-):</i>	Is the voltage less than 6 V?	Replace the body integrated unit. <Ref. to SL-48, Body Integrated Unit.>	Go to step 6.
<b>6 CHECK HARNESS.</b> With the tester connected, disconnect control module.	Is there any control module whose voltage has changed?	Replace the control module whose voltage has changed.	Repair or replace the short circuit of the harness.
<b>7 CHECK HARNESS.</b> With the tester connected, disconnect control module.	Is there any control module whose resistance has changed?	Replace the control module whose resistance has changed.	Repair or replace the short circuit of the harness.
<b>8 CHECK HARNESS.</b> 1) Shake the harness used for low speed CAN communication circuit. 2) Read the DTC of body integrated unit using Subaru Select Monitor.	Is U1302 a current malfunction?	Repair or replace the open, short circuit of the harness.	Go to step 9.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## LAN SYSTEM (DIAGNOSTICS)

	Step	Check	Yes	No
9	<b>CHECK CONNECTOR.</b> 1) Turn the ignition switch to OFF. 2) Disconnect all control module connectors (i84, or B280, i10, B283, i119 or i122) that are connected to low speed CAN communication line.	Is there poor contact of connector terminal?	Repair the connector terminal, or replace harness.	Temporary communication failure occurs.



# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

LAN SYSTEM (DIAGNOSTICS)

## S: DTC U1311 CAN-LS METER UNIT DATA ABNORMAL

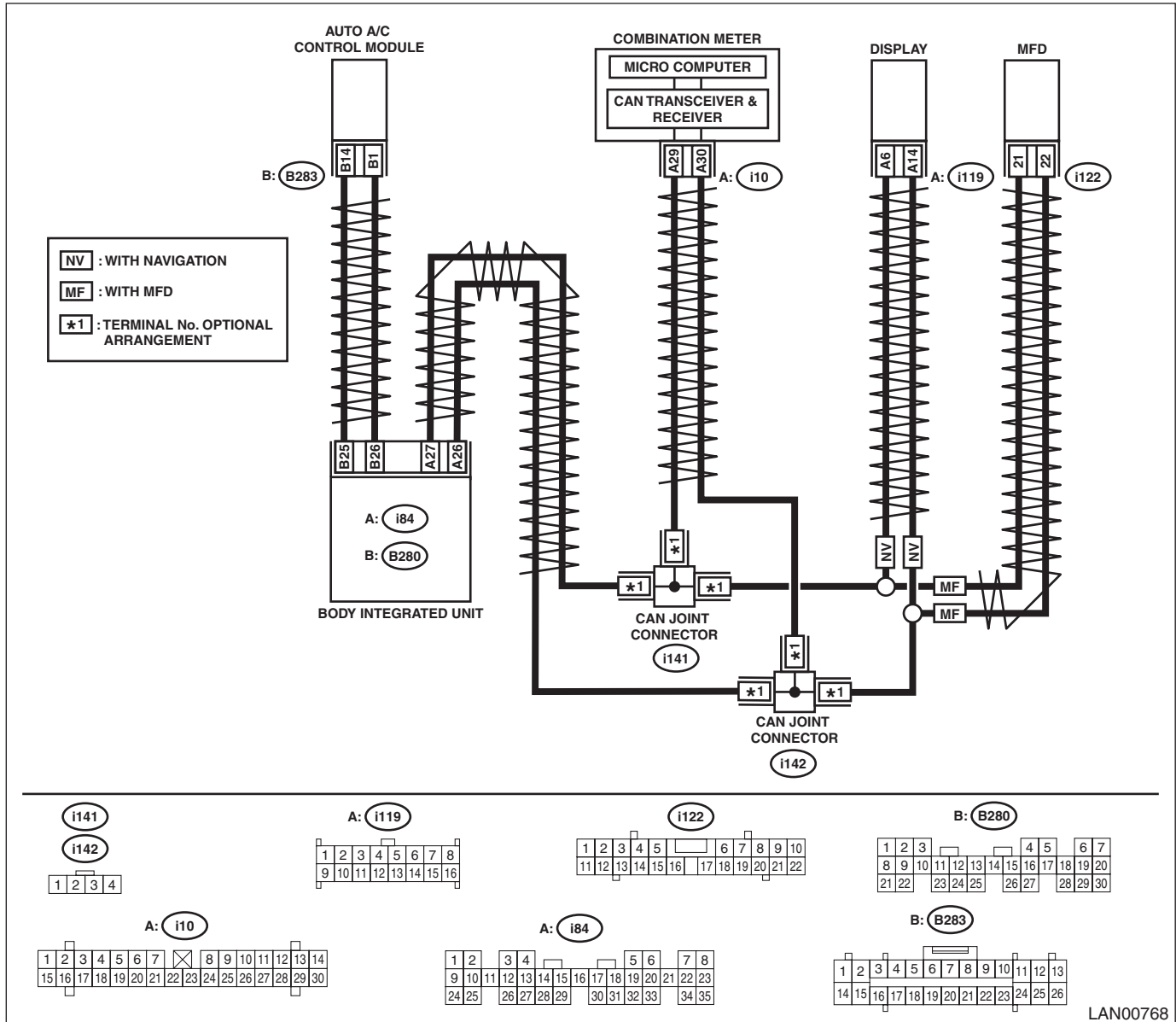
### DTC DETECTING CONDITION:

Error data is received from combination meter.

### TROUBLE SYMPTOM:

Defective data from combination meter occurs.

### WIRING DIAGRAM:



Step	Check	Yes	No	
1	<b>CHECK DTC.</b> Read the DTC of body integrated unit using Subaru Select Monitor. <Ref. to LAN(diag)-27, Read Diagnostic Trouble Code (DTC).>	Is DTC U1300 or U1302 displayed?	Perform the diagnosis according to DTC.	Go to step 2.
2	<b>CHECK DTC.</b> Read the DTC of body integrated unit using Subaru Select Monitor.	Is U1311 a current malfunction?	Go to step 3.	Go to step 4.

## Diagnostic Procedure with Diagnostic Trouble Code (DTC)

### LAN SYSTEM (DIAGNOSTICS)

Step	Check	Yes	No
<b>3</b> <b>CHECK DTC.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the combination meter connector (i10). 3) Connect the disconnected connectors. 4) Turn the ignition switch to ON. 5) Read the DTC of body integrated unit using Subaru Select Monitor.	Is U1311 a current malfunction?	Replace the combination meter. <Ref. to IDI-11, REMOVAL, Combination Meter.>	Go to step 4.
<b>4</b> <b>CHECK HARNESS.</b> 1) Shake the harness used for low speed CAN communication circuit. 2) Read the DTC of body integrated unit using Subaru Select Monitor.	Is U1311 a current malfunction?	Repair or replace the harness.	Go to step 5.
<b>5</b> <b>CHECK CONNECTOR.</b> 1) Turn the ignition switch to OFF. 2) Disconnect all control module connectors (i84, or B280, i10, B283, i119 or i122) that are connected to low speed CAN communication line.	Is there poor contact of connector terminal?	Repair the connector terminal, or replace harness.	Temporary communication failure occurs.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

LAN SYSTEM (DIAGNOSTICS)

## T: DTC U1321 CAN-LS METER NO-RECEIVE DATA

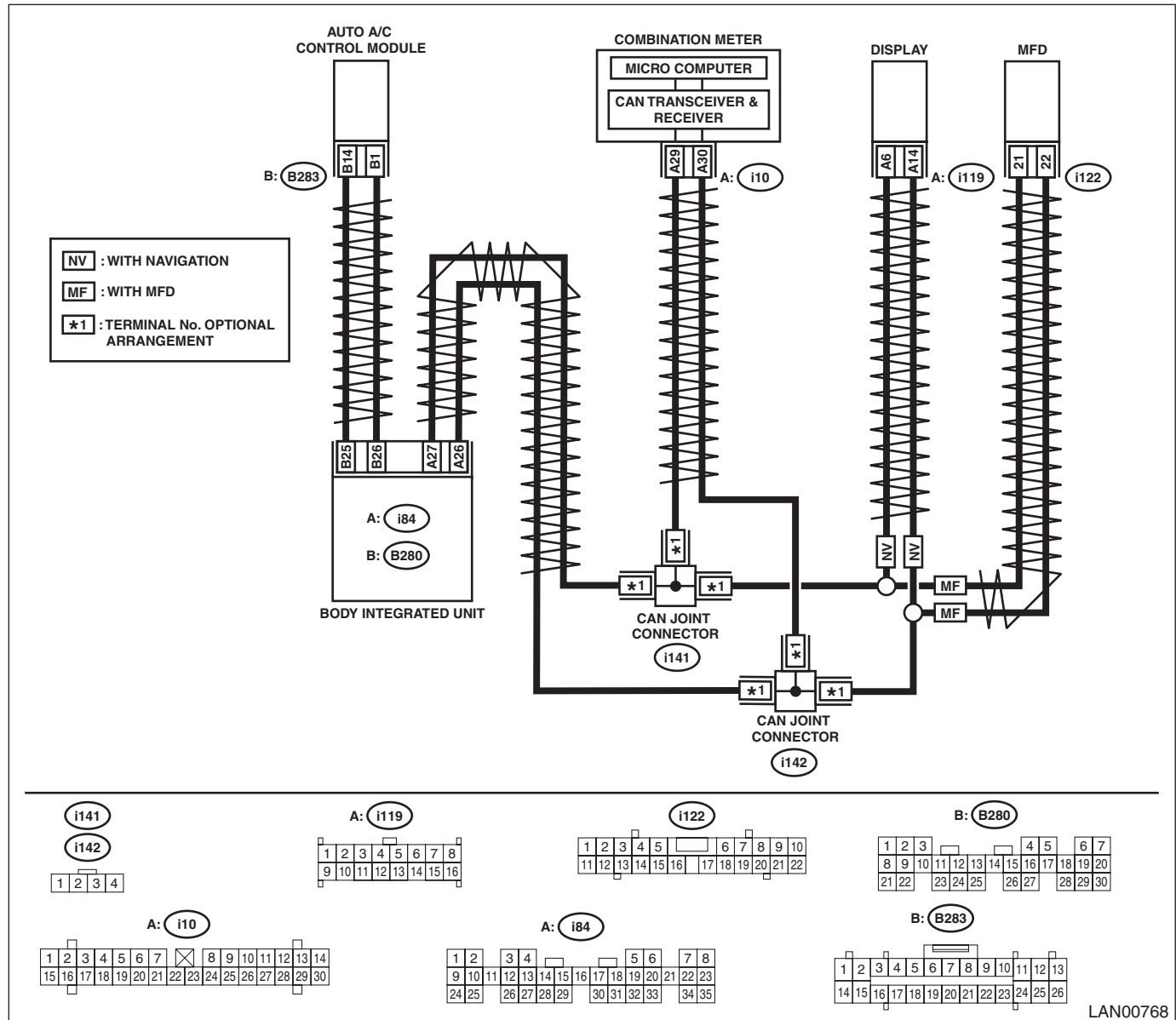
### DTC DETECTING CONDITION:

Not received data from combination meter.

### TROUBLE SYMPTOM:

- Engine may not be started.
- "Er LC" is displayed in odo/trip meter.

### WIRING DIAGRAM:



LAN00768

Step	Check	Yes	No	
1	<b>CHECK ALL DTCS.</b> Read all DTCs using the Subaru Select Monitor. <Ref. to LAN(diag)-27, Read Diagnostic Trouble Code (DTC).>	Is U1300 or U1302 displayed?	Perform the diagnosis according to DTC.	Go to step 2.
2	<b>CHECK DTC.</b> Read the DTC of body integrated unit using Subaru Select Monitor.	Is U1321 a current malfunction?	Go to step 3.	Go to step 7.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

## LAN SYSTEM (DIAGNOSTICS)

Step	Check	Yes	No
<b>3 CHECK DTC.</b> 1) Turn the ignition switch to OFF. 2) Disconnect all control module connectors (i84, or B280, i10, B283, i119 or i122) that are connected to low speed CAN communication line. 3) Connect the disconnected connectors. 4) Turn the ignition switch to ON. 5) Read the DTC of body integrated unit using Subaru Select Monitor.	Is U1321 a current malfunction?	Go to step 4.	Go to step 7.
<b>4 CHECK HARNESS.</b> 1) Turn the ignition switch to OFF. 2) Disconnect all control module connectors (i84, or B280, i10, B283, i119 or i122) that are connected to low speed CAN communication line. 3) Using the tester, check for open, short (power supply-output short, GND-output short) in the harness.  <b>Connector &amp; terminal</b> <i>(i84) No. 26 — (i10) No. 30 (combination meter):</i> <i>(i84) No. 27 — (i10) No. 29 (combination meter):</i> <i>(B280) No. 25 — (B283) No. 14 (auto A/C):</i> <i>(B280) No. 26 — (B283) No. 1 (auto A/C):</i> <i>(i84) No. 26 — (i85) No. 22 (MFD):</i> <i>(i84) No. 27 — (i85) No. 21 (MFD):</i> <i>(i84) No. 26 — (i50) No. 14 (navigation):</i> <i>(i84) No. 27 — (i50) No. 6 (navigation):</i>	Is harness normal?	Go to step 5.	Repair or replace the harness.
<b>5 CHECK COMBINATION METER.</b> 1) Connect the disconnected connectors. 2) Perform the self-diagnosis of combination meter.	Is the self diagnosis normal?	Go to step 6.	Replace the combination meter.
<b>6 CHECK DTC.</b> 1) Turn the ignition switch to OFF. 2) Disconnect all control module connectors (i84, or B280, i10, B283, i119 or i122) that are connected to low speed CAN communication line. 3) Connect the disconnected connectors. 4) Turn the ignition switch to ON. 5) Read the DTC of body integrated unit using Subaru Select Monitor.	Is U1321 a current malfunction?	Replace the body integrated unit. <Ref. to SL-48, Body Integrated Unit.>	Go to step 7.
<b>7 CHECK HARNESS.</b> 1) Shake the harness used for low speed CAN communication circuit. 2) Read the DTC of body integrated unit using Subaru Select Monitor.	Is U1321 a current malfunction?	Repair the poor contact, open circuit of harness or replace harness.	Go to step 8.
<b>8 CHECK CONNECTOR.</b> 1) Turn the ignition switch to OFF. 2) Disconnect all control module connectors (i84, or B280, i10, B283, i119 or i122) that are connected to low speed CAN communication line.	Is there poor contact of connector terminal?	Repair the connector terminal, or replace harness.	It is possible that temporary poor communication occurs.

# Diagnostic Procedure with Diagnostic Trouble Code (DTC)

LAN SYSTEM (DIAGNOSTICS)

## U: DTC B1500 KEYLESS UART COM. MALFUNCTION

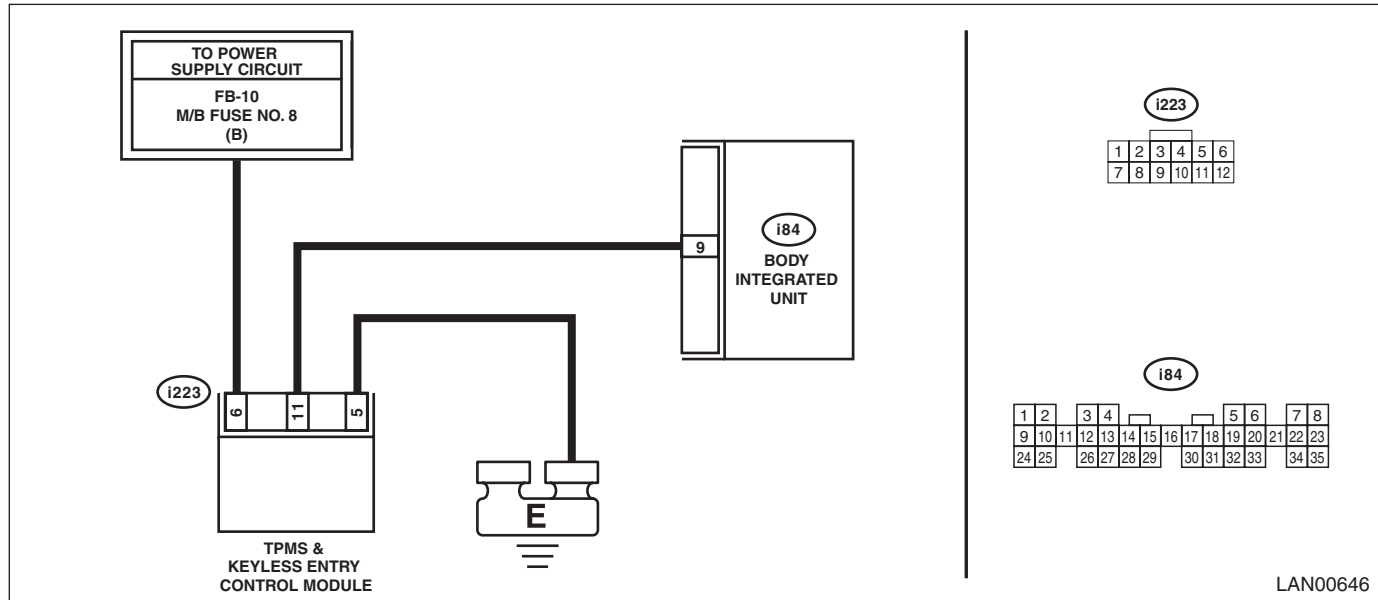
### DTC DETECTING CONDITION:

UART (communication line) between TPMS & keyless entry control module and body integrated unit is open or shorted, the connector is not connected properly, or the terminal is crimped improperly, TPMS & keyless entry control module internal error.

### TROUBLE SYMPTOM:

Door lock does not operate with keyless.

### WIRING DIAGRAM:



Step	Check	Yes	No
<b>1 CHECK DTC.</b> 1) Insert the ignition key and remove. 2) Read the DTC of body integrated unit using Subaru Select Monitor. <Ref. to LAN(diag)-27, Read Diagnostic Trouble Code (DTC).>	Is B1500 current malfunction?	Go to step 2.	Go to step 7.
<b>2 CHECK DTC.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from body integrated unit and TPMS & keyless entry control module. 3) Connect the disconnected connectors. 4) Turn the ignition switch to ON. 5) Read the DTC of body integrated unit using Subaru Select Monitor.	Is B1500 current malfunction?	Go to step 3.	Go to step 7.
<b>3 CHECK HARNESS.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from body integrated unit and TPMS & keyless entry control module. 3) Using the tester, check for open, short (power supply-output short, GND-output short) in the harness. <b>Connector &amp; terminal</b> <b>(i84) No. 9 — (i223) No. 11:</b>	Is harness normal?	Go to step 4.	Repair or replace the harness.

## Diagnostic Procedure with Diagnostic Trouble Code (DTC)

### LAN SYSTEM (DIAGNOSTICS)

Step	Check	Yes	No
<b>4</b> <b>CHECK HARNESS.</b> Using the tester, measure the voltage between TPMS & keyless entry control module and chassis ground. <b>Connector &amp; terminal</b> <b>(i223) No. 6 (+) — Chassis ground (-):</b>	Is the voltage battery voltage?	Go to step 5.	Check the power supply circuit for TPMS & keyless entry control module.
<b>5</b> <b>CHECK HARNESS.</b> Using the tester, measure the resistance between TPMS & keyless entry control module and chassis ground. <b>Connector &amp; terminal</b> <b>(i223) No. 5 — Chassis ground:</b>	Is the resistance less than 10 $\Omega$ ?	Go to step 6.	Repair or replace the open circuit of harness.
<b>6</b> <b>CHECK OPERATION.</b> 1) Install the TPMS & keyless entry control module from other vehicle, which is working normally. 2) Register the keyless key which is working normally. 3) Operate the keyless key.	Is the door locking operate?	Replace the TPMS & keyless entry control module. <Ref. to SL-46, REMOVAL, Keyless Entry Control Module.>	Replace the body integrated unit. <Ref. to SL-48, Body Integrated Unit.>
<b>7</b> <b>CHECK CONNECTOR.</b> Disconnect the connectors from body integrated unit and TPMS & keyless entry control module.	Is there poor contact of connector?	Repair the connector, or replace harness.	Temporary poor contact occurs.

## 13. General Diagnostic Table

### A: INSPECTION

Item	Operation	Specifications		Index
		YES	NO	
Diagnostic code	DTC is not displayed when inspecting all DTCs.	System is normal.	Perform the diagnosis according to DTC.	—
Engine coolant temperature	Engine coolant temperature gauge displays correctly without engine coolant temperature warning light illuminating/blinking.	System is normal.	Refer to the following to check. • Engine cooling system • LAN system	Check the current data display of ECM, TCM and body integrated unit, and if three data values differ, it is possible that the driving system CAN is malfunctioning.
Remaining fuel level	Fuel gauge displays correctly without low fuel warning light remaining illuminated.	System is normal.	Refer to the following to check. • Combination meter system • LAN system	Display the current data of body integrated unit, and if the values of “Fuel level resistance” and “Fuel level resistance 2” differ, it is possible that the body integrated unit is malfunctioning.
Ambient air temperature	Ambient air temperature is displayed correctly.	System is normal.	Refer to the following to check. • HVAC system • LAN system	—
Rear window defogger	Rear window defogger operates by operating the switch. Indicator in the switch illuminates when rear window defogger is operating.	System is normal.	Refer to the following to check. • Rear window defogger • HVAC system	—
Wiper deicer	Wiper deicer operates by operating the switch.	System is normal.	Refer to the following to check. • Wiper deicer system • HVAC system	Operates only when the customization of the body integrated unit “wiperdeicer” is set to “ON”.
Rear wiper	Rear wiper operates normally by operating the switch.	System is normal.	Refer to the following to check. • Wiper and washer system	—
Key interlock	Key cannot be removed in other than the parking range. Key can be removed in the parking range.	System is normal.	Refer to the following to check. • Shift lock control system • LAN system	—
Shift Lock	Shift operation is normal.	System is normal.	Refer to the following to check. • Shift lock control system • Combination meter system • LAN system	—

## General Diagnostic Table

### LAN SYSTEM (DIAGNOSTICS)

Item	Operation	Specifications		Index
		YES	NO	
Seat belt warning system	Indicator in the meter illuminate when driver's seat belt is not worn. Alarm sounds when vehicle speed is approx. 15 km/h (9.4 MPH) without seat belt fastened. Indicator in the center display illuminates when passenger's seat is occupied and the passenger's seat belt is not fastened. Alarm sounds when vehicle speed is approx. 15 km/h (9.4 MPH) without seat belt fastened.	System is normal.	Refer to the following to check. <ul style="list-style-type: none"> <li>• Seat belt warning system</li> <li>• Combination meter system</li> <li>• LAN system</li> </ul>	—
Door lock	Lock/unlock operates by operating the central door lock switch. Rear gate opens by operating the rear gate release switch.	System is normal.	Refer to the following to check. <ul style="list-style-type: none"> <li>• Security and locks</li> <li>• LAN system</li> </ul>	—
Keyless Entry	Lock/unlock operates by operating the keyless transmitter. Rear gate unlocks by operating the rear gate unlock button.	System is normal.	Refer to the following to check. <ul style="list-style-type: none"> <li>• Security and locks</li> <li>• LAN system</li> </ul>	—
Answer back	Answer back operates by operating lock/unlock with the keyless entry.	System is normal.	Refer to the following to check. <ul style="list-style-type: none"> <li>• Security and locks</li> <li>• LAN system</li> </ul>	—
Room light	Turns ON/OFF according to the door open/close operation, the lock/unlock operation with the keyless entry, and the ignition operation.	System is normal.	Refer to the following to check. <ul style="list-style-type: none"> <li>• Room light system</li> <li>• Security and locks</li> <li>• LAN system</li> </ul>	—
Map light	Turns ON/OFF according to the door open/close operation, the lock/unlock operation with the keyless entry, and the ignition operation.	System is normal.	Refer to the following to check. <ul style="list-style-type: none"> <li>• Spot map light</li> <li>• Security and locks</li> <li>• LAN system</li> </ul>	—
Luggage light	Turns ON/OFF according to the door open/close operation, the lock/unlock operation with the keyless entry, and the ignition operation.	System is normal.	Refer to the following to check. <ul style="list-style-type: none"> <li>• Luggage light</li> <li>• Security and locks</li> <li>• LAN system</li> </ul>	—
Key illumination	Turns ON/OFF according to the driver's side door open/close and the ignition operation.	System is normal.	Refer to the following to check. <ul style="list-style-type: none"> <li>• Ignition switch illumination</li> <li>• Security and locks</li> <li>• LAN system</li> </ul>	Key illumination blinks when customization of the body integrated unit "Factory initial setting" is set to "Factory".



# General Diagnostic Table

LAN SYSTEM (DIAGNOSTICS)

Item	Operation	Specifications		Index
		YES	NO	
Illumination control	Illumination volume control is available.	System is normal.	Refer to the following to check. <ul style="list-style-type: none"><li>• Illumination control</li><li>• Combination meter system</li><li>• LAN system</li></ul>	—
Engine start	Engine starts normally.	System is normal.	Refer to the following to check. <ul style="list-style-type: none"><li>• Engine (diagnostics)</li><li>• Immobilizer</li><li>• LAN system</li></ul>	—
Vehicle security	When locked by the keyless entry, security monitor condition starts. When unlocked by the keyless entry, security is released.	System is normal.	Refer to the following to check. <ul style="list-style-type: none"><li>• Security and locks</li><li>• LAN system</li></ul>	—

# General Diagnostic Table

LAN SYSTEM (DIAGNOSTICS)

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**WIRING SYSTEM SECTION**

**WIRING SYSTEM**

**WI**

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.



# WIRING SYSTEM



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## 1. Basic Diagnostic Procedure

### A: BASIC PROCEDURES

#### 1. GENERAL DESCRIPTION

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

#### 2. IDENTIFICATION OF TROUBLE SYMPTOM

Determine what the problem is based on the symptom.

#### 3. PROBABLE CAUSE OF TROUBLE

Look at the wiring diagram and check the system's circuit. Then check the switch, relay, fuse, ground, etc.

#### 4. LOCATION AND REPAIR OF TROUBLE

- 1) Using the diagnostics, narrow down the causes.
- 2) If necessary, use a voltmeter, ohmmeter, etc.
- 3) Before replacing certain component parts (switch, relay, etc.), check the power supply, ground, for open wiring harness, poor connectors, etc. If no problem is encountered, check the component parts.

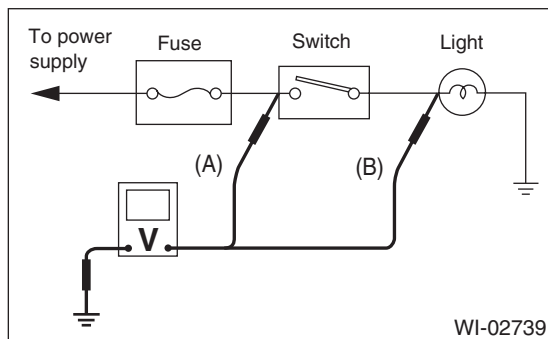
#### 5. SYSTEM OPERATION CHECK

After repairing, ensure that the system operates properly.

### B: BASIC INSPECTION

#### 1. VOLTAGE MEASUREMENT

- 1) Using a voltmeter, connect the negative lead to a good ground point or negative battery terminal and the positive lead to the connector or component terminal.
- 2) Contact the positive lead of the voltmeter on connector (A). The voltmeter will indicate a voltage.
- 3) Shift the positive lead to connector (B). The voltmeter will indicate no voltage.



- 4) With the test set-up held as it is, turn the switch to ON. The voltmeter will indicate a voltage and, at the same time, the light will illuminate.

- 5) The circuit is in good order. If a problem such as a light failing to illuminate occurs, use the procedures outlined above to track down the malfunction.

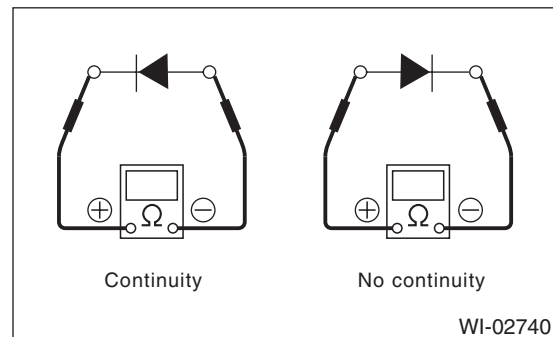
#### 2. CIRCUIT CONTINUITY CHECKS

- 1) Disconnect the battery terminal or connector so there is no voltage between the check points. Contact the two leads of an ohmmeter to each of the check points.

If the circuit has diodes, reverse the two leads and check again.

- 2) Use an ohmmeter to check for diode continuity. When contacting the negative lead to the diode positive side and the positive lead to the negative side, there should be continuity.

When contacting the two leads in reverse, there should be no continuity.



- 3) The symbol "○ — ○" indicates that continuity exists between two points or terminals. For example, when a switch position is at "3", continuity exists among terminals 1, 3 and 6, as shown in the table below.

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

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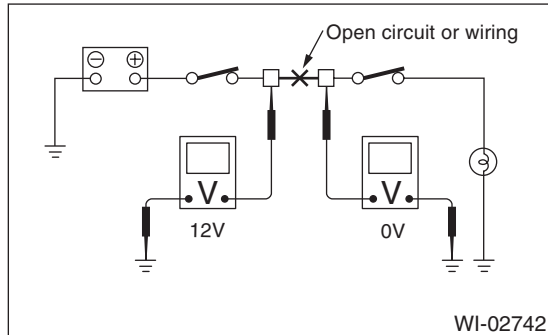
# Basic Diagnostic Procedure

## WIRING SYSTEM

### 3. HOW TO DETERMINE AN OPEN CIRCUIT

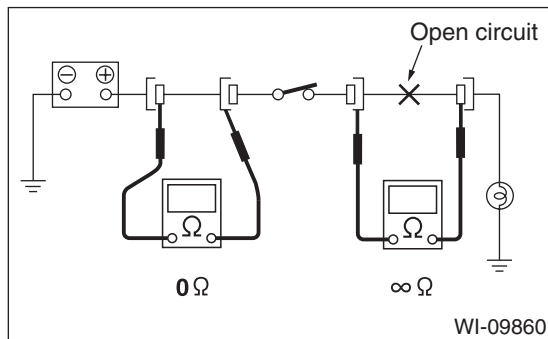
#### 1) WITH VOLTMETER:

An open circuit is determined by measuring the voltage between respective connectors and ground using a voltmeter, starting with the connector closest to the power supply. The power supply must be turned ON so that current flows in the circuit. If voltage is not present between a particular connector and ground, the circuit between that connector and the previous connector is open.



#### 2) WITH OHMMETER:

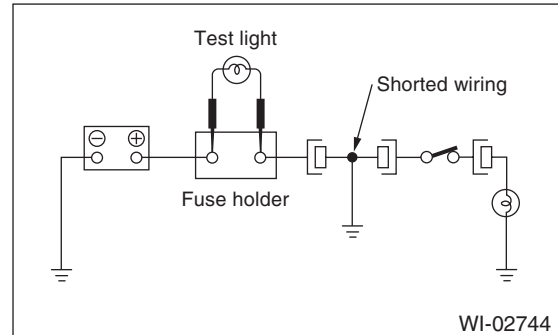
Disconnect all connectors affected, and check continuity in the wiring between adjacent connectors. When the ohmmeter indicates "infinite", the wiring is open.



### 4. HOW TO DETERMINE A SHORT CIRCUIT

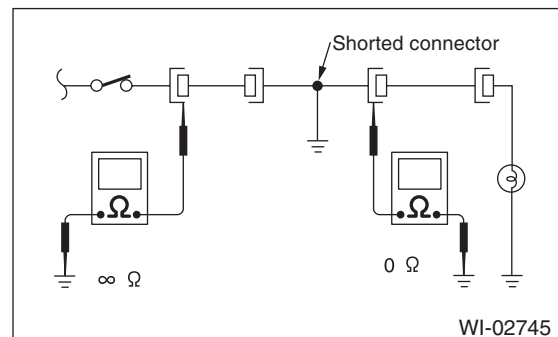
#### 1) WITH TEST LIGHT:

Connect a test light (rated at approx. 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 light goes out when a connector is disconnected, the wiring between that connector and the next connector (farther from the power supply) is shorted.



#### 2) WITH OHMMETER:

Disconnect all affected connectors, and check continuity between each connector and ground. When the ohmmeter indicates continuity between a particular connector and a ground, that connector is shorted.





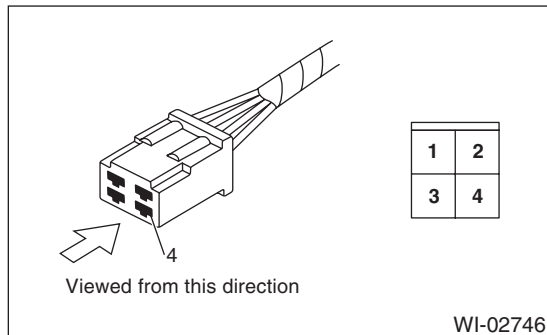
## C: HOW TO READ WIRING DIAGRAMS

### 1. WIRING DIAGRAM

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

Sketches and codes are used in the diagrams. They should read as follows:

- Each connector and its terminal position are indicated by a sketch of the connector in a disconnected state which is viewed from the front.



- The number of poles or pins, presence of a lock 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.

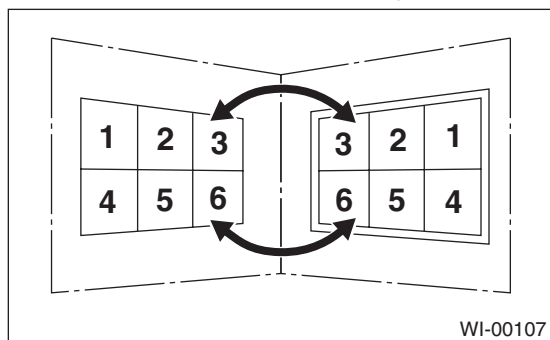
Connector used in vehicle	Connector shown in wiring diagram											
	Sketch	Symbol	Number of poles									
	<p>Double frames</p> <p>Indicates a lock is included.</p> <table border="1" style="margin: auto; text-align: center;"> <tr><td>4</td><td>3</td><td>2</td><td>1</td></tr> <tr><td>9</td><td>8</td><td>7</td><td>6</td><td>5</td></tr> </table> <p>Indicates the number of poles.</p>	4	3	2	1	9	8	7	6	5		<p>Numbered in order from upper right to lower left</p>
4	3	2	1									
9	8	7	6	5								
	<p>Indicates a lock is included.</p> <table border="1" style="margin: auto; text-align: center;"> <tr><td>1</td><td>2</td><td>3</td><td>4</td></tr> <tr><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td></tr> </table> <p>Single frame</p>	1	2	3	4	5	6	7	8	9		<p>Numbered in order from upper left to lower right</p>
1	2	3	4									
5	6	7	8	9								

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# Basic Diagnostic Procedure

## WIRING SYSTEM

- 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.



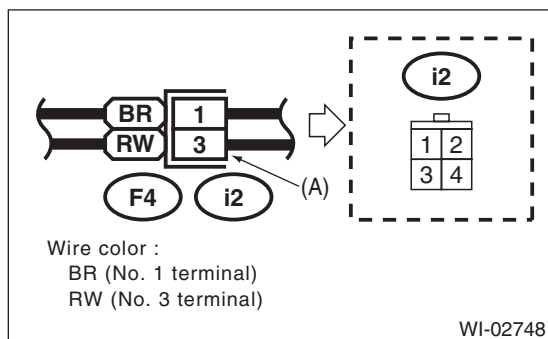
### • WIRING DIAGRAM:

The connectors are numbered along with the number of poles, external colors, and mating connections in the accompanying list.

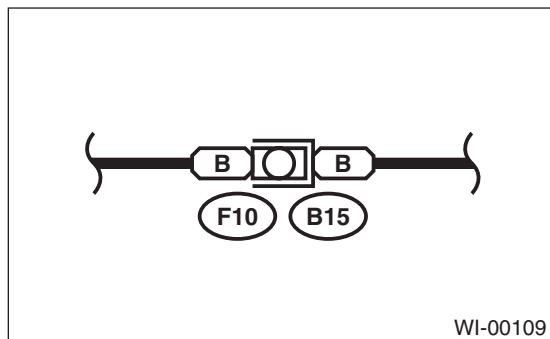
- The sketch of each connector in the wiring diagram usually shows the (A) side of the connector. The relationship between the wire color, terminal number and connector is described in the figure.

### 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.

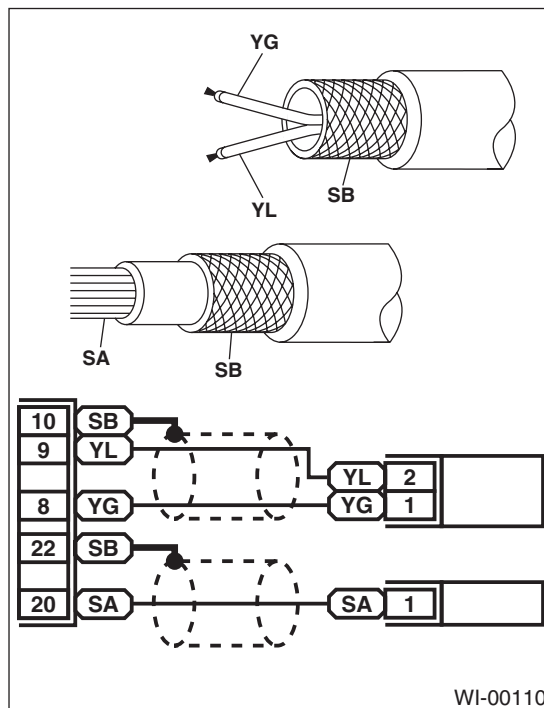


- In the wiring diagram, connectors which have no terminal number refer to one-pole types. Sketches of these connectors are omitted intentionally.

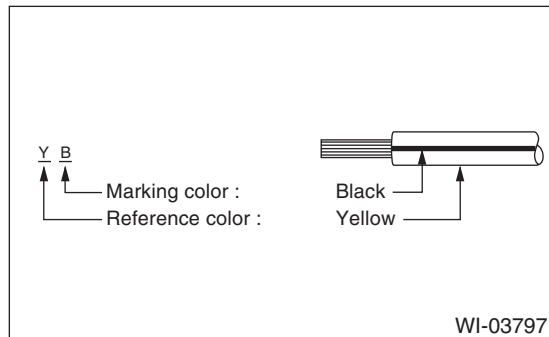


- The following color codes are used to indicate the colors of the wires.

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
Sb	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:

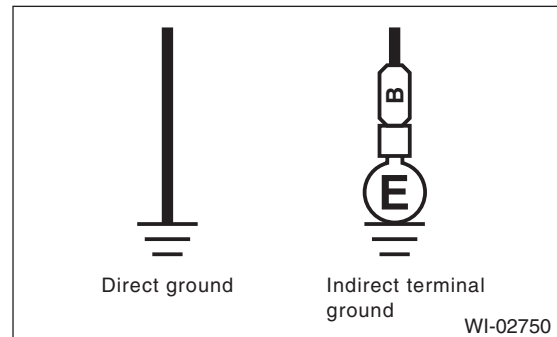
**When replacing or repairing a wire, be sure to use the same size and type of the wire which was originally used.**

### 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 <sup>2</sup>	No. of strands/ strand diameter	Outside diameter of 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

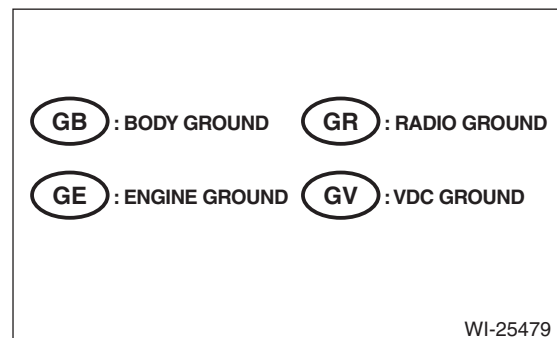
- Each unit is either directly grounded to the body or indirectly grounds through a harness ground terminal. Different symbols are used in the wiring diagram to identify the two grounding systems.



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

### NOTE:

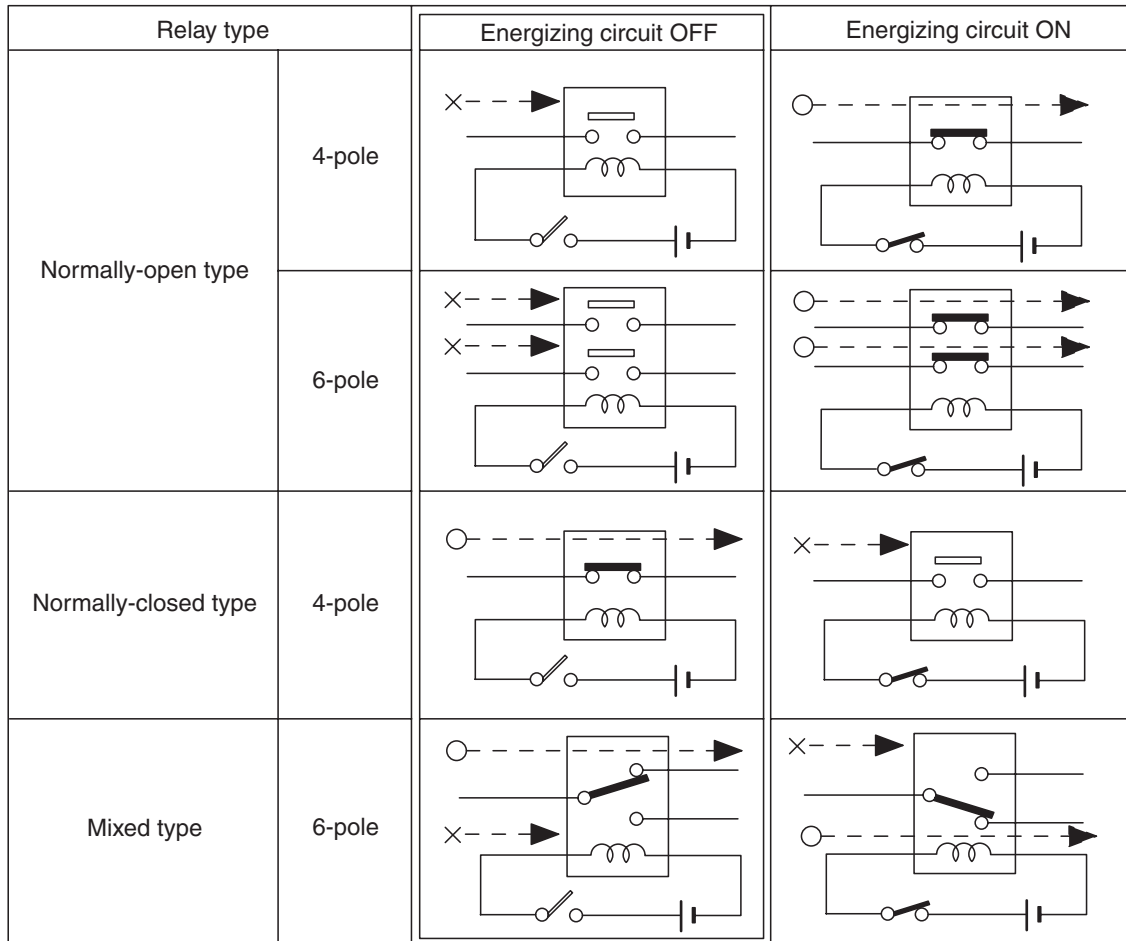
All wiring harnesses are provided with a ground point which should be securely connected.



# Basic Diagnostic Procedure

## WIRING SYSTEM

- Relays are classified as normally-open or normally-closed.
- The normally-closed relay has one or more contacts. The wiring diagram shows the relay mode when the energizing circuit is OFF.



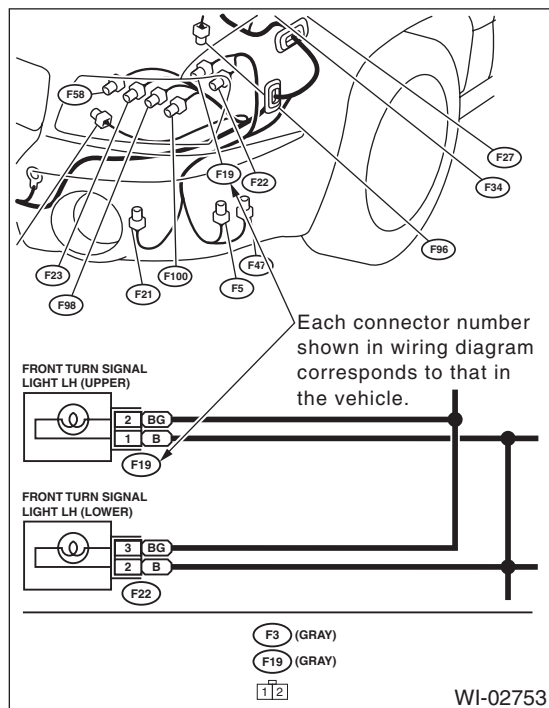
Key to symbols:

- : Current flows.
- : Current does not flow.

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- 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 corresponds to the area or system of the vehicle.

Symbol	Wiring harness and cord
F	Front wiring harness
B	Bulkhead wiring harness
E	Engine wiring harness
T	Transmission cord
D	Door cord LH & RH, Rear gate cord Rear door cord LH & RH, Rear defogger cord
i	Instrument panel wiring harness
R	Rear wiring harness, Fuel tank cord, Roof cord, Rear gate cord, Rear defogger ground cord (Sedan model)
AB	Airbag wiring harness

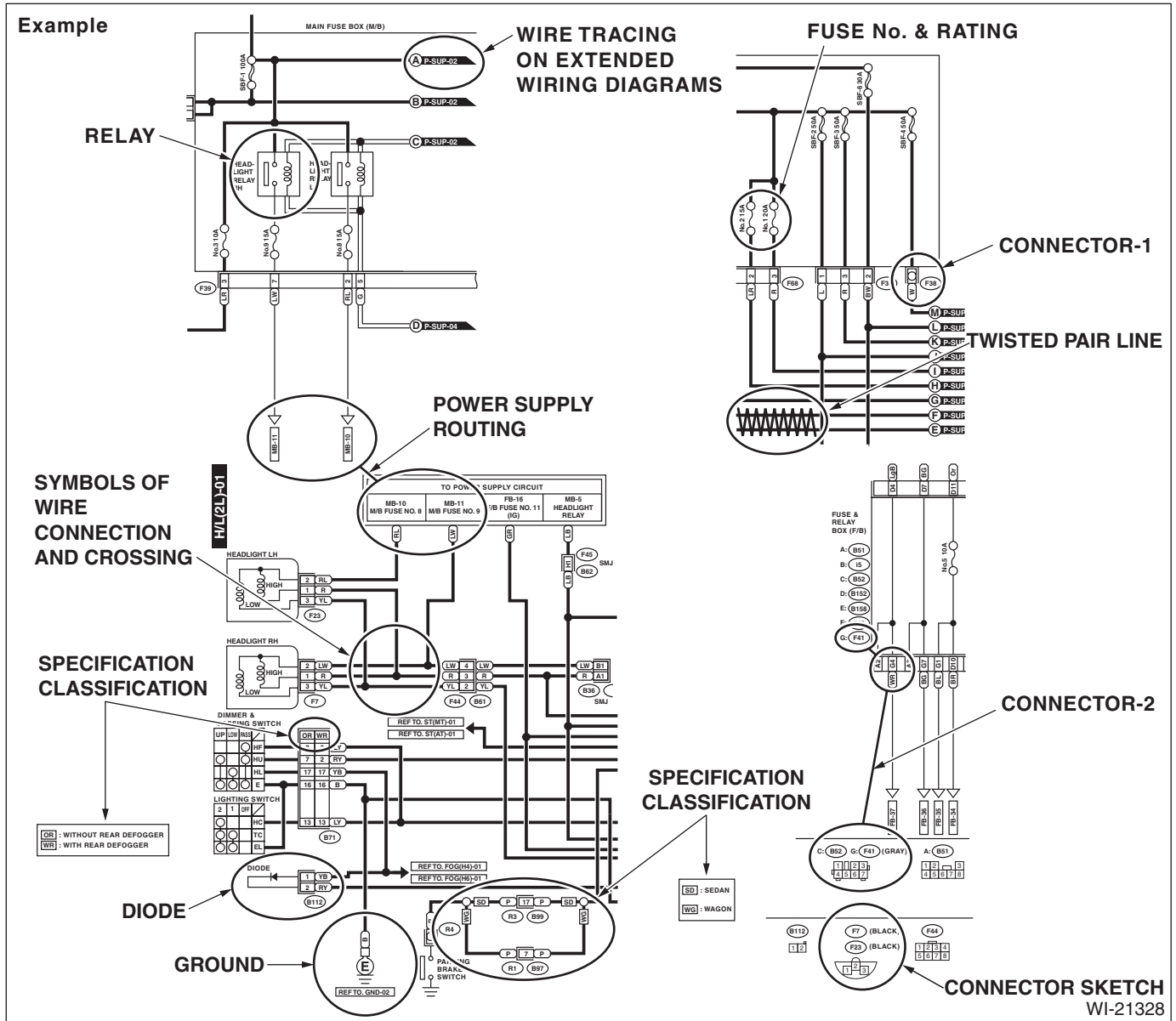


# Basic Diagnostic Procedure

## WIRING SYSTEM

### D: SYMBOLS IN WIRING DIAGRAMS

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



## 1. RELAY

A symbol used to indicate a relay.

## 2. CONNECTOR 1

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

## 3. WIRING CONNECTION

Some wiring diagrams are indicated in foldouts for convenience. Wiring destinations are indicated where necessary by corresponding symbols. (When two pages are needed for clear indication)

## 4. FUSE NO. & RATING

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

## 5. CONNECTOR 2

- Each connector is indicated by a symbol.
- Each terminal number is indicated in the corresponding wiring diagram in an abbreviated form.
- For example, terminal number "G4" refers to No. 4 terminal of connector (G: F41) shown in the connector sketch.

## 6. CONNECTOR SKETCH

- Each connector sketch clearly identifies the shape and color of a connector as well as terminal locations. Non-colored connectors are indicated in white or 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

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

## 8. DIODE

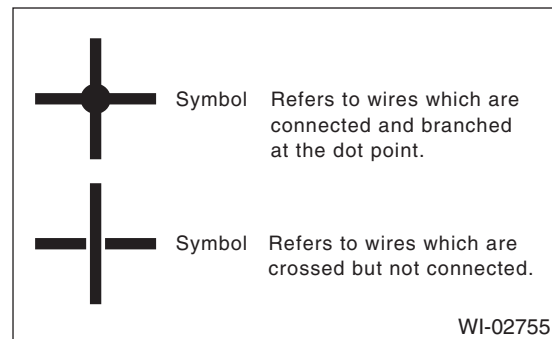
A symbol is used to indicate a diode.

## 9. WIRE TRACING ON EXTENDED WIRING DIAGRAMS

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

A ↔ A, B ↔ B

## 10. SYMBOLS OF WIRE CONNECTION AND CROSSING



## 11. POWER SUPPLY CIRCUIT

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 "DC POWER SUPPLY CIRCUIT" in the wiring diagram.

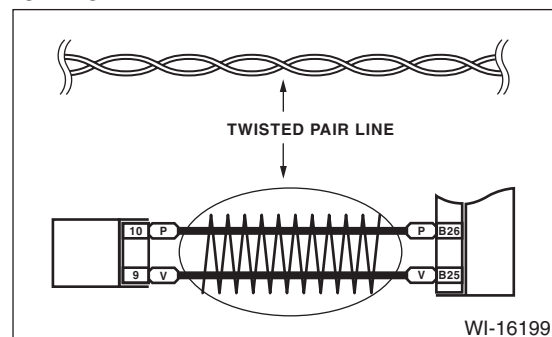
Accordingly, using the "DC POWER SUPPLY CIRCUIT" and wiring diagrams permits service personnel to understand the entire electrical arrangement of a system.

## 12. CLASSIFICATION BY SPECIFICATION

When the wiring diagram differ according to vehicle specifications, the specification difference is described by using abbreviations.

## 13. TWISTED PAIR LINE

The twisted pair line is indicated by a symbol in the wiring diagrams.







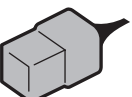







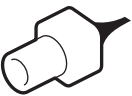











# Basic Diagnostic Procedure

## WIRING SYSTEM

### E: CONNECTOR SYMBOL IN WIRING HARNESS

A number of connector symbols are used in each wiring diagram to easily identify the wiring harness connectors.

Standard type: Female		
Pole: From 1 to 8	Pole: From 9 to 20	Pole: More than 21
		
		
Standard type: Male		
		
		

Water proof type: Female		
Pole: From 1 to 8	Pole: From 9 to 20	Pole: More than 21
		
		
Water proof type: Male		
		
		

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## F: ABBREVIATION IN WIRING DIAGRAMS

Abbr.	Full name
A/C	Air Conditioner
A/F	Air/Fuel (Air fuel ratio sensor)
ABS	Anti-lock Brake System
ACC	Accessory
ALT	Generator
ASSY	Assembly
AT	Automatic Transmission
AUX	Auxiliary Audio Input Terminal
AWD	All Wheel Drive
B, BAT	Battery
CAN	Controller Area Network
CPU	Central Processing Unit
DN	Down
ECM	Engine Control Module
EEPROM	Electrically Erasable Programmable Read-Only Memory
EGR	Exhaust Gas Recirculation
F/B	Fuse & Relay Box
GPS	Global Positioning System
H/L	Headlight
HI	High
HID	High Intensity Discharge
I/F	Interface
IG	Ignition
L, LH	Left Hand
LCD	Liquid Crystal Display
LO	Low
M/B	Main Fuse Box
MFD	Multi Function Display
OP	Optional Parts or Open
R, RH	Right Hand
SBF	Slow Blow Fuse
ST	Starter
TCS	Traction Control System
TCM	Transmission Control Module
TPMS	Tire Pressure Monitor System
U	Up
VDC	Vehicle Dynamics Control

# Working Precautions

## WIRING SYSTEM

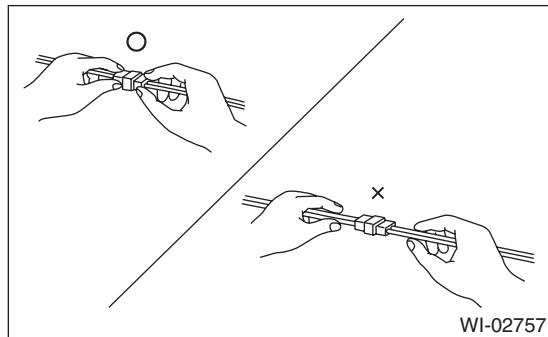
### 2. Working Precautions

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

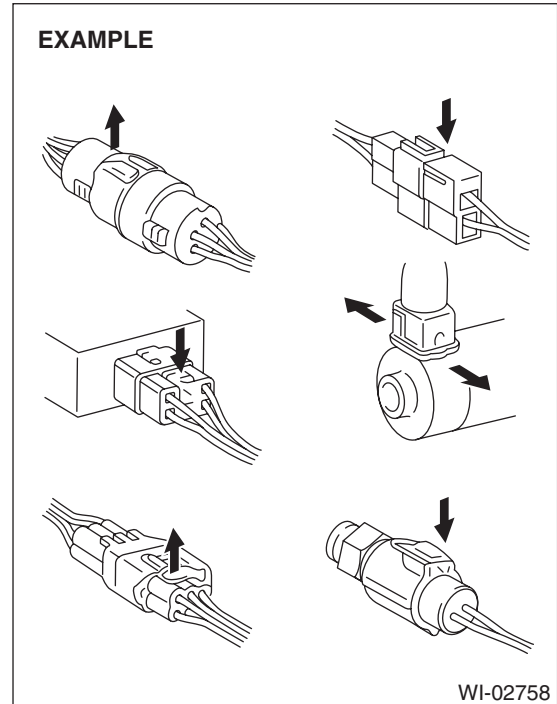
- 1) When working under a vehicle which is jacked-up, always be sure to use rigid rack.
- 2) The parking brake must always be applied during working. Also, in automatic transmission vehicles, keep the select lever set to the P (Parking) range.
- 3) Be sure the workshop is properly ventilated when running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

#### B: PRECAUTIONS IN TROUBLE DIAGNOSIS AND REPAIR OF ELECTRIC PARTS

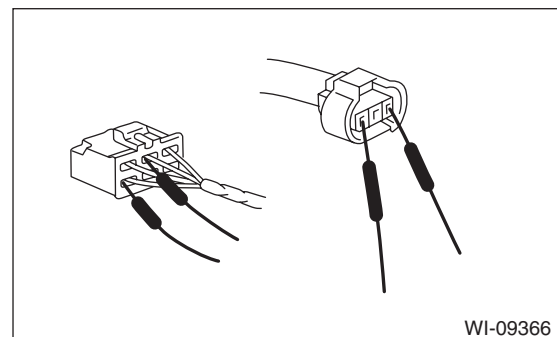
- 1) The battery cable must be disconnected from the battery's (-) terminal, and the ignition switch must be set to the OFF position, unless otherwise required by the diagnostics.
- 2) Securely fasten the wiring harness with clamps and clips so that the harness does not interfere with the body end parts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



- 6) When checking continuity between connector terminals, or measuring voltage across the terminal and ground, always contact tester probe(s) on terminals from the wiring connection side. If the probe is too thick to gain access to the terminal, use "mini" test leads. To check water-proof connectors (which are not measurable from the wiring side), contact test probes on the terminal side. Be careful not to bend or damage the terminals.



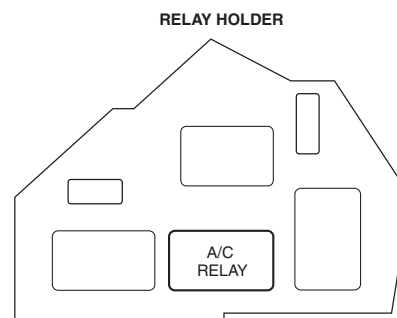
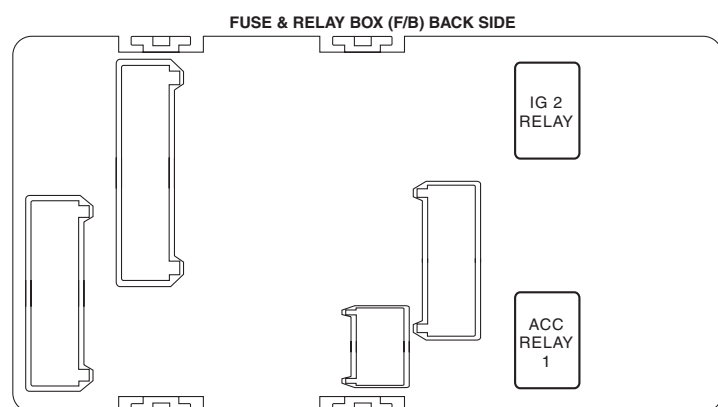
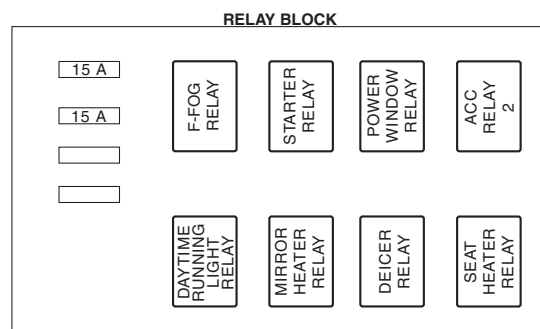
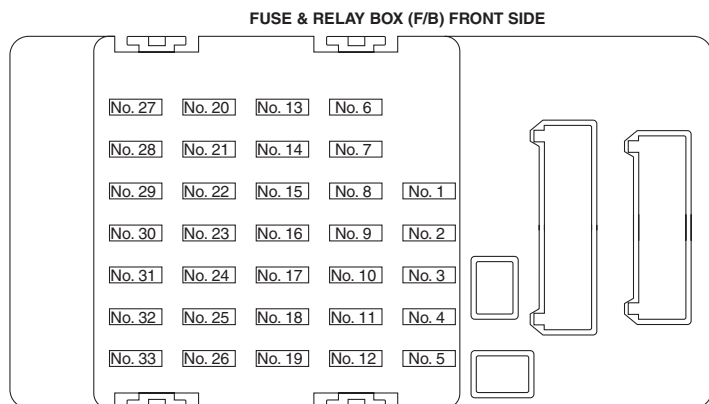
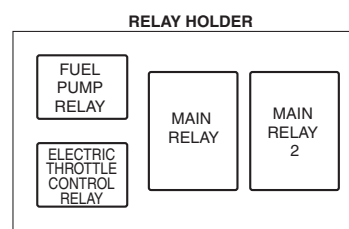
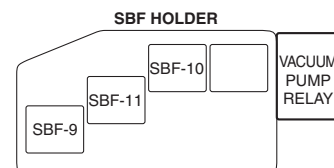
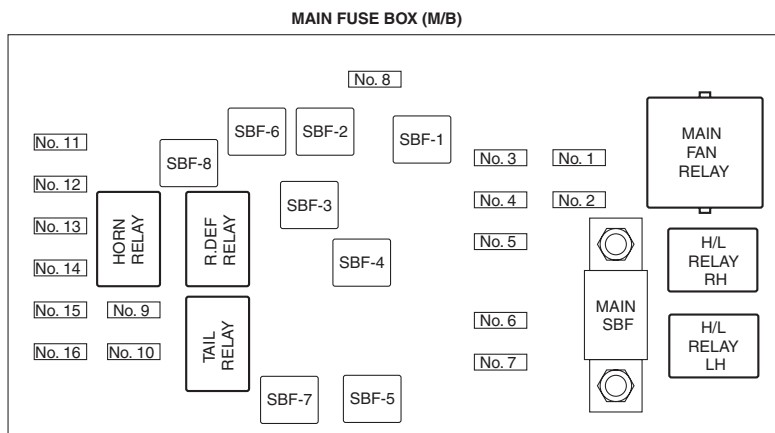
- 7) Sensors, relays, electrical unit, etc., are sensitive to strong impacts. Handle them with care so that they are not dropped or mishandled.

## 3. Power Supply Circuit

### A: WIRING DIAGRAM

P-SUP-01

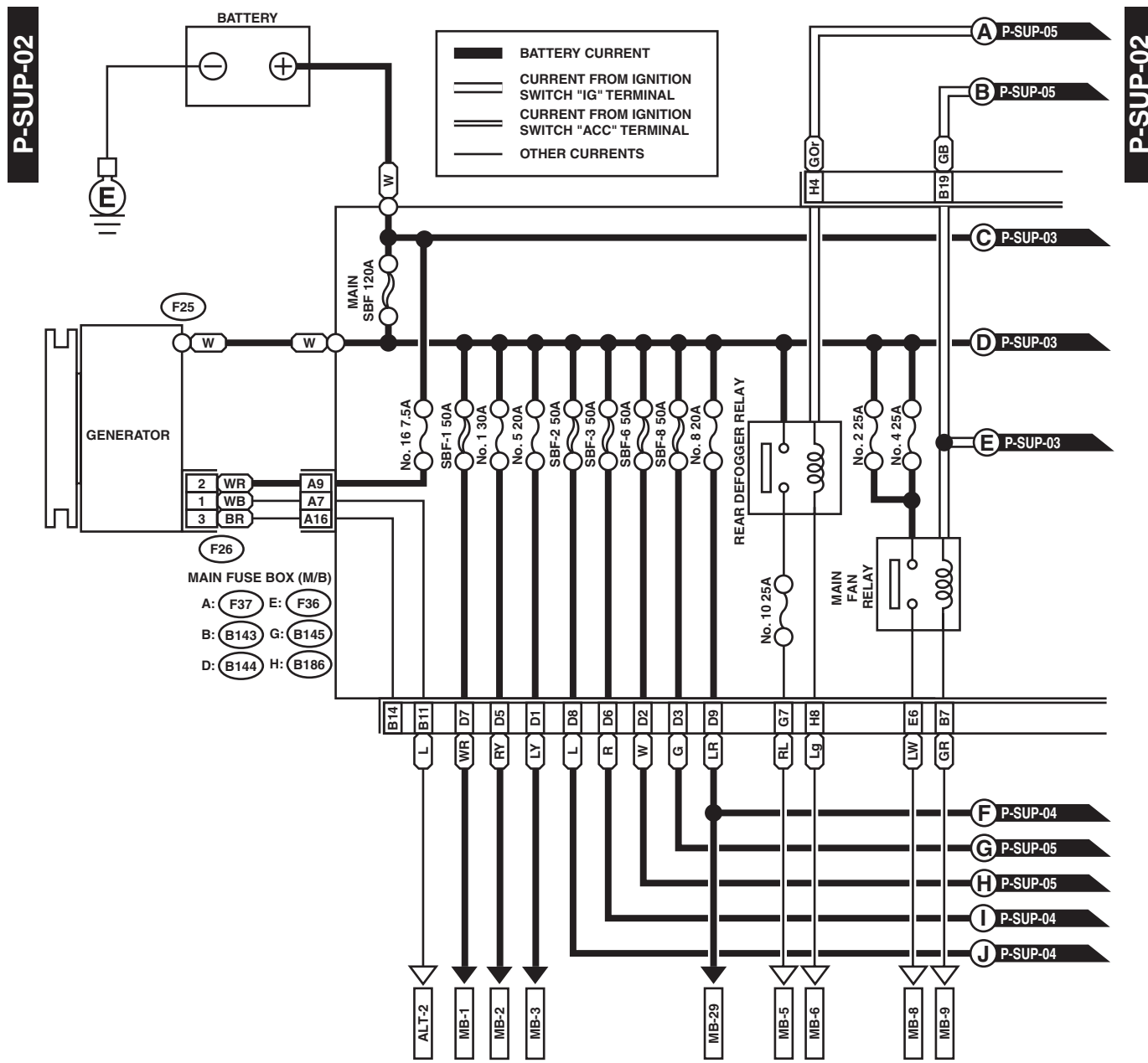
P-SUP-01



WI-26813

# Power Supply Circuit

## WIRING SYSTEM



F26 (GREEN)



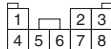
G: B145 (BROWN)



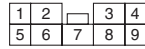
E: F36



H: B186



D: B144 (BROWN)



B: B143



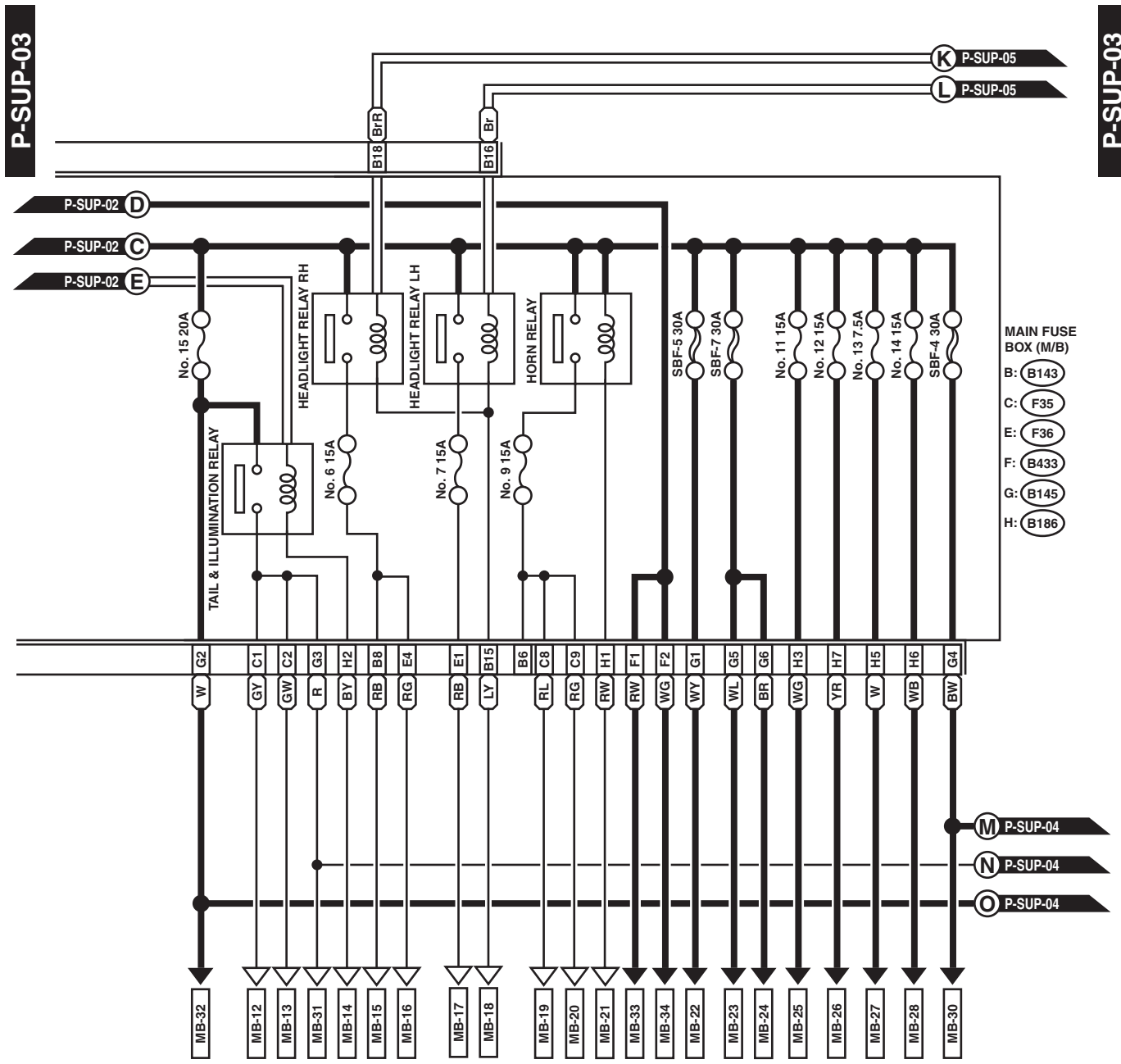
A: F37



WI-26814

# Power Supply Circuit

WIRING SYSTEM



F: (B433)

G: (B145) (BROWN)

E: (F36)

H: (B186)

C: (F35) (BLUE)

B: (B143)

1	2
---	---

1	2	3	
4	5	6	7

1	2	3	
4	5	6	7

1	2	3		
4	5	6	7	8

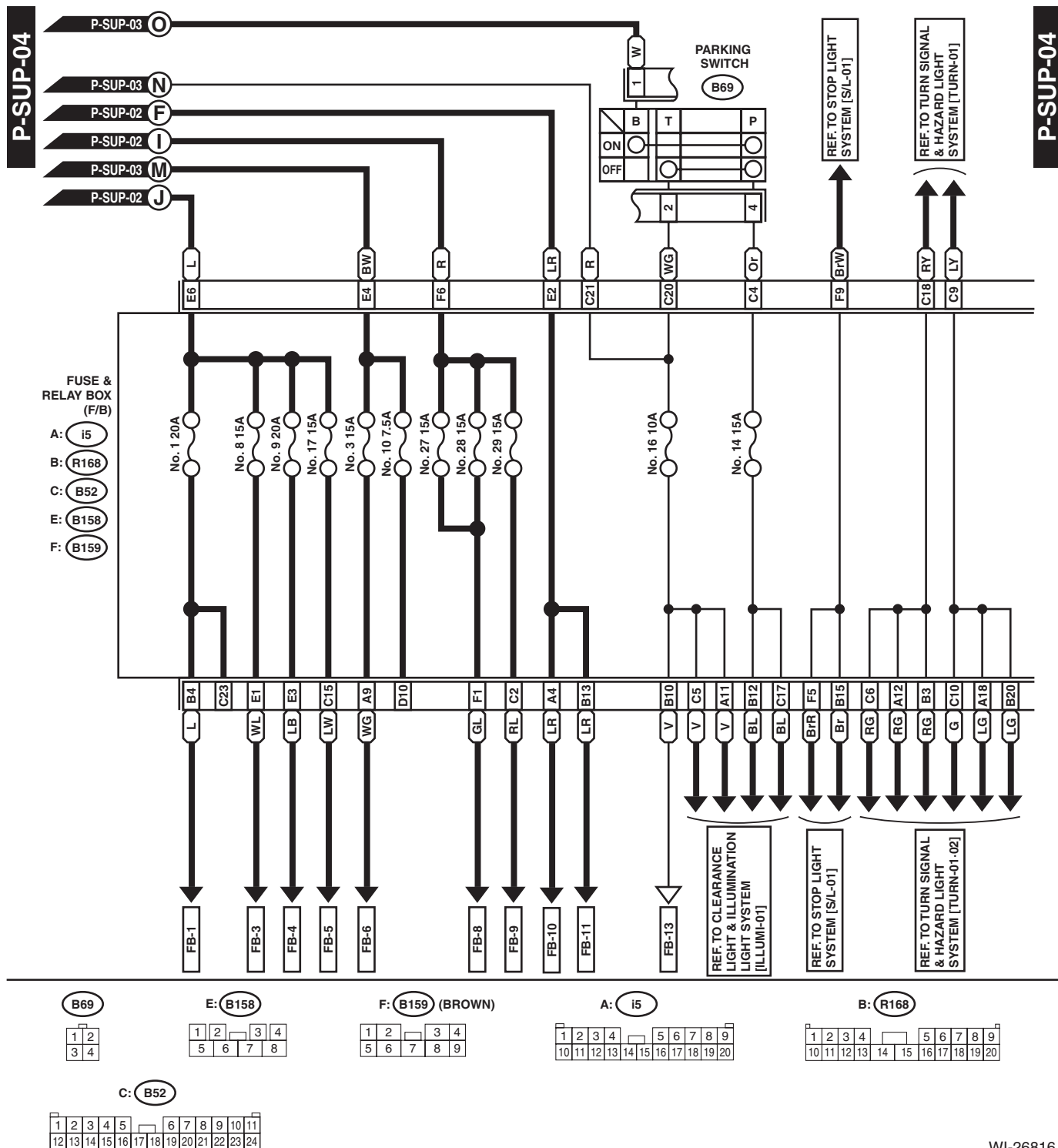
1	2	3	4	5		
6	7	8	9	10	11	12

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

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# Power Supply Circuit

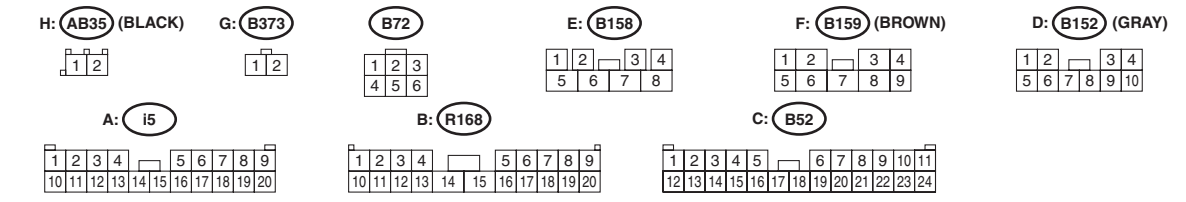
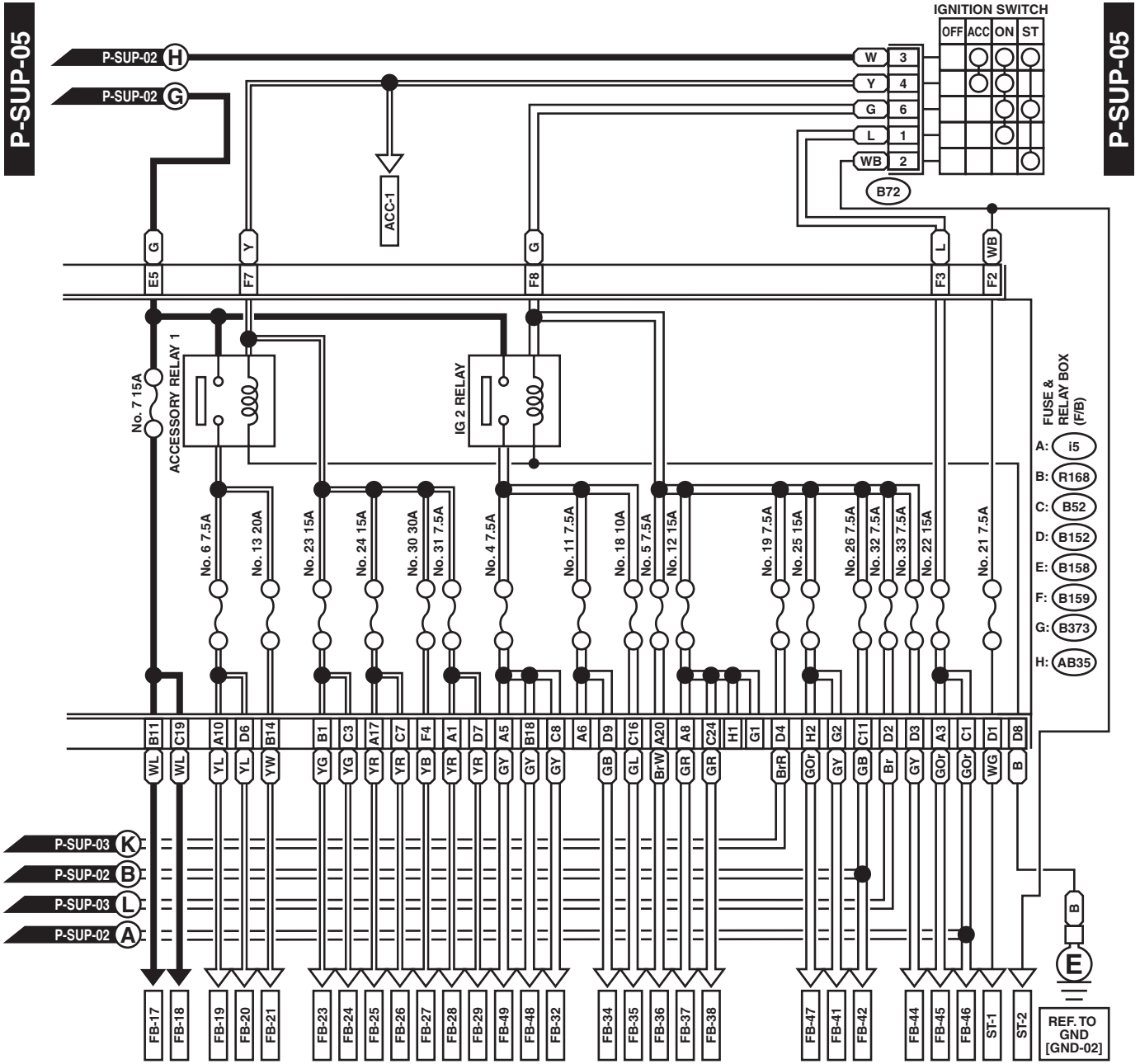
## WIRING SYSTEM



WI-26816

# Power Supply Circuit

WIRING SYSTEM



WI-30940

# Power Supply Circuit

## WIRING SYSTEM

No.	Load
MB-1	VDC control module
MB-2	VDC control module
MB-3	Accessory relay 2
MB-5	Mirror heater relay
	Rear defogger
MB-6	Body integrated unit
MB-8	Radiator fan control unit
MB-9	ECM
MB-12	Headlight beam leveler RH
MB-13	Headlight beam leveler LH
MB-14	Combination switch (lighting)
MB-15	Combination meter
MB-16	Headlight RH
MB-17	Headlight LH
MB-18	Daytime running light control module
	Body integrated unit
MB-19	Horn
MB-20	Horn
MB-21	Body integrated unit
	Remote engine start control module
	Horn switch
MB-22	Main relay
MB-23	Main relay 2
	Main relay
MB-24	Electronic throttle control relay
MB-25	Fuel pump relay
MB-26	TCM
MB-27	ECM
	Data link connector
MB-28	Key warning switch
	Key illumination
	Turn signal and hazard unit
	Body integrated unit
MB-29	Spot map light
	Vanity mirror light LH
	Vanity mirror light RH
	Puddle light LH
	Puddle light RH
	Handsfree kit
	Foot light (Driver's seat)
	Foot light (Passenger's seat)
	Home link
	Body integrated unit
	Room light
MB-30	Power window circuit breaker
MB-31	F/B fuse No. 16
	Headlight beam leveler switch
MB-32	Parking switch
MB-33	Blower motor relay

No.	Load
MB-34	Audio amplifier
	Vacuum pump relay
FB-1	Trailer connector
FB-3	Stop light and brake switch
FB-4	Mirror heater relay
	Wiper deicer relay
FB-5	Seat heater relay
FB-6	Body integrated unit
FB-8	Rear A/C relay
FB-9	Front fog light relay
FB-10	MFD
	Impact sensor
	Audio
	TPMS & keyless entry control module
	Second-row seat foot light RH
	Display
	Navigation unit
	Front step light LH
	Front step light RH
	Rear entertainment (Roof)
Rear step light RH	
XM radio	
FB-11	Second-row seat foot light LH
	Luggage room light
	Rear gate light
	Rear step light LH
FB-13	Navigation unit
FB-17	Warning box LH
	Warning box RH
	Rearview camera module
	Combination meter
FB-18	Auto A/C control module
	Body integrated unit
FB-19	Remote control mirror switch
	Push switch
FB-20	Accessory relay 2
	Seat heater relay
	Rearview mirror (without rearview display)
FB-21	Rear accessory power supply socket (Third-row seat)
	Rear accessory power supply socket (Luggage room)
FB-23	Rear wiper motor
FB-24	Body integrated unit
	Rear washer motor



# Power Supply Circuit

WIRING SYSTEM

No.	Load
FB-25	MFD
	Audio
	Audio amplifier
	Display
	Navigation unit
	Rearview camera module
	AUX switching unit
FB-26	Handsfree kit
	Rear entertainment (Roof)
FB-27	Combination switch (wiper)
	Front wiper motor
	Wiper relay unit
FB-28	Body integrated unit
FB-29	Auto A/C control module
FB-32	Open/Close switch
	Sunroof control module & motor
	Stop light and brake switch
	Tilt switch
	Data link connector
	Rearview mirror (with rearview display)
	Wiper deicer relay
FB-34	Turn signal and hazard unit
FB-35	Daytime running light control module
	Low beam relay
	Back-up light relay
FB-36	MFD
	Warning box RH
	Combination meter
FB-37	Body integrated unit
FB-38	ECM
	TCM
	Fuel pump relay
FB-41	Airbag control module
FB-42	Power window relay
FB-44	VDC control module
	Steering angle sensor
	Yaw rate & G sensor
FB-45	A/C control panel
	Rear A/C relay
FB-46	A/C relay
	Intake door actuator
	Auto A/C control module
	Pressure switch
	Blower motor relay
FB-47	Occupant detection control module
FB-48	Power seat LH (with memory)
FB-49	Impact sensor
	Display
	TPMS & keyless entry control module
ACC-1	Front washer motor

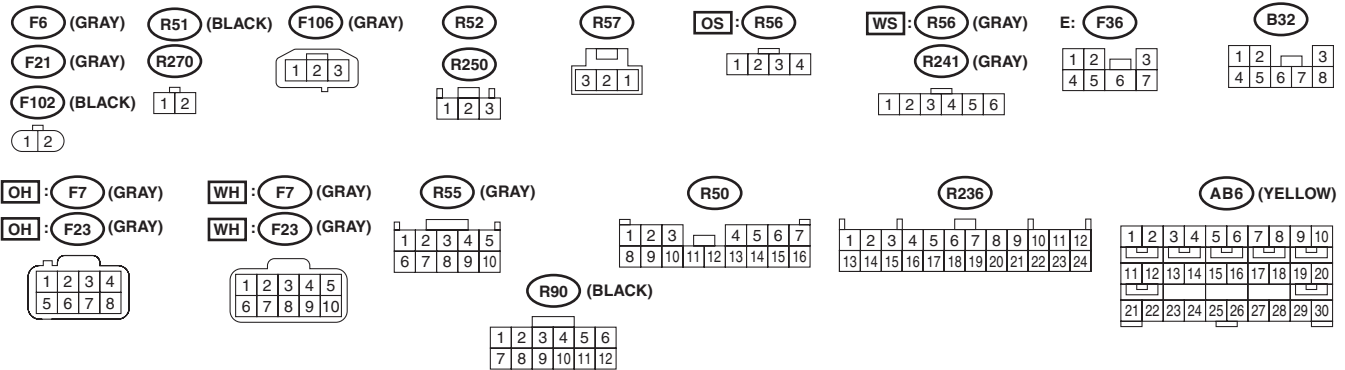
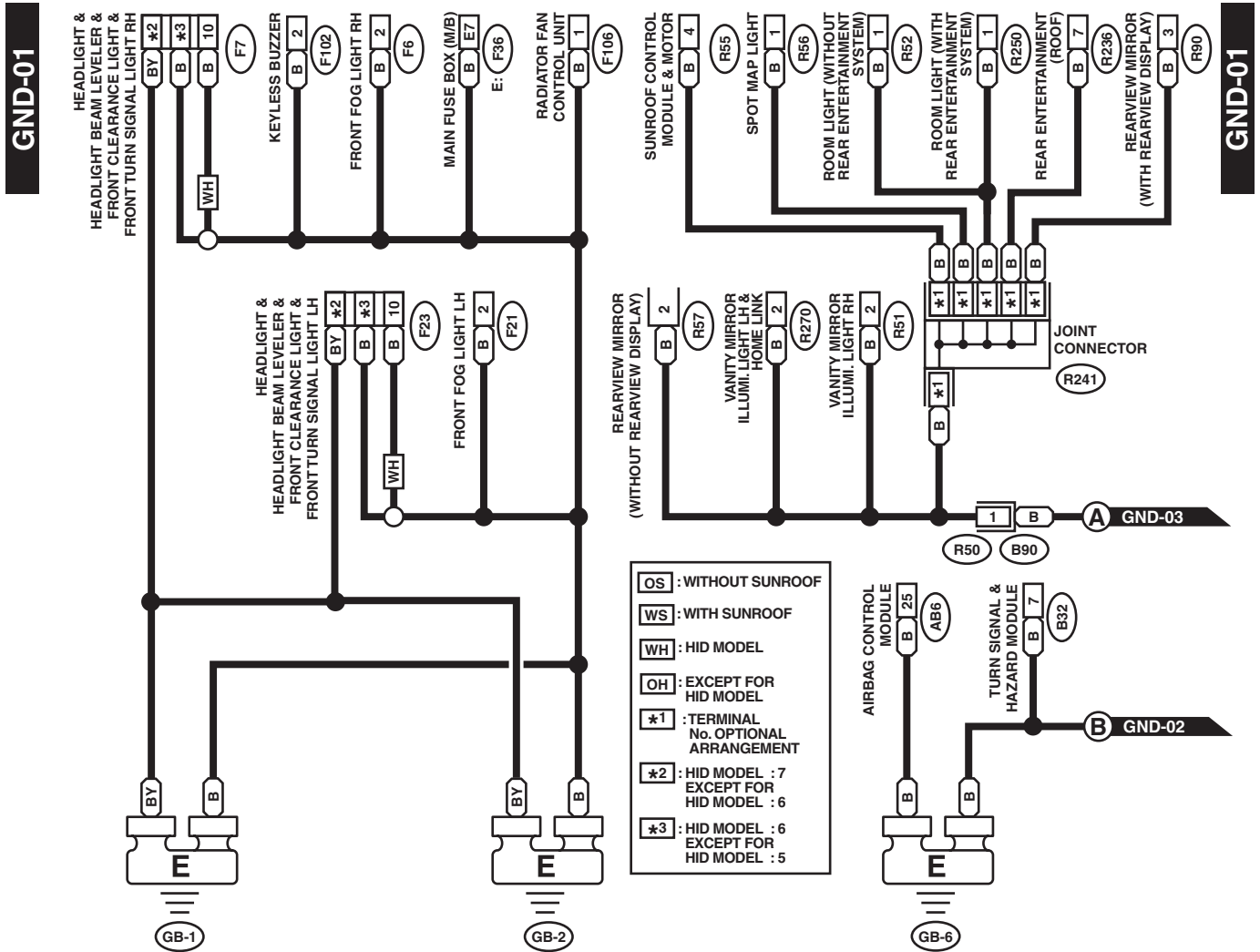
No.	Load
ST-1	Inhibitor relay
ST-2	Starter relay

# Ground Circuit

## WIRING SYSTEM

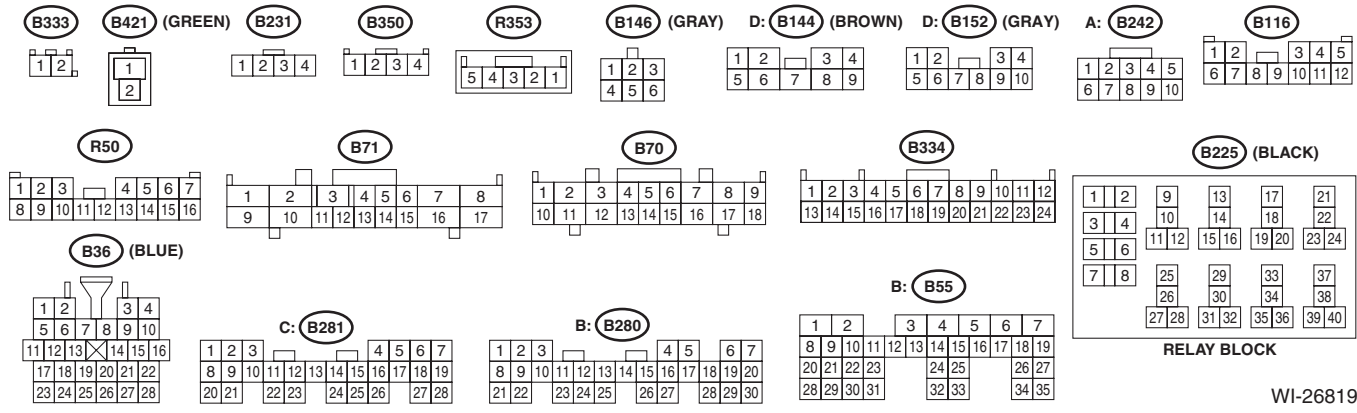
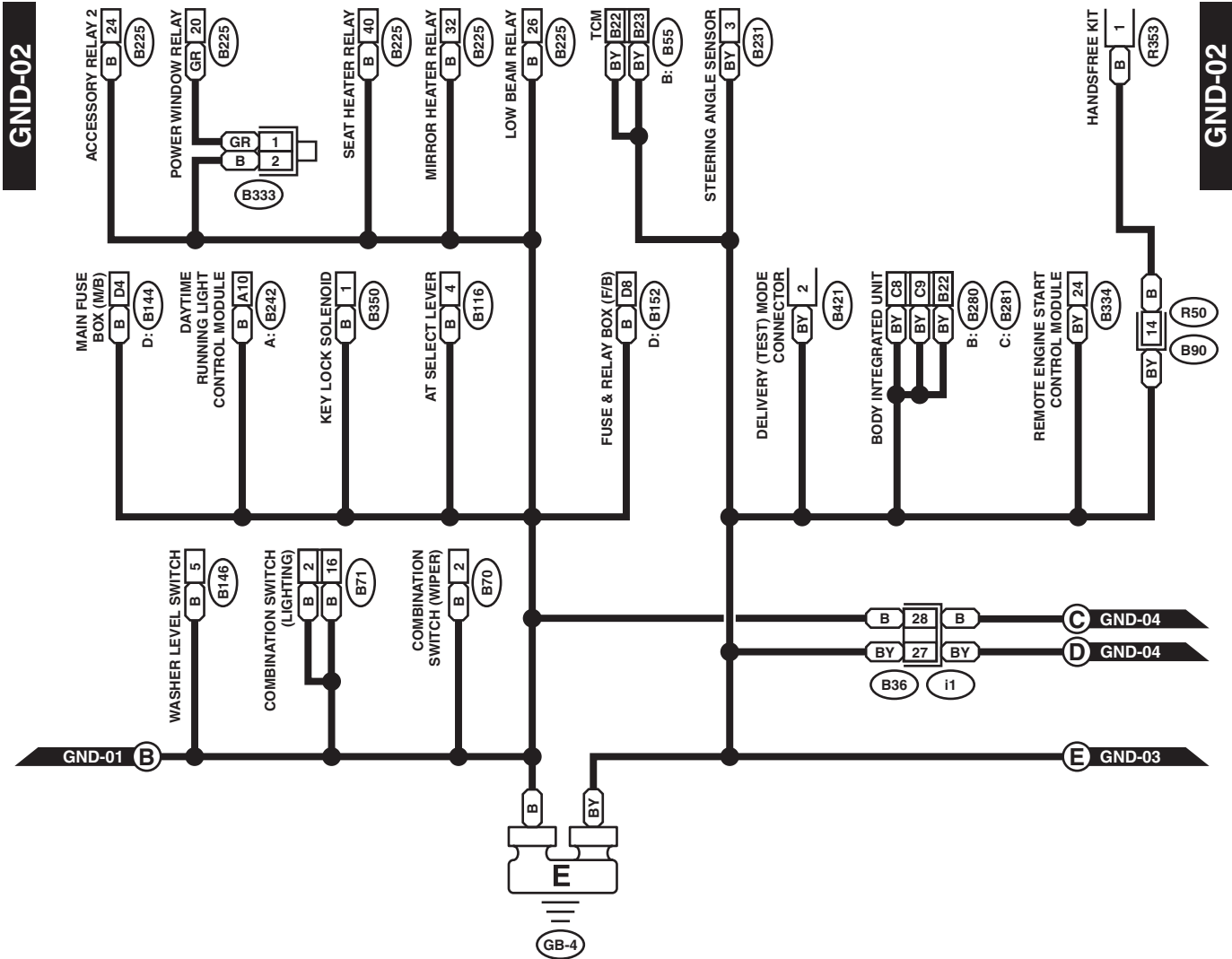
### 4. Ground Circuit

#### A: WIRING DIAGRAM



WI-31732

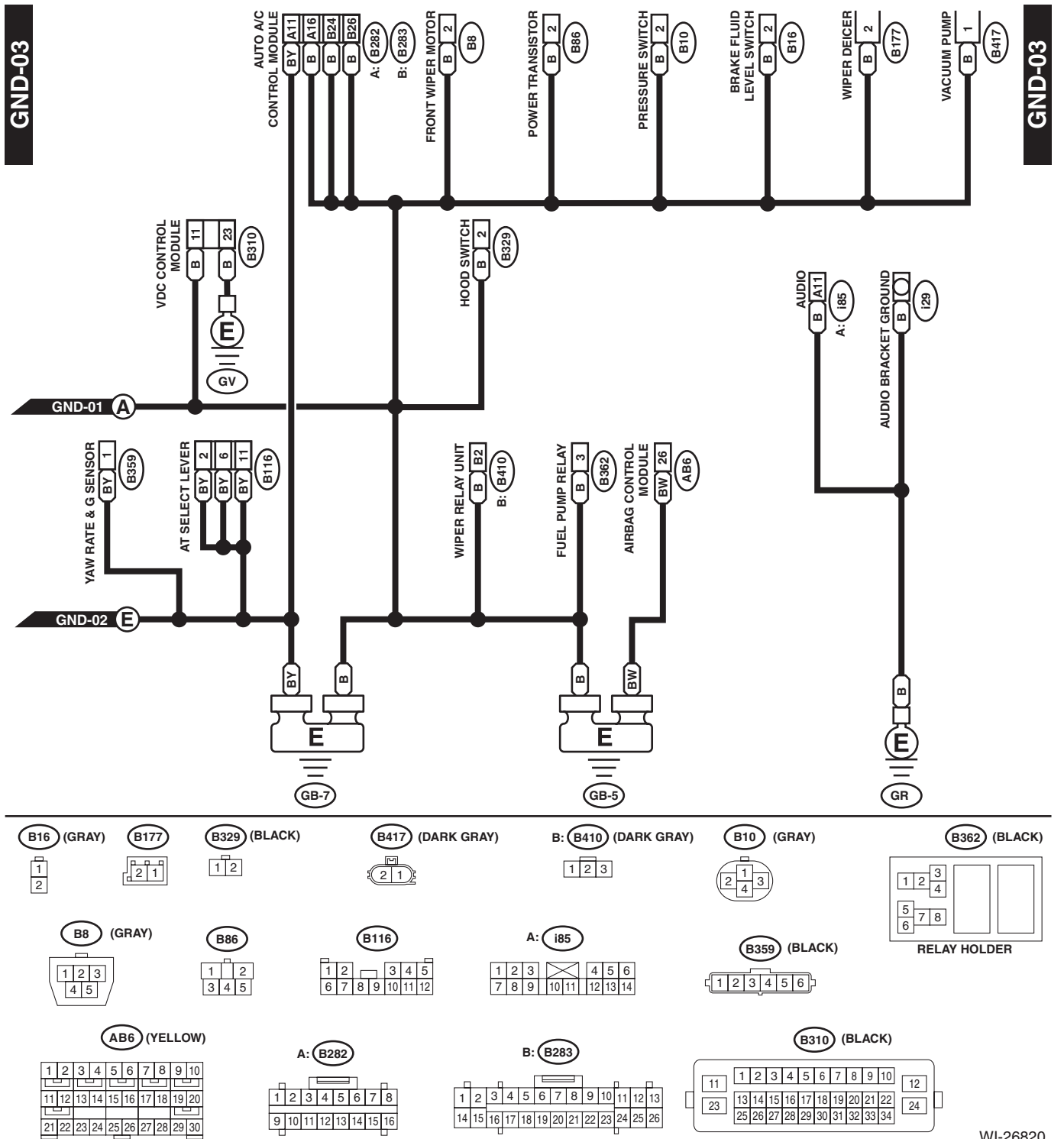
# Ground Circuit



WI-26819

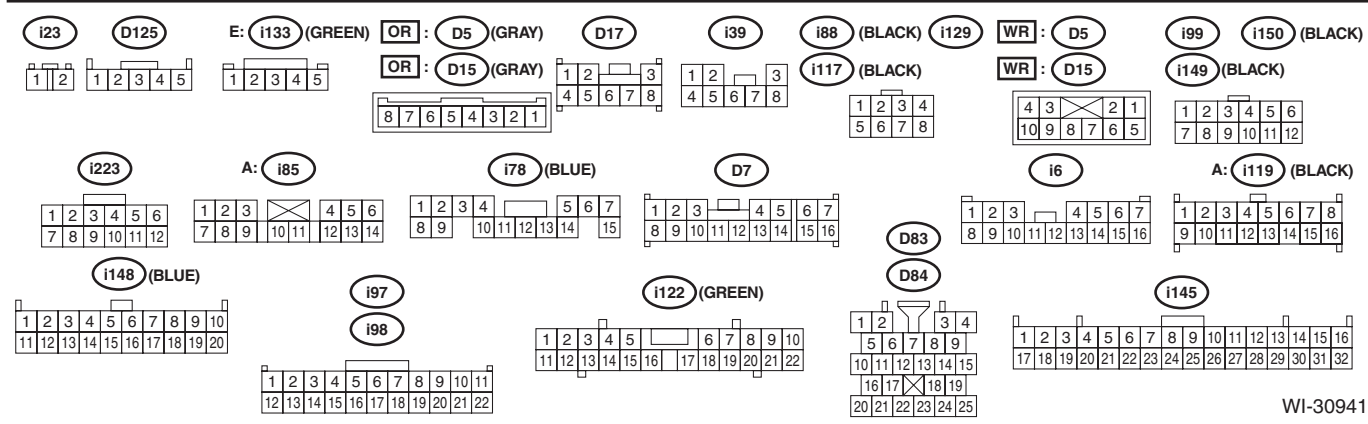
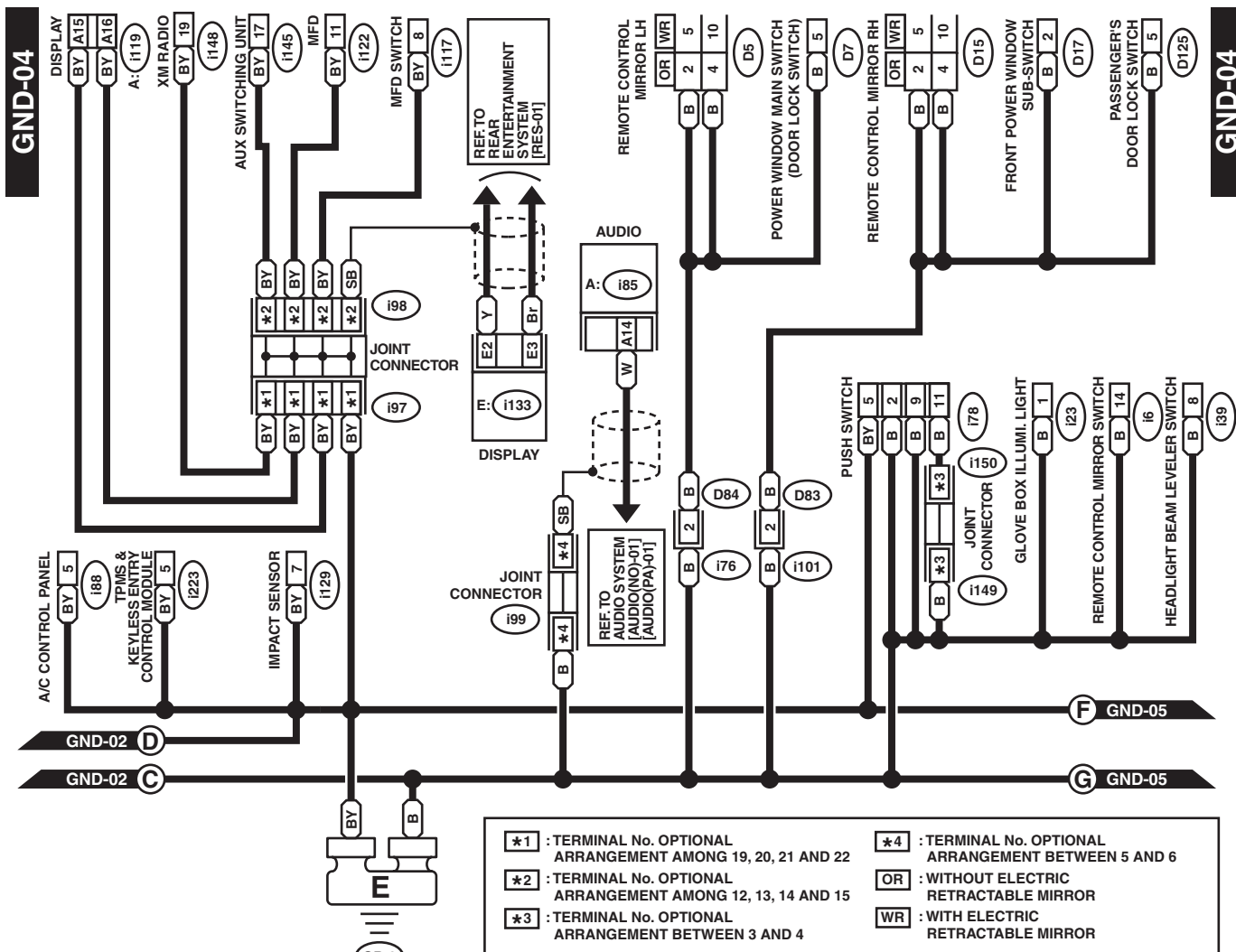
# Ground Circuit

## WIRING SYSTEM



WI-26820

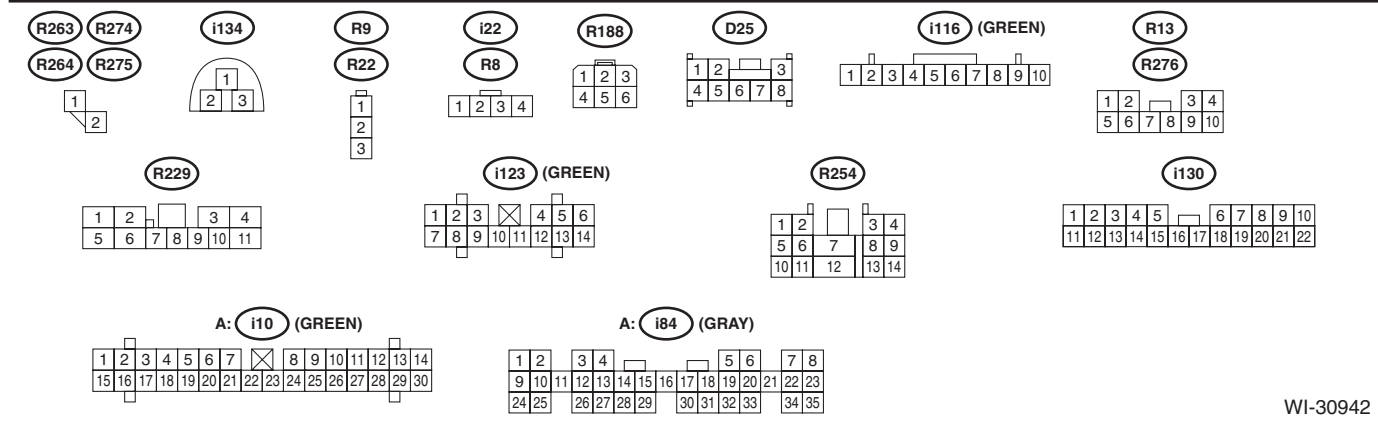
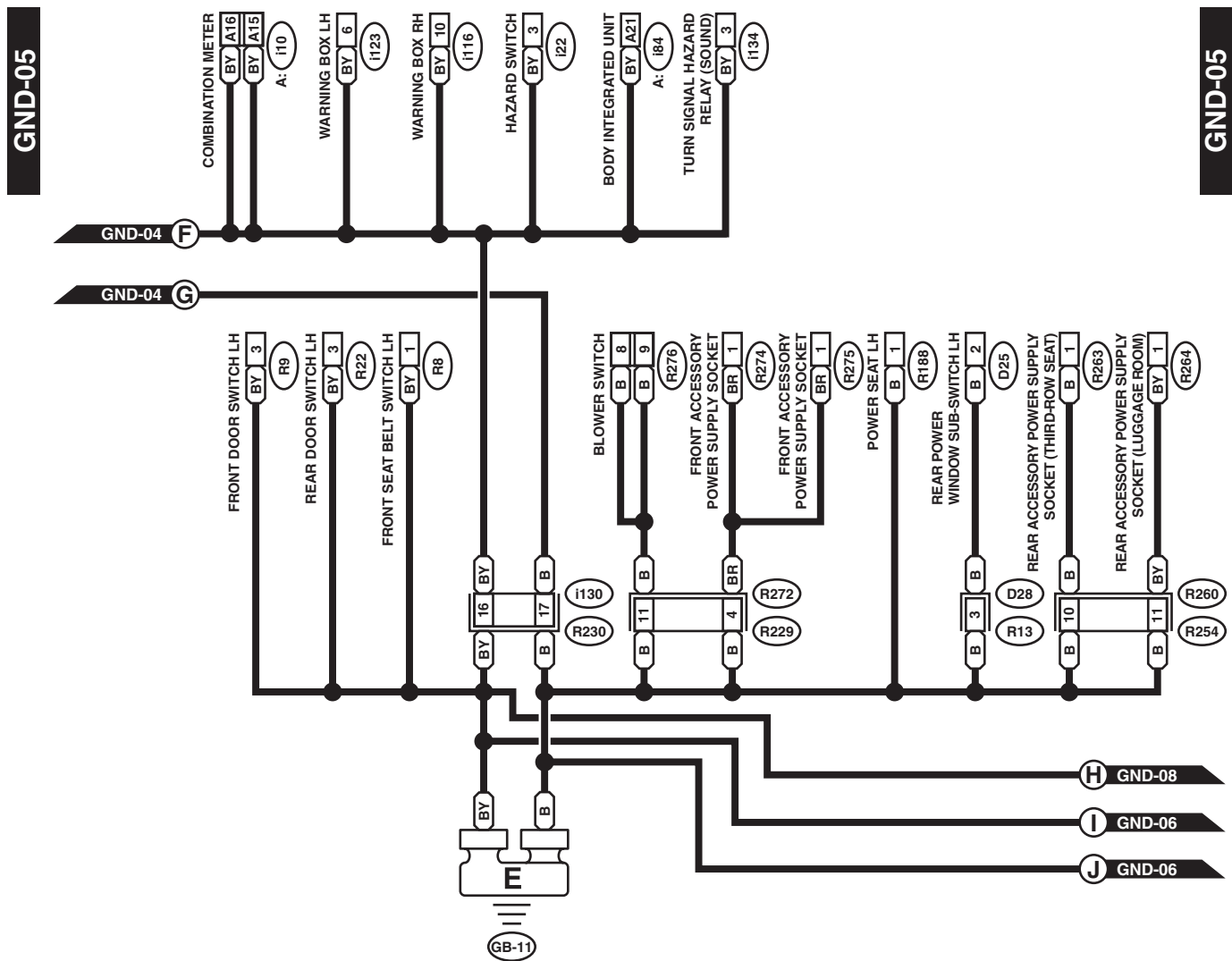
# Ground Circuit



WI-30941

# Ground Circuit

WIRING SYSTEM

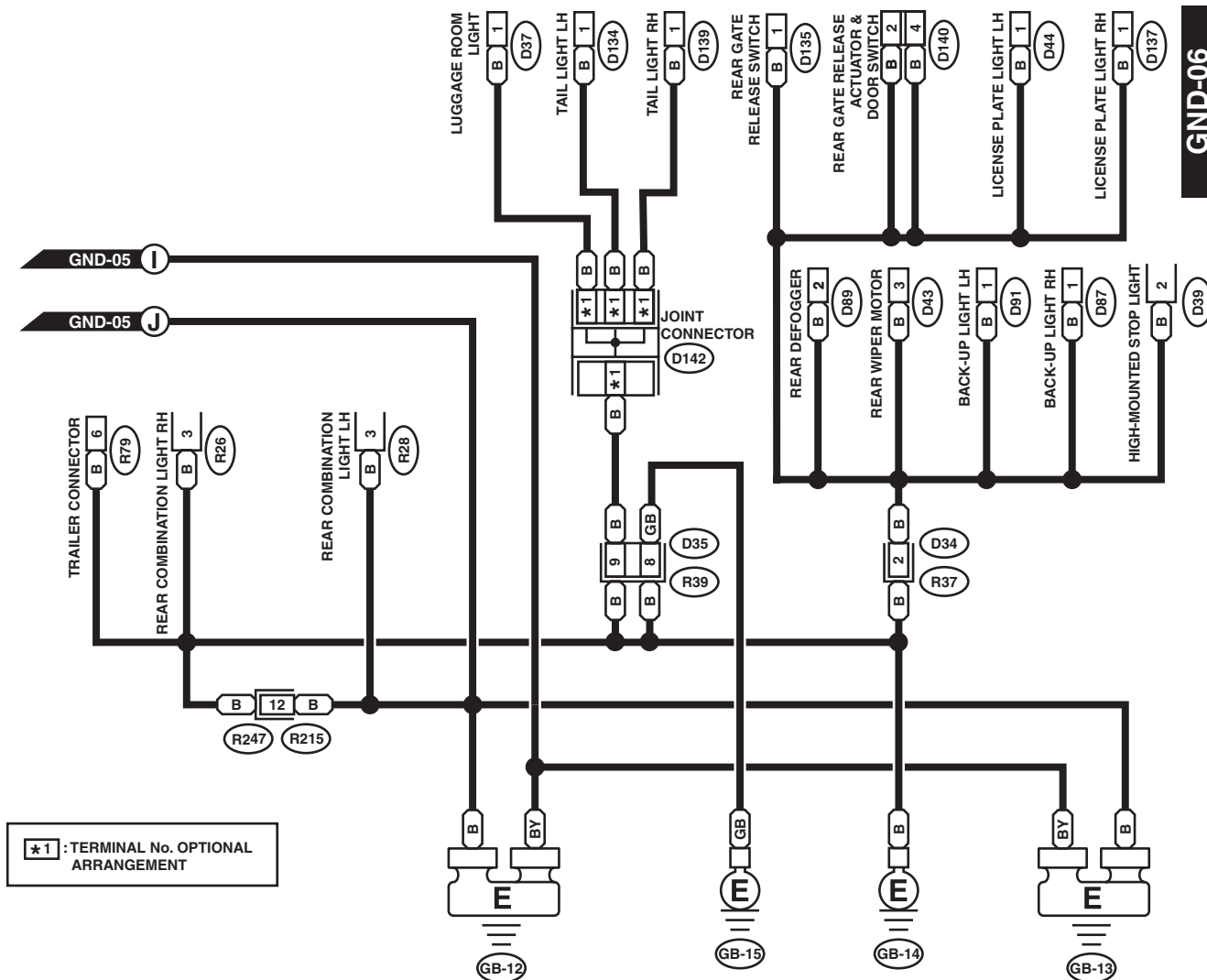


WI-30942

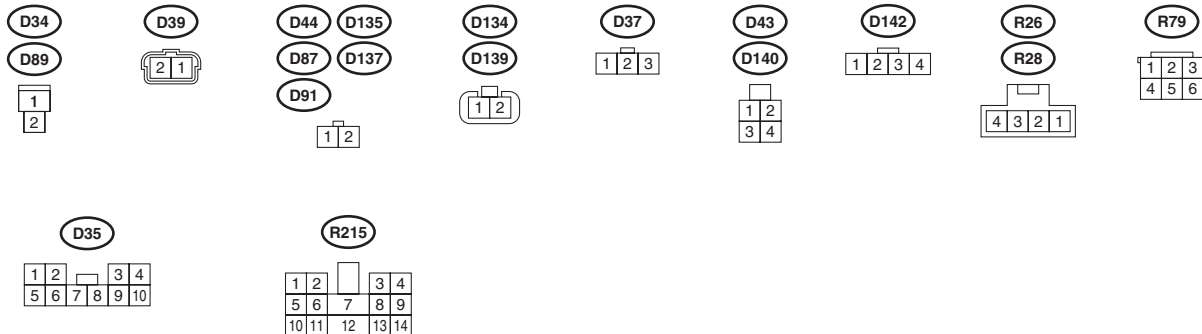
# Ground Circuit

GND-06

GND-06



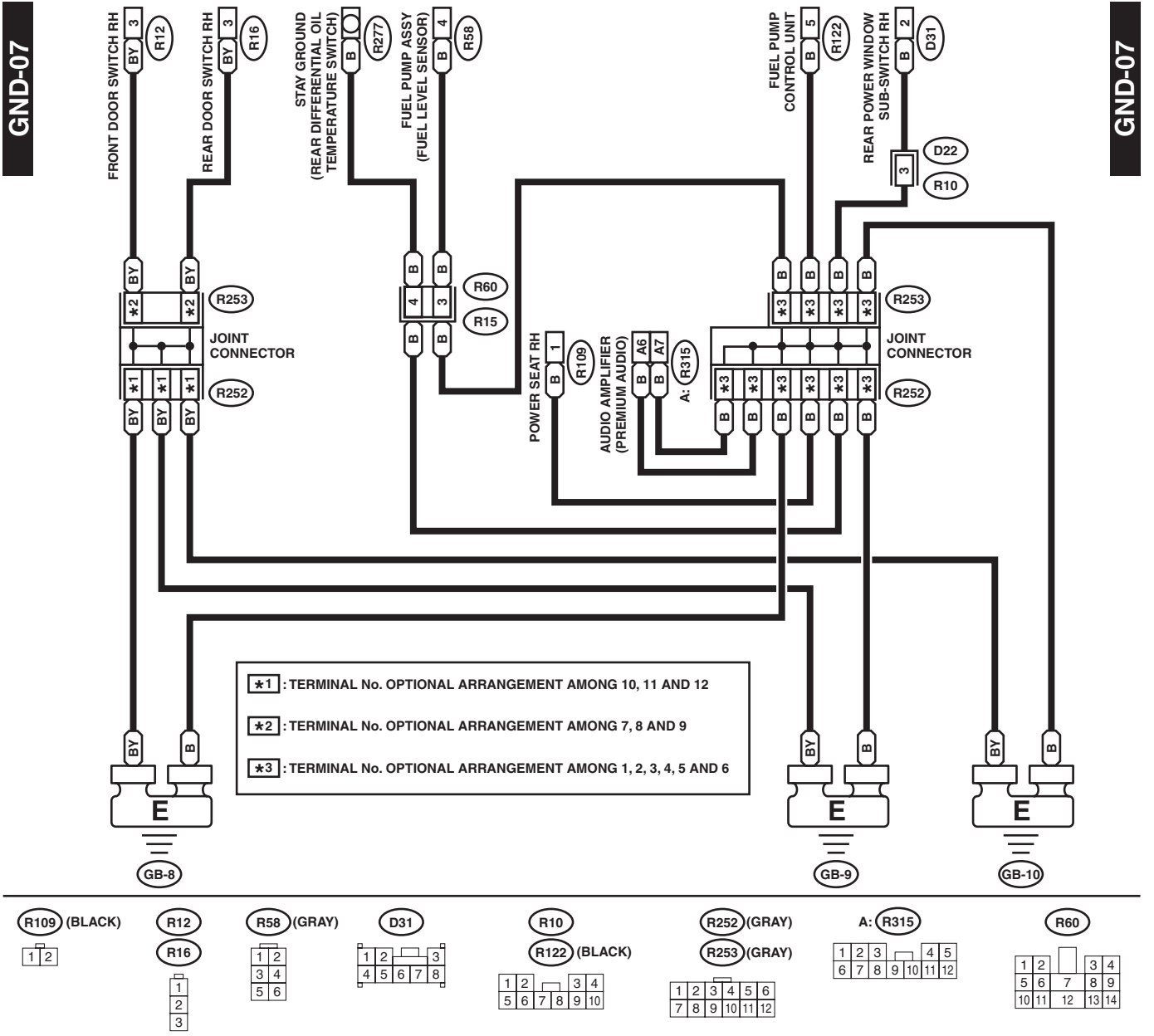
★ 1 : TERMINAL No. OPTIONAL ARRANGEMENT



WI-26823

# Ground Circuit

## WIRING SYSTEM



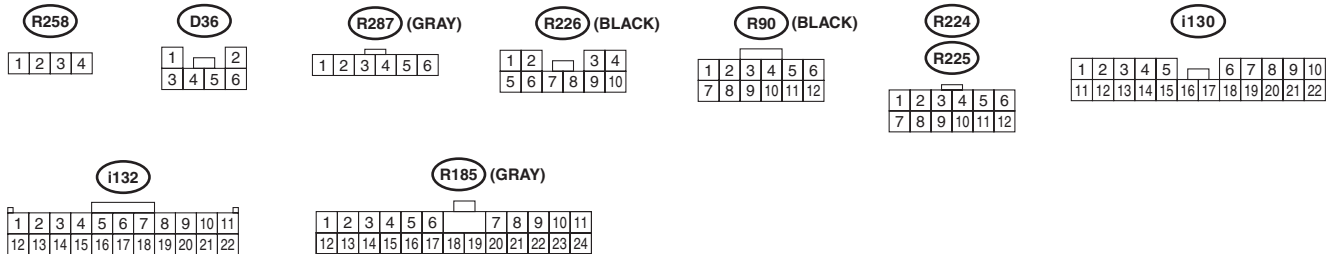
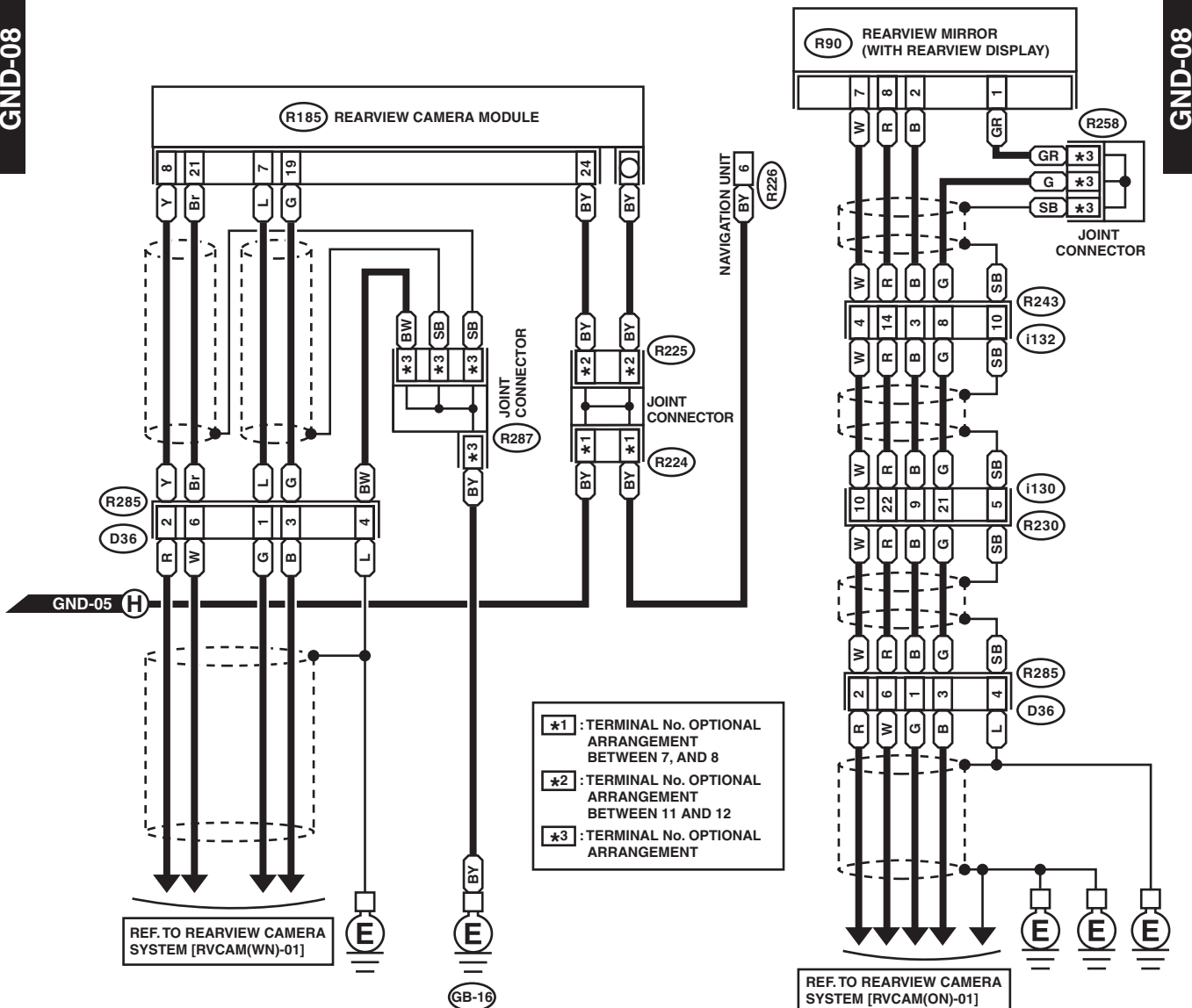
WI-32069



# Ground Circuit

GND-08

GND-08

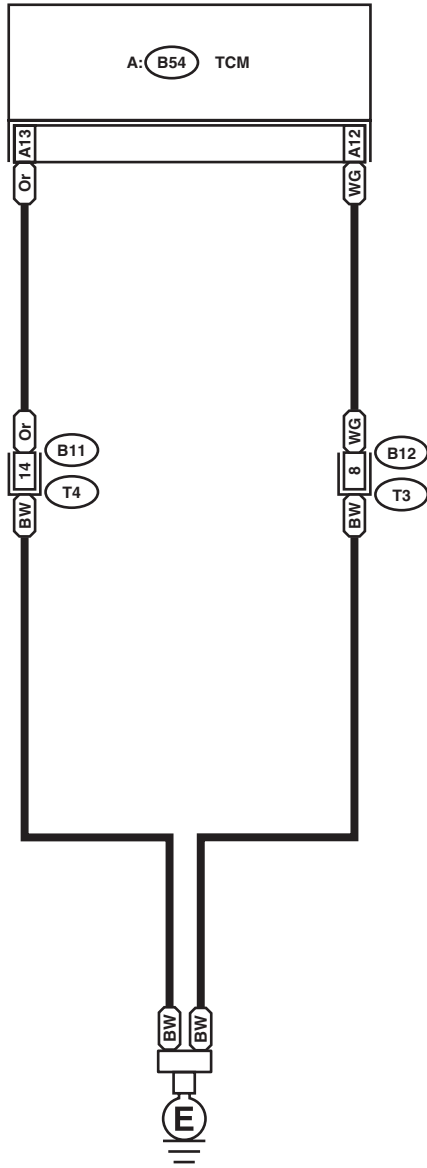


# Ground Circuit

WIRING SYSTEM

GND-09

GND-09



B12 (LIGHT GRAY)

1	2	3	4
5	6	7	8

B11 (GRAY)

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

A: B54

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

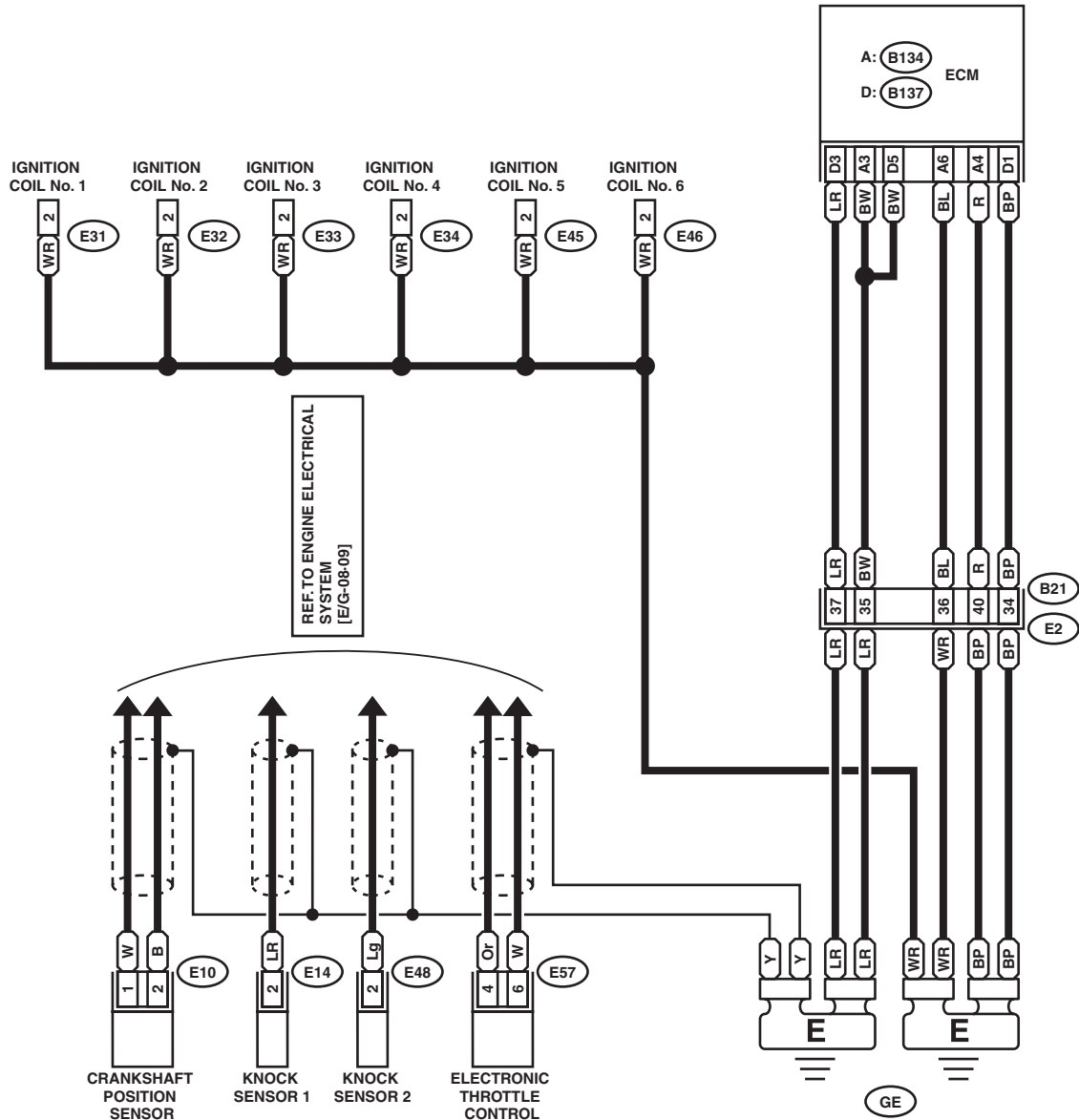
WI-30957

# Ground Circuit

WIRING SYSTEM

GND-10

GND-10



REF. TO ENGINE ELECTRICAL SYSTEM [E/G-08-09]

E10 (LIGHT GRAY)

E14 (BLUE)

E48 (BLUE)

1 2

(GRAY) E31 E34 (GRAY)

(GRAY) E32 E45 (GRAY)

(GRAY) E33 E46 (GRAY)

1  
2  
3

E57 (BLACK)

1 2 3 4 5 6

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				

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	

B21 (BLACK)

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

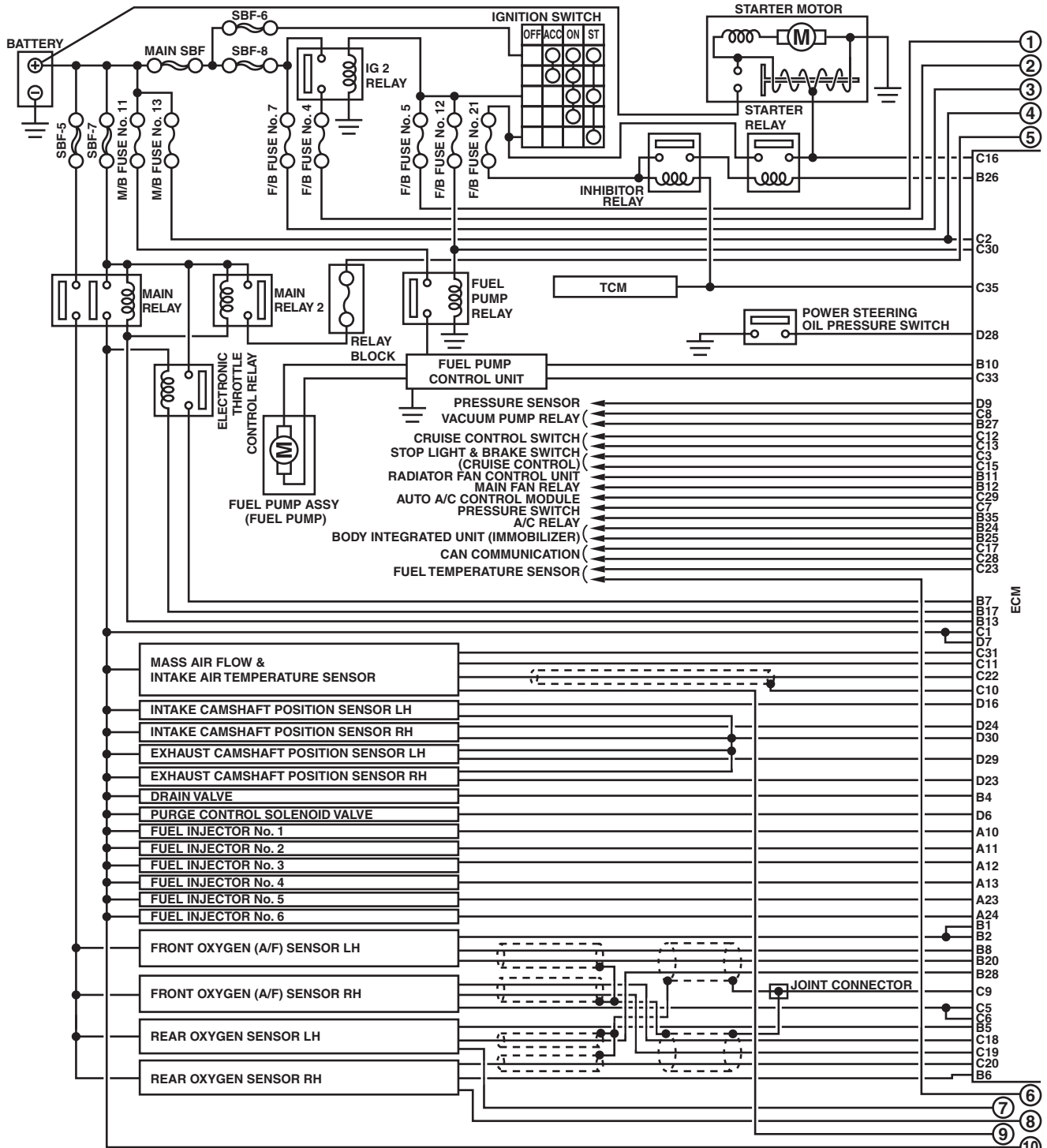
WI-26826

# Engine Electrical System

## WIRING SYSTEM

### 5. Engine Electrical System

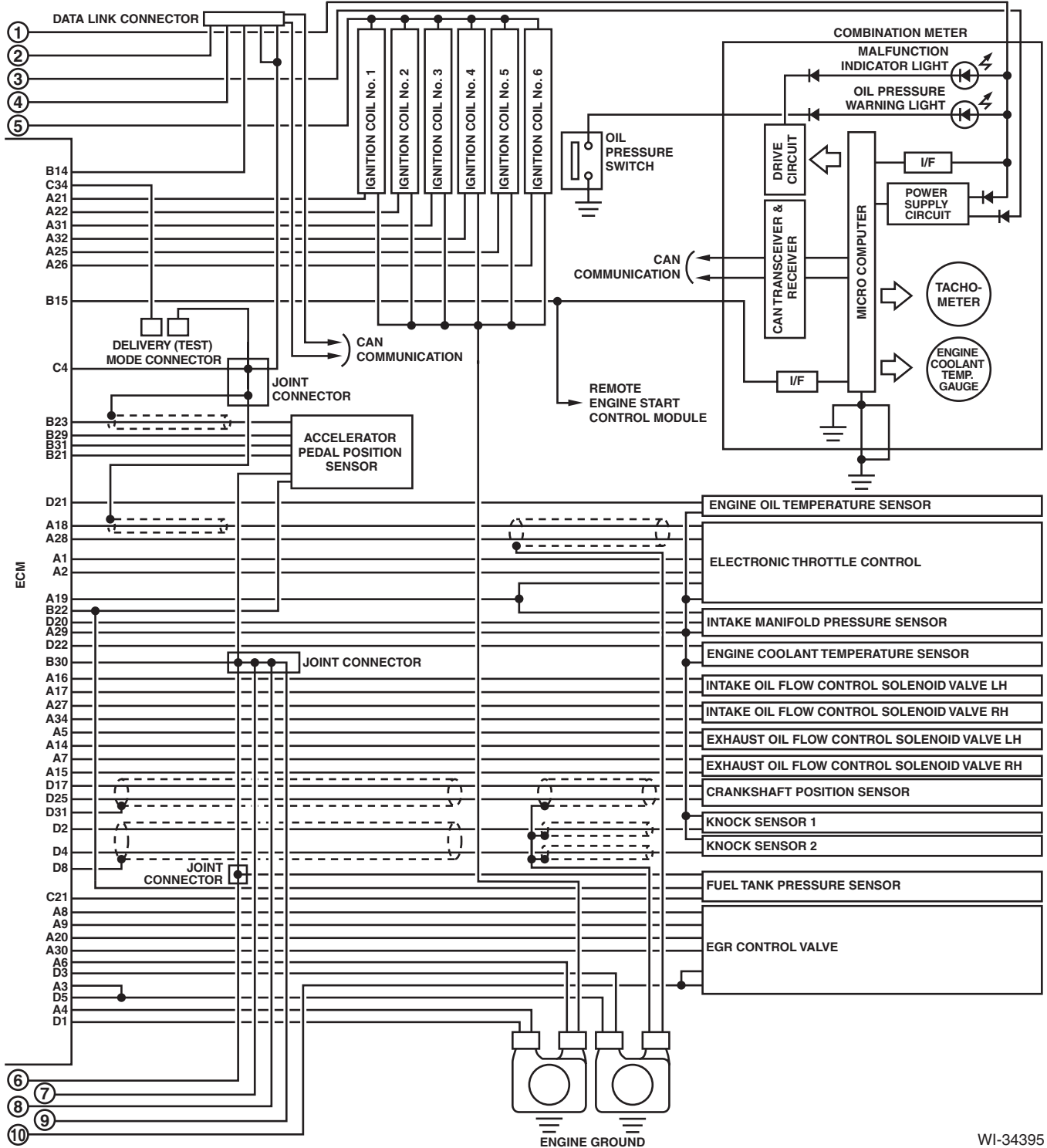
#### A: WIRING DIAGRAM



WI-30943

# Engine Electrical System

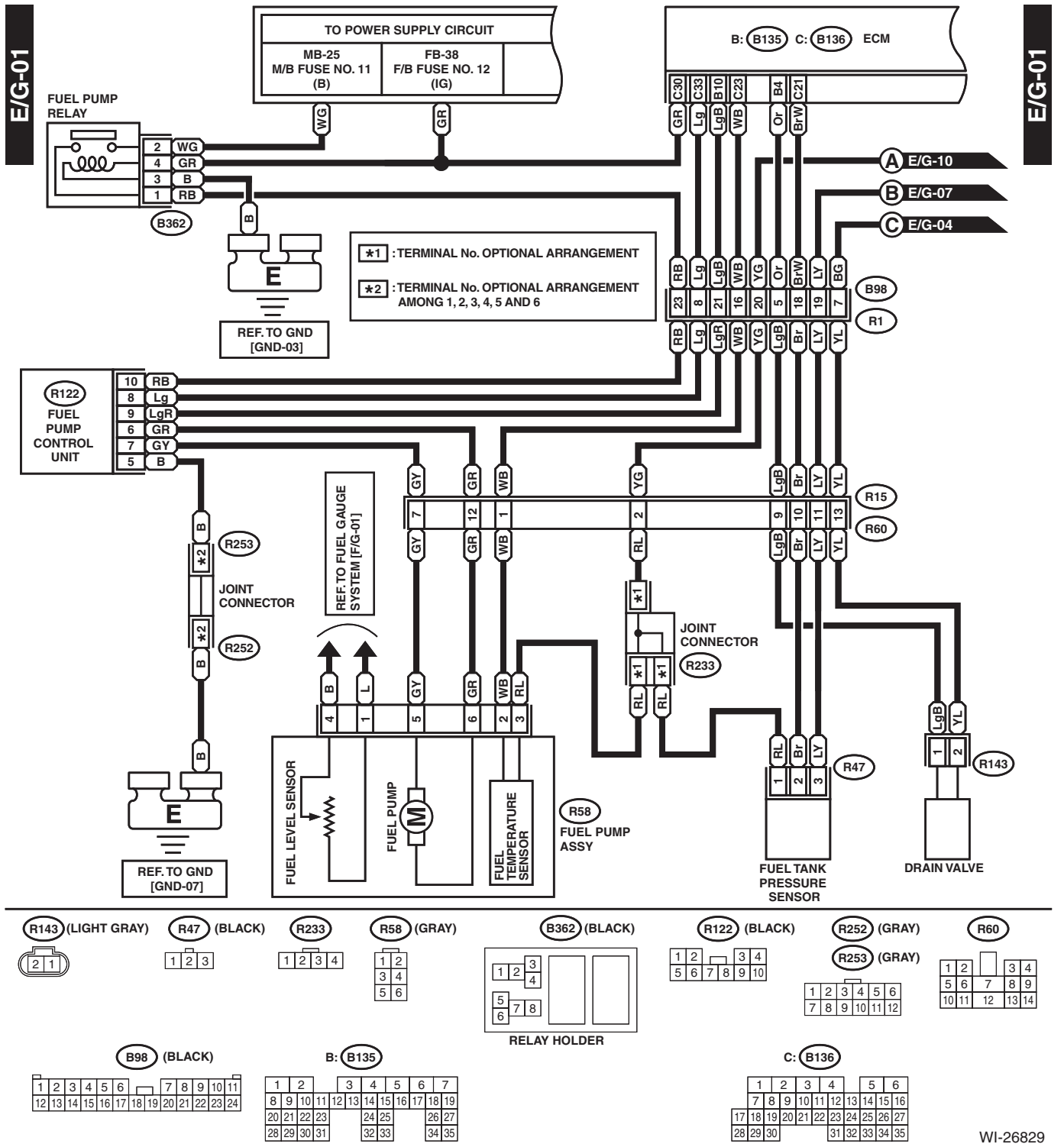
WIRING SYSTEM



WI-34395

# Engine Electrical System

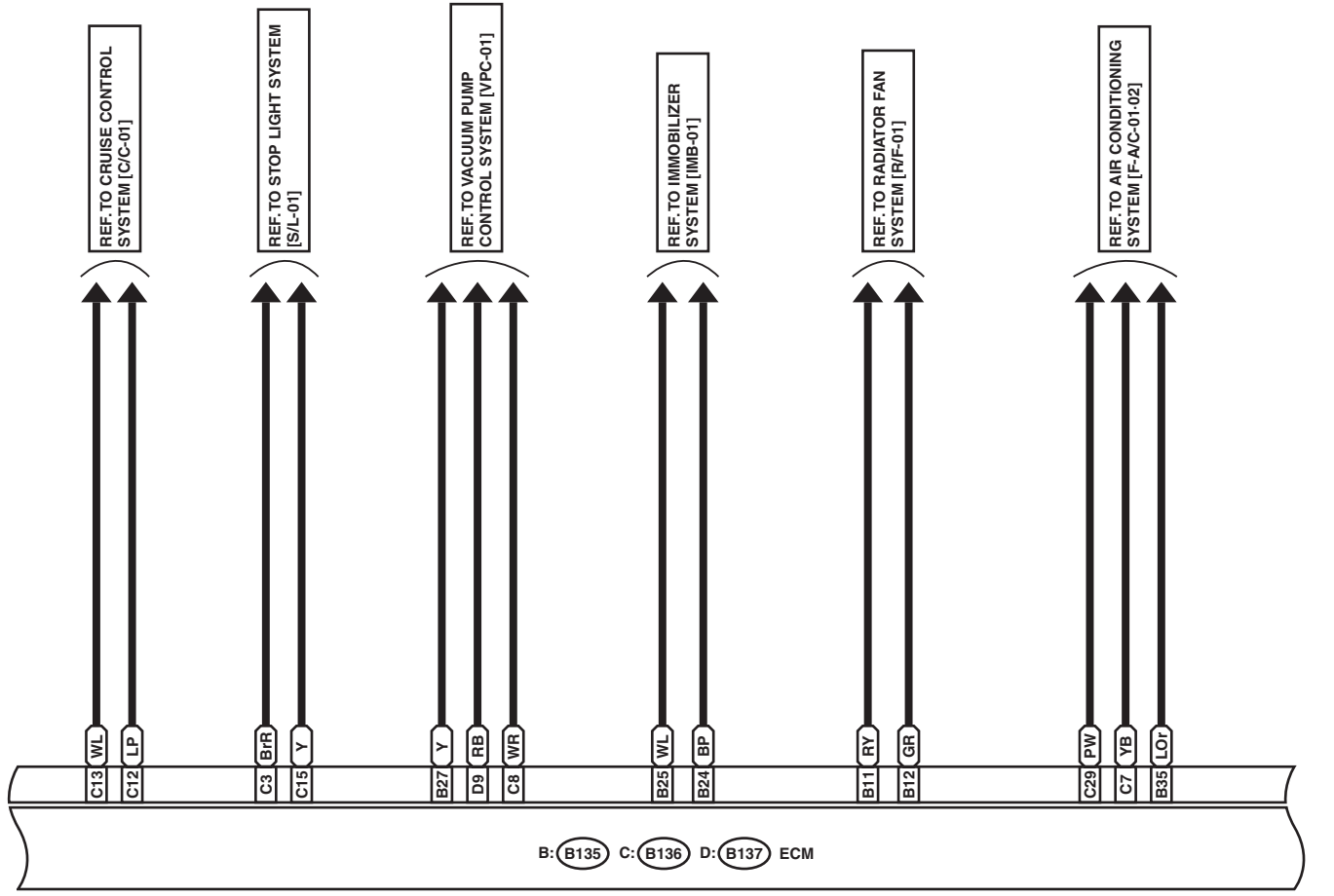
## WIRING SYSTEM



WI-26829

E/G-02

E/G-02



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	32	33	34	35

B: (B135)

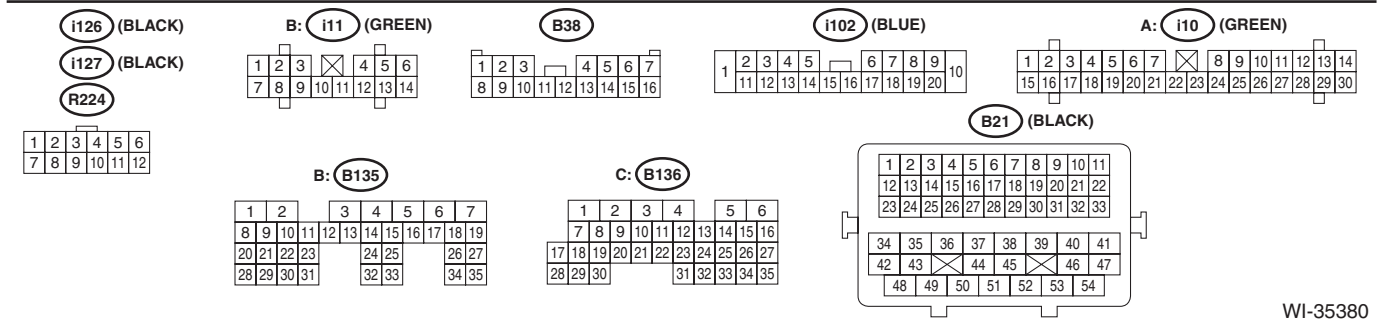
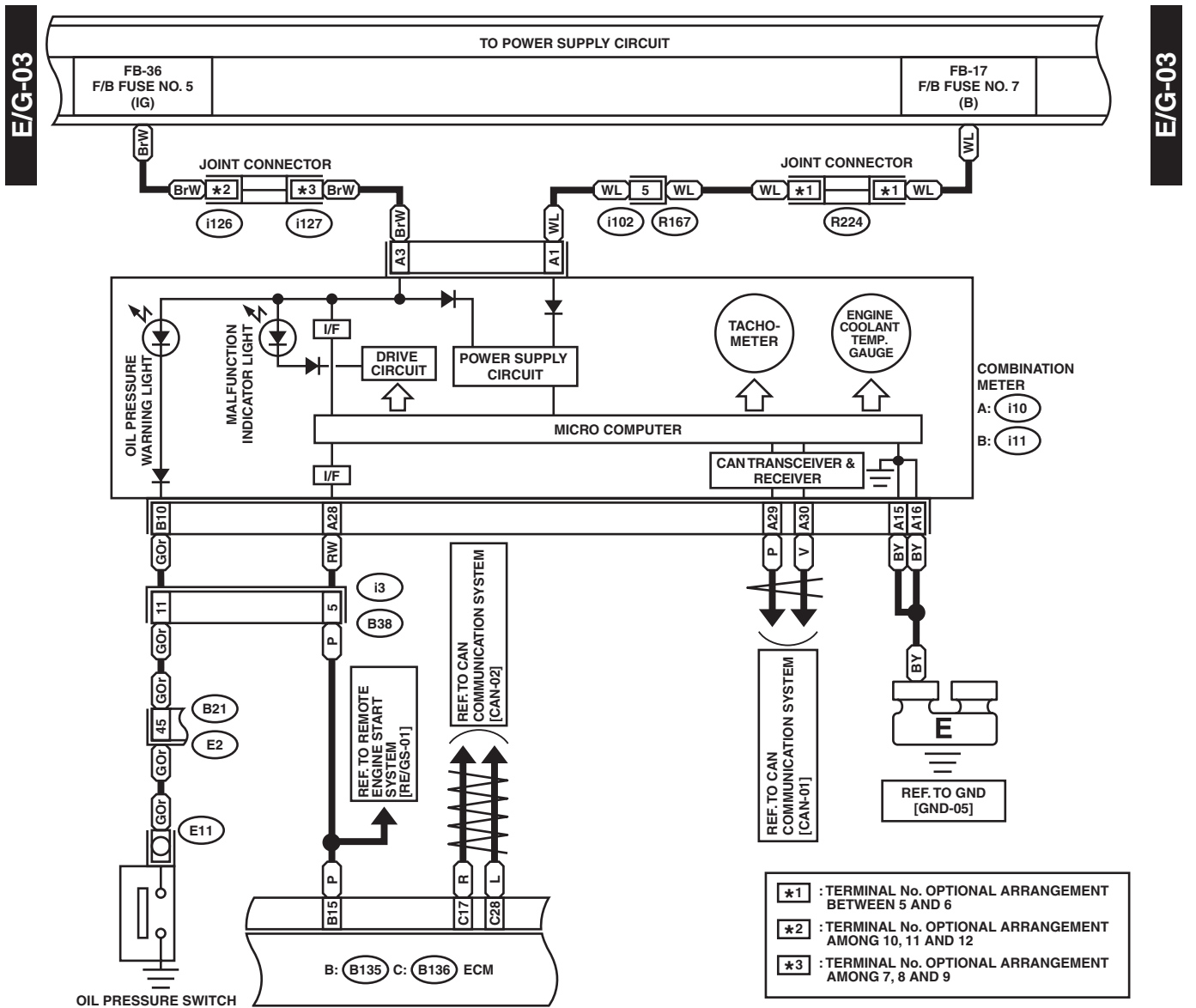
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8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31	32	33	34	35

C: (B136)

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

# Engine Electrical System

## WIRING SYSTEM

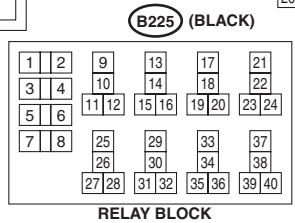
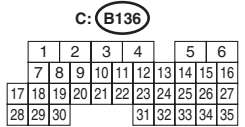
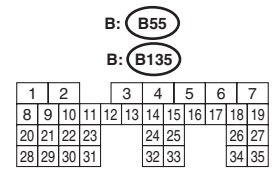
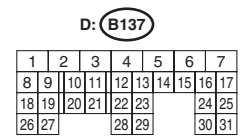
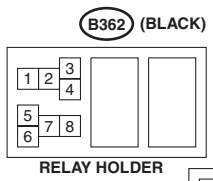
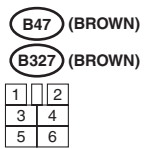
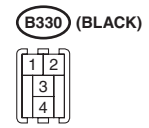
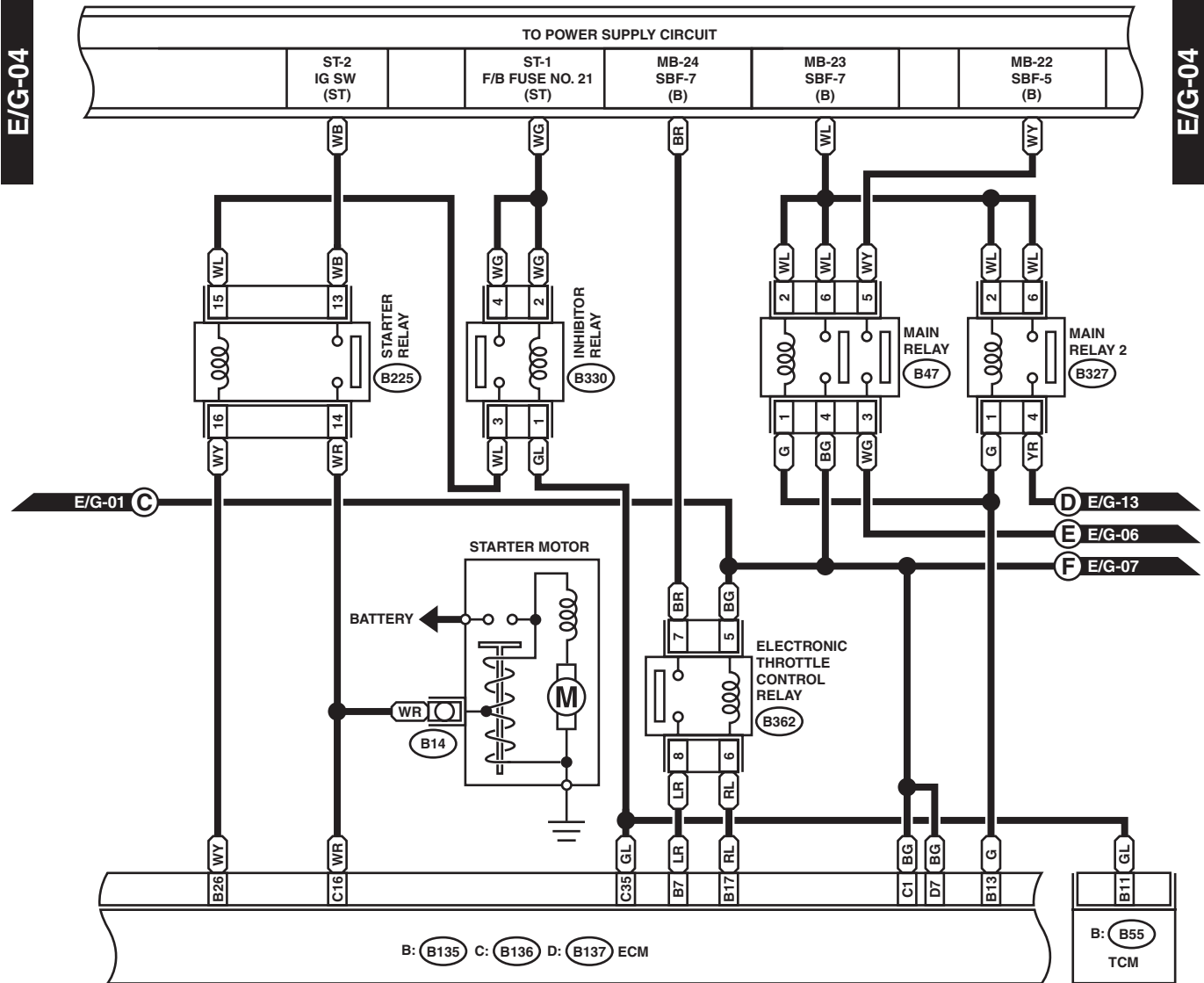


WI-35380



# Engine Electrical System

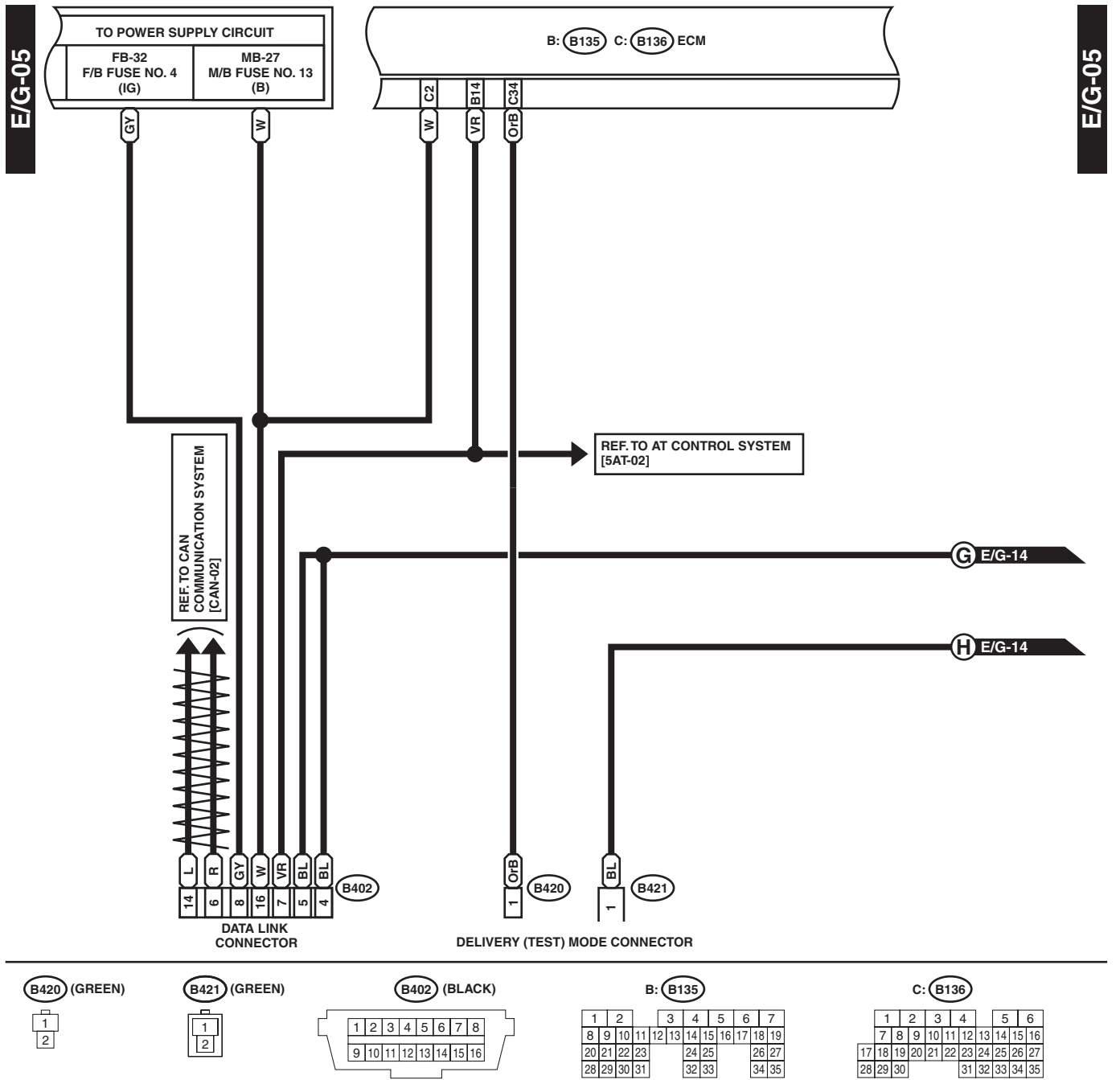
WIRING SYSTEM



WI-26832

# Engine Electrical System

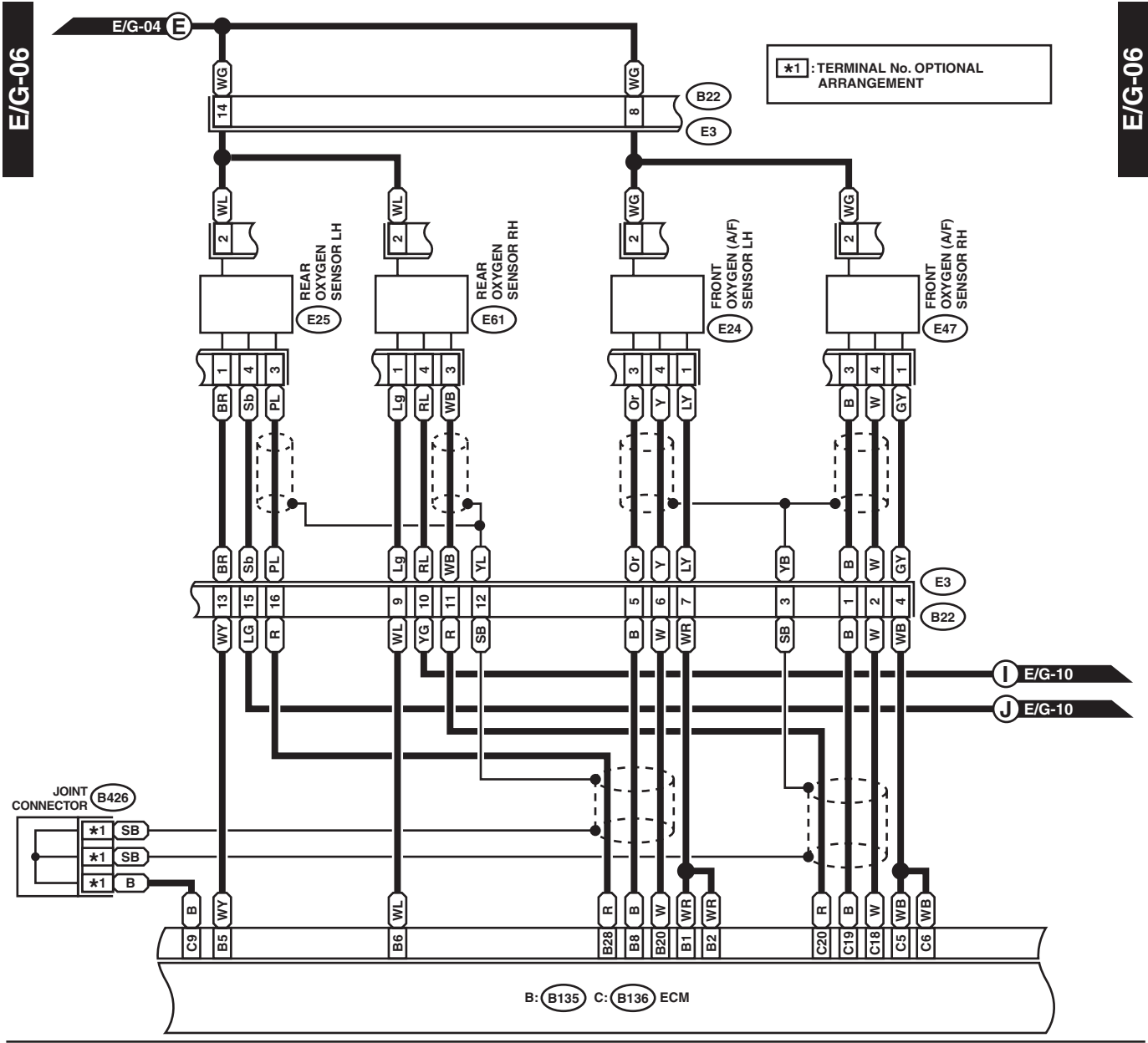
## WIRING SYSTEM



WI-26833

# Engine Electrical System

WIRING SYSTEM

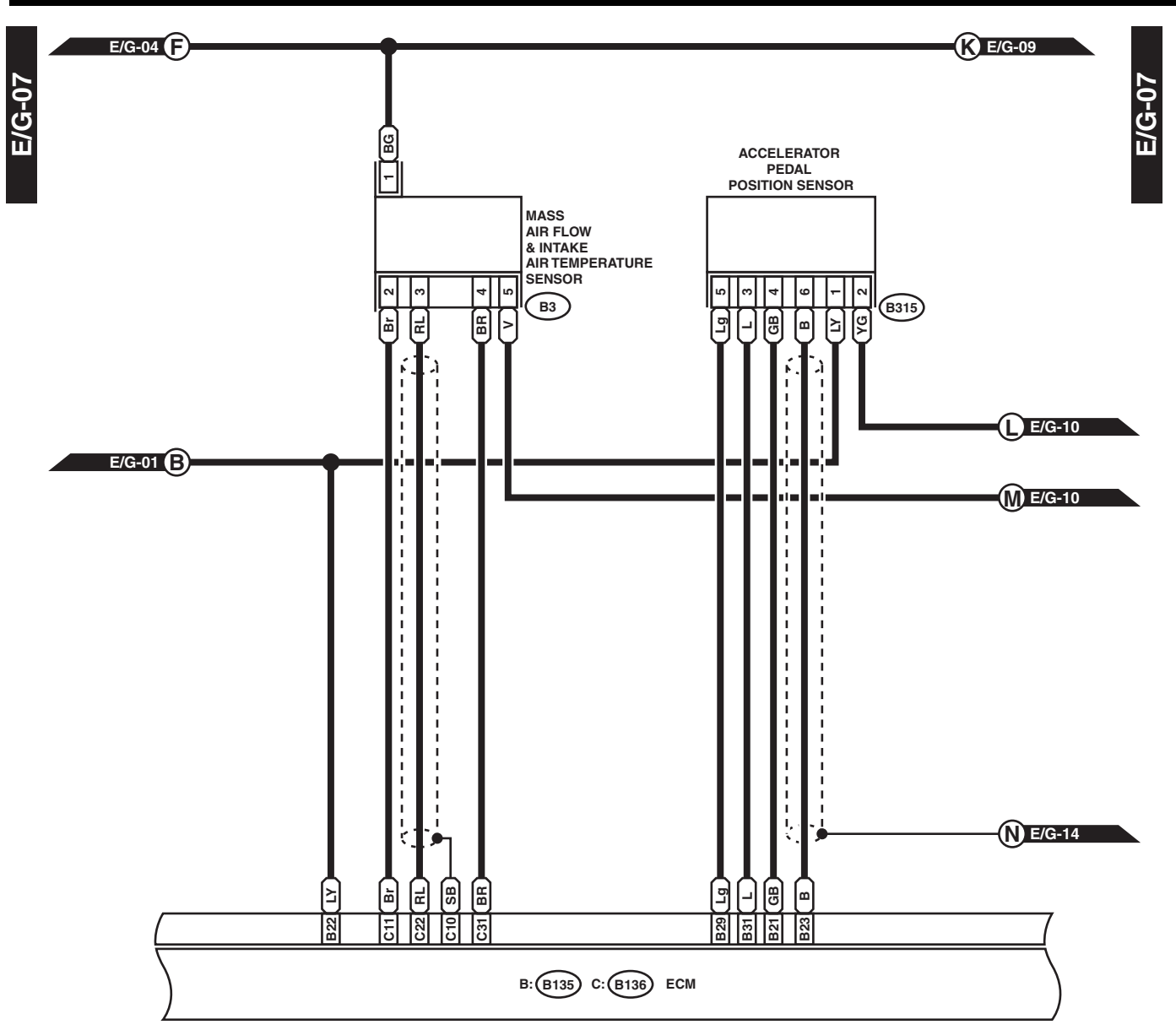


<b>E24</b> (LIGHT GRAY)	<b>B426</b>	<b>B22</b> (BROWN)	<b>B: (B135)</b>	<b>C: (B136)</b>																																																																																																							
<b>E25</b> (DARK GRAY)	<table border="1"><tr><td>1</td><td>2</td><td>3</td></tr><tr><td>4</td><td>5</td><td>6</td></tr></table>	1	2	3	4	5	6	<table border="1"><tr><td>1</td><td>2</td><td>3</td><td>4</td></tr><tr><td>5</td><td>6</td><td>7</td><td>8</td></tr><tr><td>9</td><td>10</td><td>11</td><td>12</td></tr><tr><td>13</td><td>14</td><td>15</td><td>16</td></tr></table>	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	<table border="1"><tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td></tr><tr><td>8</td><td>9</td><td>10</td><td>11</td><td>12</td><td>13</td><td>14</td><td>15</td><td>16</td><td>17</td><td>18</td><td>19</td></tr><tr><td>20</td><td>21</td><td>22</td><td>23</td><td>24</td><td>25</td><td>26</td><td>27</td><td></td><td></td><td></td><td></td></tr><tr><td>28</td><td>29</td><td>30</td><td>31</td><td>32</td><td>33</td><td>34</td><td>35</td><td></td><td></td><td></td><td></td></tr></table>	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					<table border="1"><tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td></tr><tr><td>7</td><td>8</td><td>9</td><td>10</td><td>11</td><td>12</td><td>13</td><td>14</td><td>15</td><td>16</td></tr><tr><td>17</td><td>18</td><td>19</td><td>20</td><td>21</td><td>22</td><td>23</td><td>24</td><td>25</td><td>26</td><td>27</td></tr><tr><td>28</td><td>29</td><td>30</td><td></td><td>31</td><td>32</td><td>33</td><td>34</td><td>35</td><td></td><td></td></tr></table>	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		
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<b>E47</b> (LIGHT GRAY)																																																																																																											
<b>E61</b> (DARK GRAY)																																																																																																											
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3	4																																																																																																										

WI-26834

# Engine Electrical System

## WIRING SYSTEM



**B3** (BLACK)

1	2	3	4	5
---	---	---	---	---

**B315** (BLACK)

1	2	3	4	5	6
---	---	---	---	---	---

**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	29	30	31	32	33	34	35				

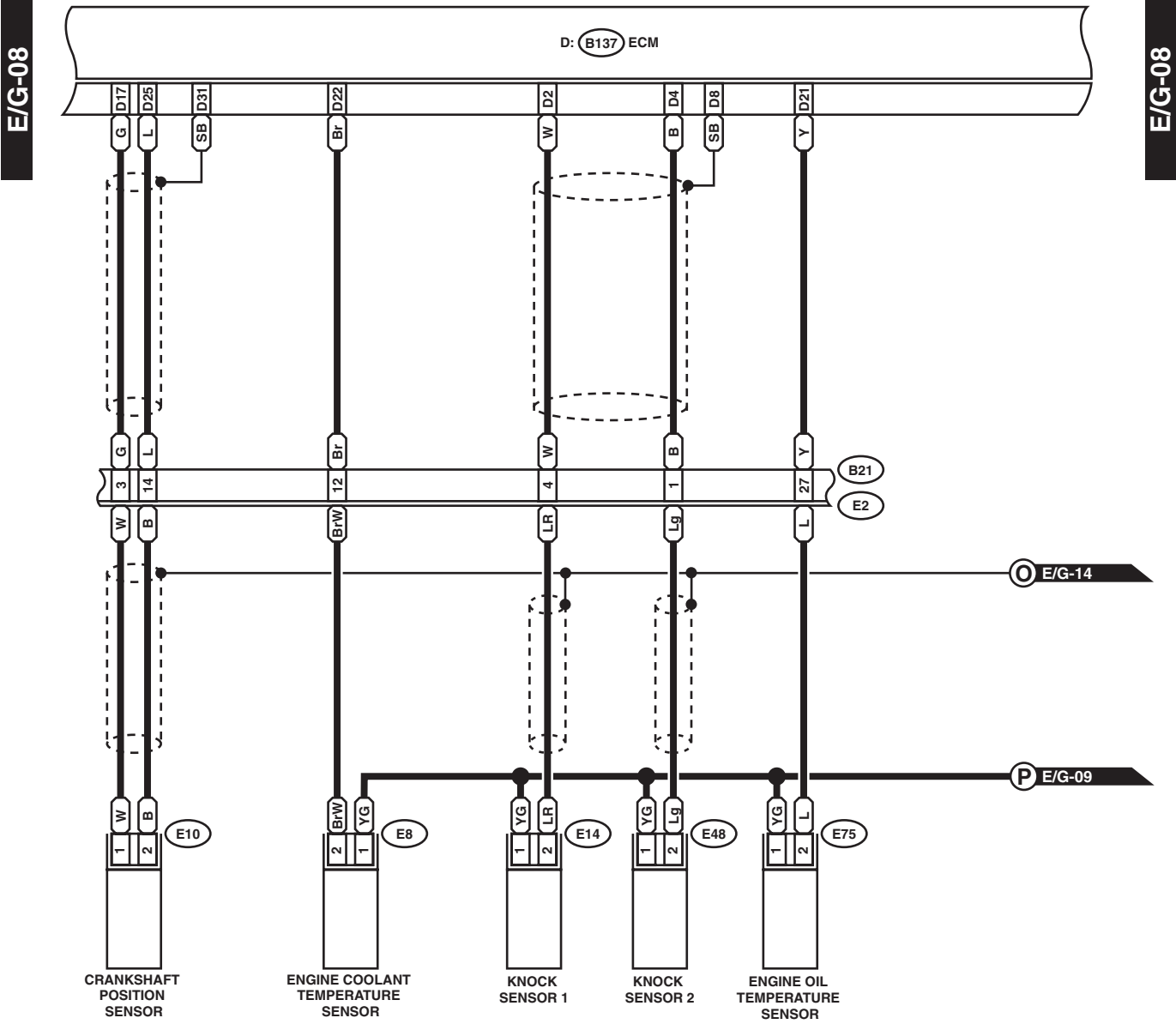
**C: B136**

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

WI-26835

# Engine Electrical System

WIRING SYSTEM



- (BROWN) E8 (BLUE)
- (LIGHT GRAY) E10 (BLACK)
- (BLUE) E14

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				

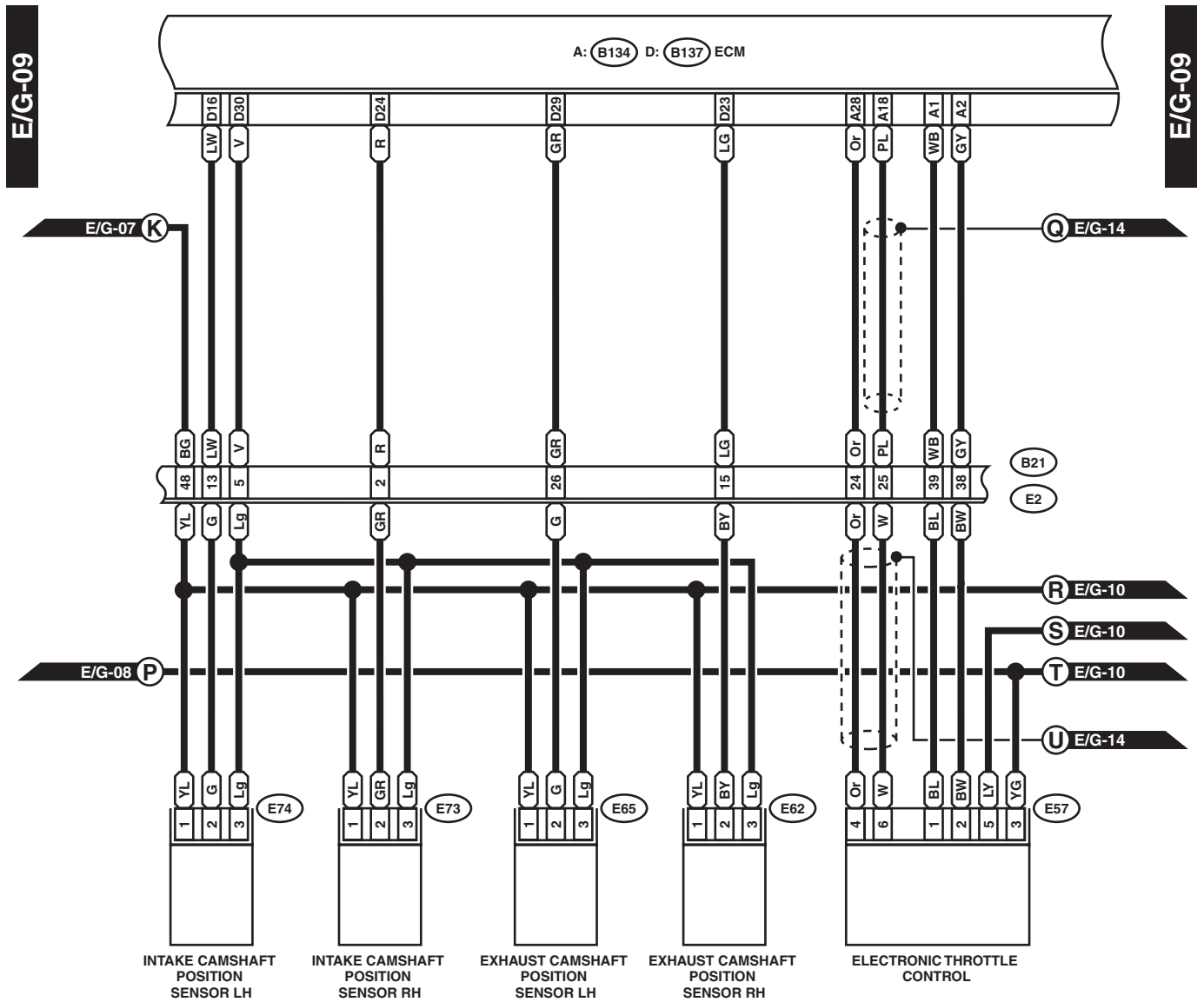
(B21) (BLACK)

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

WI-34396

# Engine Electrical System

## WIRING SYSTEM



E62 (GRAY)

E57 (BLACK)

D: B137

A: B134

B21 (BLACK)

E65 (GRAY)

1	2	3	4	5	6
---	---	---	---	---	---

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		

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		

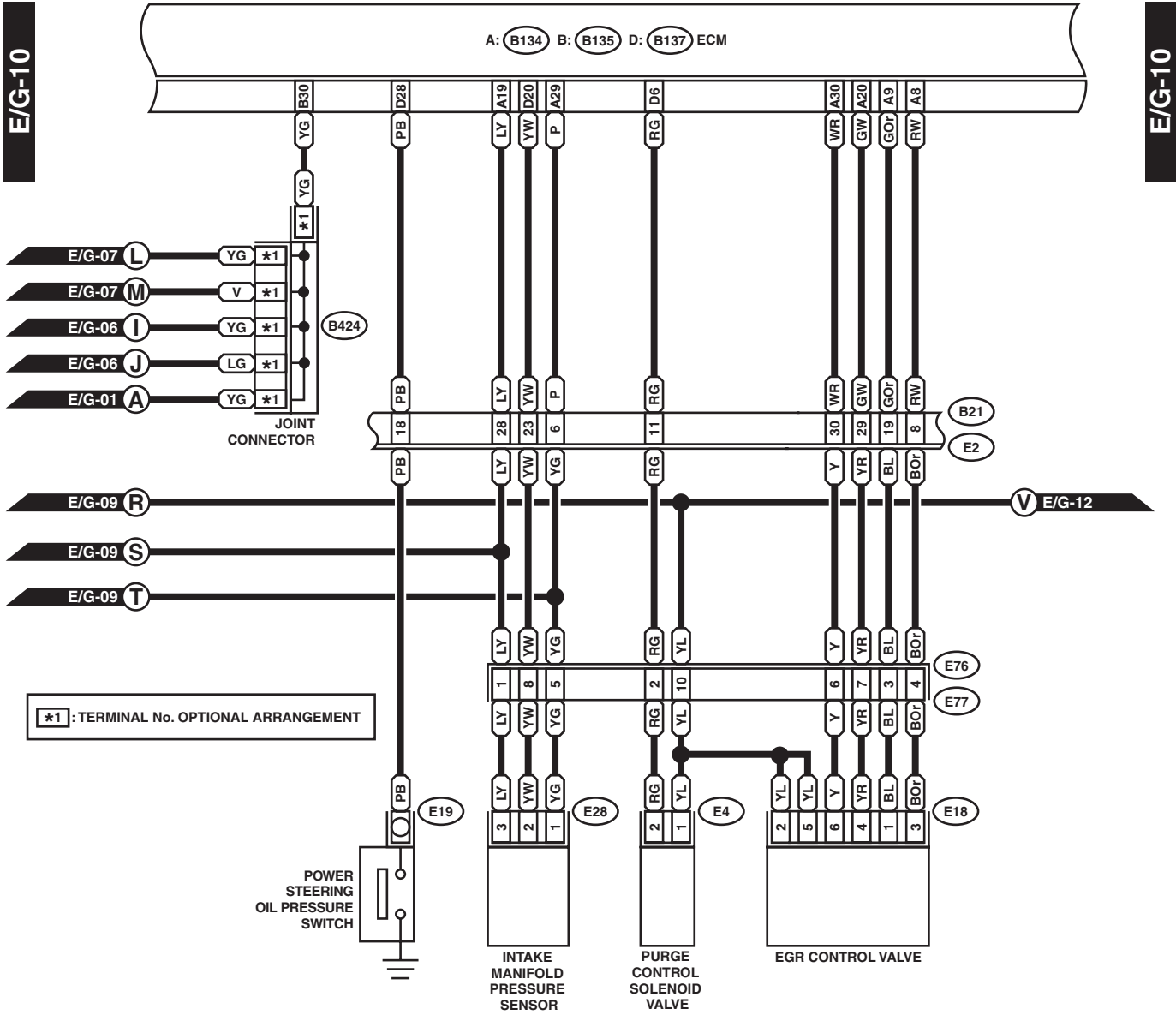
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12	13	14	15	16	17	18	19	20	21	22
23	24	25	26	27	28	29	30	31	32	33
34	35	36	37	38	39	40	41			
42	43	44	45	46	47					
48	49	50	51	52	53	54				

1	2	3
---	---	---

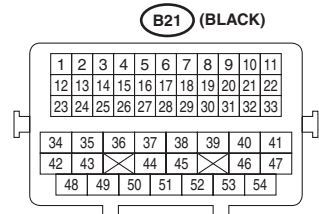
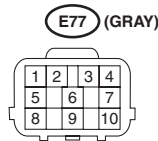
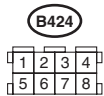
WI-26837

# Engine Electrical System

WIRING SYSTEM



\*1 : TERMINAL No. OPTIONAL ARRANGEMENT



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				

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	

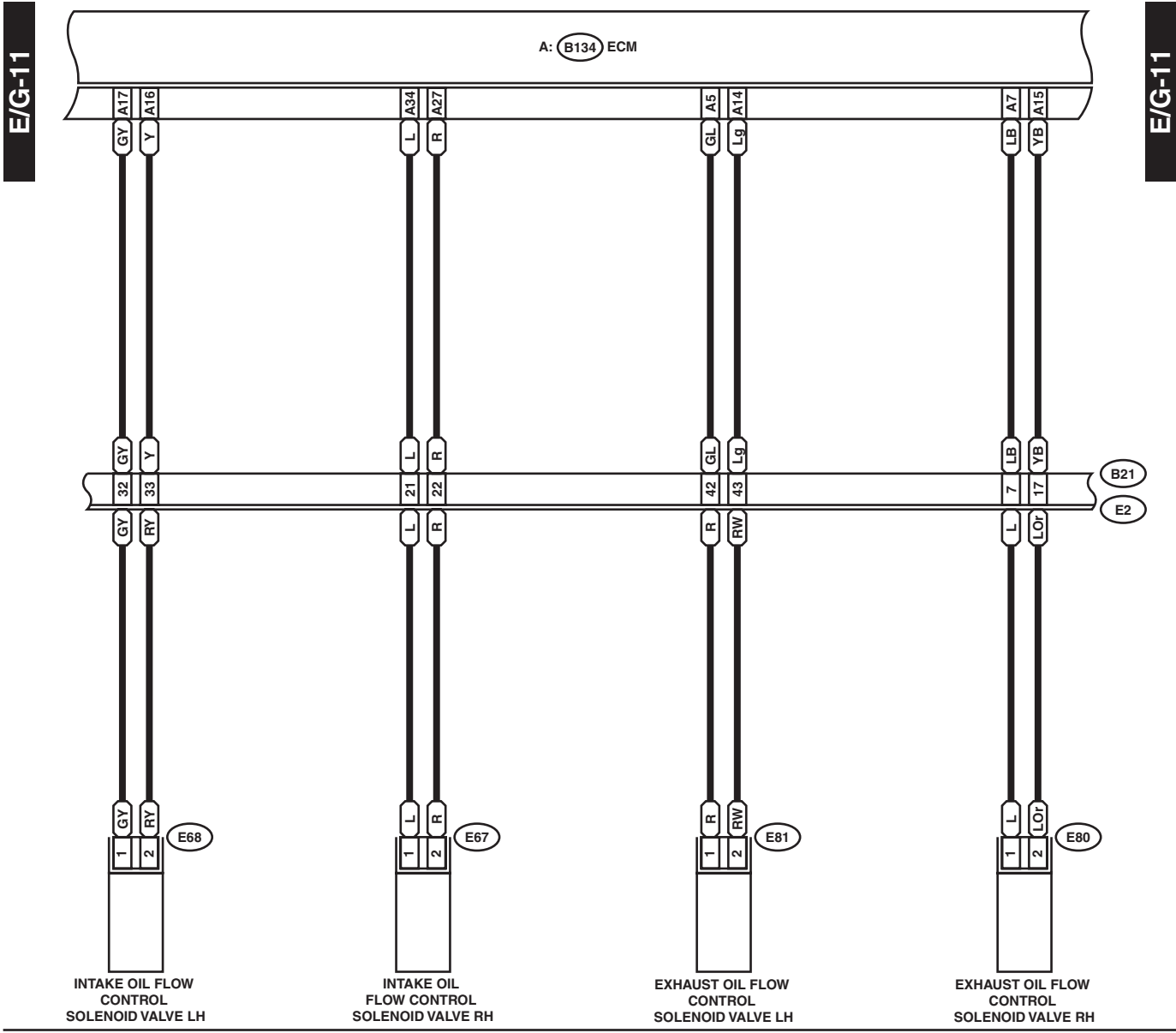
B: B135

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
29	30	31	32	33	34	35

WI-34397

# Engine Electrical System

## WIRING SYSTEM



- E67** (BLACK)
- E68** (BLACK)
- E80** (BLUE)
- E81** (BLUE)

**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			

**B21 (BLACK)**

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

WI-26839

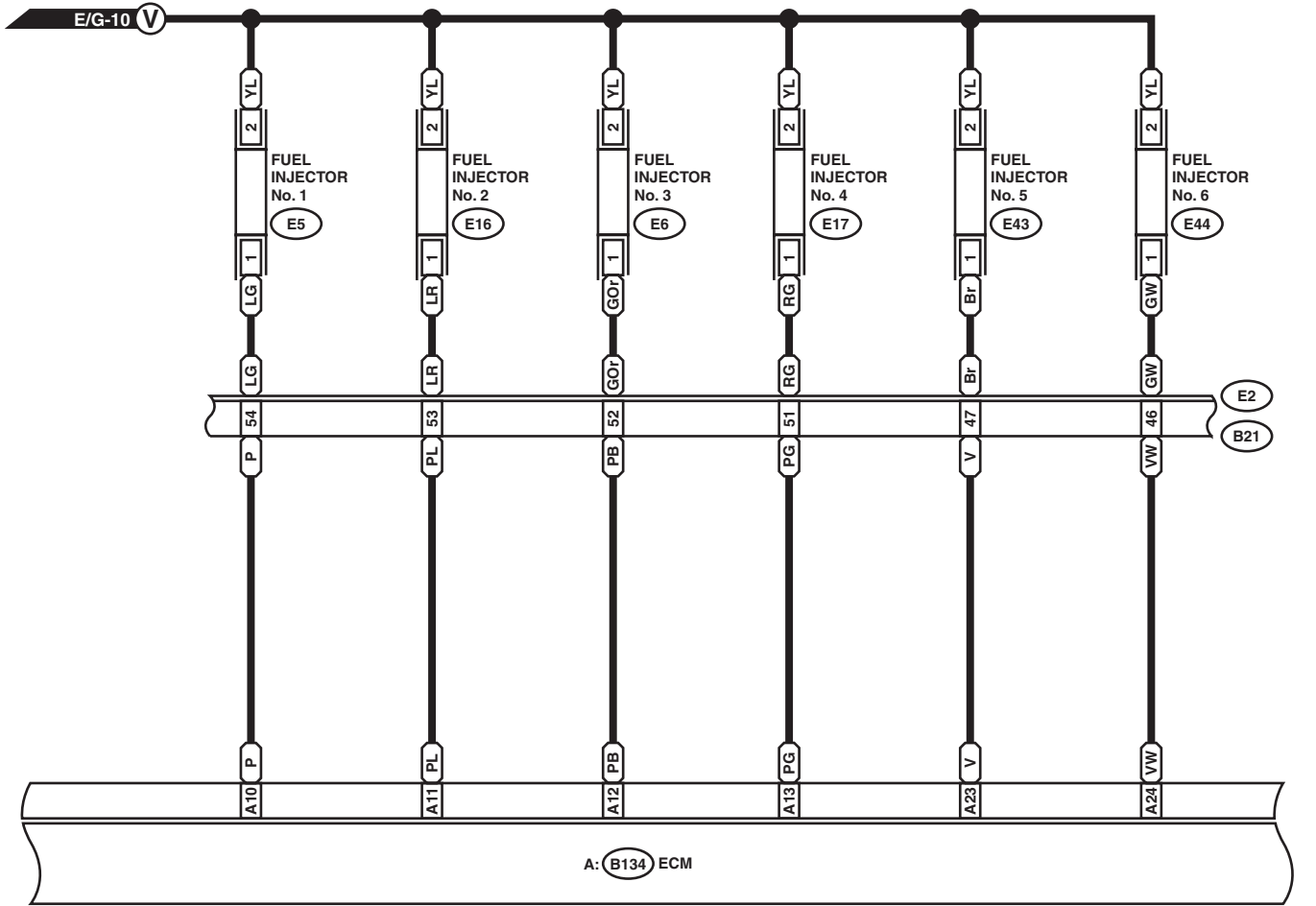


# Engine Electrical System

WIRING SYSTEM

E/G-12

E/G-12



- (DARK GRAY) E5    E17 (DARK GRAY)
  - (DARK GRAY) E6    E43 (DARK GRAY)
  - (DARK GRAY) E16    E44 (DARK GRAY)
- 1 2

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

B21 (BLACK)

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

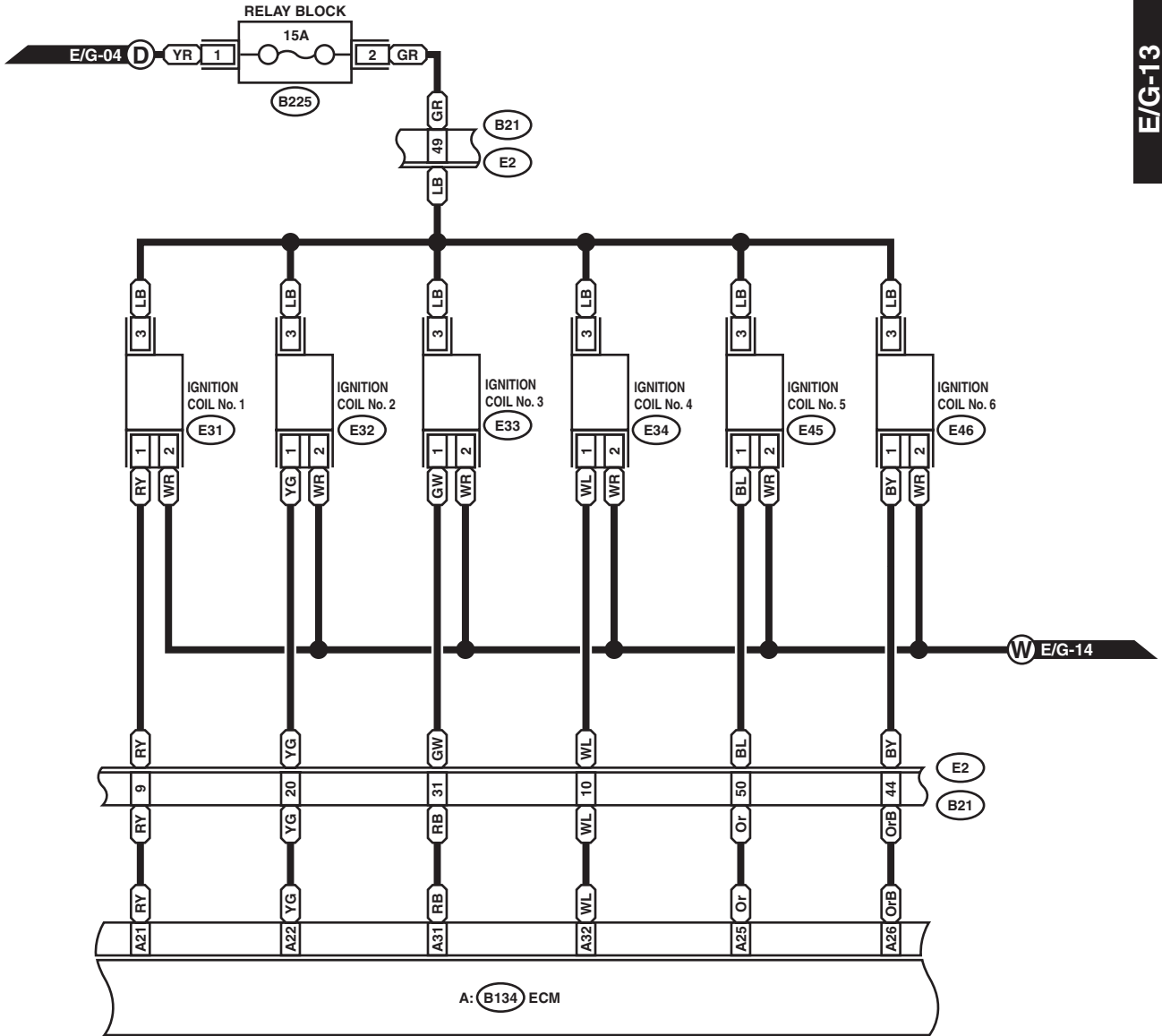
WI-26840

# Engine Electrical System

## WIRING SYSTEM

E/G-13

E/G-13



- E31 (GRAY)
- E32 (GRAY)
- E33 (GRAY)
- E34 (GRAY)
- E45 (GRAY)
- E46 (GRAY)

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	

B225 (BLACK)

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

B21 (BLACK)

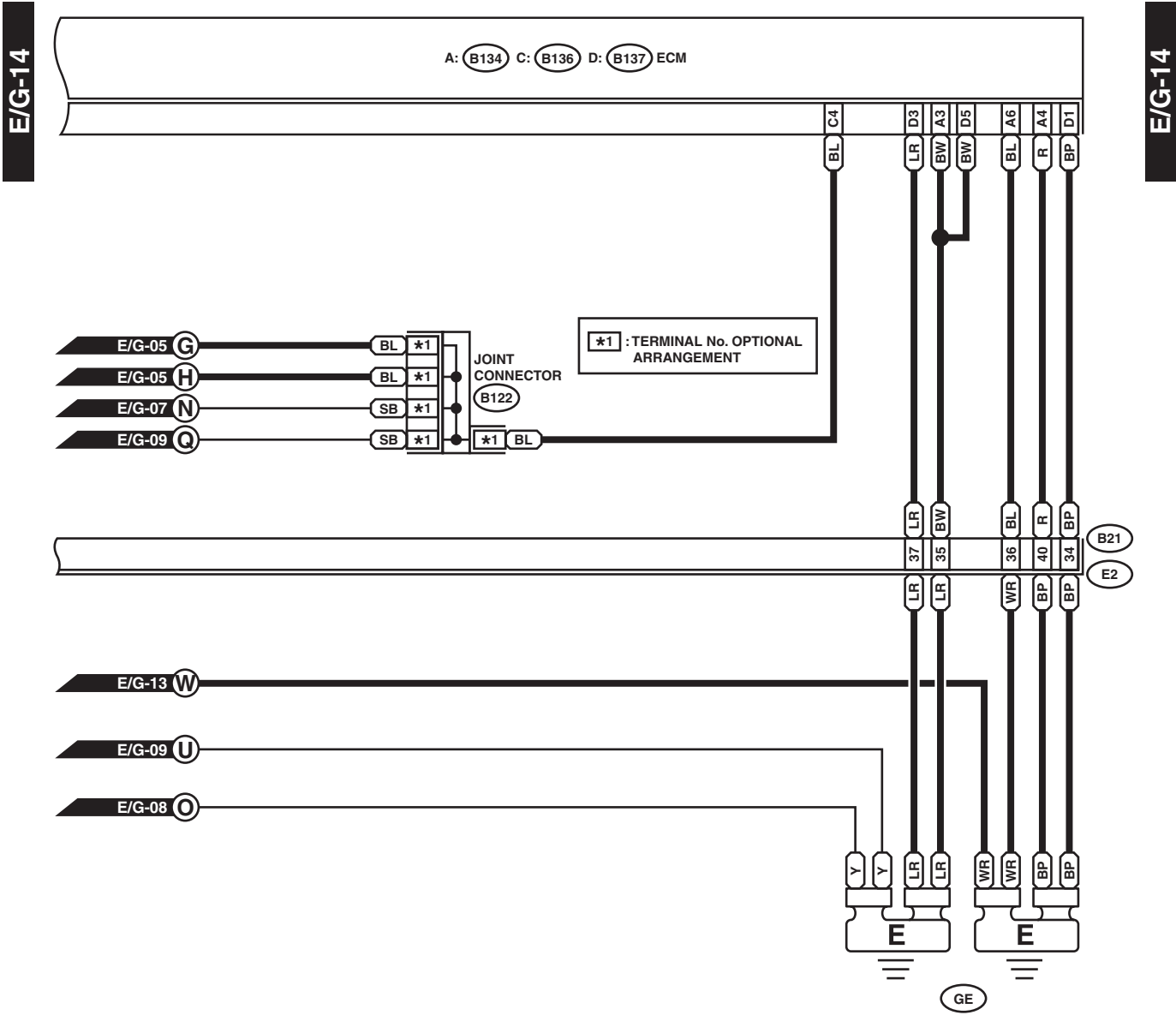
1	2	3	4	5	6	7	8	9	10	11
12	13	14	15	16	17	18	19	20	21	22
23	24	25	26	27	28	29	30	31	32	33
34	35	36	37	38	39	40	41			
42	43	44	45	46	47					
48	49	50	51	52	53	54				

RELAY BLOCK

WI-26841

# Engine Electrical System

WIRING SYSTEM



**B122**

1	2	3
4	5	6

**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	32	33	34			

**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			

**C: B136**

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

**B21 (BLACK)**

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

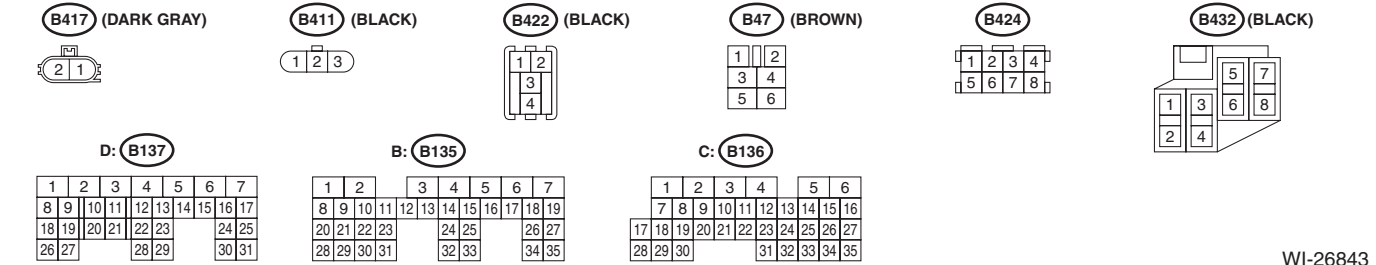
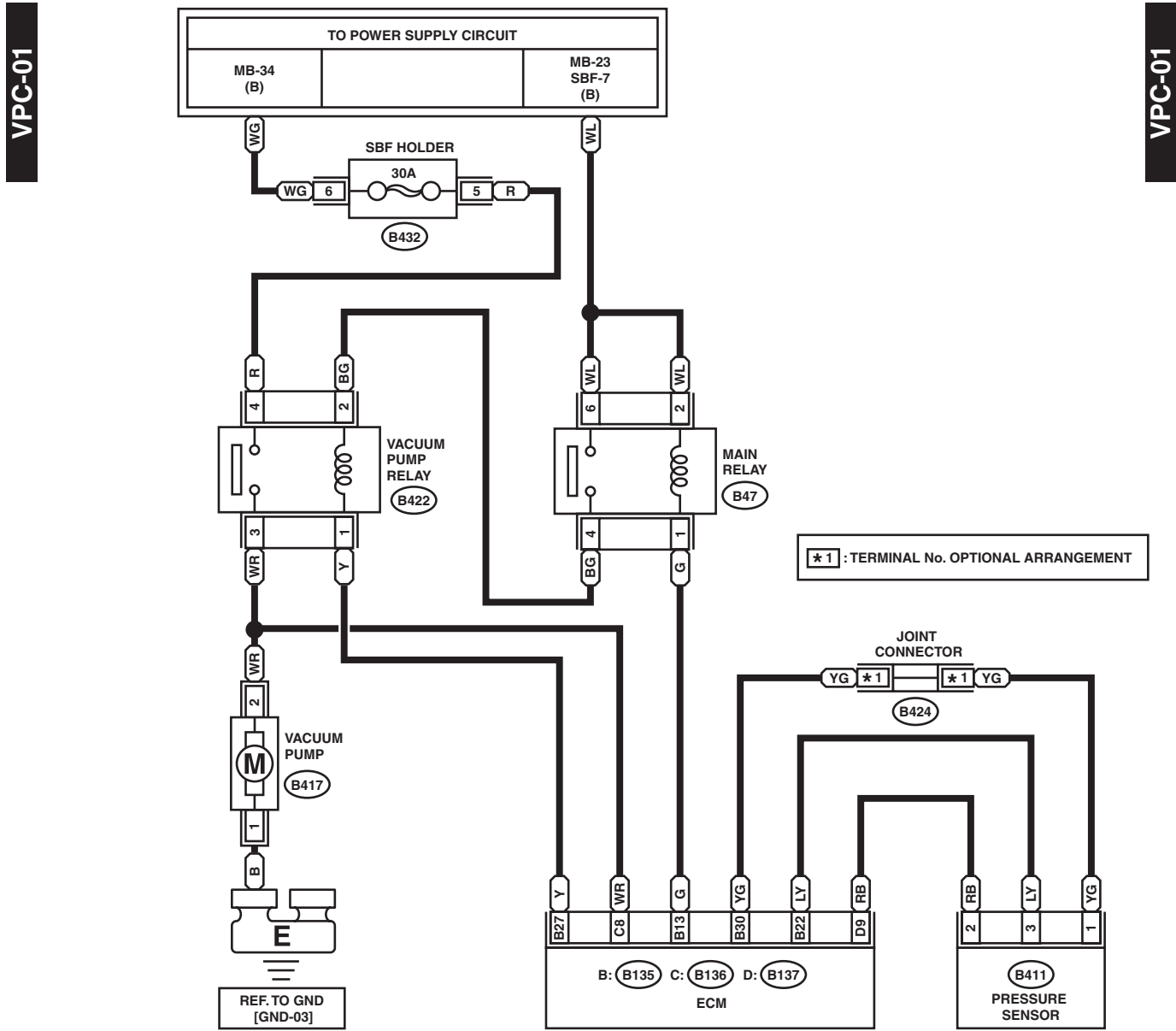
WI-26842

# Vacuum Pump Control System

WIRING SYSTEM

## 6. Vacuum Pump Control System

### A: WIRING DIAGRAM



WI-26843

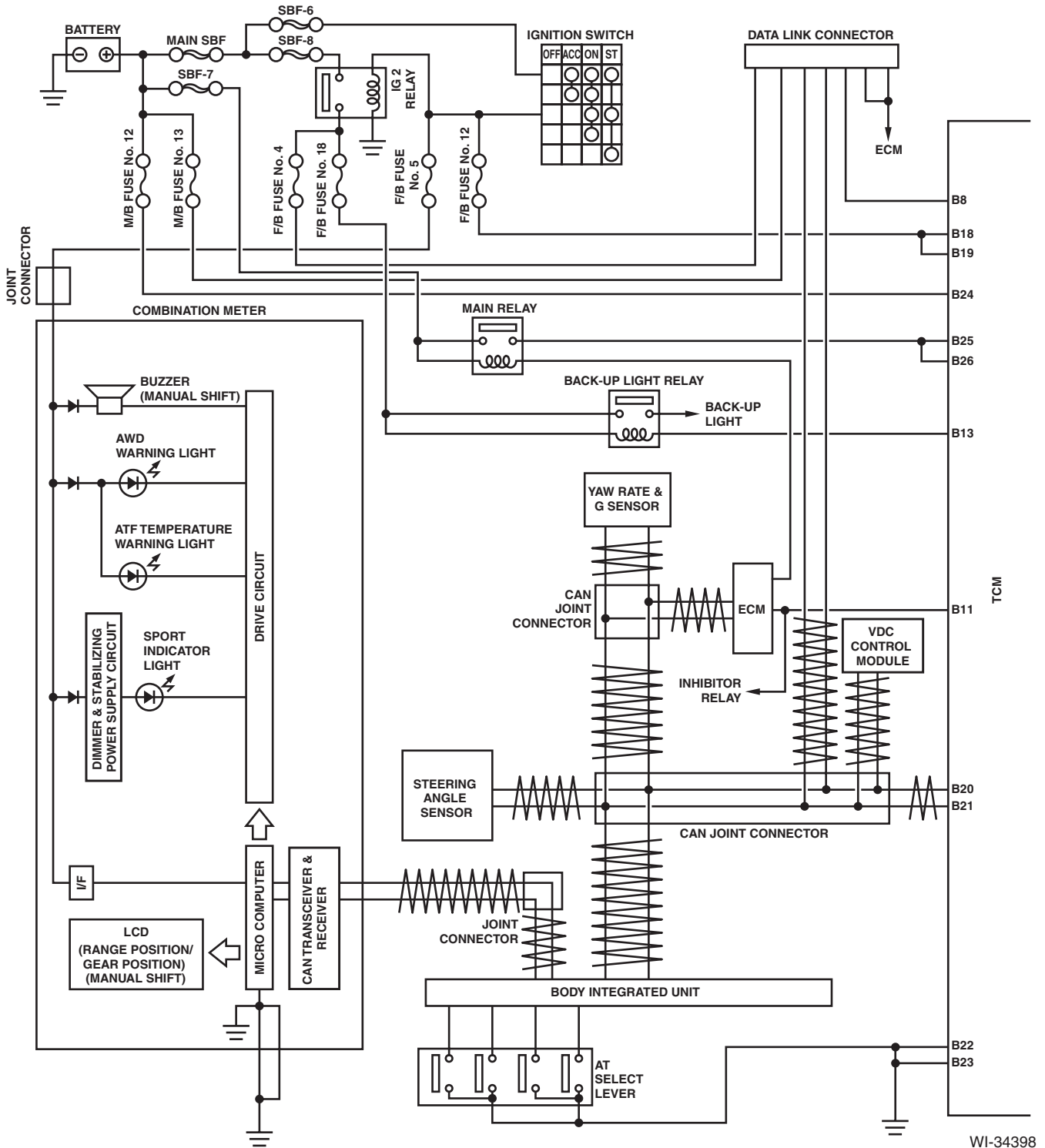


# AT Control System

## WIRING SYSTEM

### 7. AT Control System

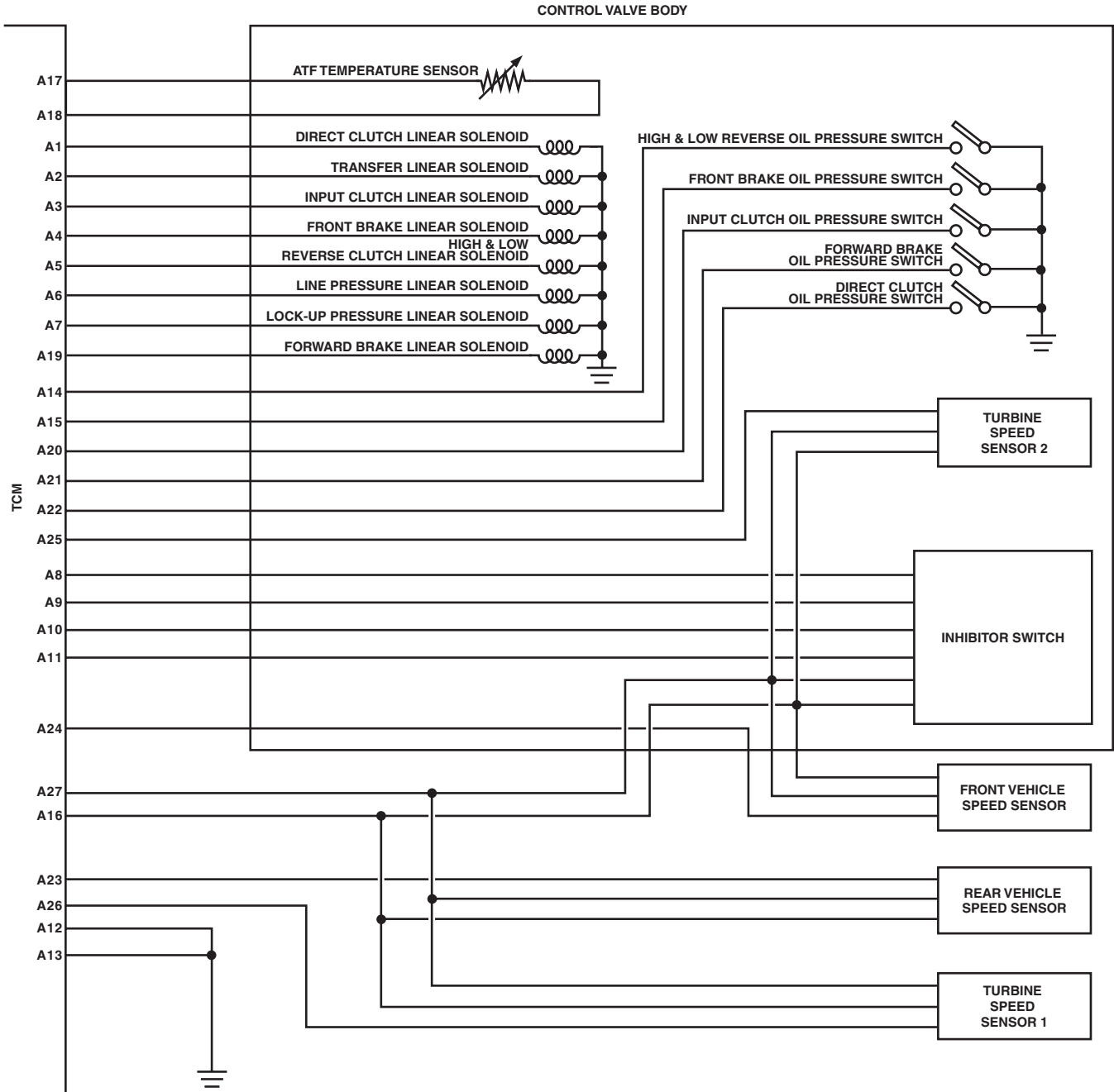
#### A: WIRING DIAGRAM



WI-34398

# AT Control System

## WIRING SYSTEM



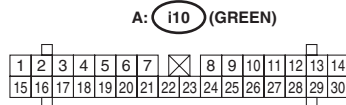
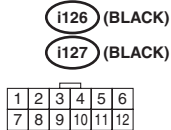
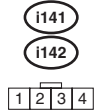
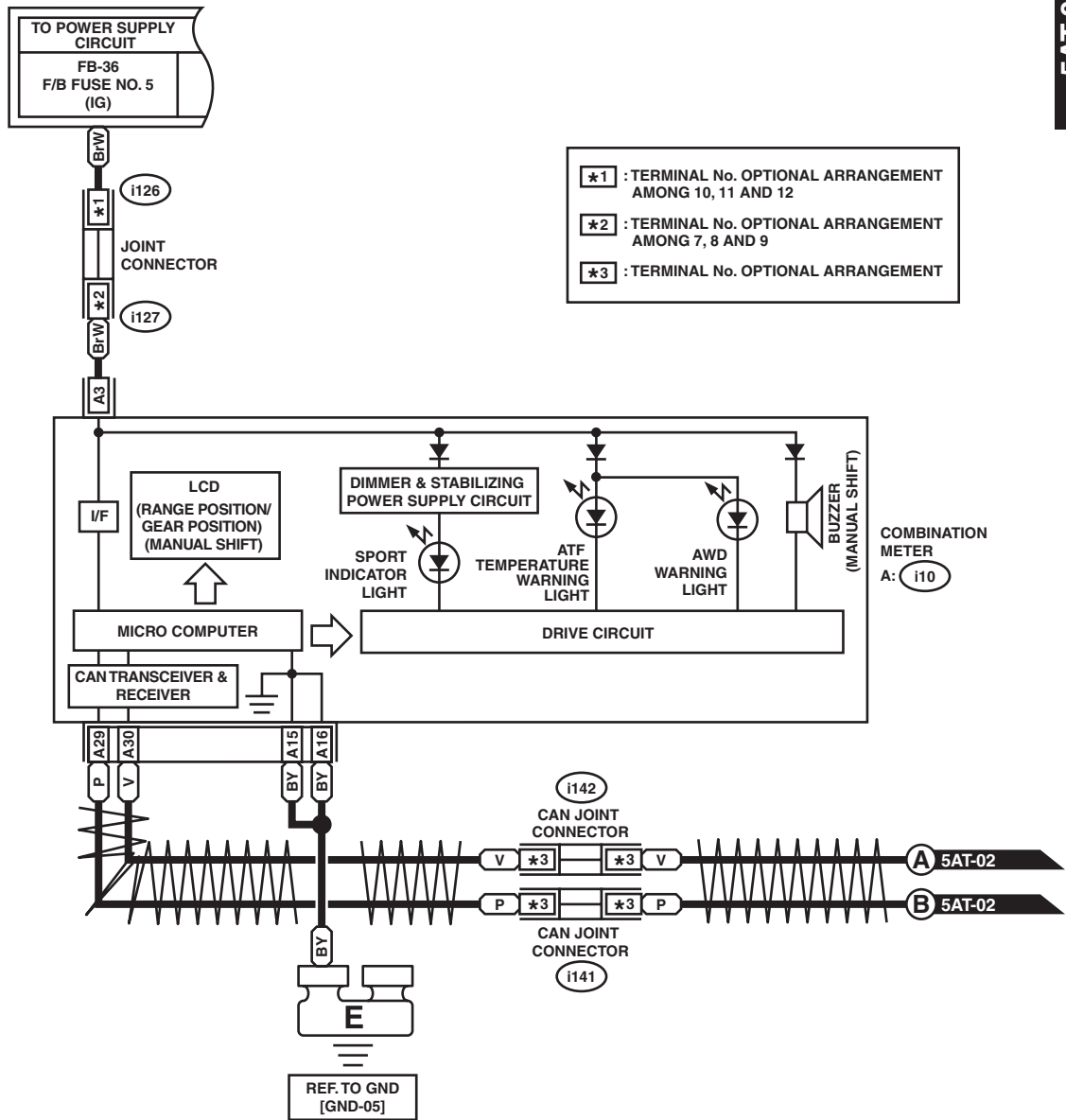
WI-31734

# AT Control System

## WIRING SYSTEM

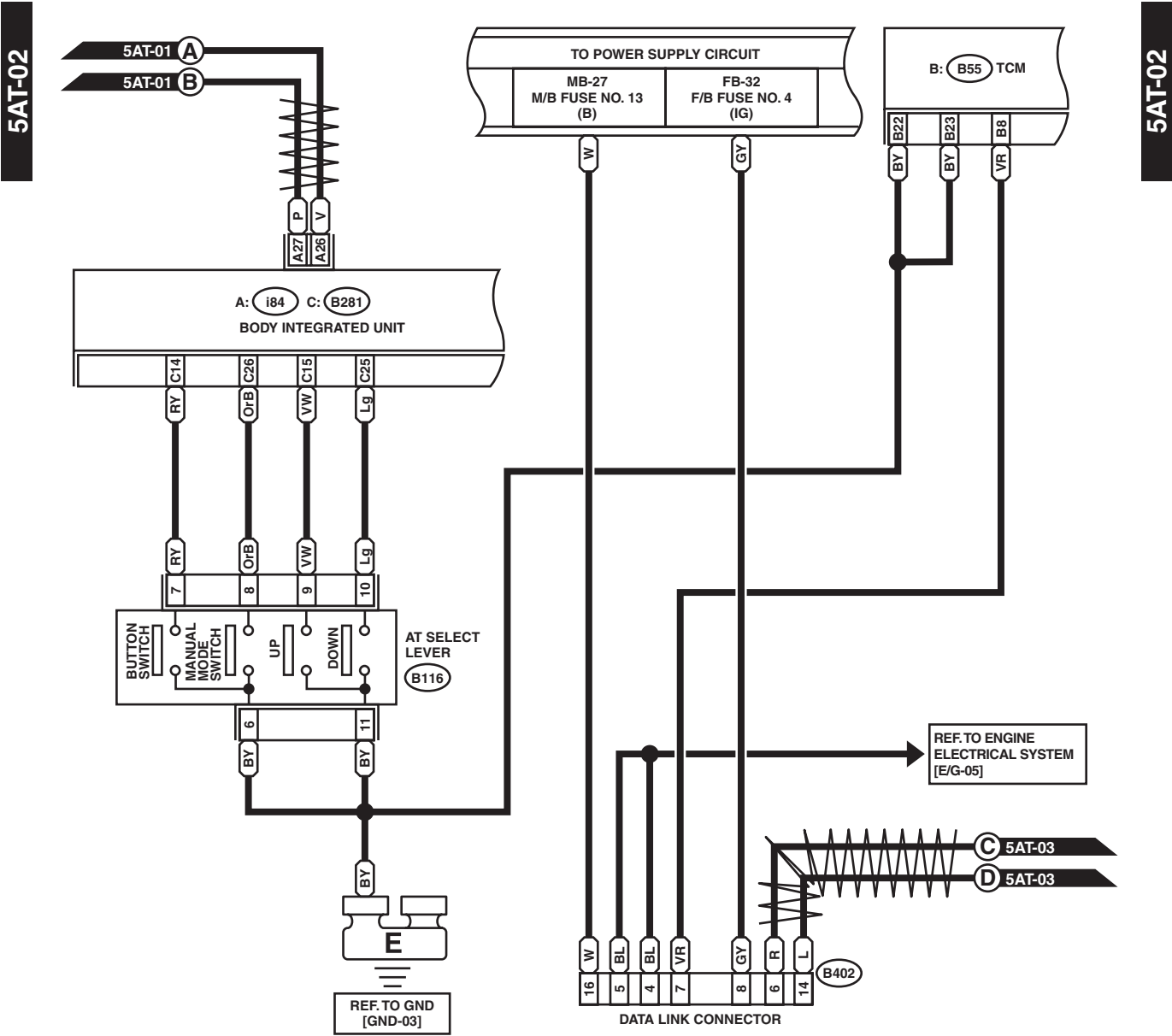
5AT-01

5AT-01



WI-34399





**5AT-02**

**B116**

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

**B402 (BLACK)**

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

**C: B281**

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

**B: B55**

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

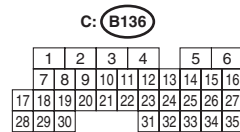
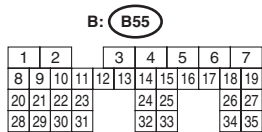
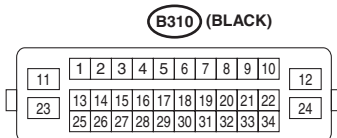
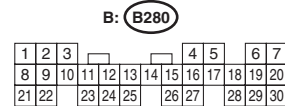
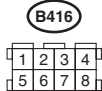
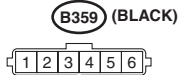
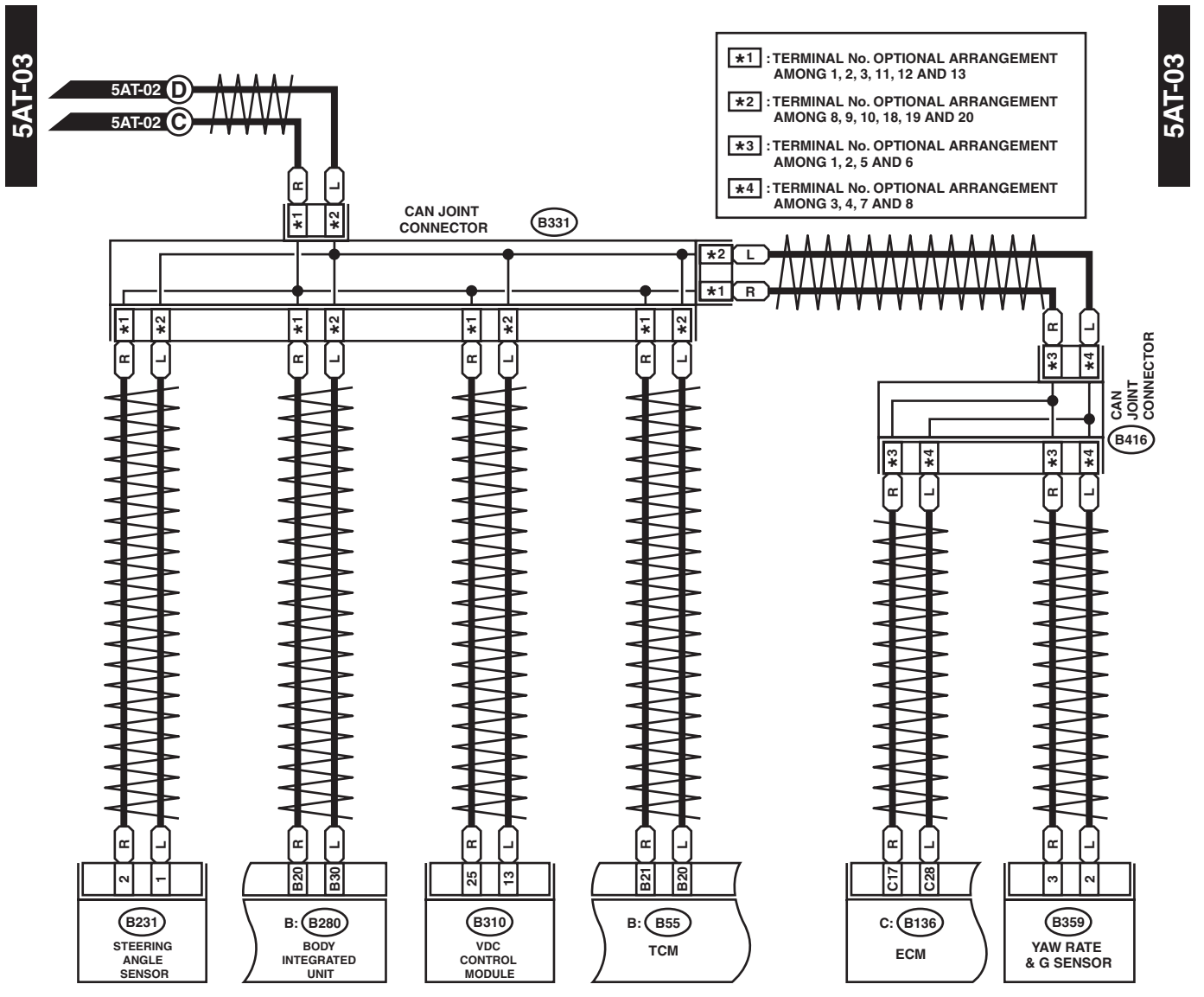
**A: i84 (GRAY)**

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

WI-32070

# AT Control System

## WIRING SYSTEM



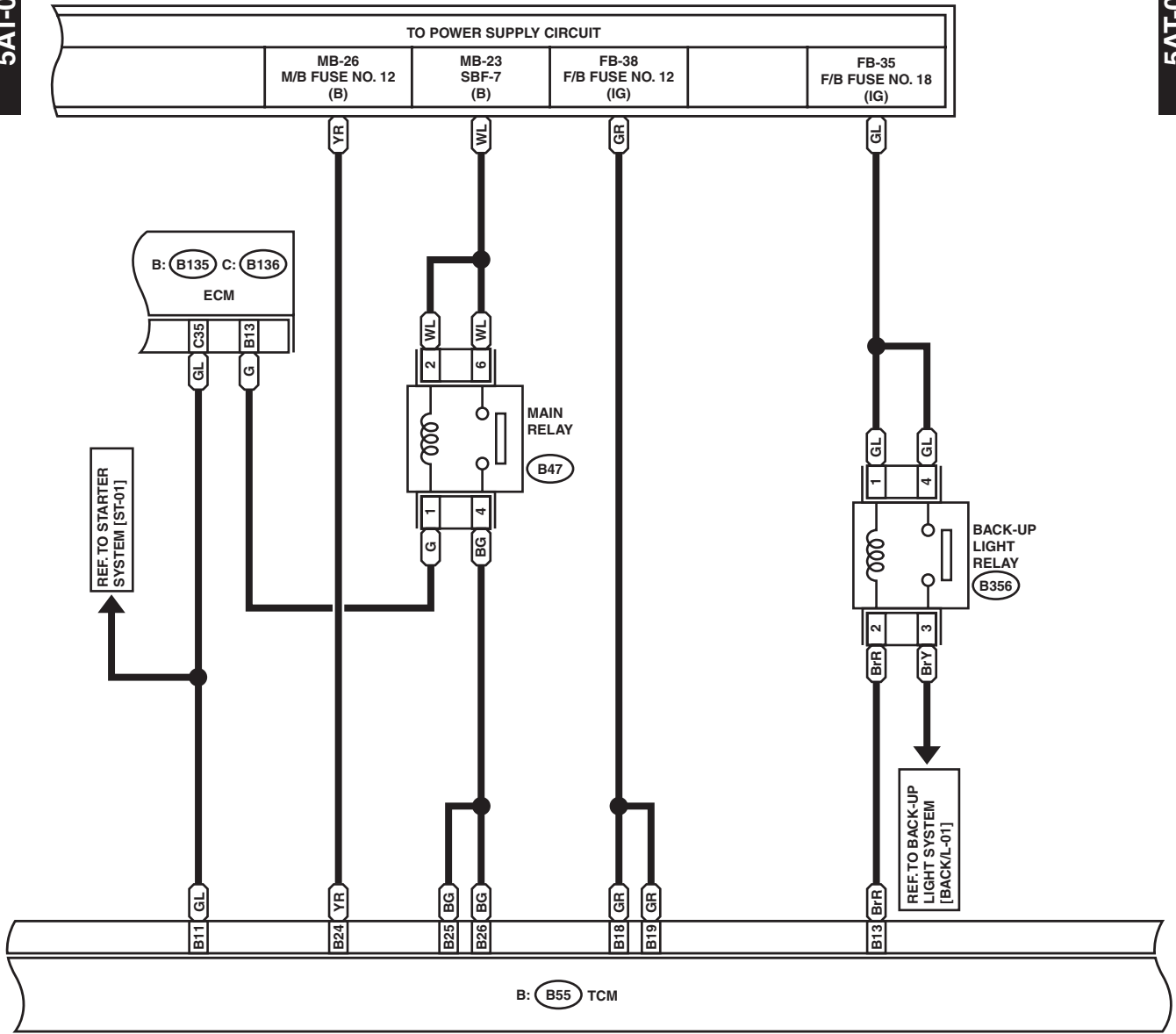
WI-26847

# AT Control System

WIRING SYSTEM

5AT-04

5AT-04

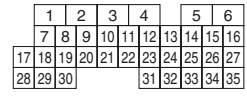
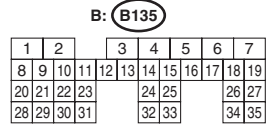


(B356) (BLACK)

(B47) (BROWN)

B: (B55)

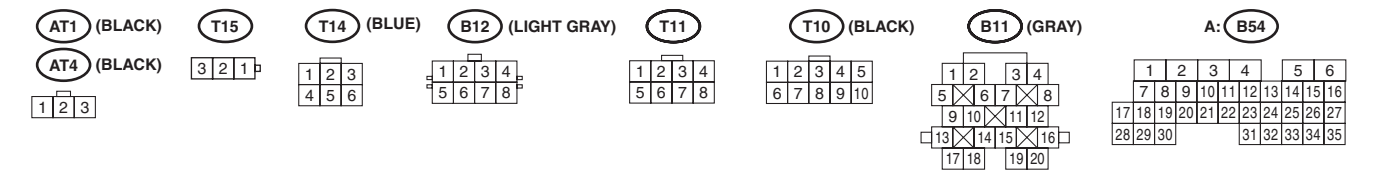
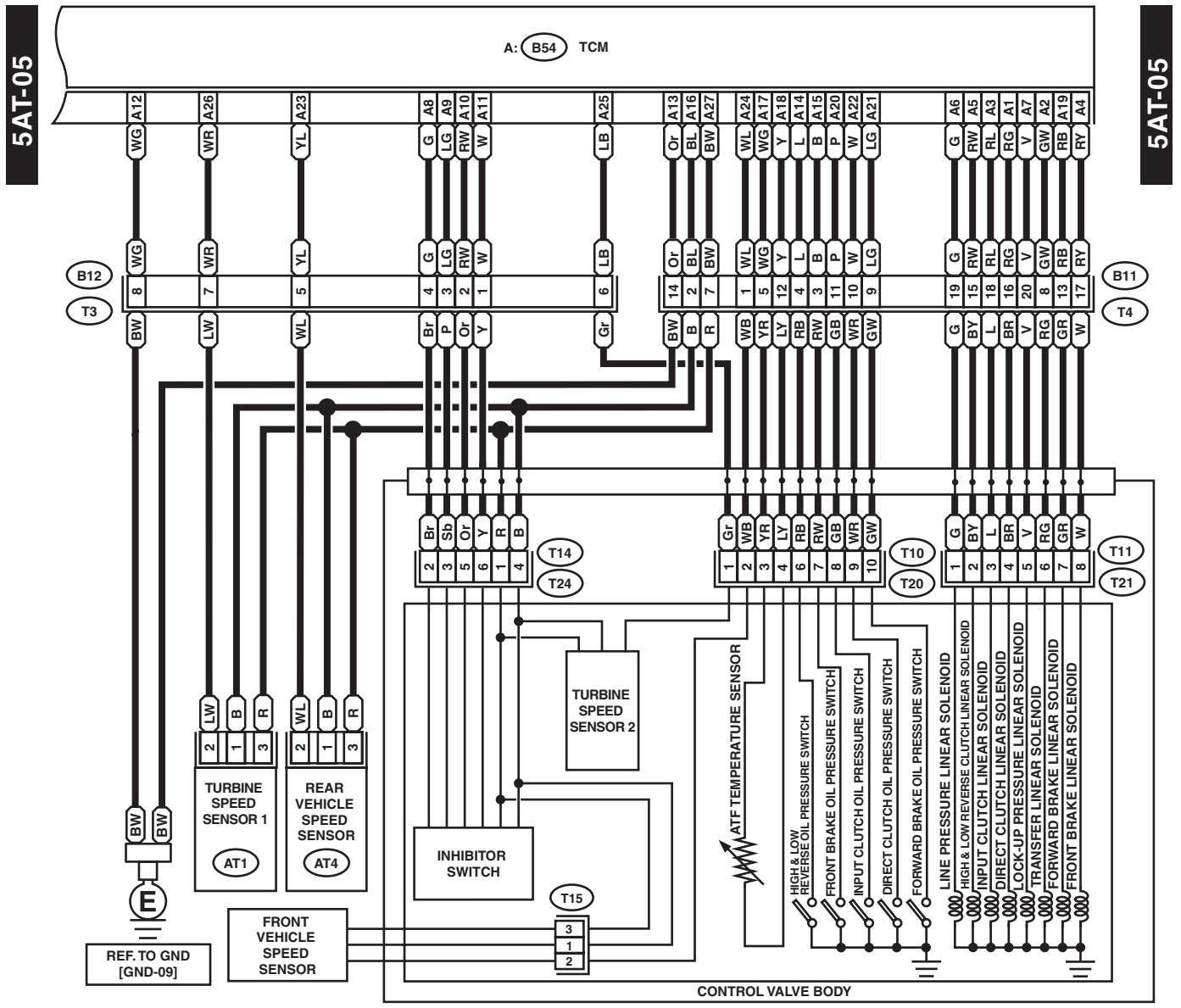
C: (B136)



WI-26848

# AT Control System

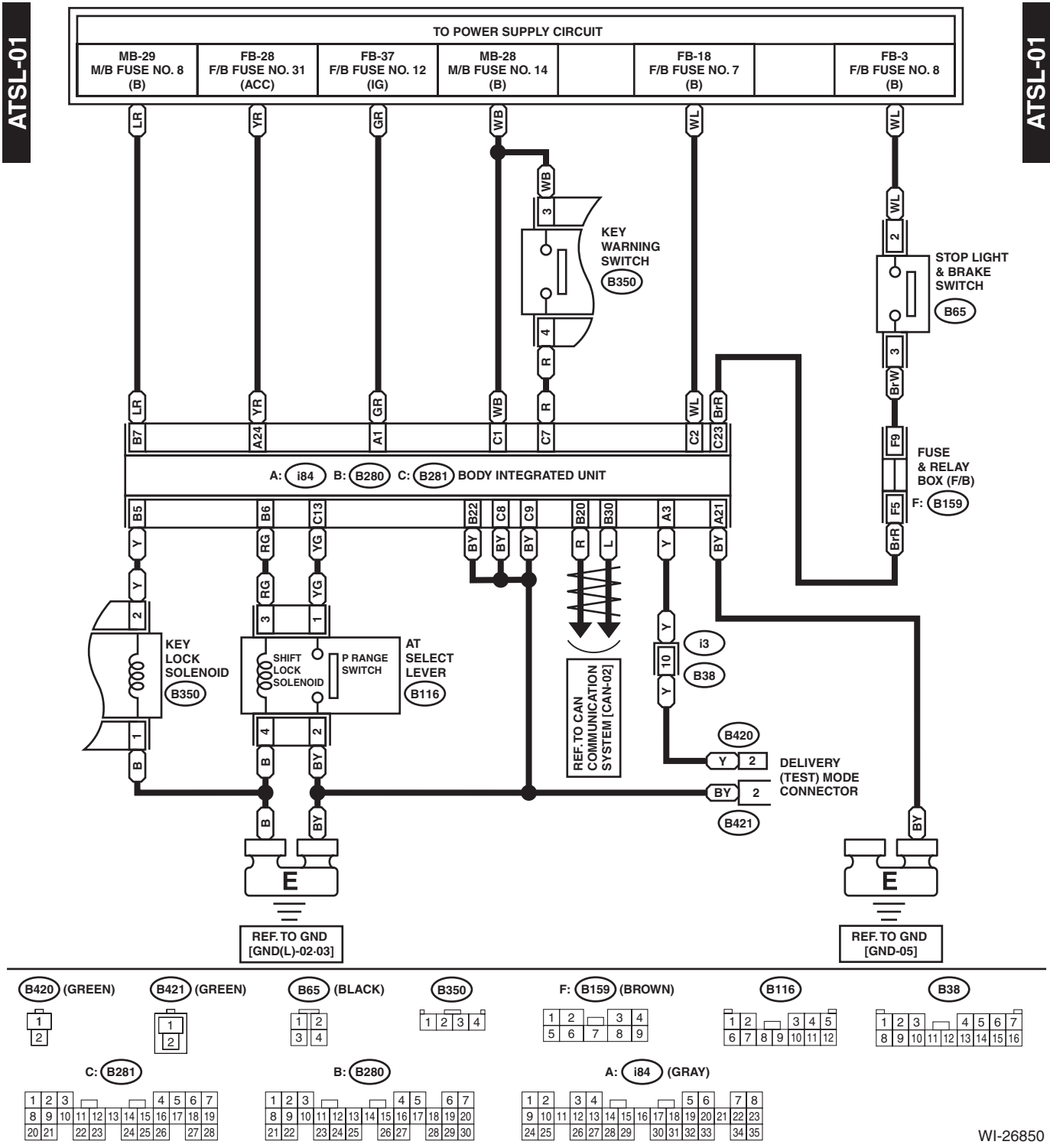
## WIRING SYSTEM



WI-30958

## 8. AT Shift Lock Control System

### A: WIRING DIAGRAM

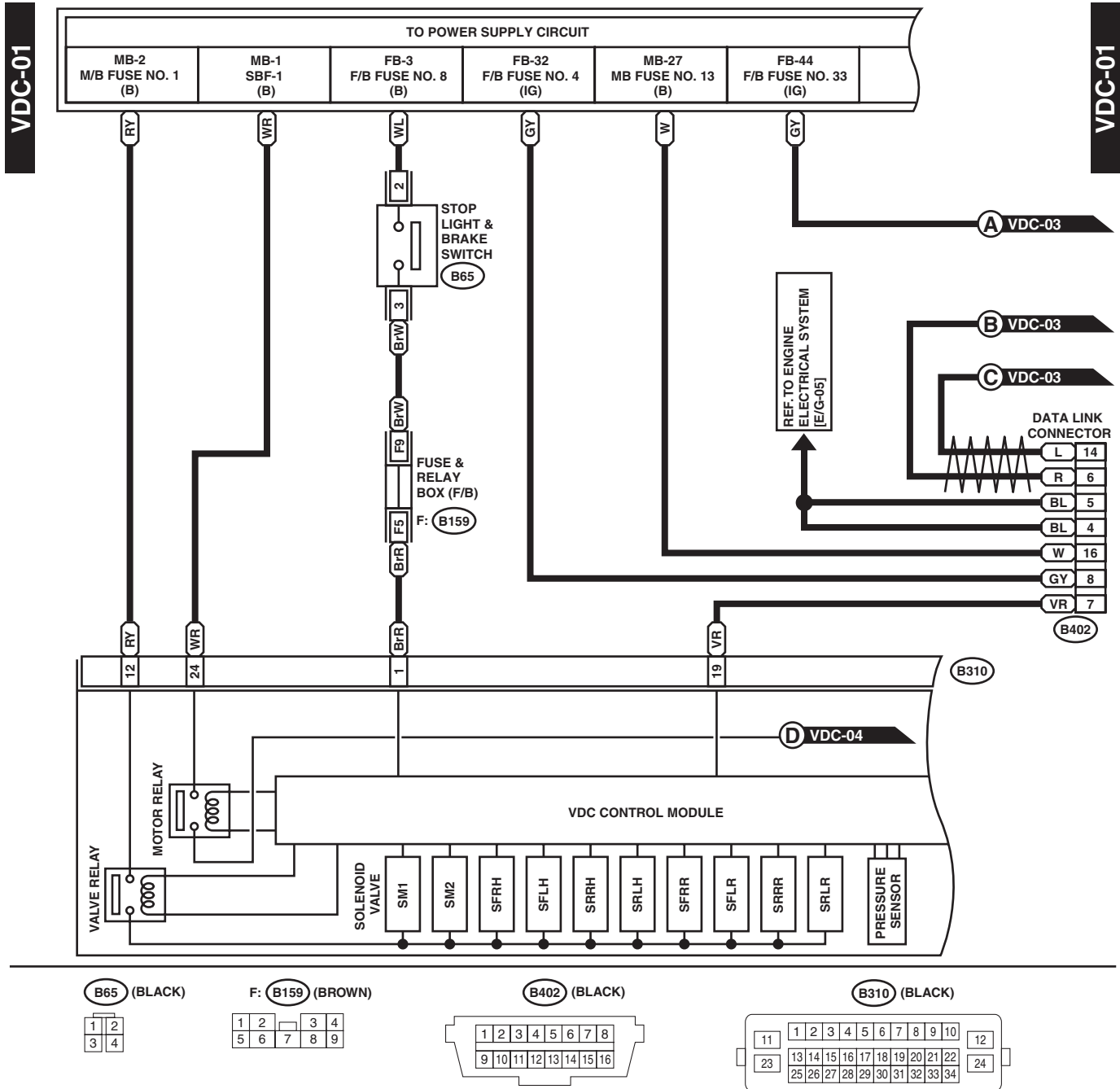


# Vehicle Dynamics Control System

WIRING SYSTEM

## 9. Vehicle Dynamics Control System

### A: WIRING DIAGRAM



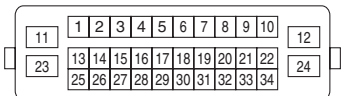
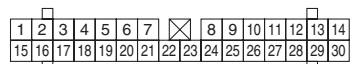
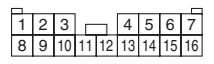
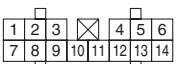
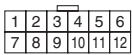
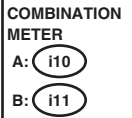
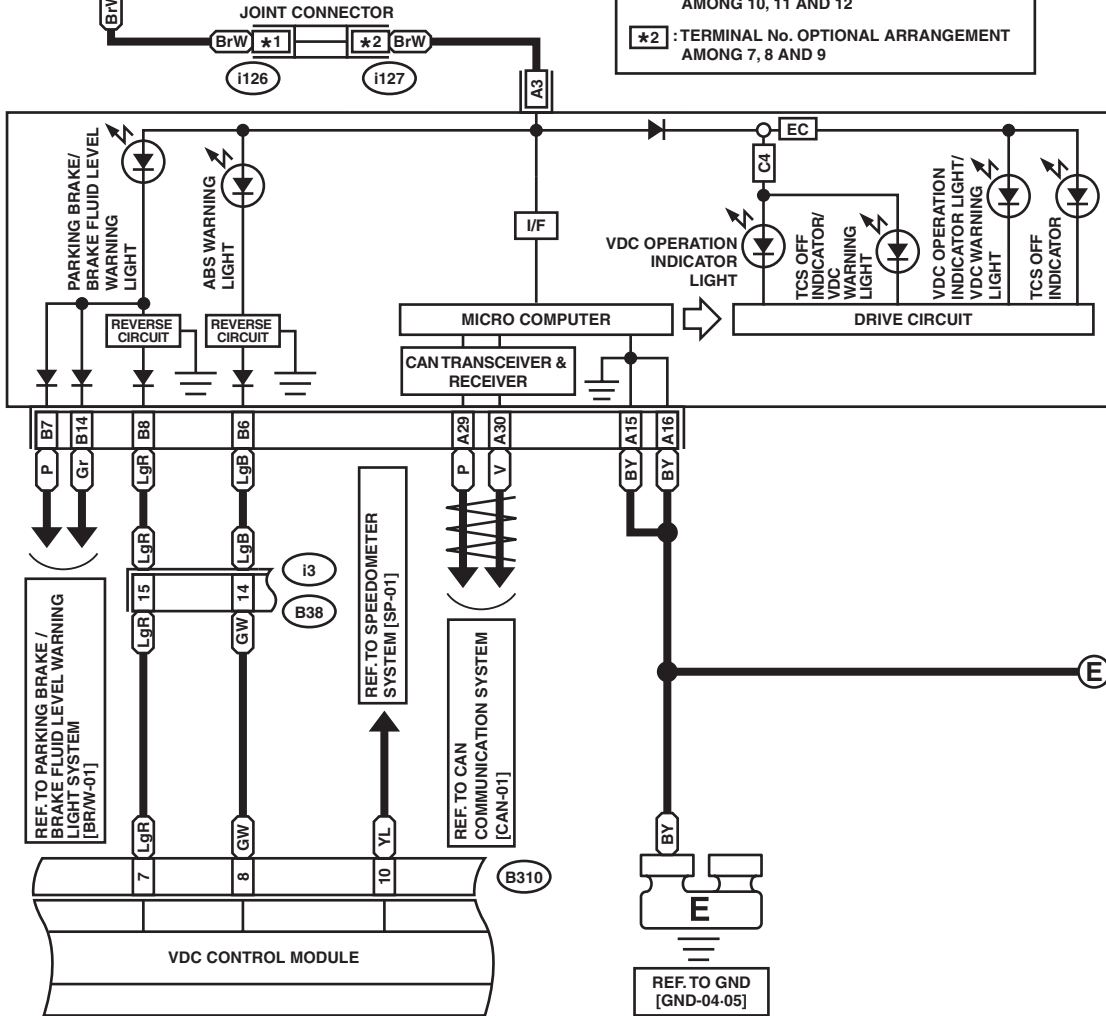
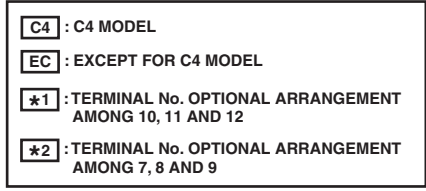
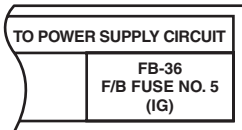
WI-26851

# Vehicle Dynamics Control System

WIRING SYSTEM

VDC-02

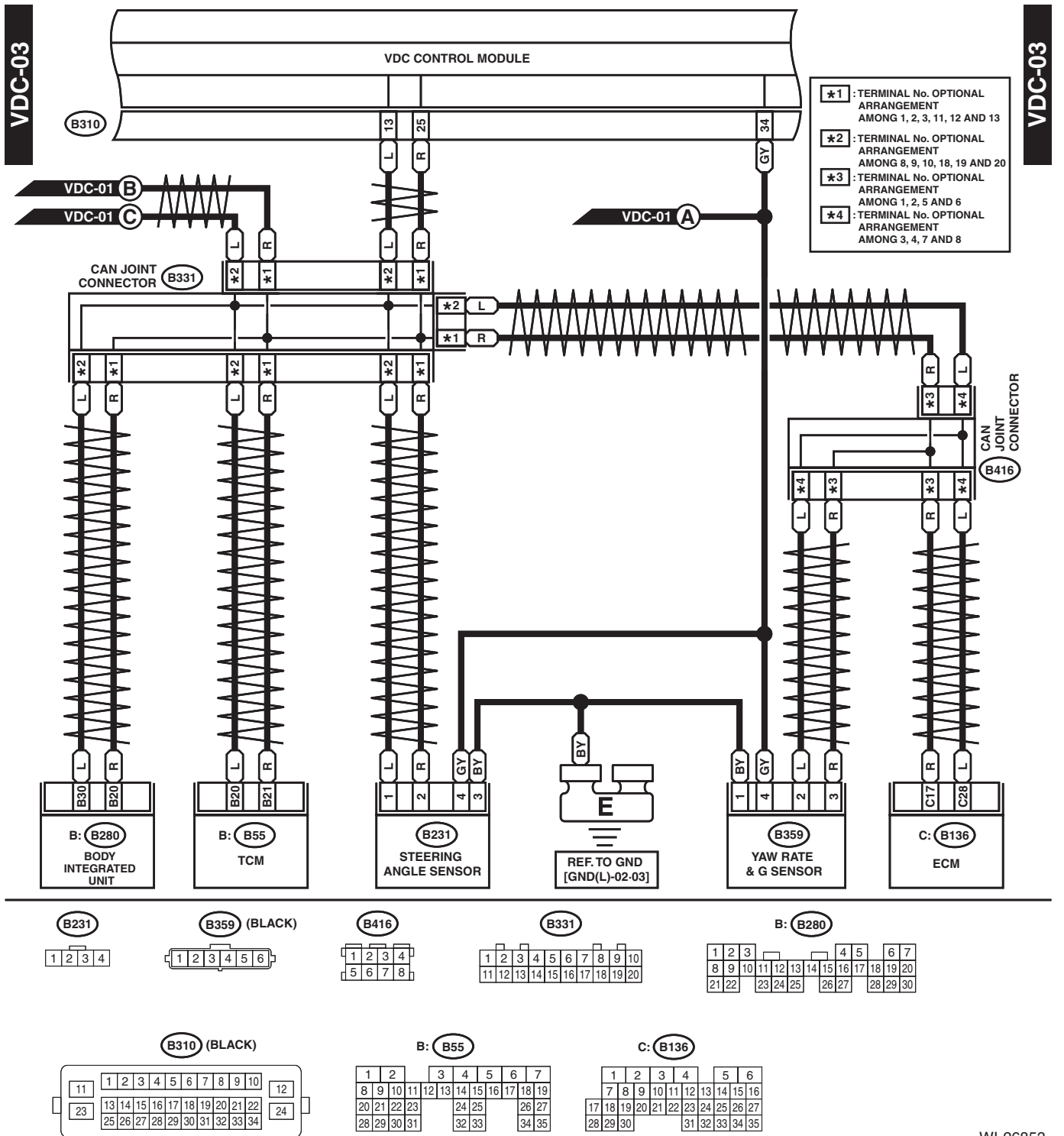
VDC-02



WI-35381

# Vehicle Dynamics Control System

## WIRING SYSTEM

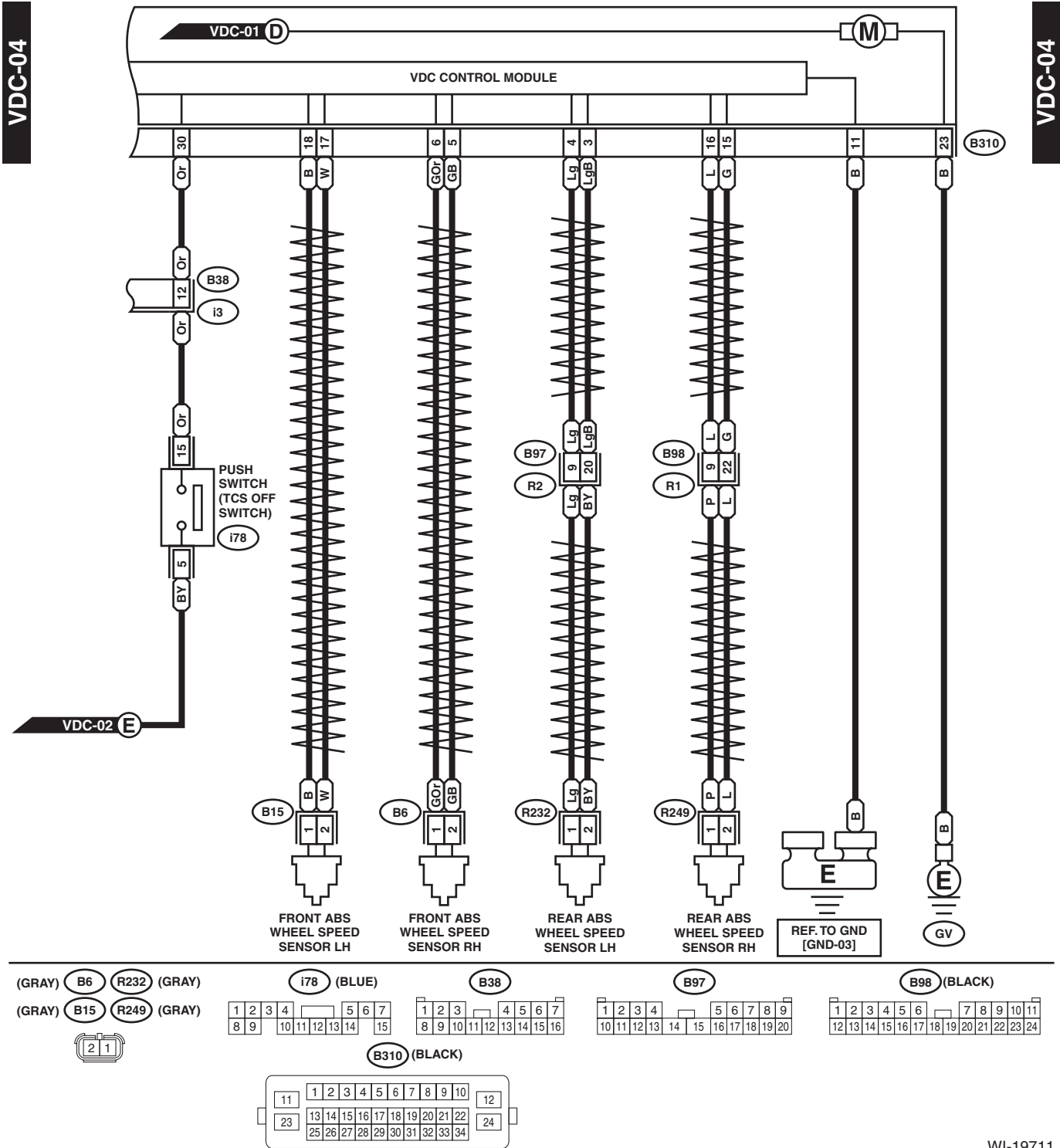


WI-26853



# Vehicle Dynamics Control System

WIRING SYSTEM



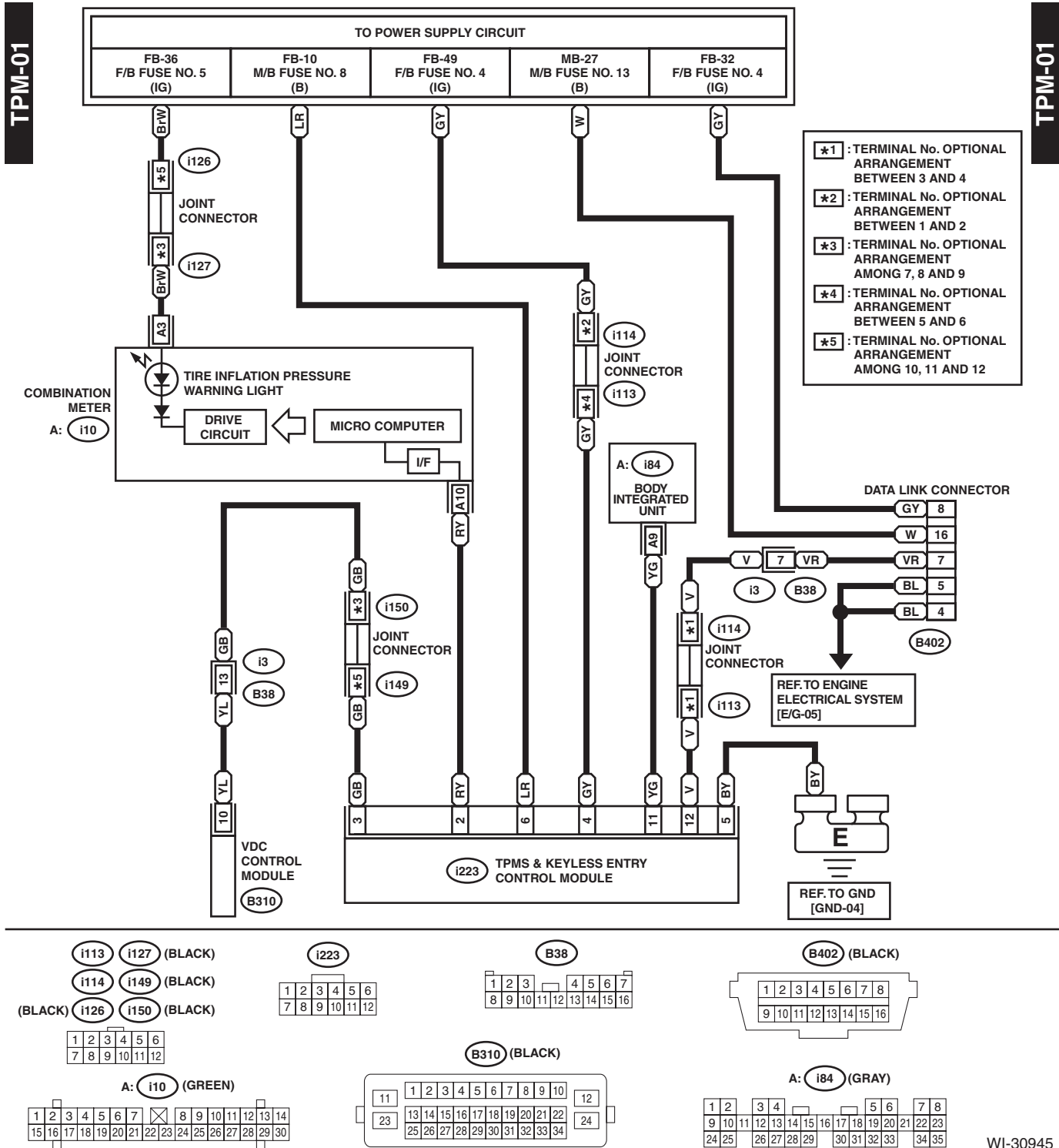
WI-19711

# Tire Pressure Monitoring System

WIRING SYSTEM

## 10. Tire Pressure Monitoring System

### A: WIRING DIAGRAM

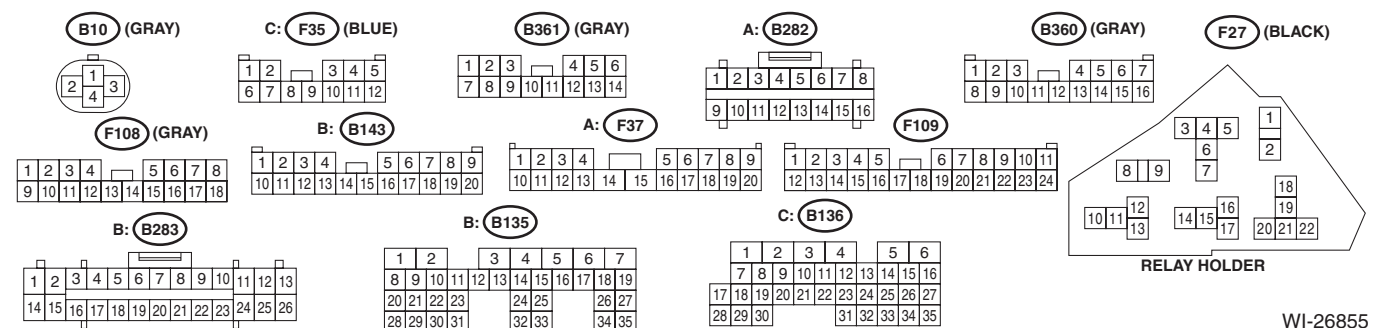
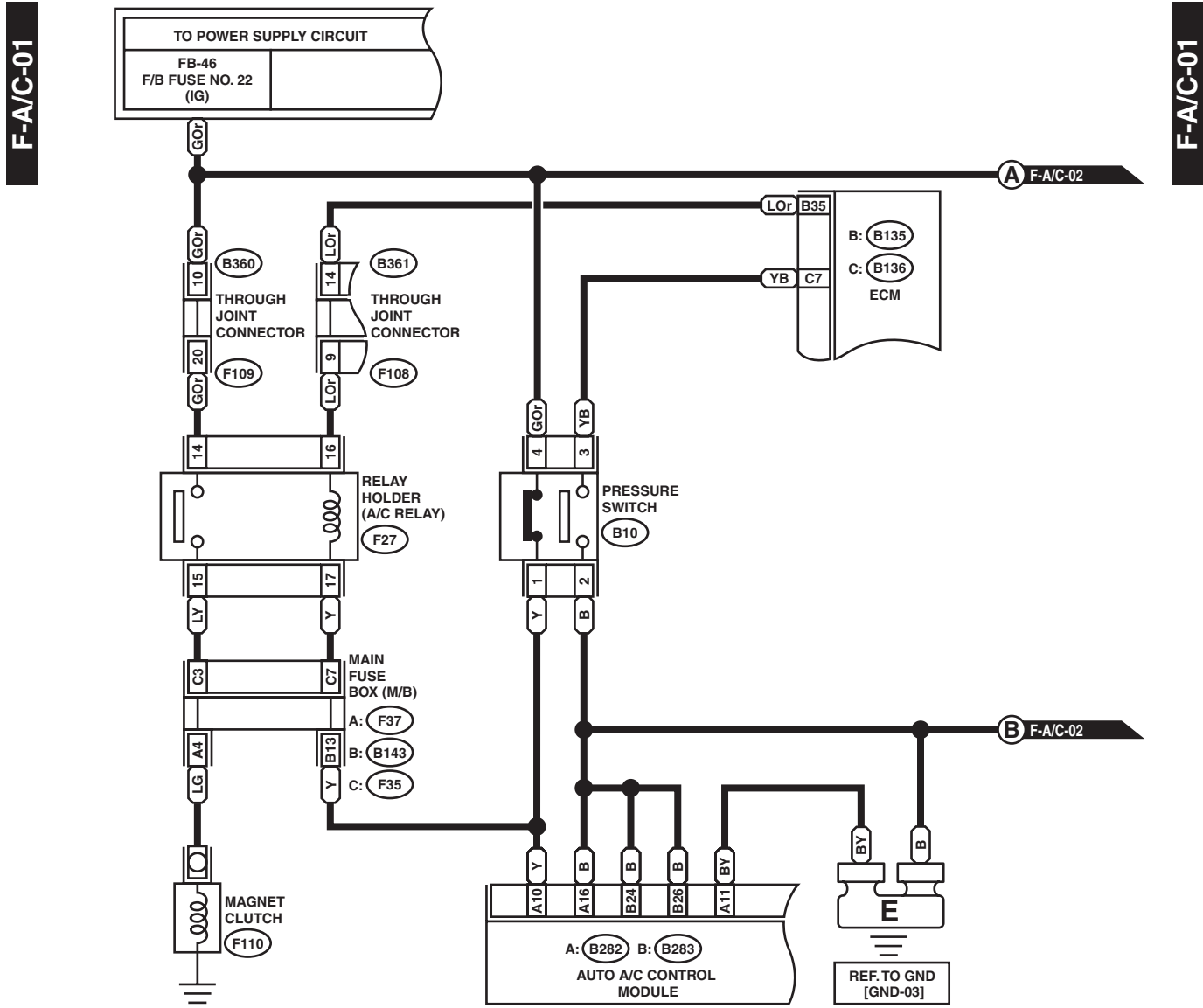


WI-30945

## 11. Air Conditioning System

### A: WIRING DIAGRAM

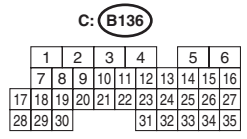
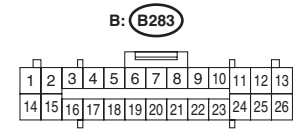
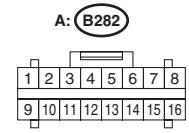
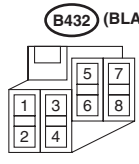
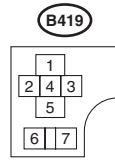
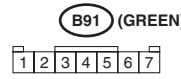
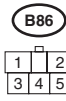
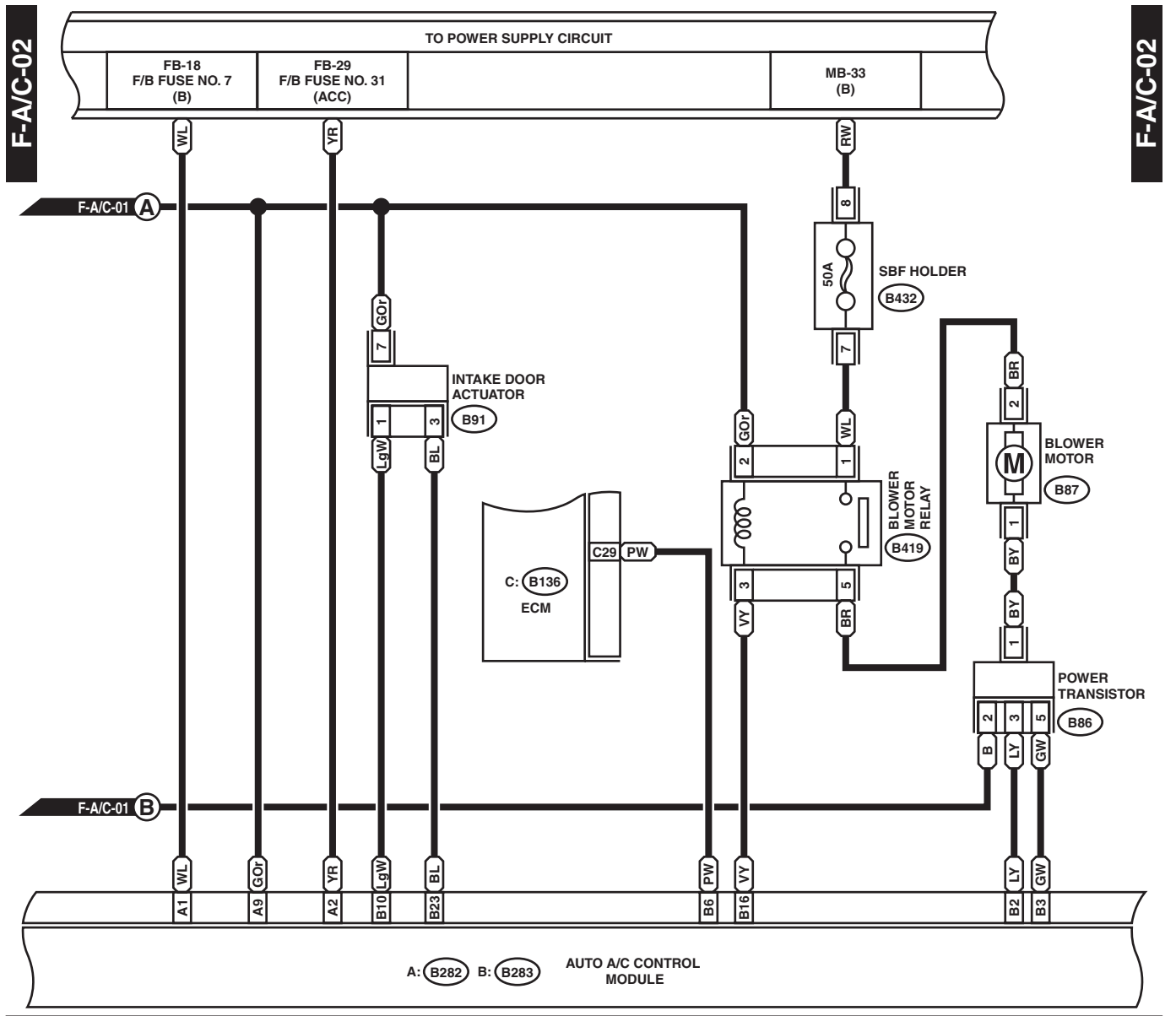
#### 1. FRONT A/C



WI-26855

# Air Conditioning System

## WIRING SYSTEM



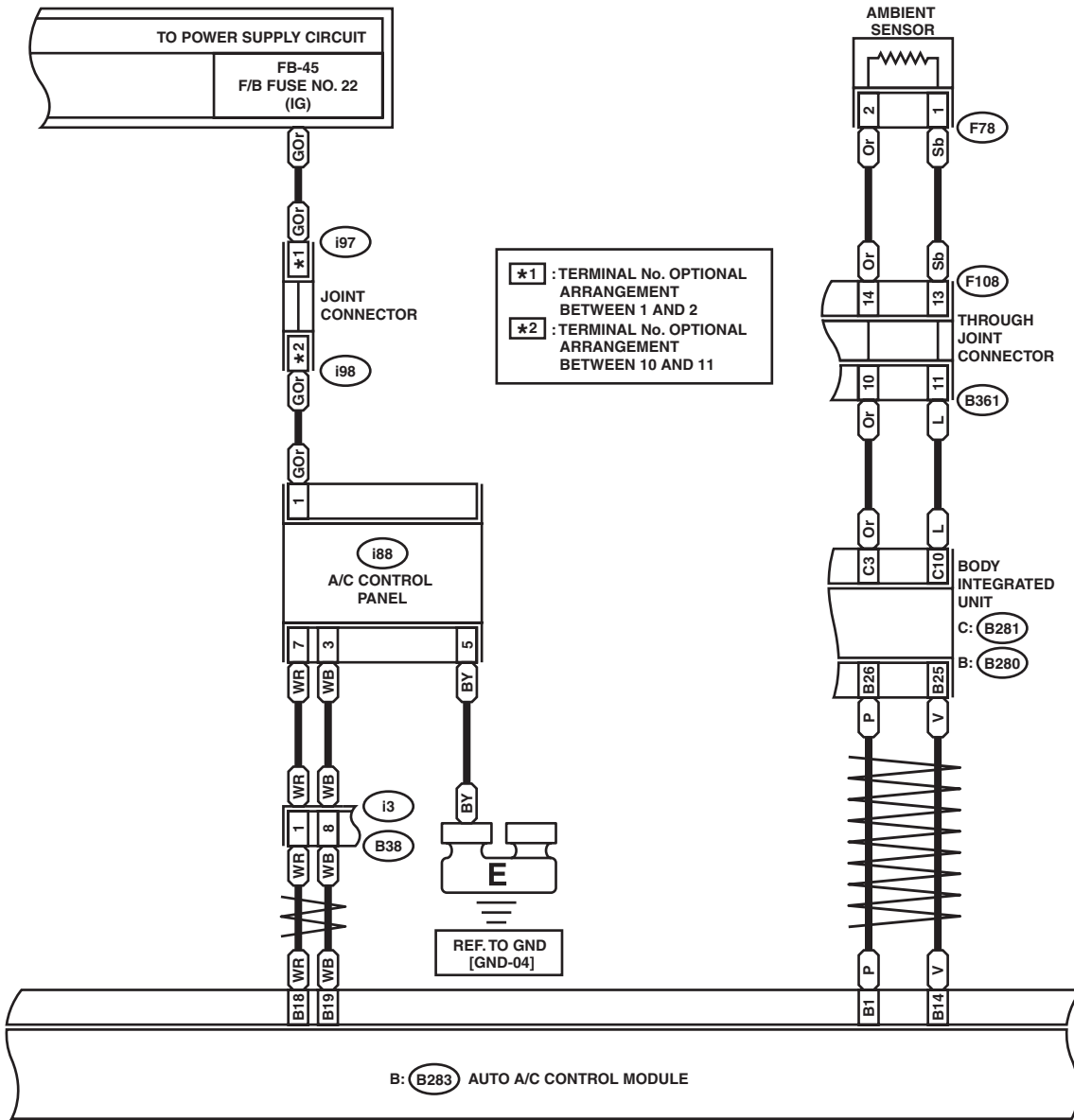
WI-26856

# Air Conditioning System

## WIRING SYSTEM

F-A/C-03

F-A/C-03



F78 (BLACK)

i88 (BLACK)

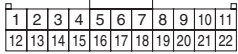
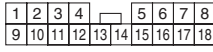
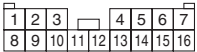
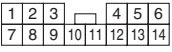
B361 (GRAY)

B38

F108 (GRAY)

i97

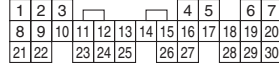
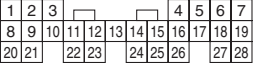
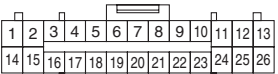
i98



B: (B283)

C: (B281)

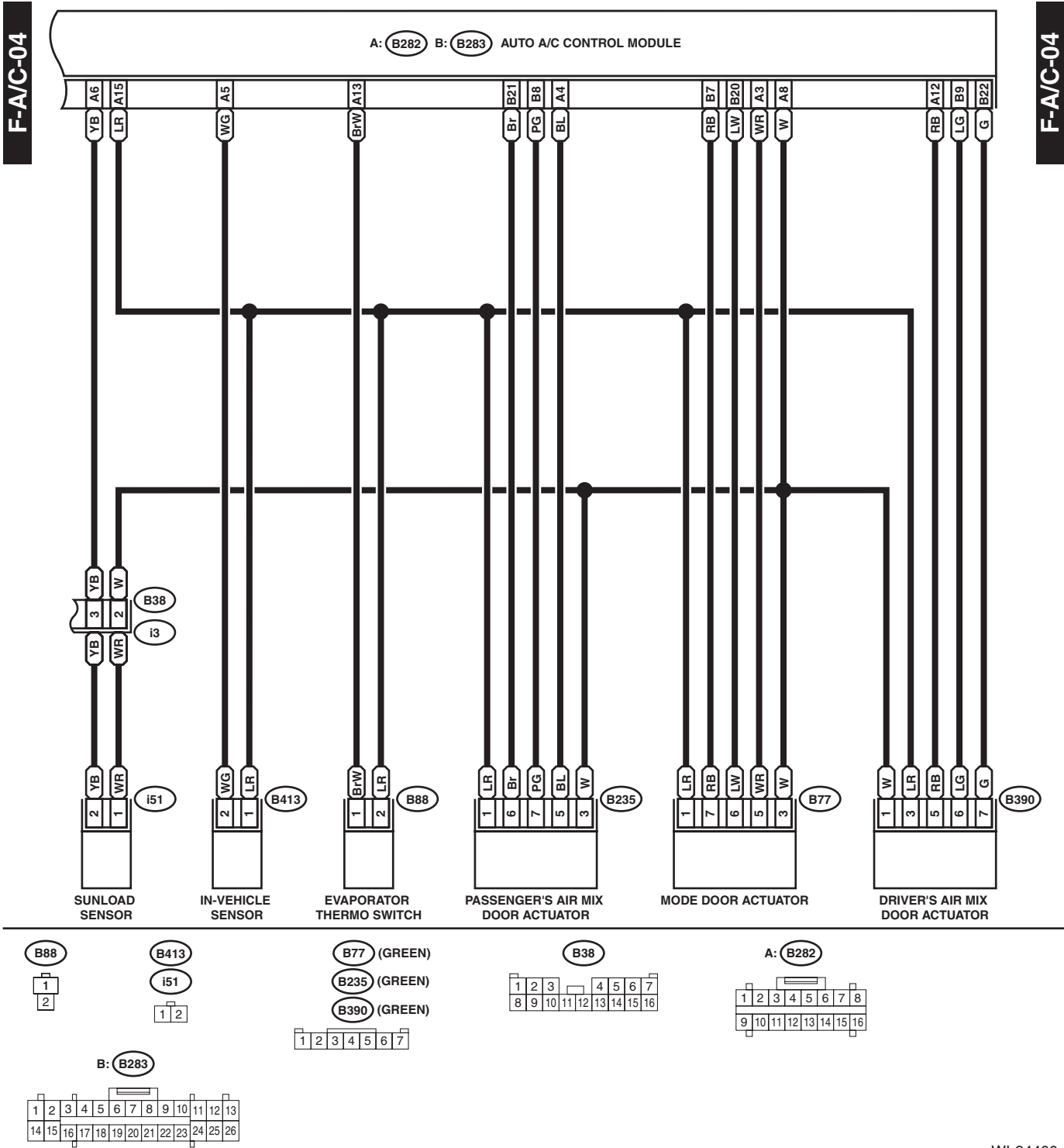
B: (B280)



WI-27946

# Air Conditioning System

WIRING SYSTEM



WI-34400

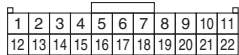
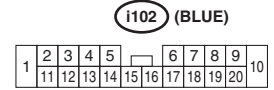
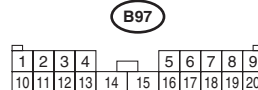
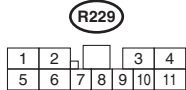
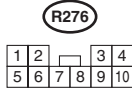
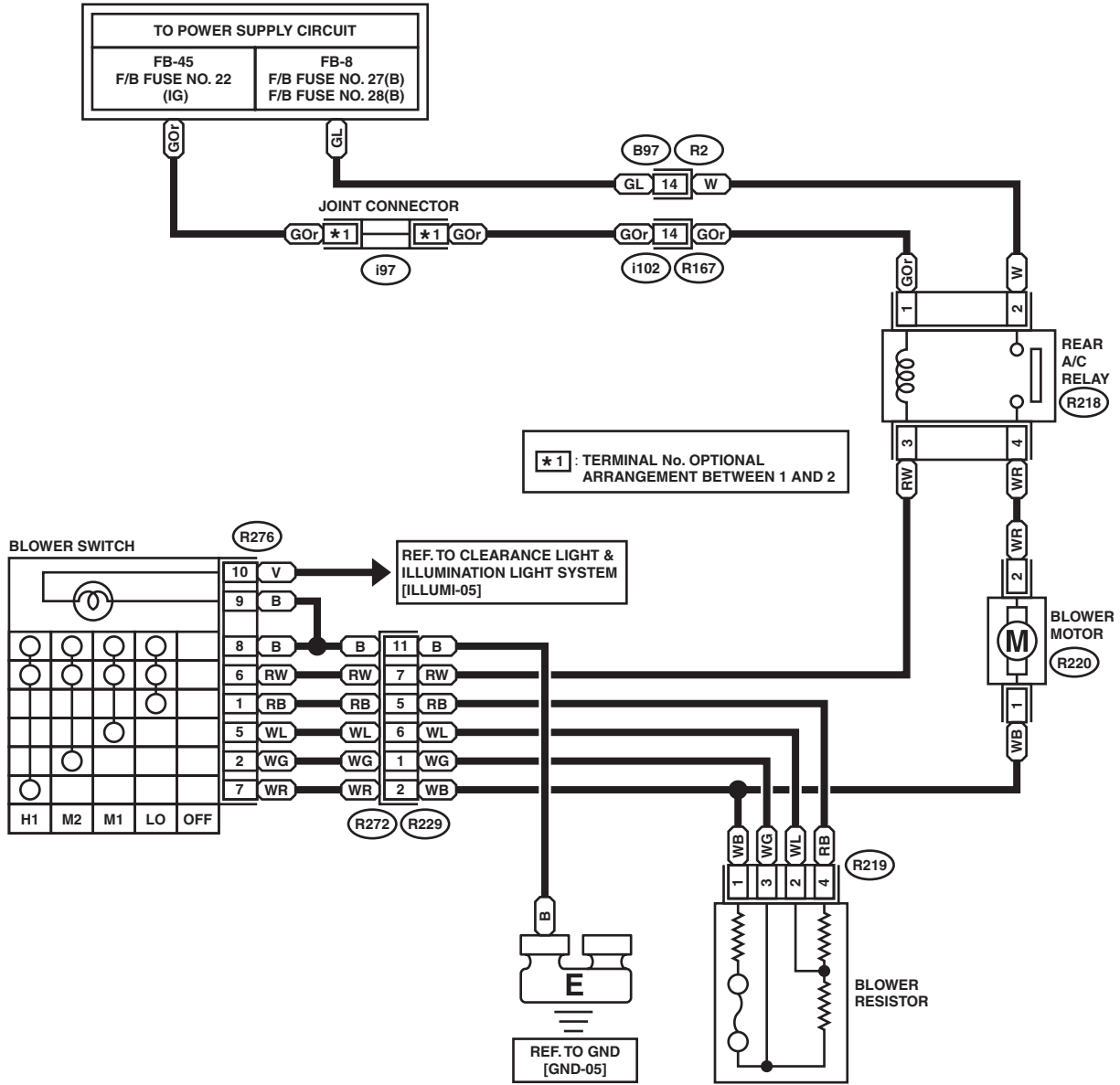
# Air Conditioning System

WIRING SYSTEM

## 2. REAR A/C

R-A/C-01

R-A/C-01



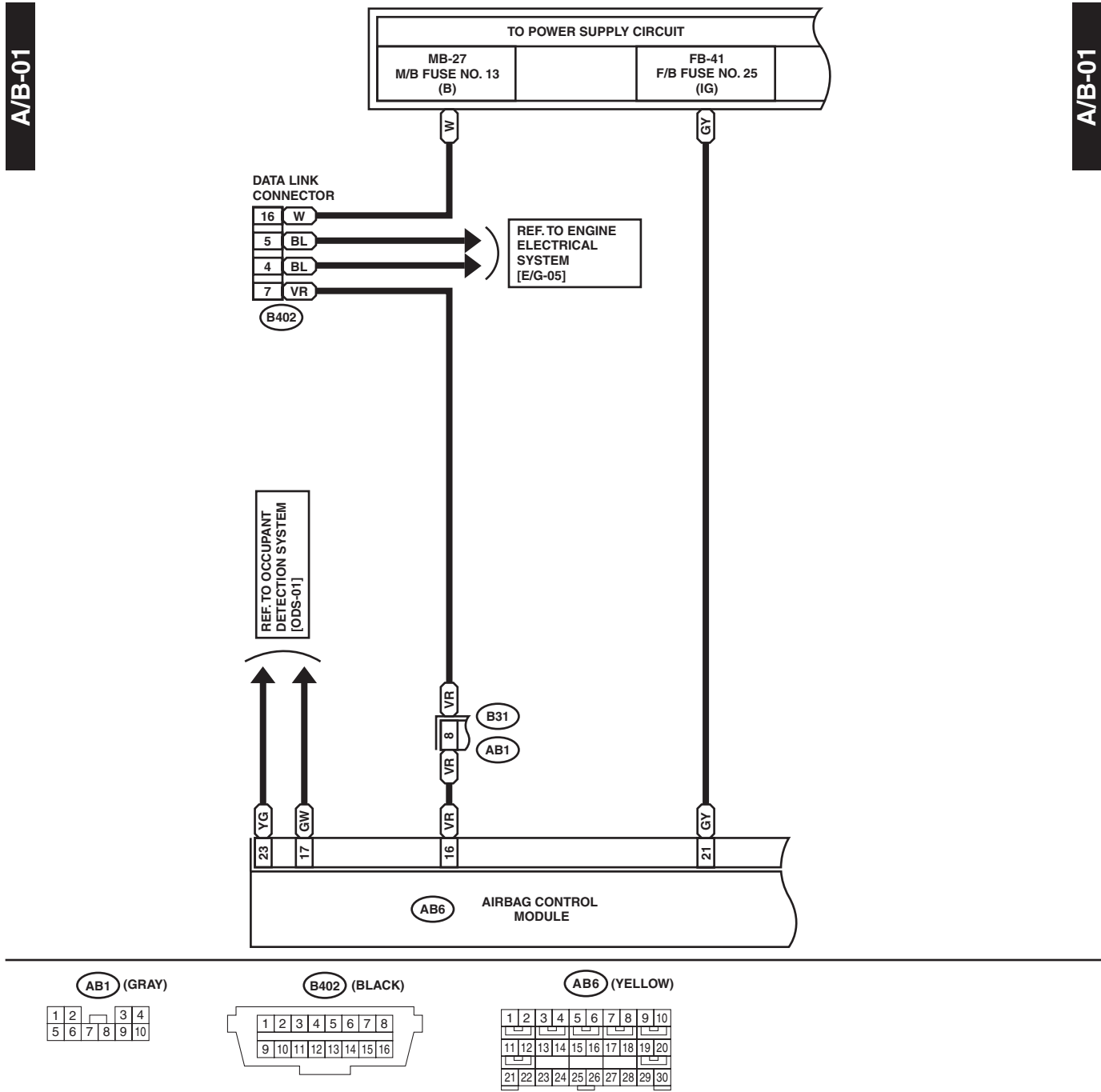
WI-16021

# Airbag System

## WIRING SYSTEM

### 12. Airbag System

#### A: WIRING DIAGRAM



WI-26858

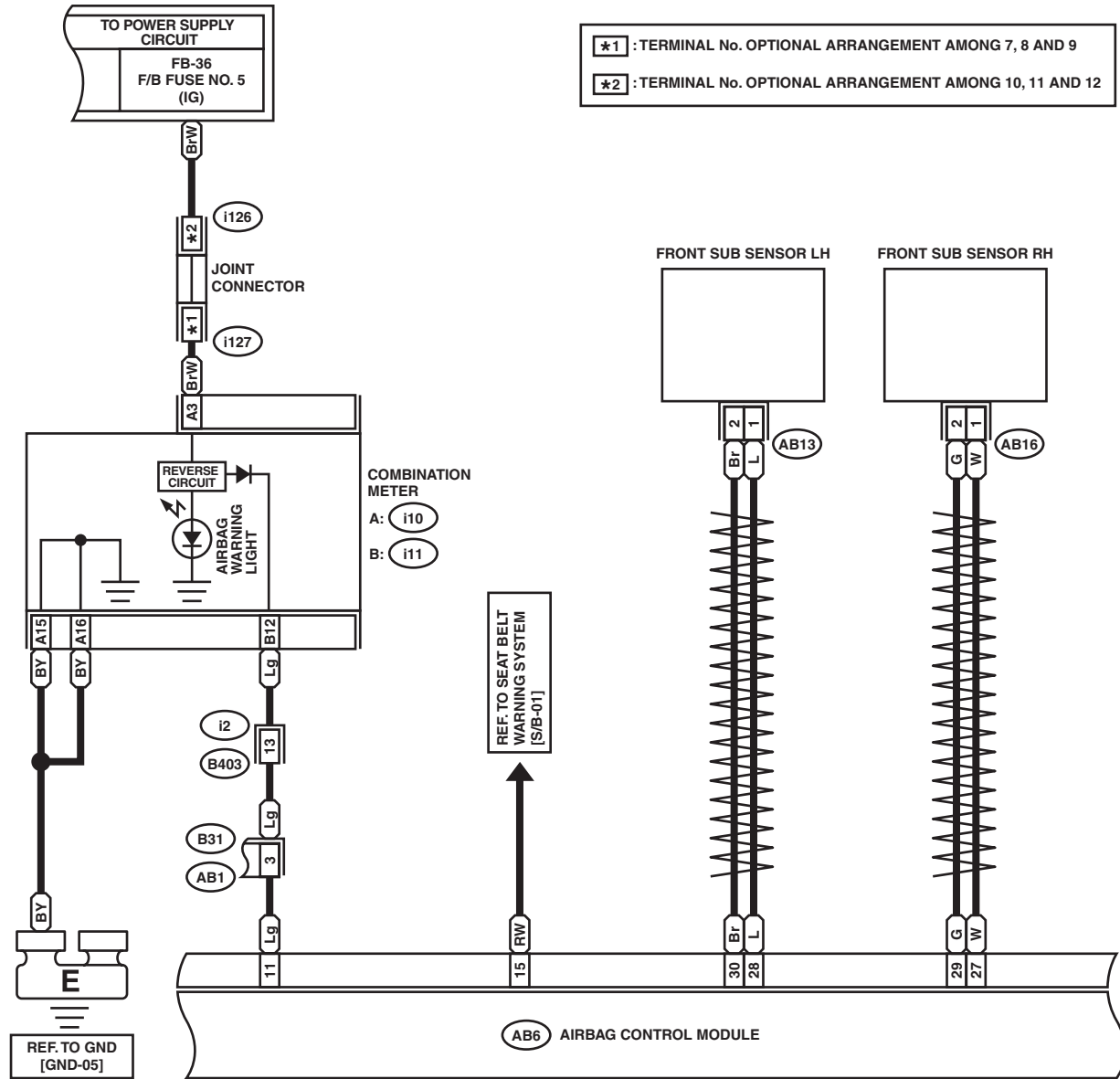


# Airbag System

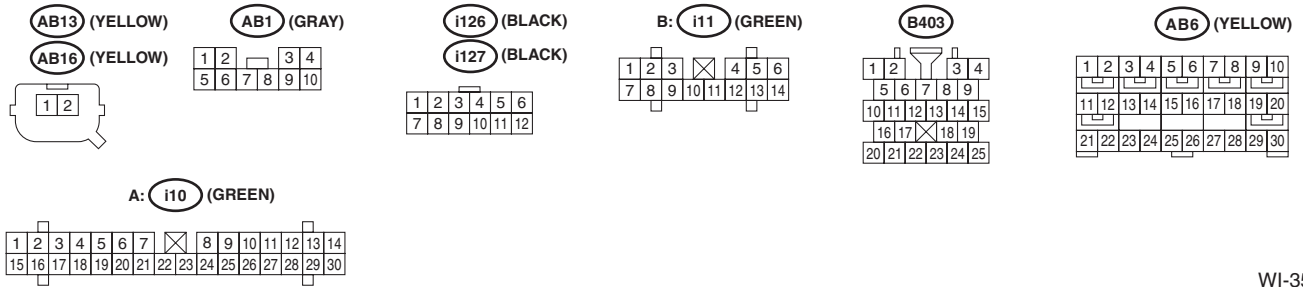
WIRING SYSTEM

A/B-02

A/B-02



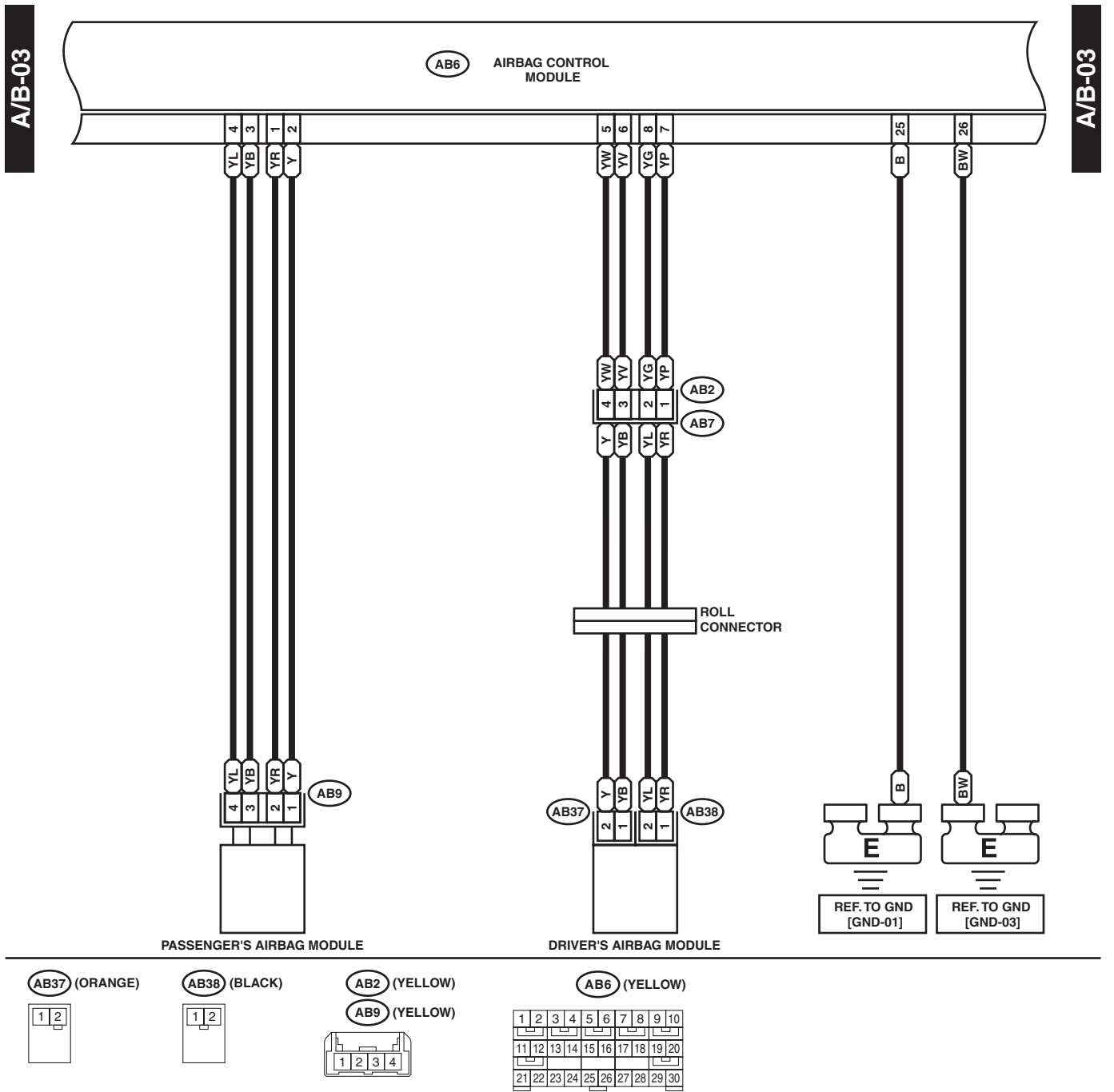
\*1 : TERMINAL No. OPTIONAL ARRANGEMENT AMONG 7, 8 AND 9  
 \*2 : TERMINAL No. OPTIONAL ARRANGEMENT AMONG 10, 11 AND 12



WI-35382

# Airbag System

## WIRING SYSTEM



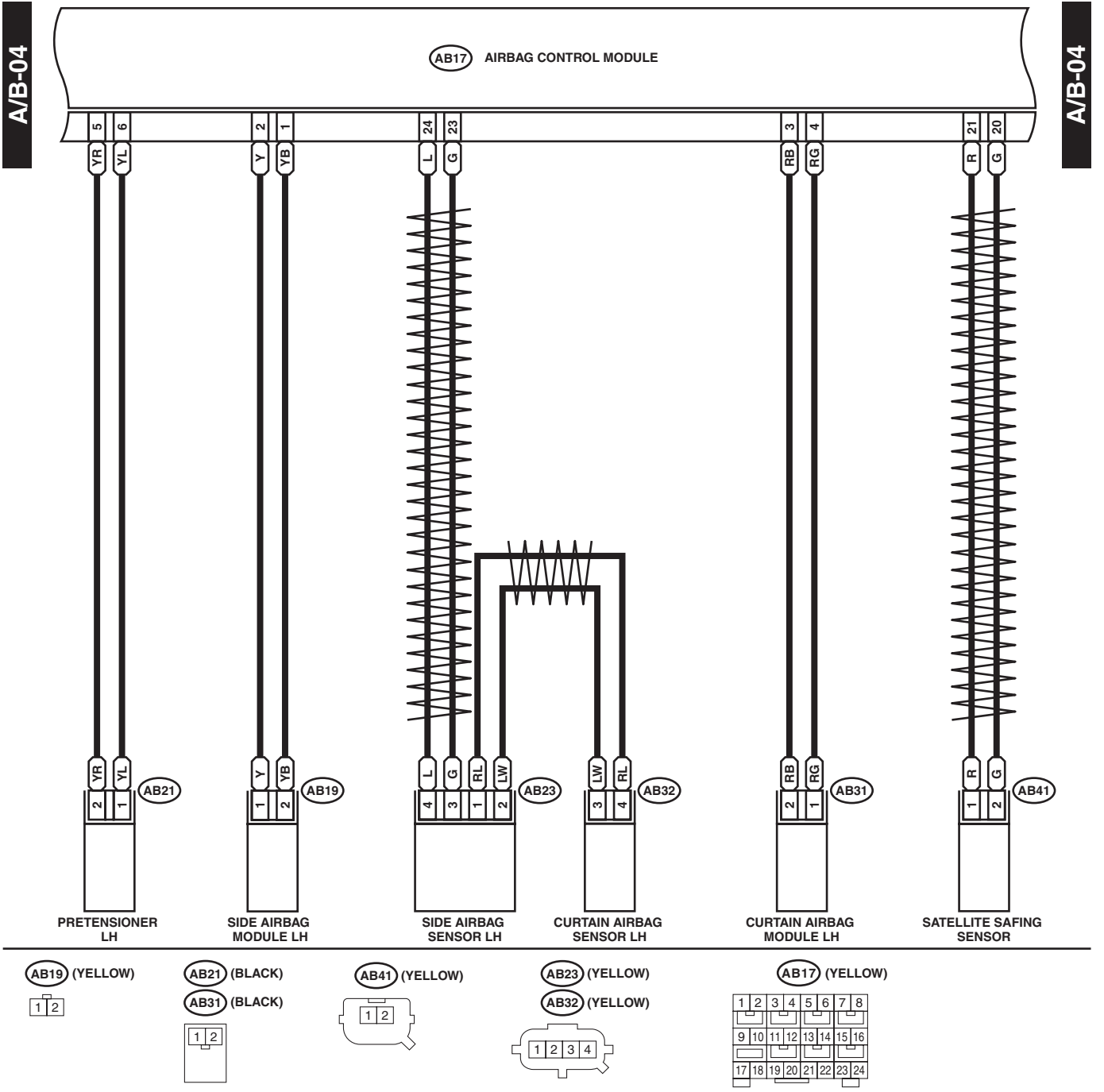
A/B-03

A/B-03

WI-26860

# Airbag System

WIRING SYSTEM



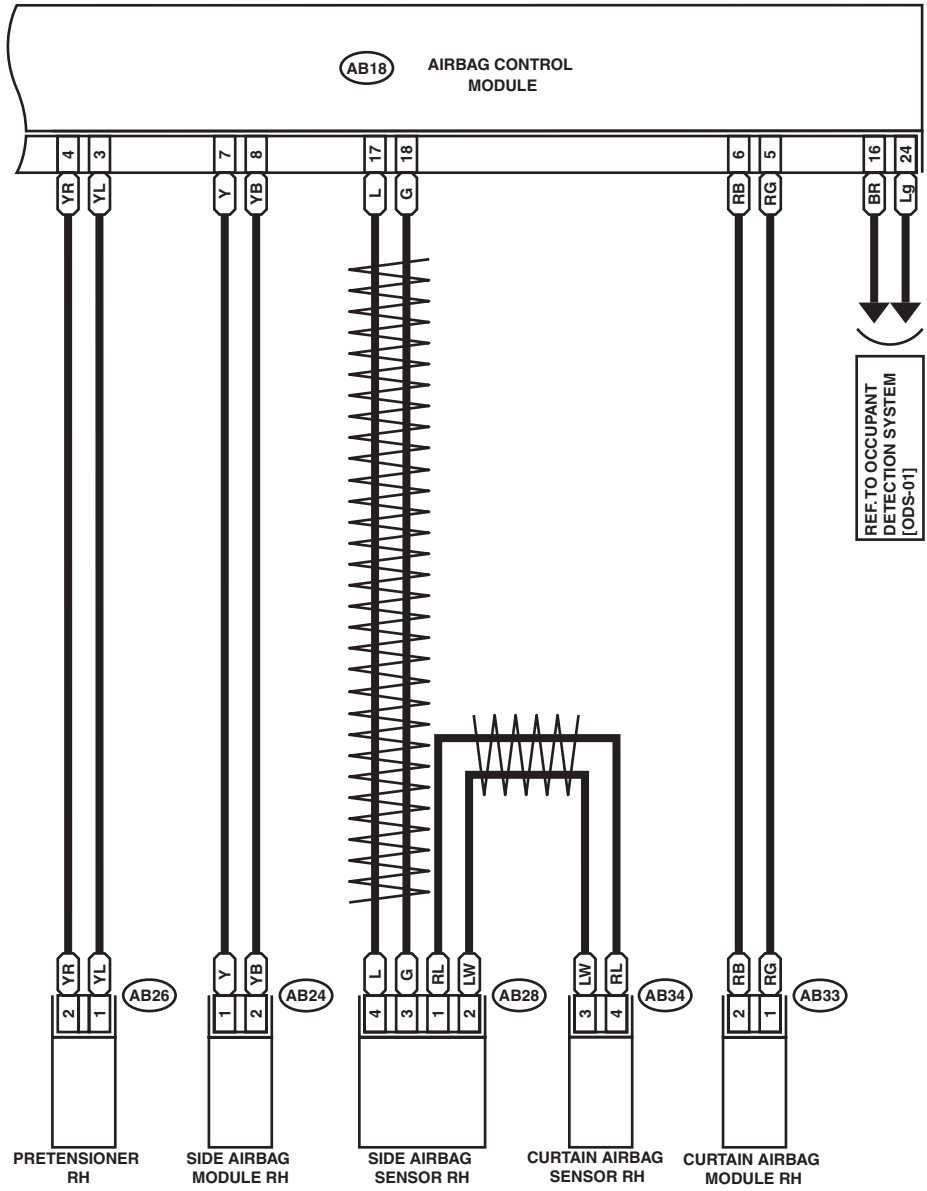
WI-34401

# Airbag System

## WIRING SYSTEM

A/B-05

A/B-05



AB24 (YELLOW)



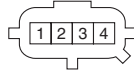
AB26 (BLACK)

AB33 (BLACK)

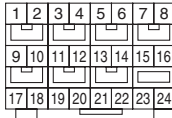


AB28 (YELLOW)

AB34 (YELLOW)



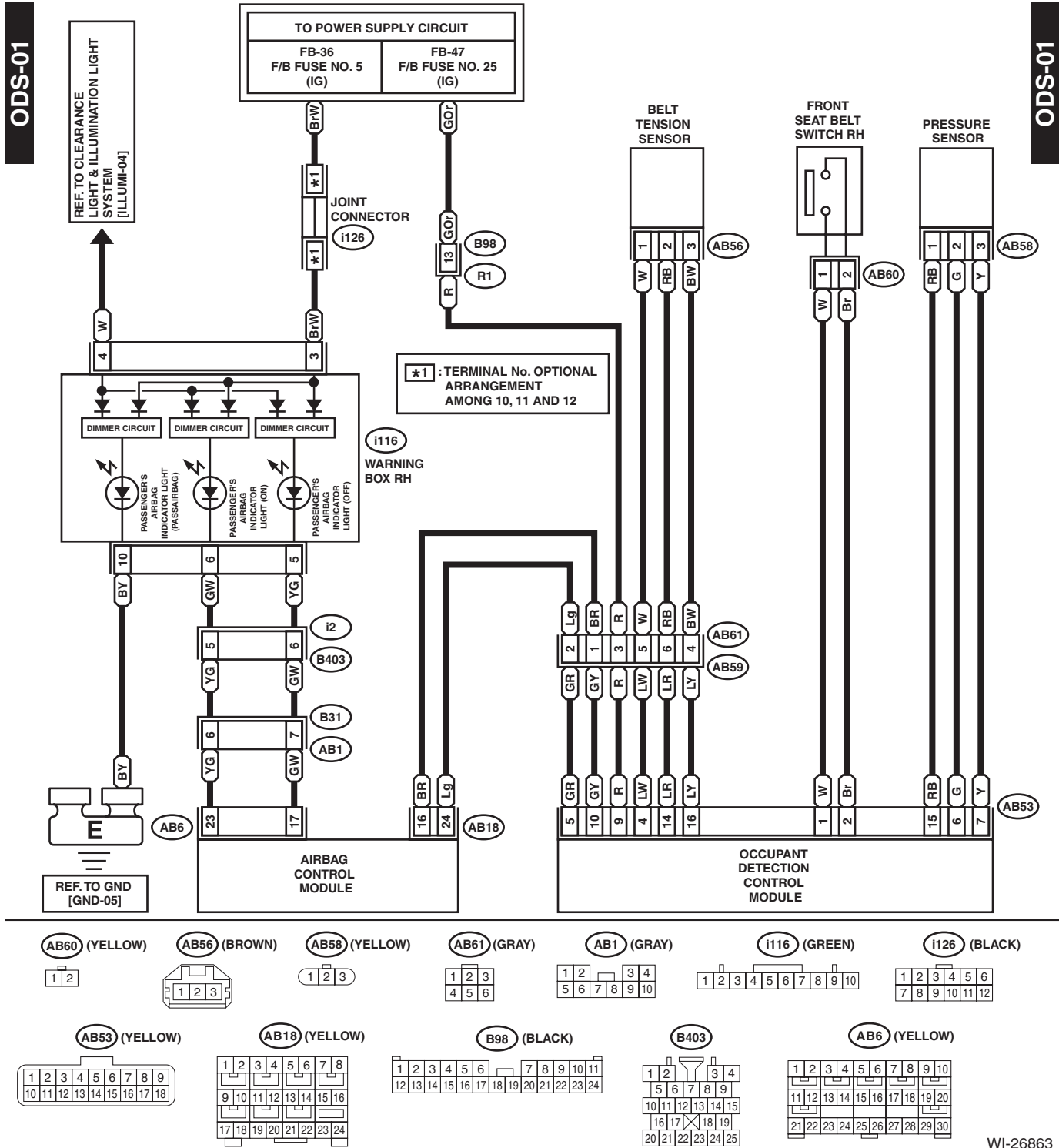
AB18 (YELLOW)



WI-26862

## 13. Occupant Detection System

### A: WIRING DIAGRAM



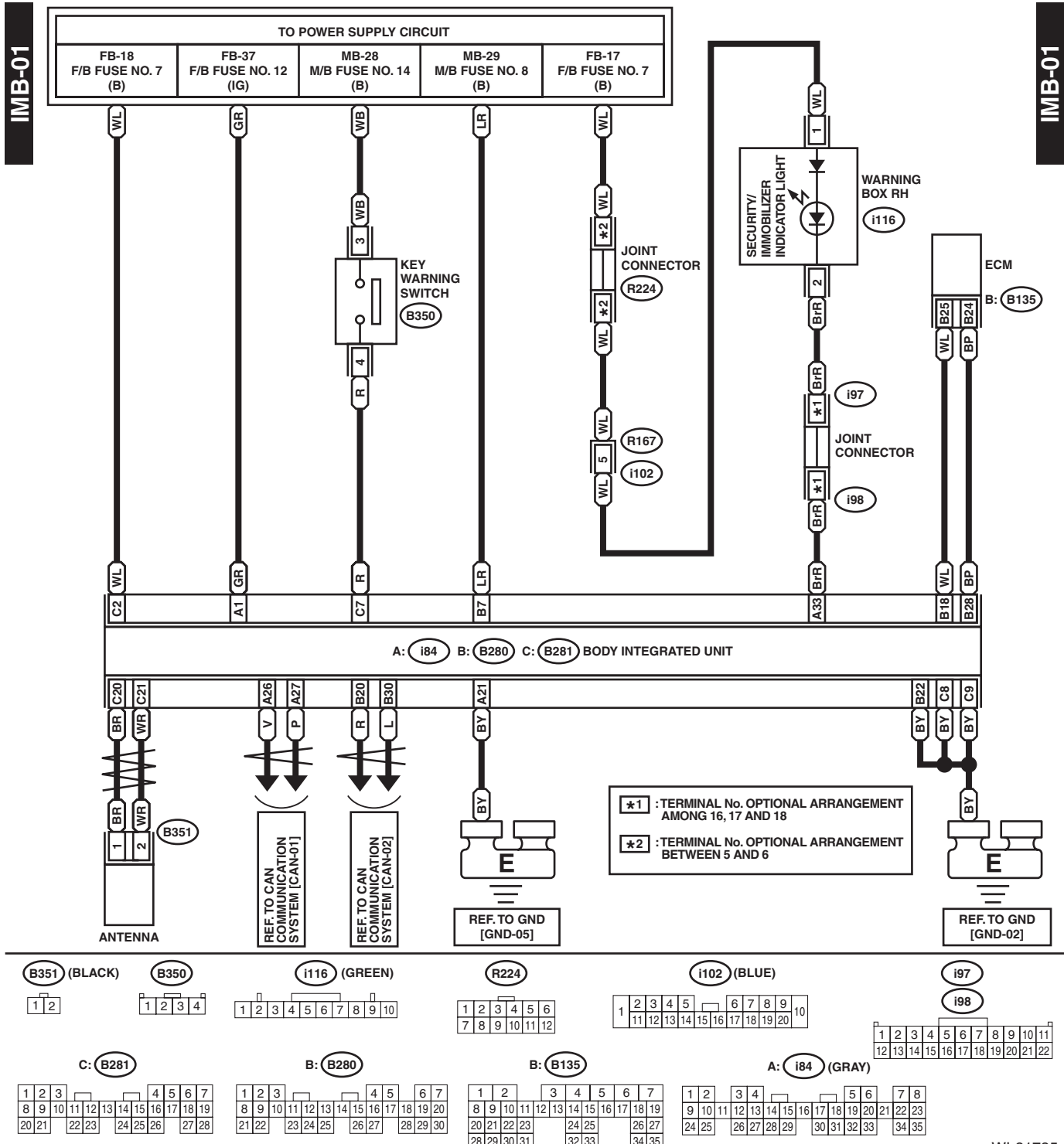
WI-26863

# Immobilizer System

WIRING SYSTEM

## 14. Immobilizer System

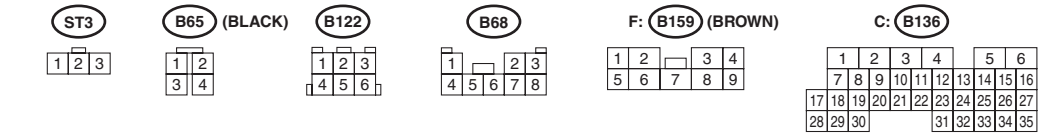
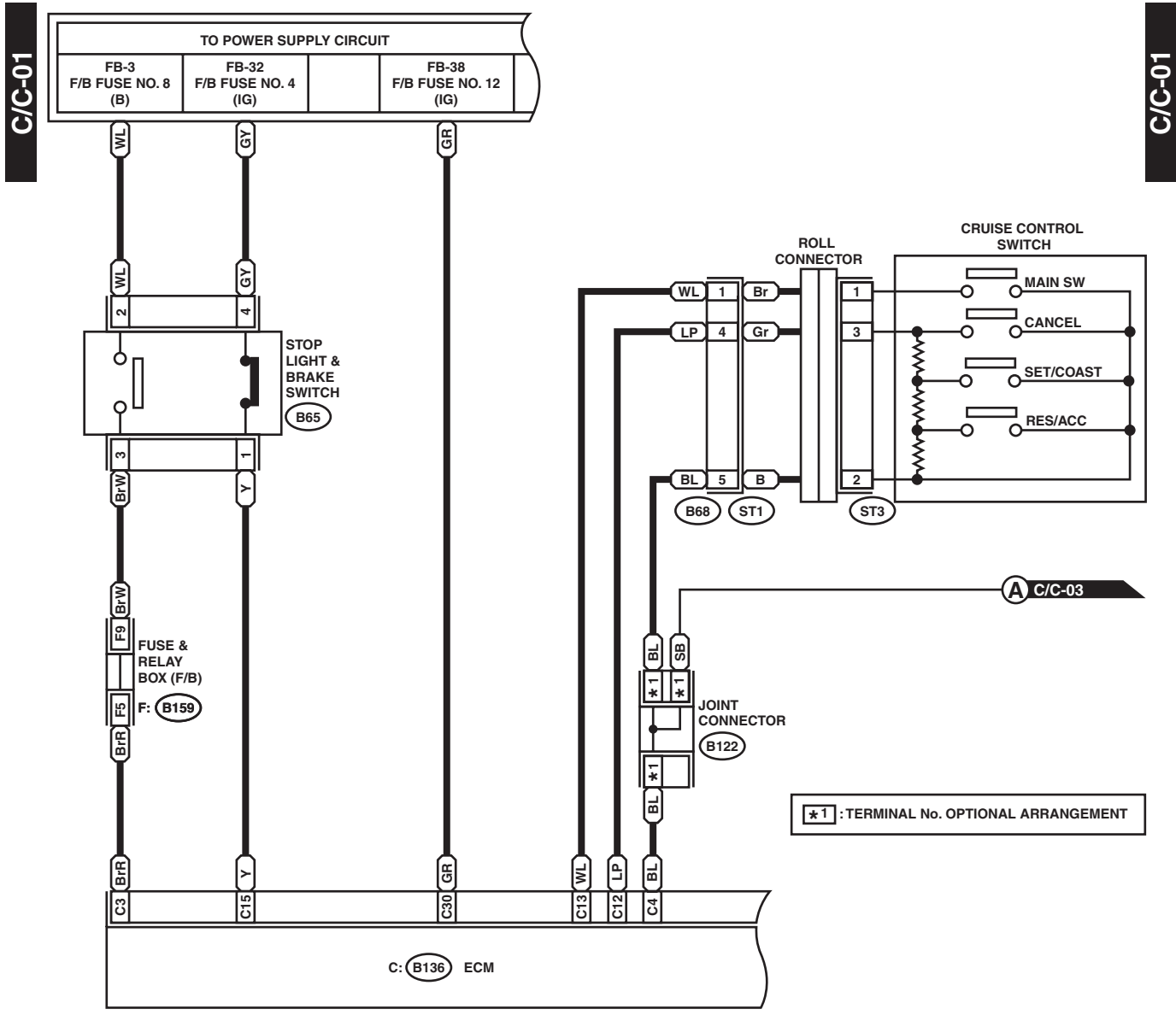
### A: WIRING DIAGRAM



WI-31735

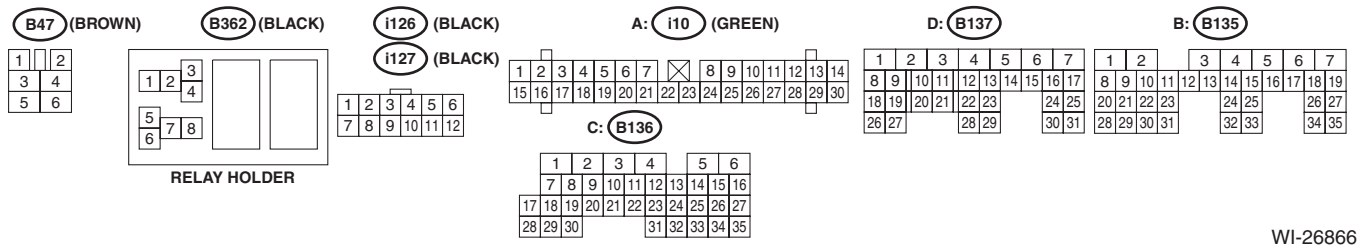
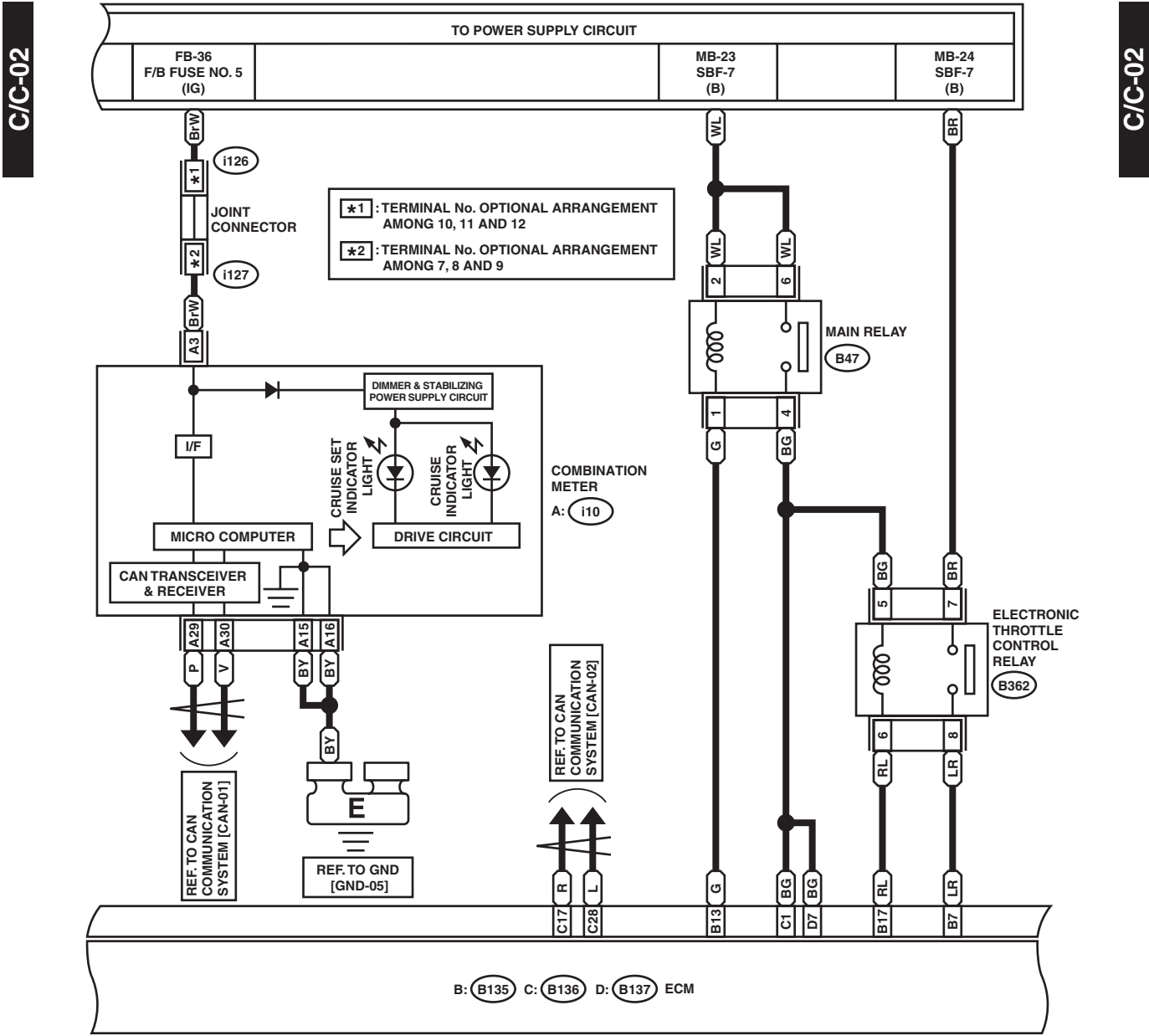
## 15. Cruise Control System

### A: WIRING DIAGRAM



# Cruise Control System

## WIRING SYSTEM

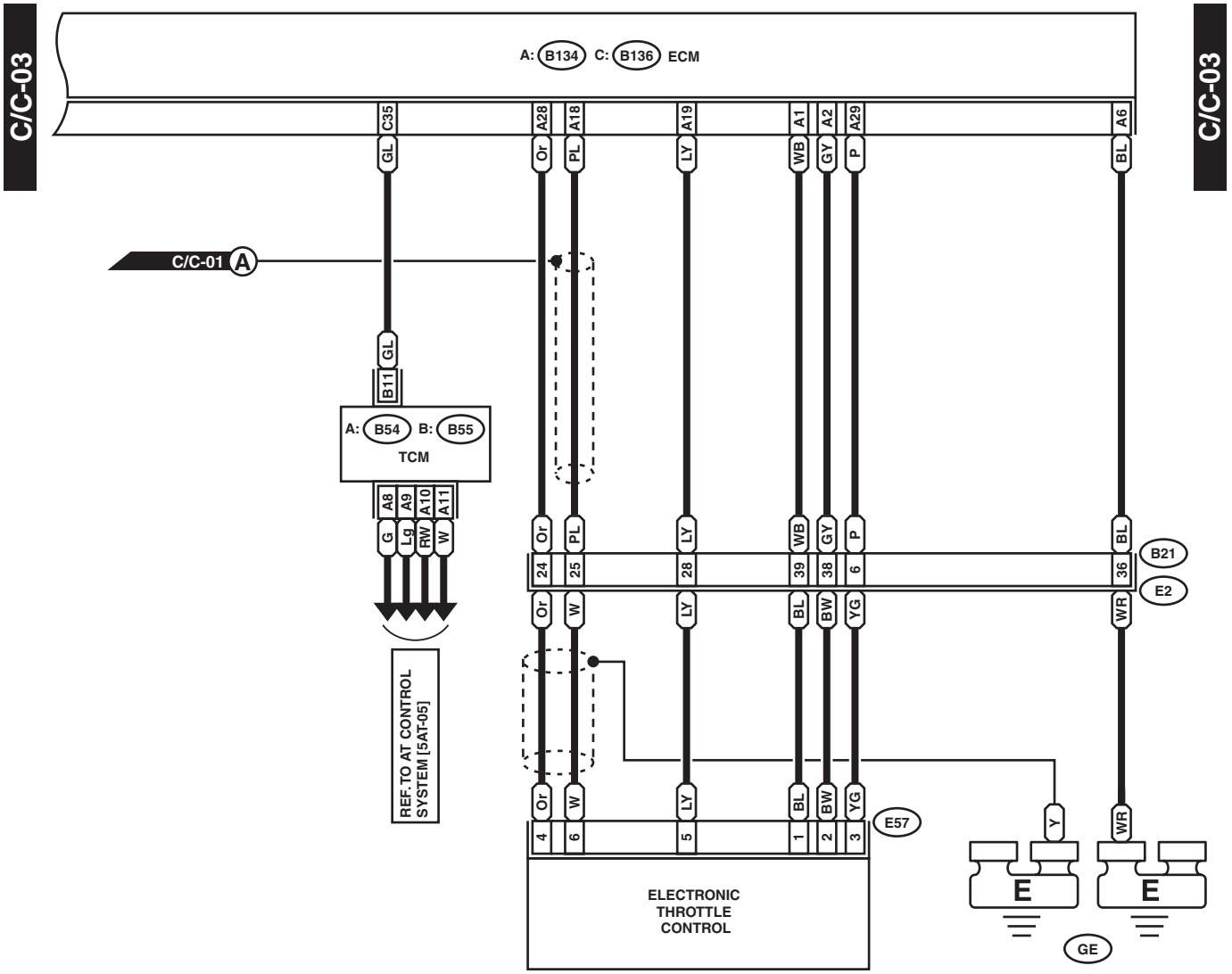


WI-26866



# Cruise Control System

WIRING SYSTEM



**E77 (BLACK)**

1	2	3	4	5	6
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**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			

**A: B54**  
**C: B136**

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

**B: B55**

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								

**B21 (BLACK)**

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

WI-26867

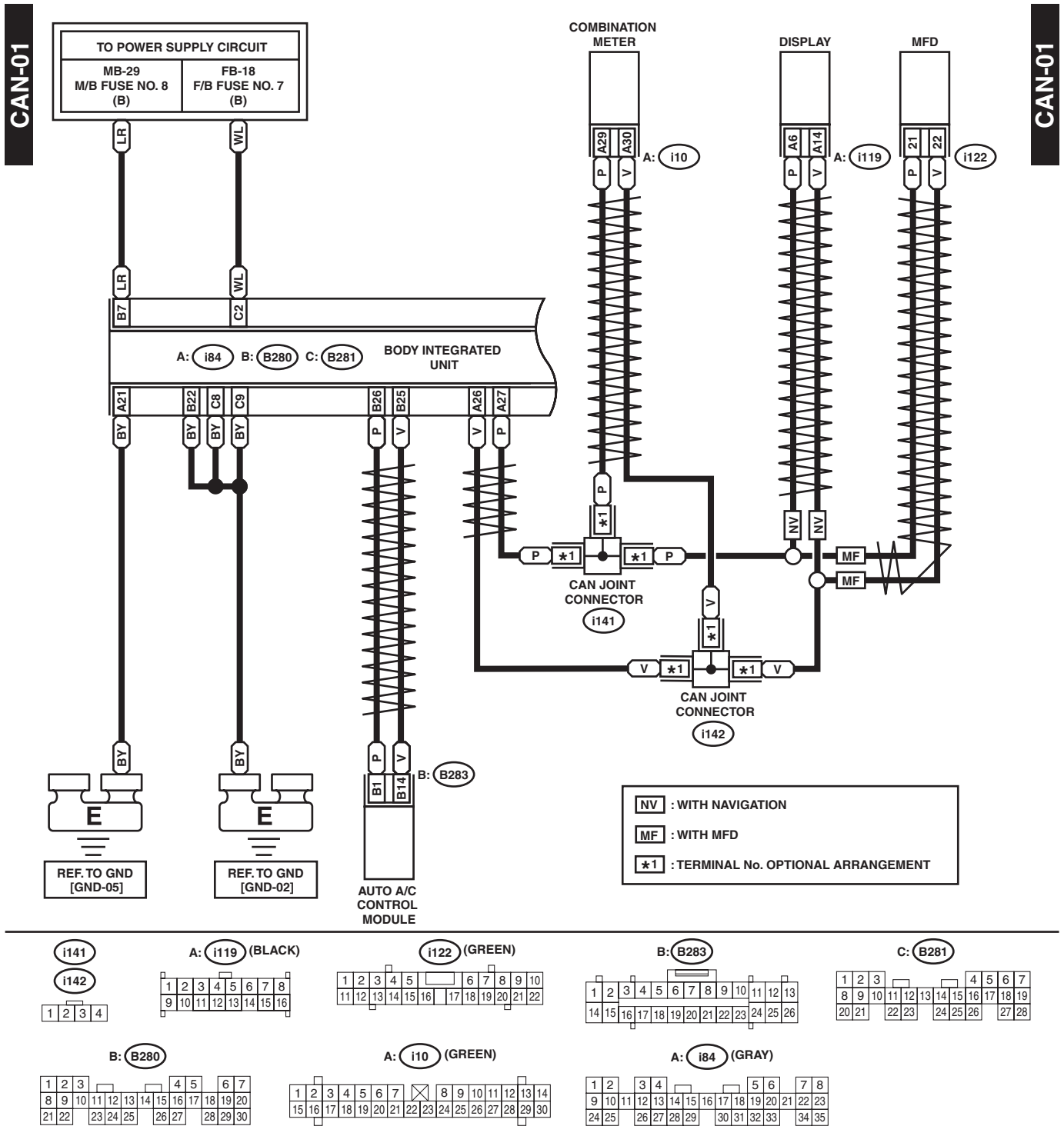
# CAN Communication System

WIRING SYSTEM

## 16. CAN Communication System

### A: WIRING DIAGRAM

#### 1. LOW SPEED CAN



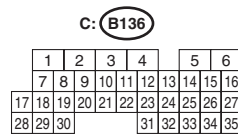
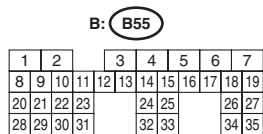
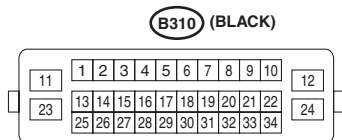
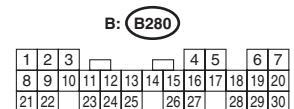
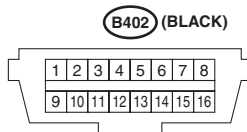
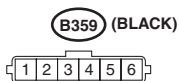
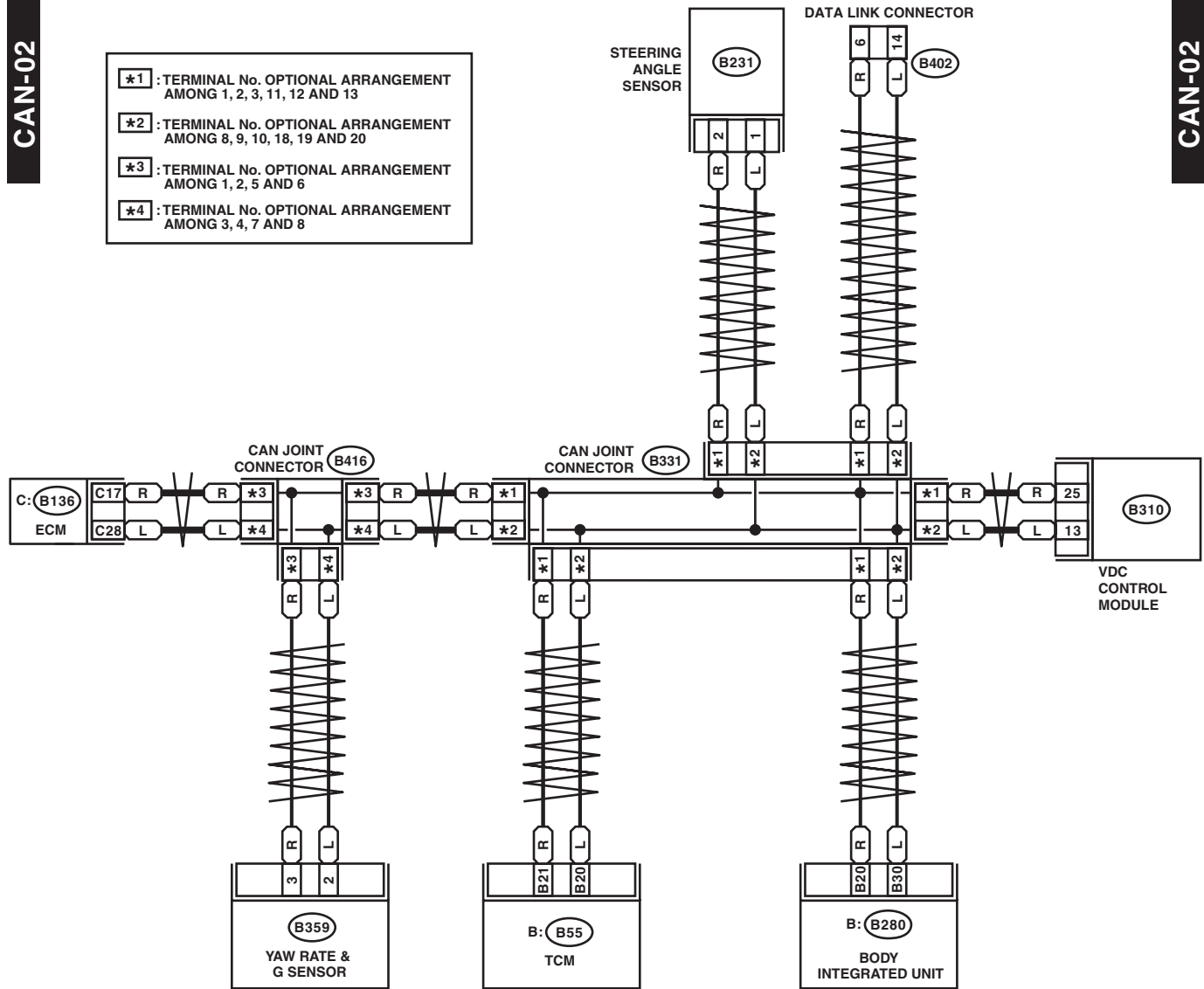
WI-27947

## 2. HIGH SPEED CAN

CAN-02

CAN-02

- \*1** : TERMINAL No. OPTIONAL ARRANGEMENT AMONG 1, 2, 3, 11, 12 AND 13
- \*2** : TERMINAL No. OPTIONAL ARRANGEMENT AMONG 8, 9, 10, 18, 19 AND 20
- \*3** : TERMINAL No. OPTIONAL ARRANGEMENT AMONG 1, 2, 5 AND 6
- \*4** : TERMINAL No. OPTIONAL ARRANGEMENT AMONG 3, 4, 7 AND 8



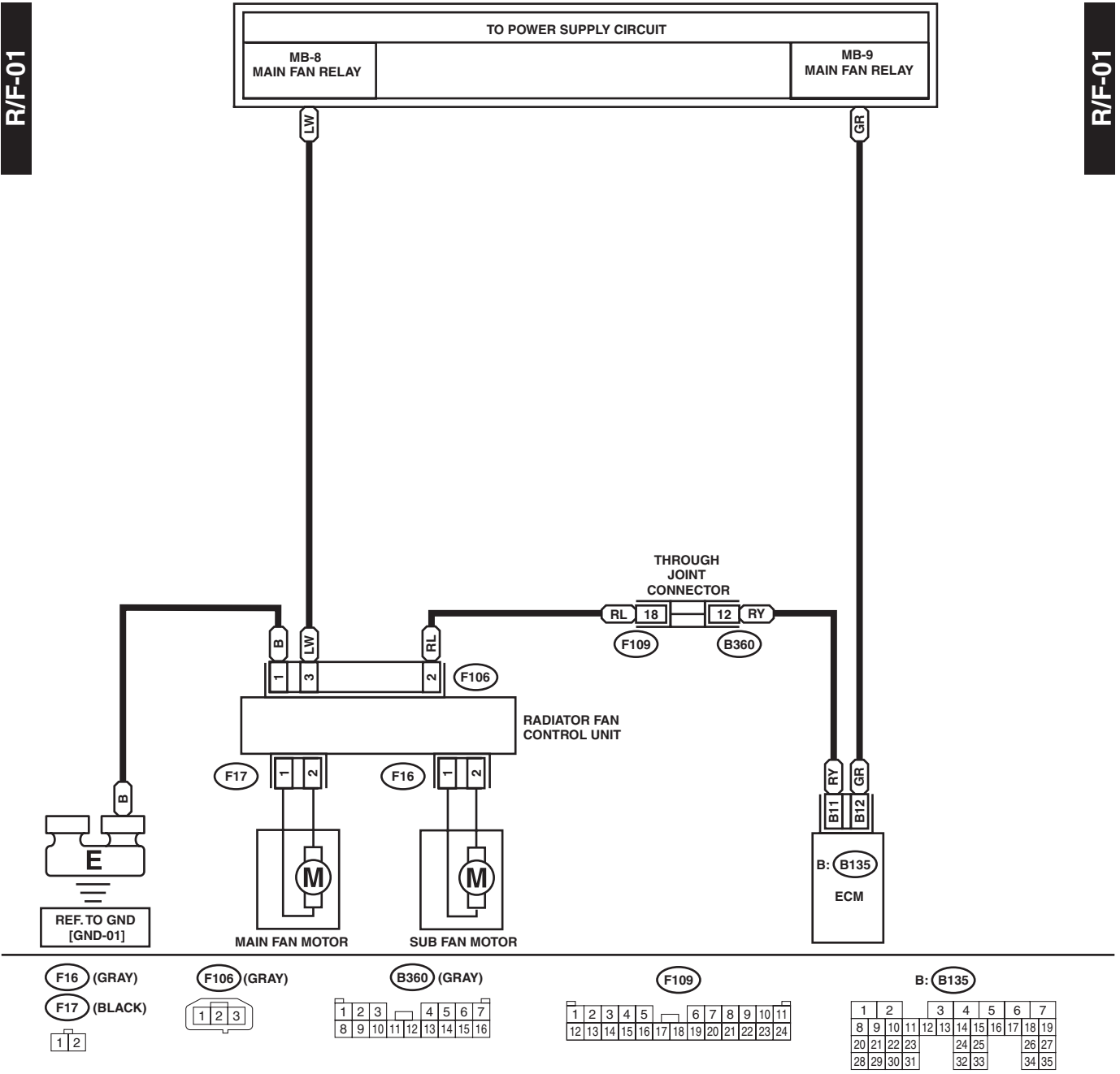
WI-35383

# Radiator Fan System

WIRING SYSTEM

## 17. Radiator Fan System

### A: WIRING DIAGRAM



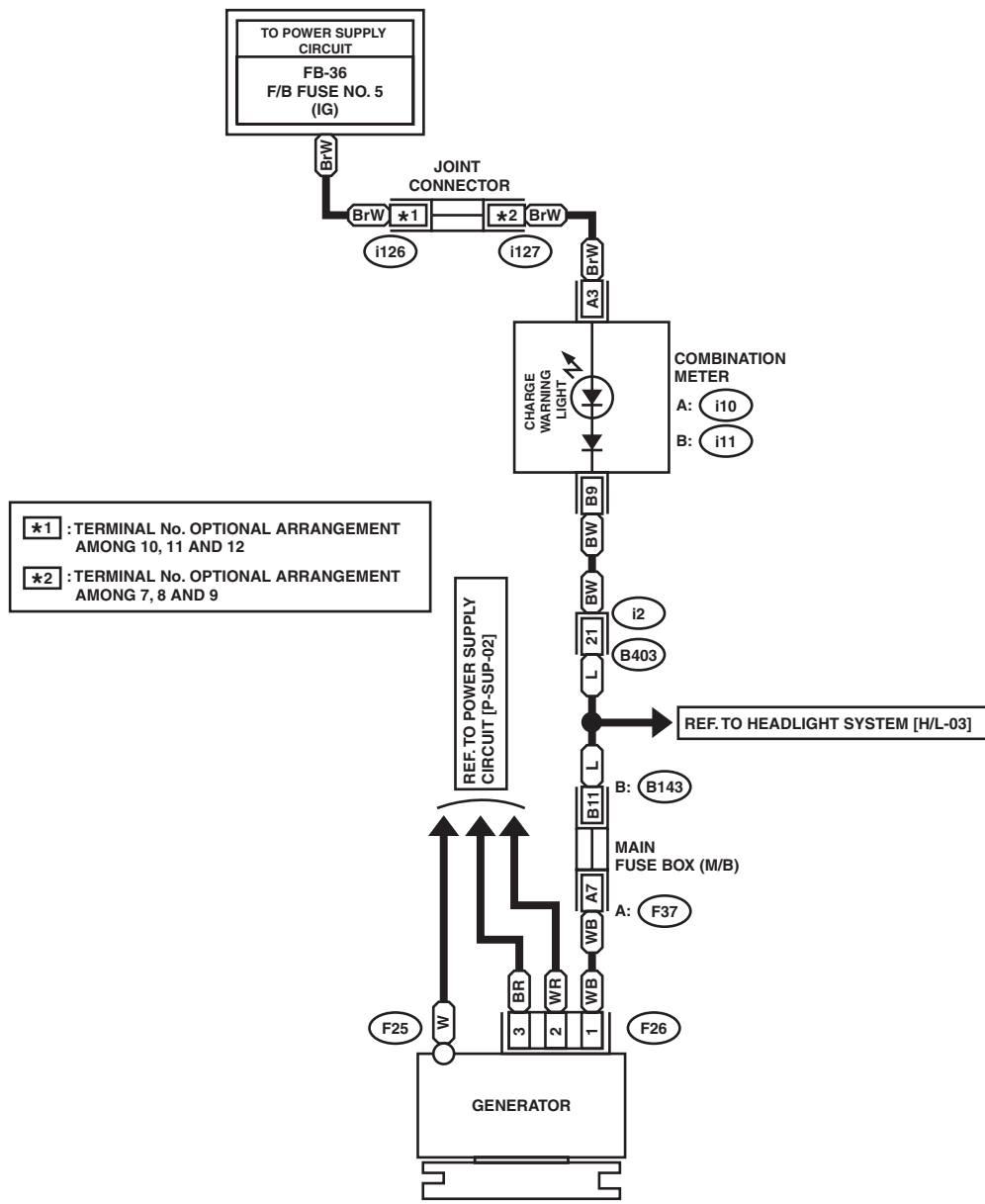
WI-26869

## 18. Charging System

### A: WIRING DIAGRAM

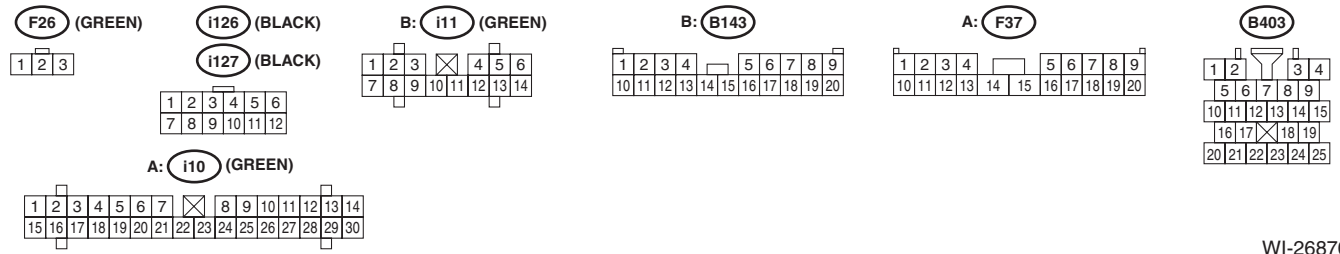
**CHG-01**

**CHG-01**



**\*1** : TERMINAL No. OPTIONAL ARRANGEMENT AMONG 10, 11 AND 12

**\*2** : TERMINAL No. OPTIONAL ARRANGEMENT AMONG 7, 8 AND 9



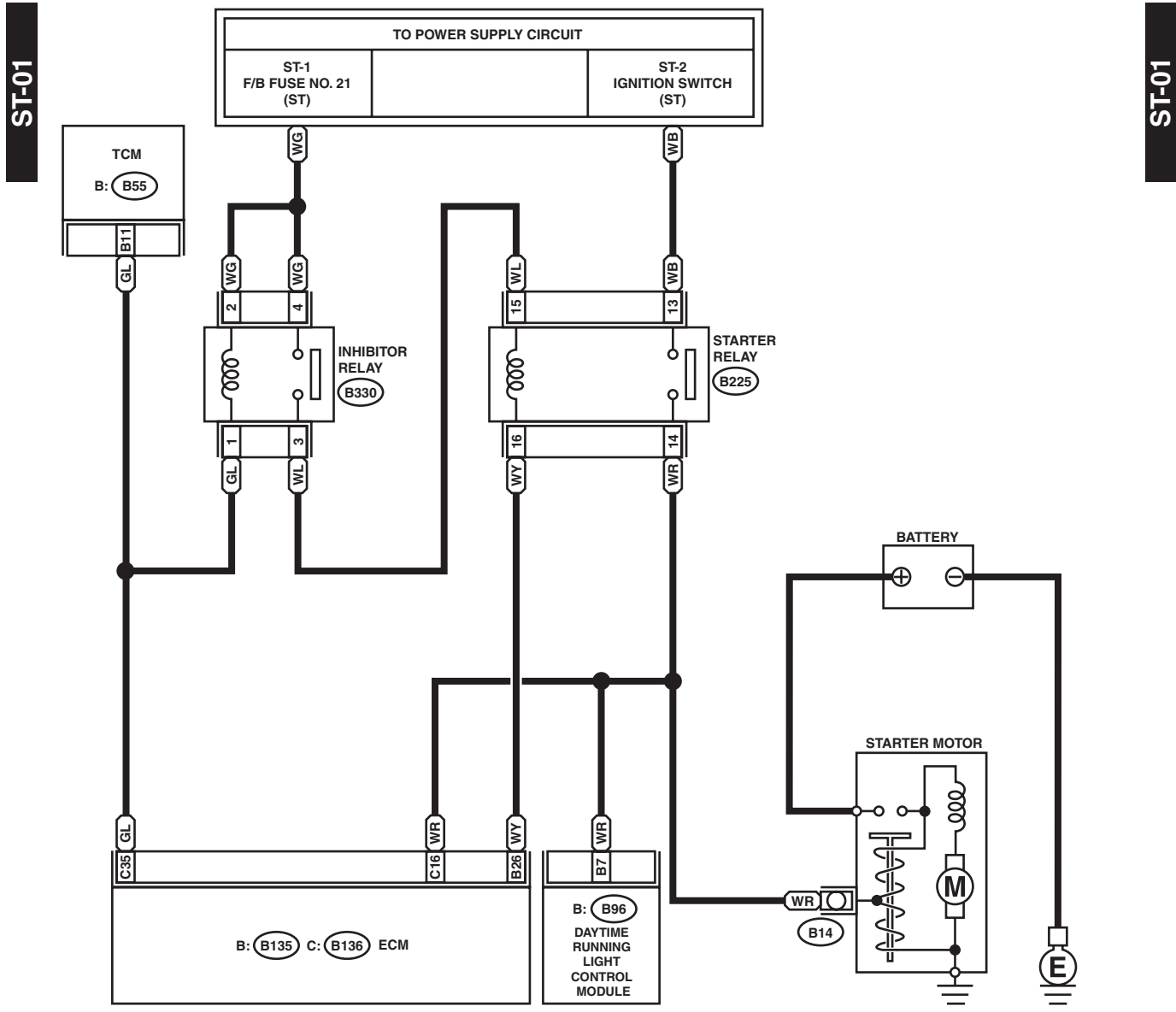
WI-26870

# Starter System

WIRING SYSTEM

## 19. Starter System

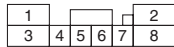
### A: WIRING DIAGRAM



B330 (BLACK)

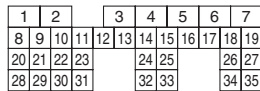


B: B96 (BLACK)



B: B55

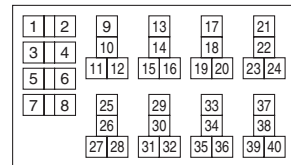
B: B135



C: B136



B225 (BLACK)

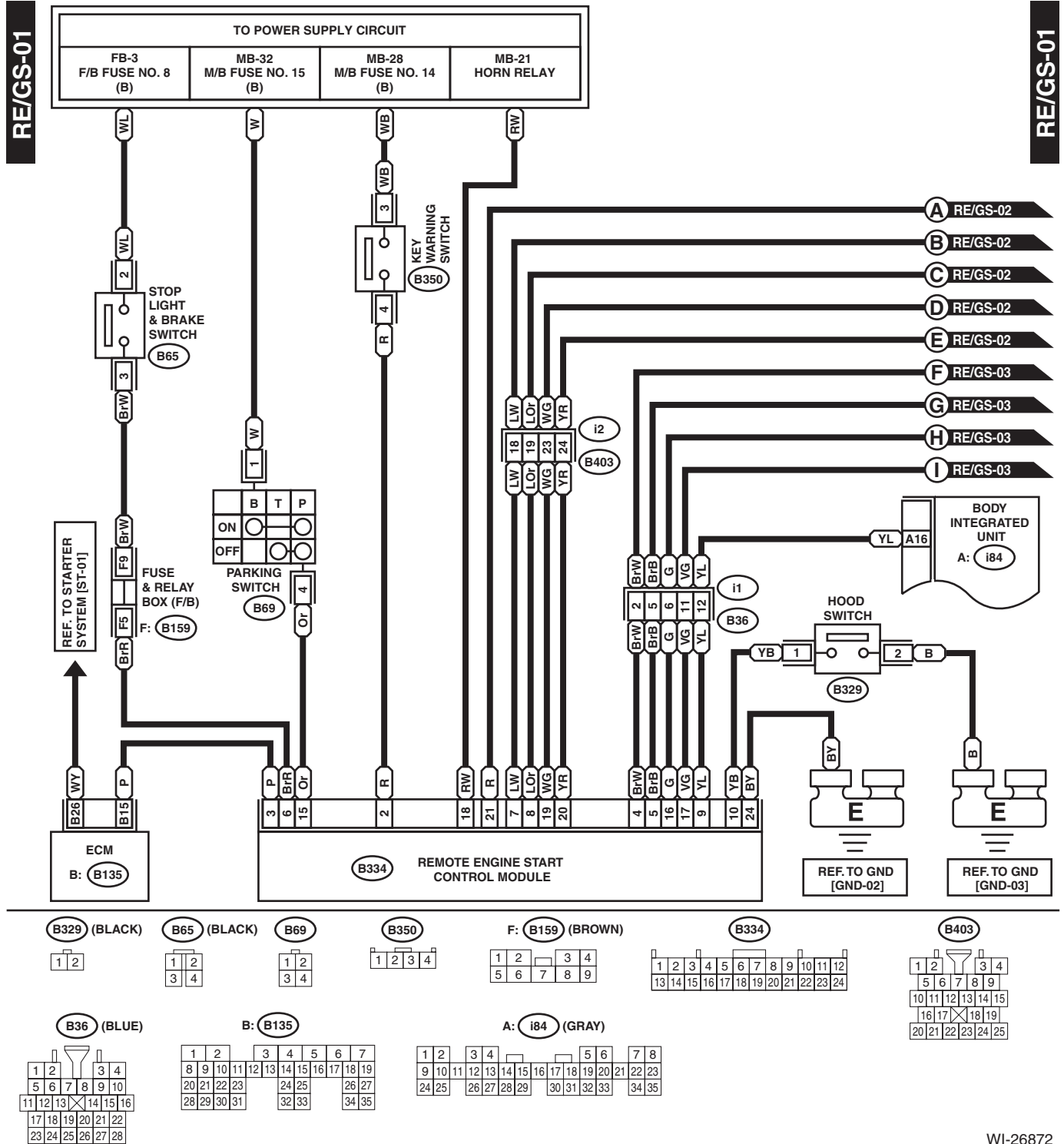


RELAY BLOCK

WI-26871

## 20. Remote Engine Start System

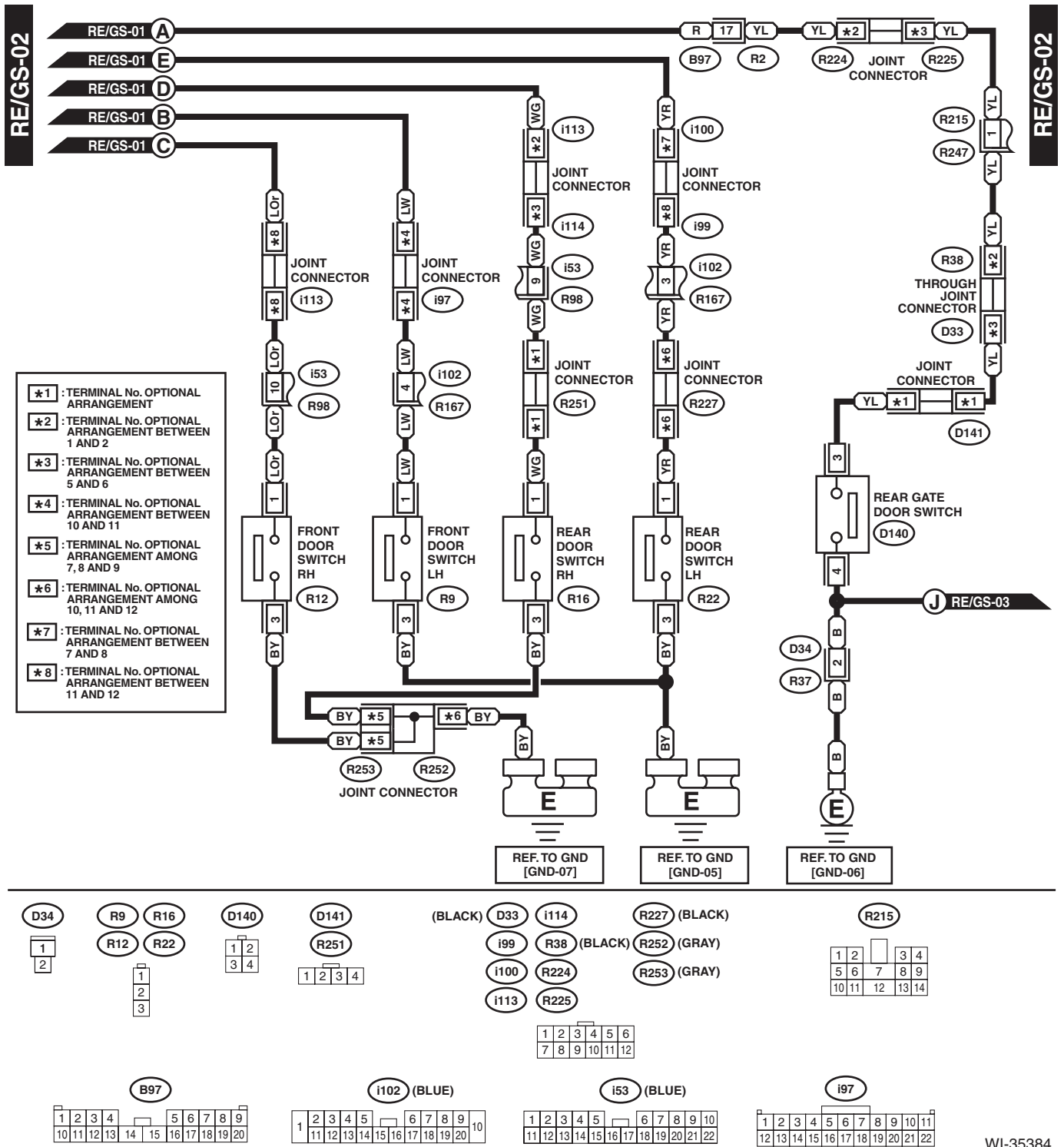
### A: WIRING DIAGRAM



WI-26872

# Remote Engine Start System

## WIRING SYSTEM

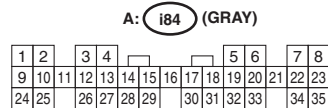
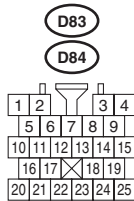
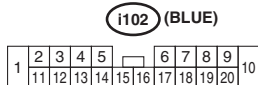
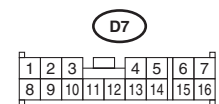
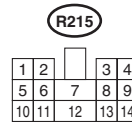
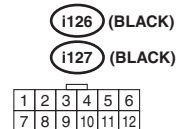
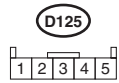
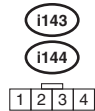
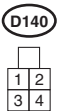
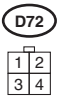
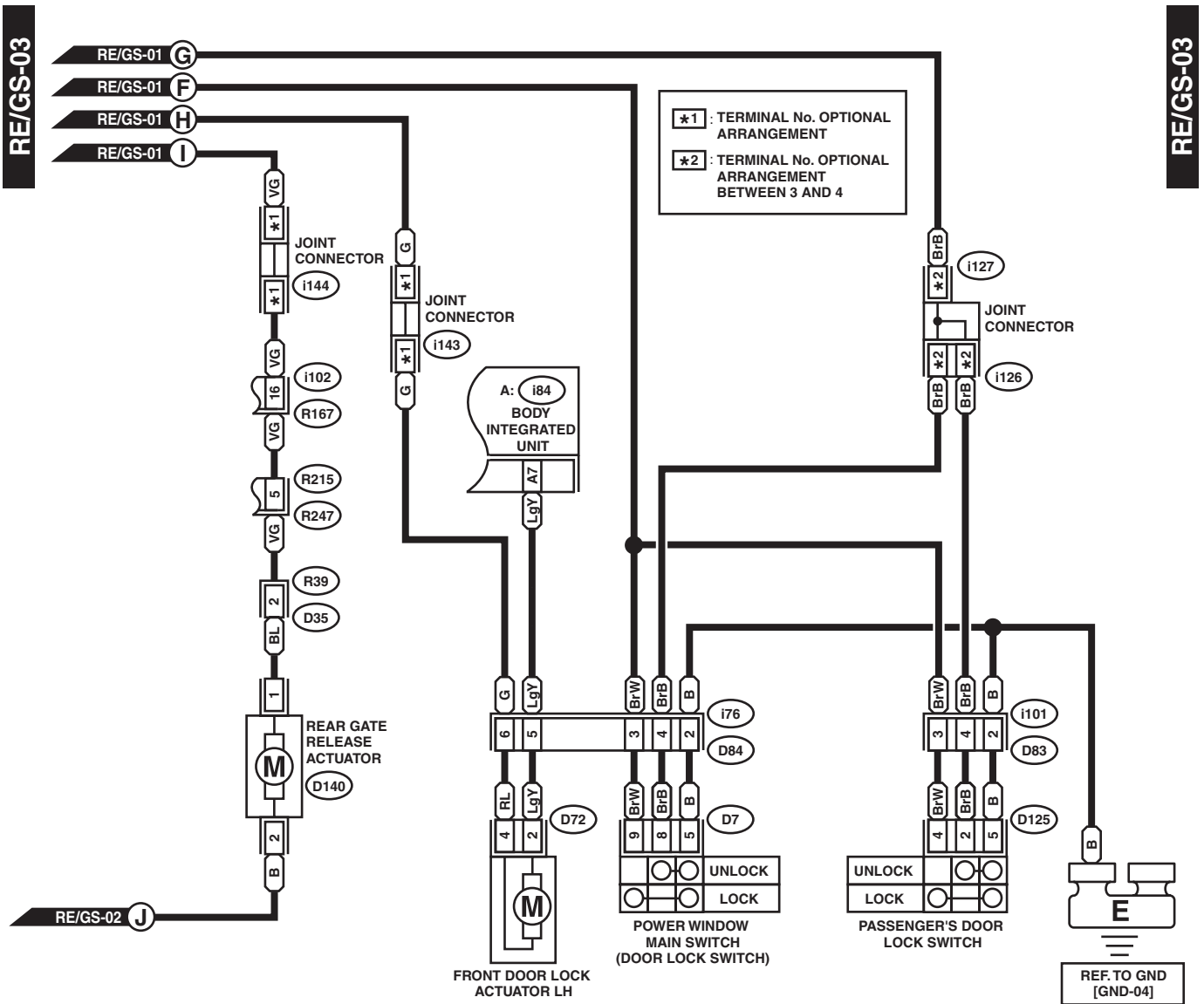


WI-35384



# Remote Engine Start System

WIRING SYSTEM



WI-16039

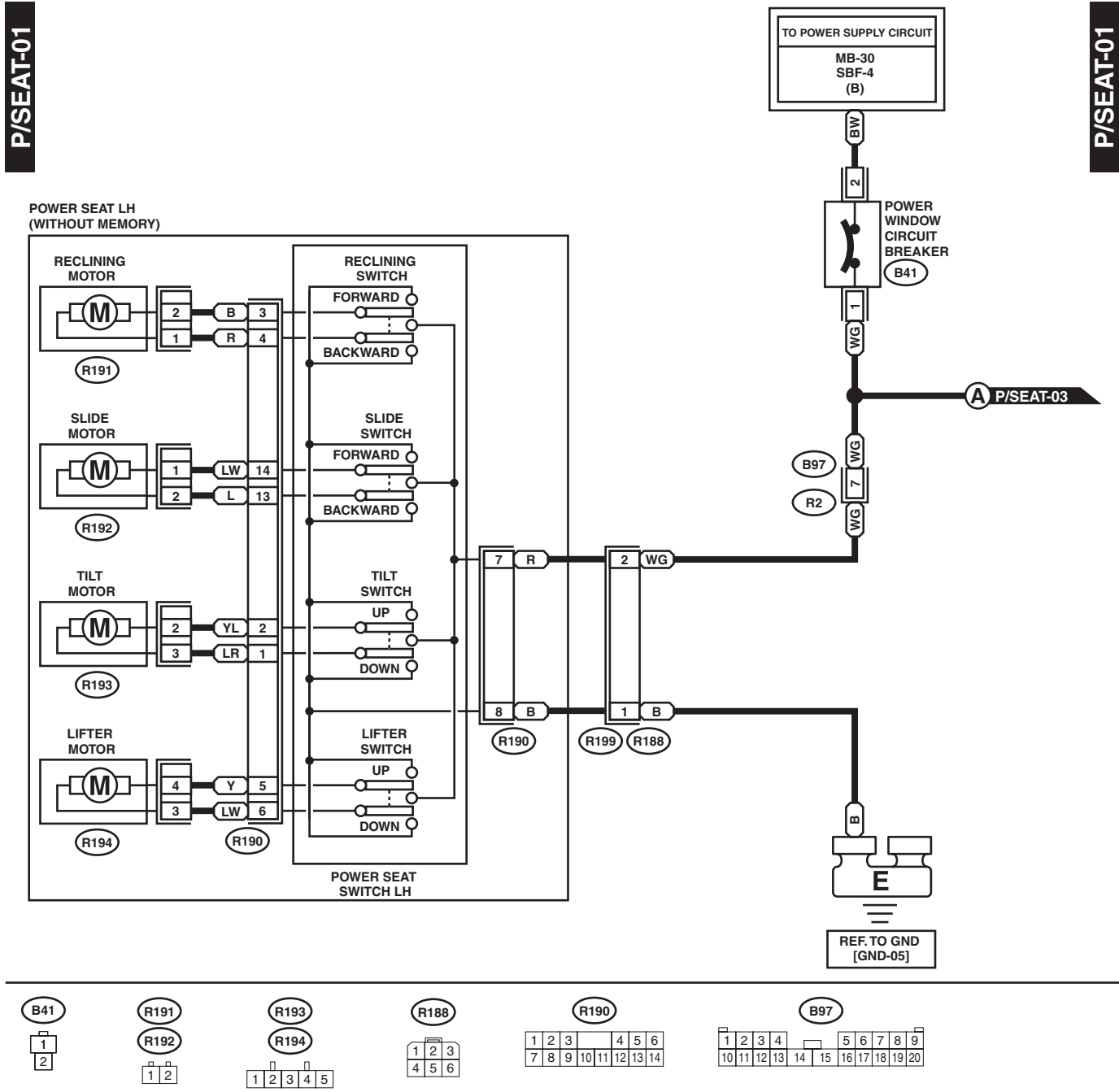
# Power Seat System

WIRING SYSTEM

## 21. Power Seat System

### A: WIRING DIAGRAM

#### 1. DRIVER'S SEAT (WITHOUT MEMORY)



WI-26874

# Power Seat System

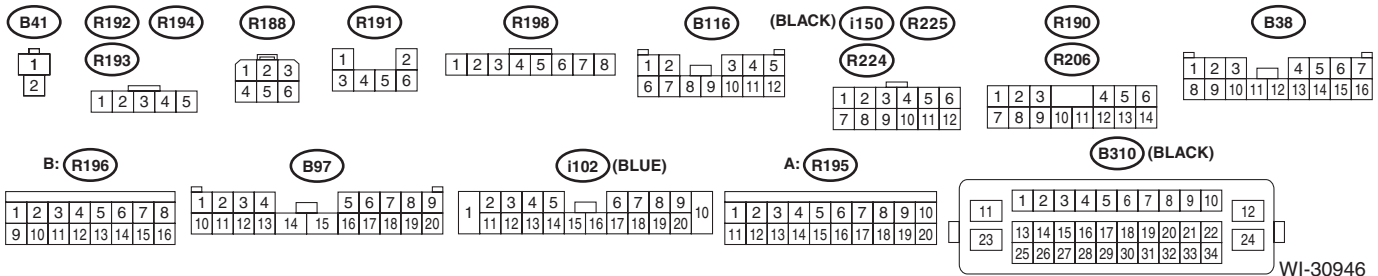
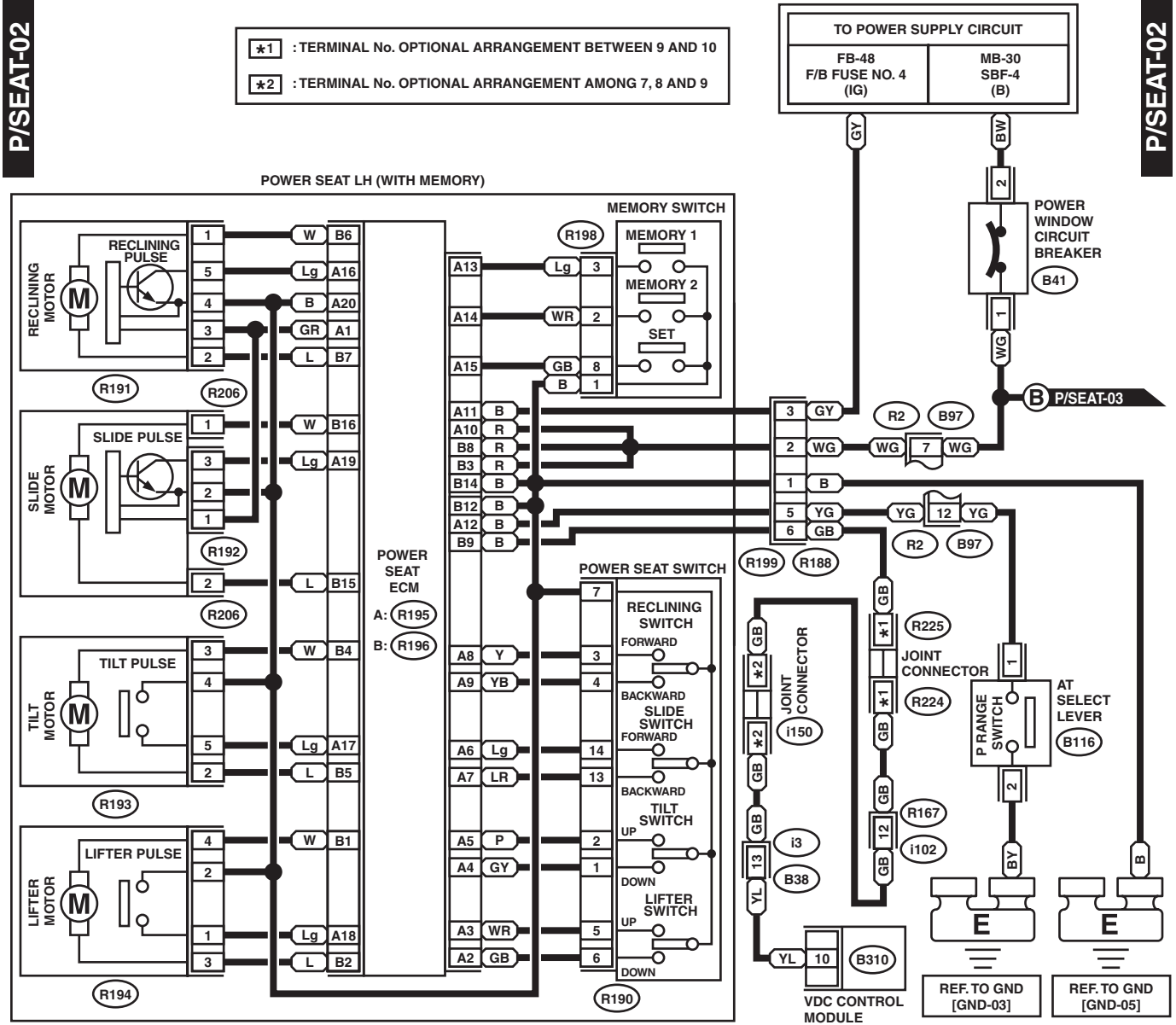
WIRING SYSTEM

## 2. DRIVER'S SEAT (WITH MEMORY)

P/SEAT-02

P/SEAT-02

- ★1 : TERMINAL No. OPTIONAL ARRANGEMENT BETWEEN 9 AND 10
- ★2 : TERMINAL No. OPTIONAL ARRANGEMENT AMONG 7, 8 AND 9



WI-30946

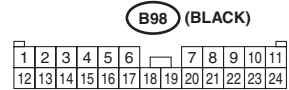
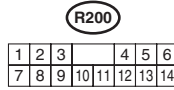
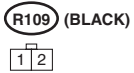
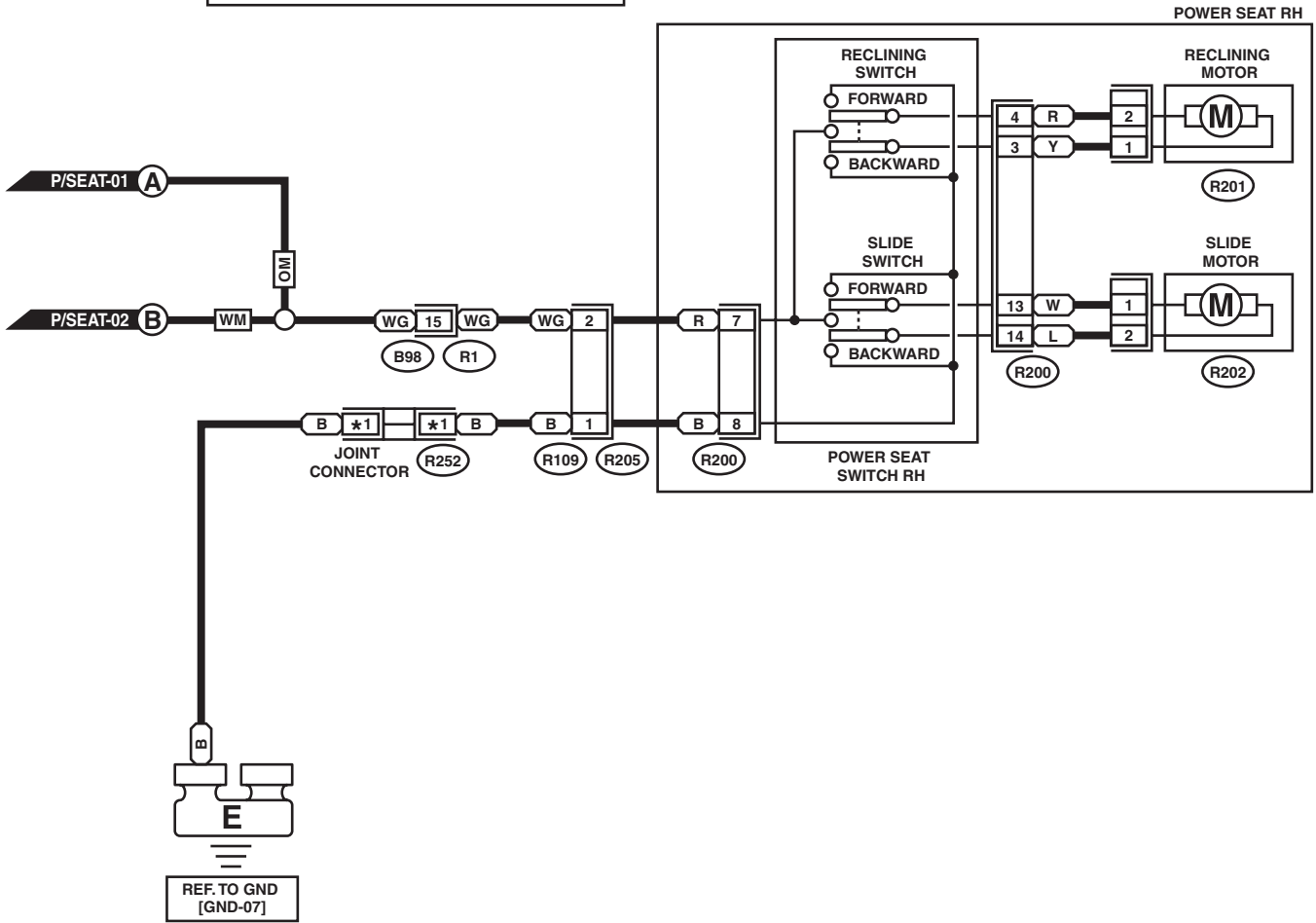
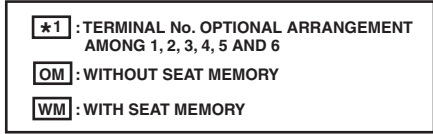
# Power Seat System

## WIRING SYSTEM

### 3. PASSENGER'S SEAT

P/SEAT-03

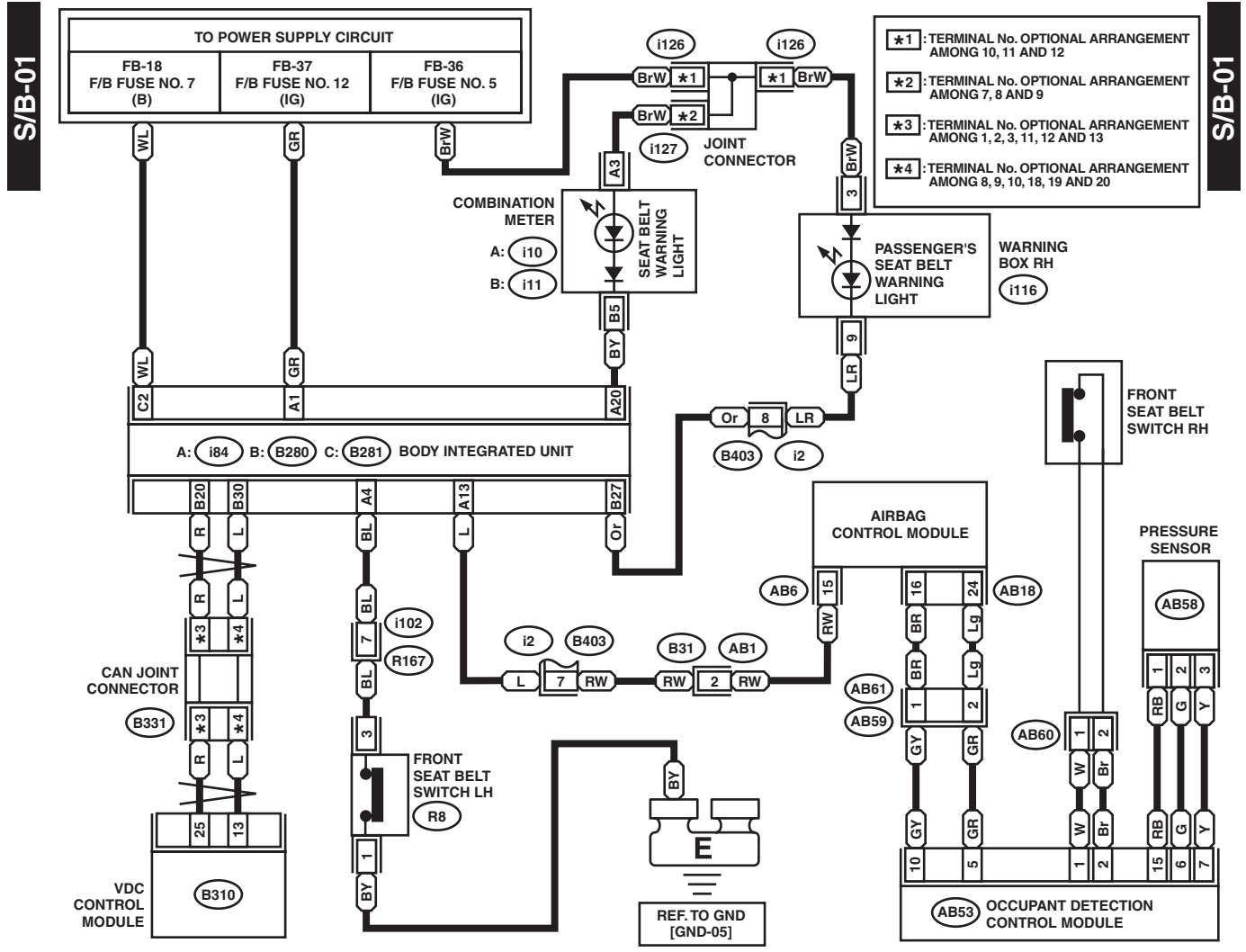
P/SEAT-03



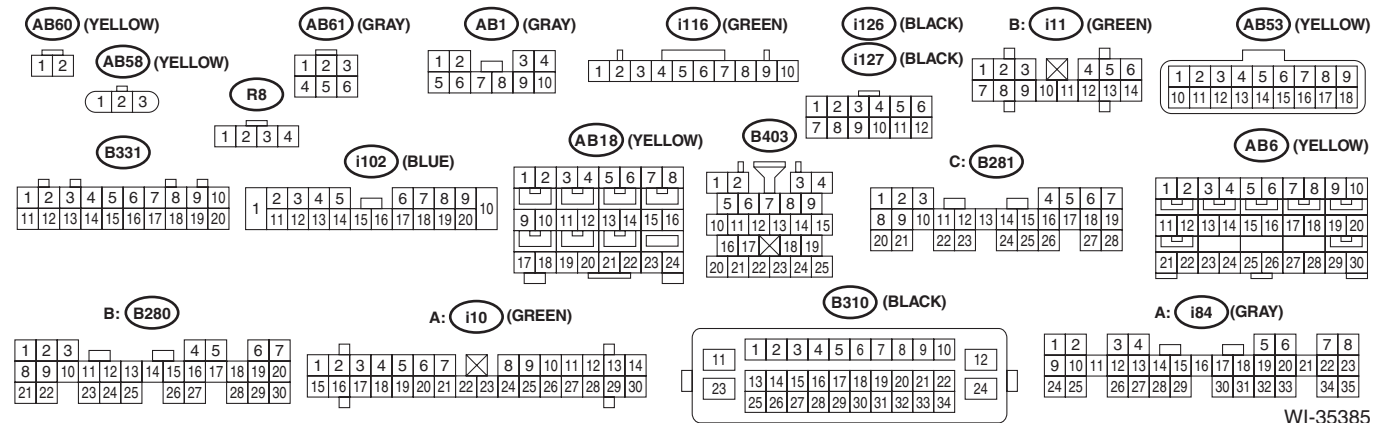
WI-26876

## 22. Seat Belt Warning System

### A: WIRING DIAGRAM



- ★1 : TERMINAL No. OPTIONAL ARRANGEMENT AMONG 10, 11 AND 12
- ★2 : TERMINAL No. OPTIONAL ARRANGEMENT AMONG 7, 8 AND 9
- ★3 : TERMINAL No. OPTIONAL ARRANGEMENT AMONG 1, 2, 3, 11, 12 AND 13
- ★4 : TERMINAL No. OPTIONAL ARRANGEMENT AMONG 8, 9, 10, 18, 19 AND 20



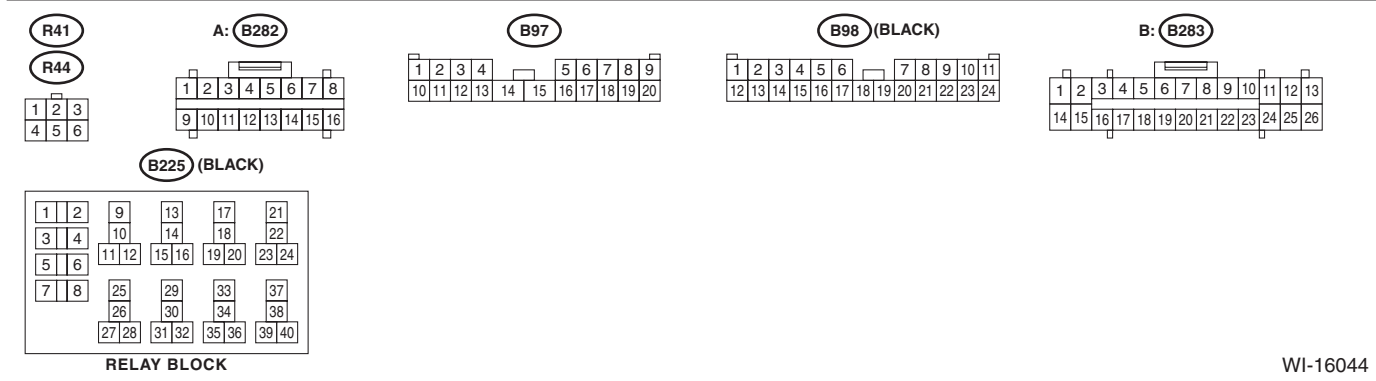
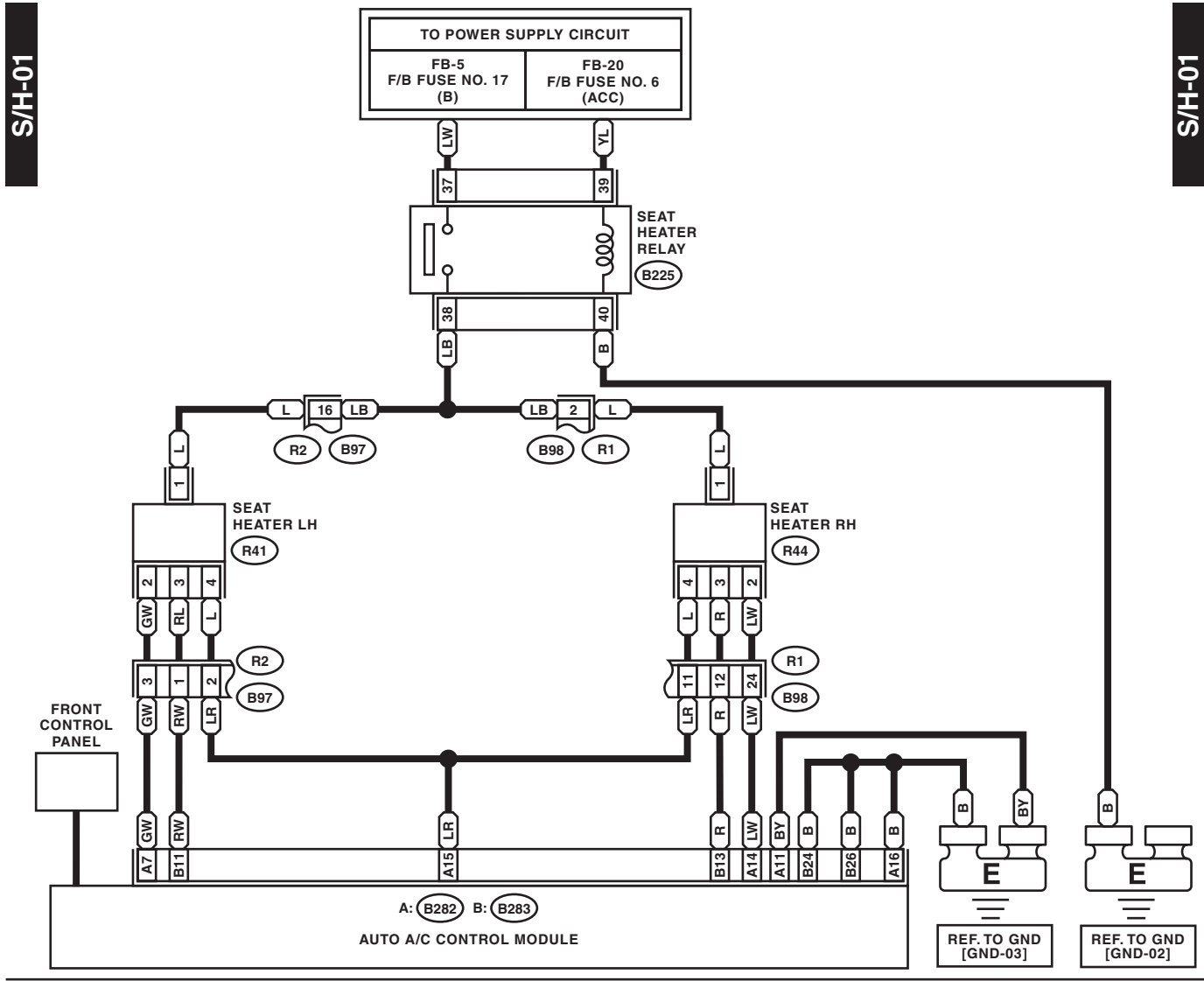
WI-35385

# Seat Heater System

WIRING SYSTEM

## 23. Seat Heater System

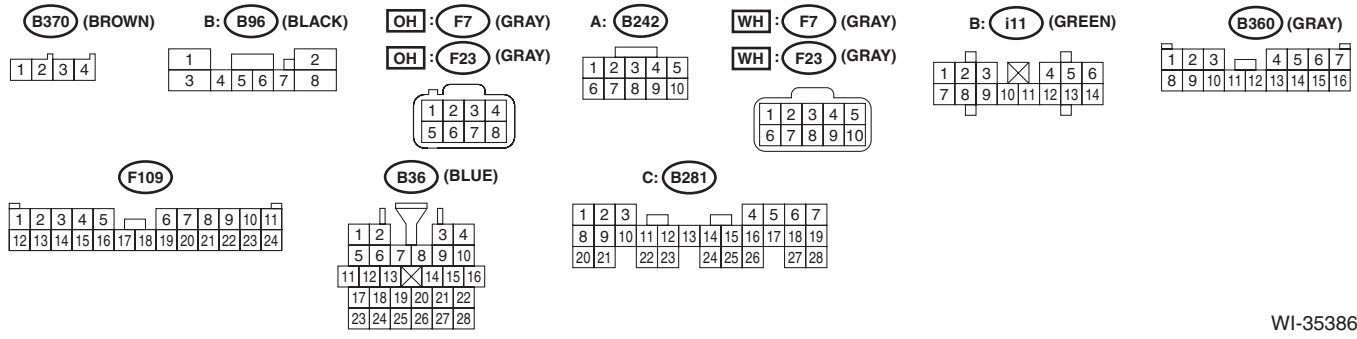
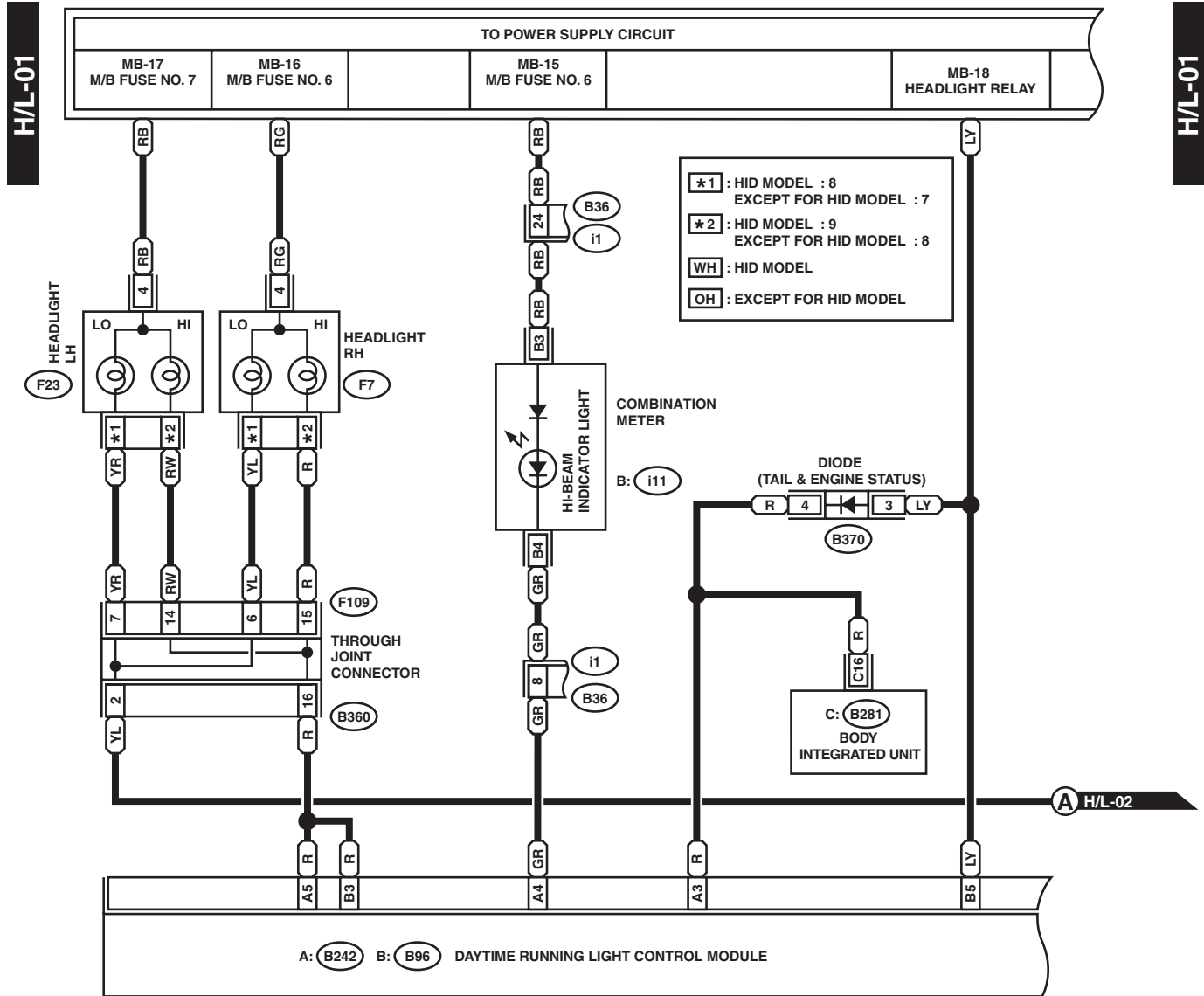
### A: WIRING DIAGRAM



WI-16044

## 24. Headlight System

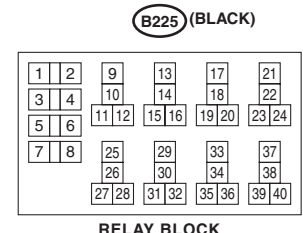
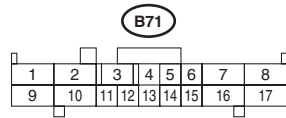
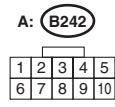
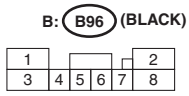
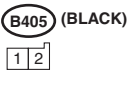
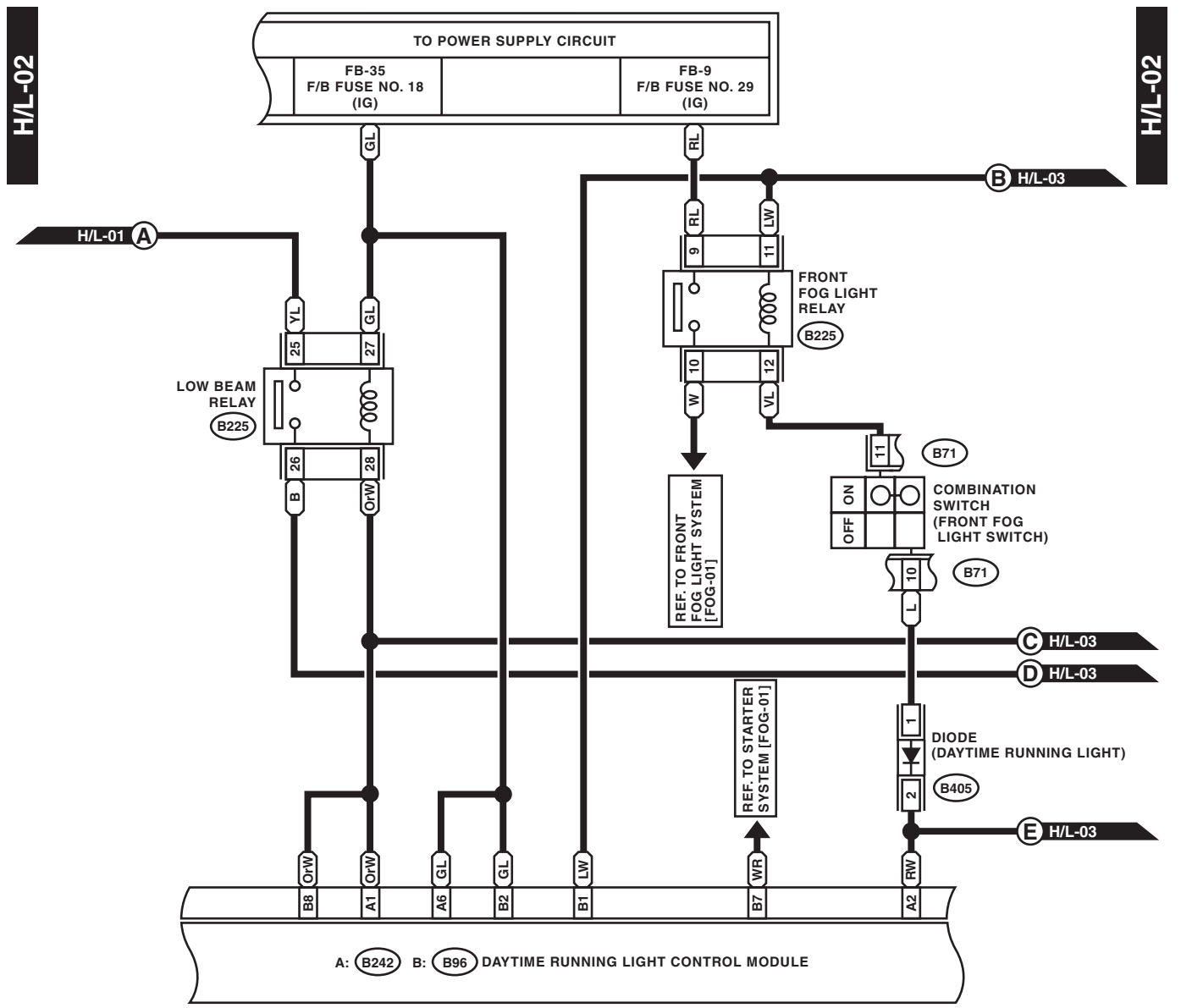
### A: WIRING DIAGRAM



WI-35386

# Headlight System

## WIRING SYSTEM



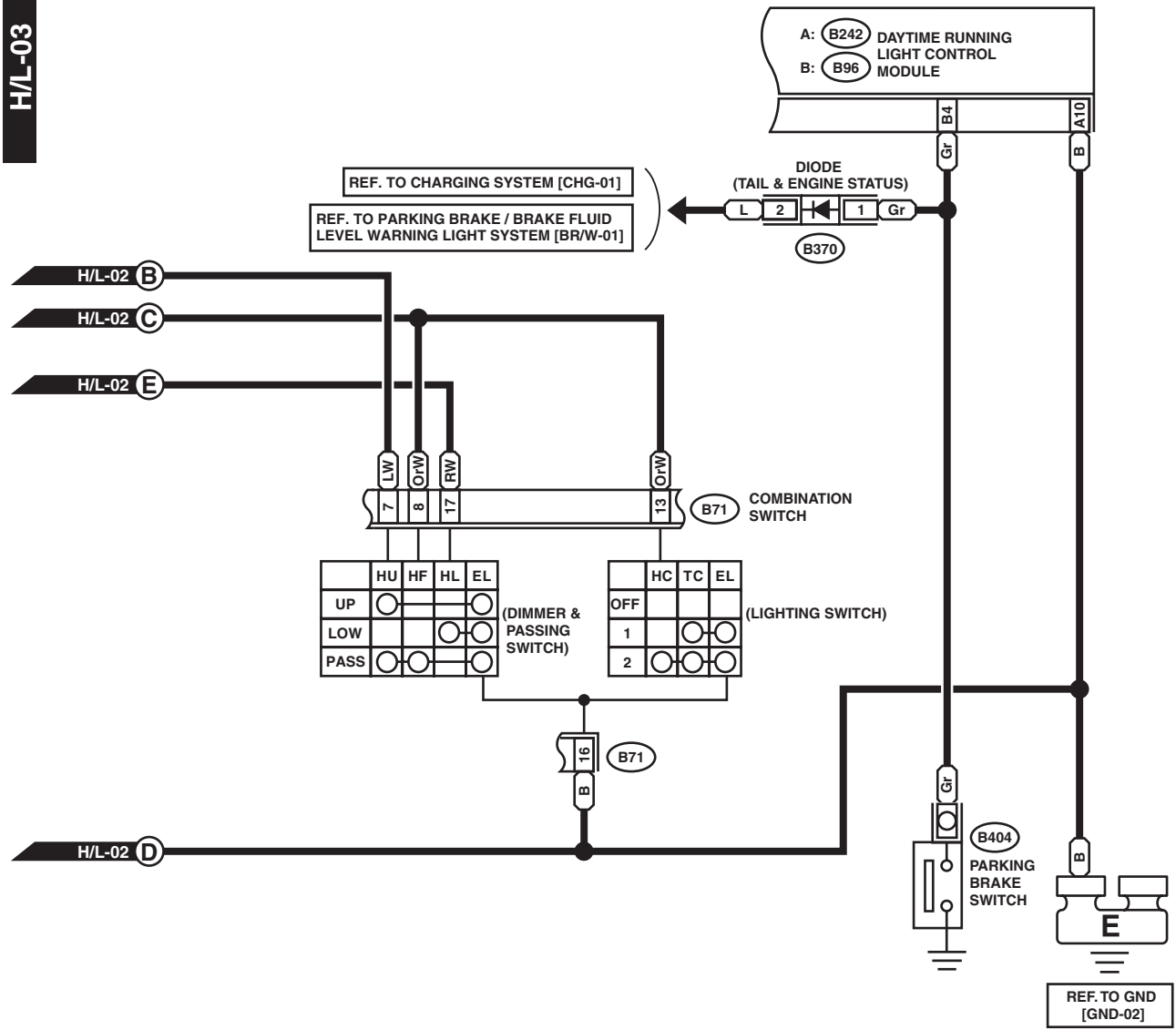
WI-16046



# Headlight System

WIRING SYSTEM

H/L-03

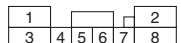


H/L-03

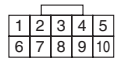
B370 (BROWN)



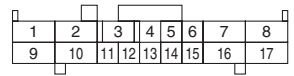
B: B96 (BLACK)



A: B242



B71



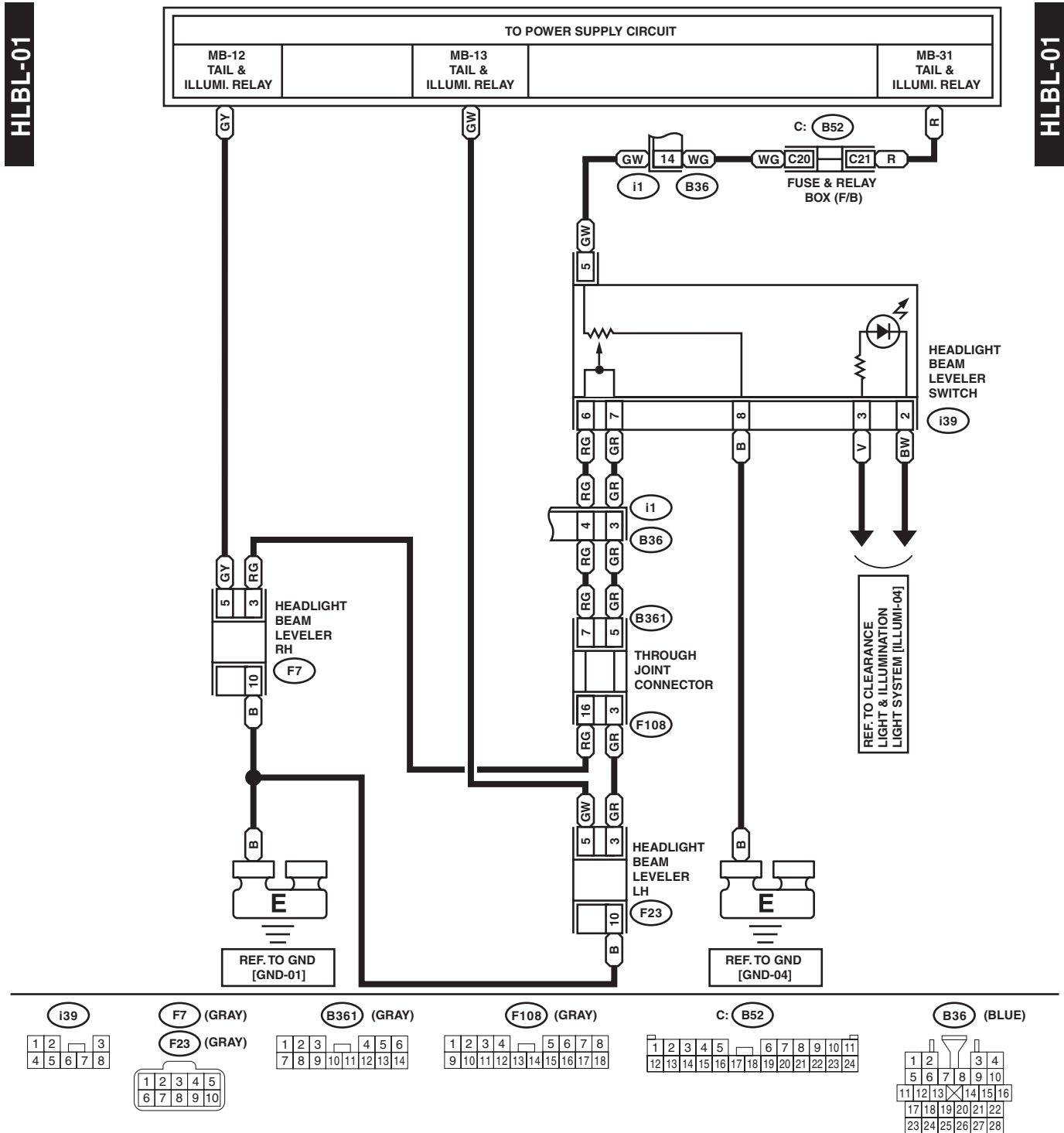
WI-27949

# Headlight Beam Leveler System

WIRING SYSTEM

## 25. Headlight Beam Leveler System

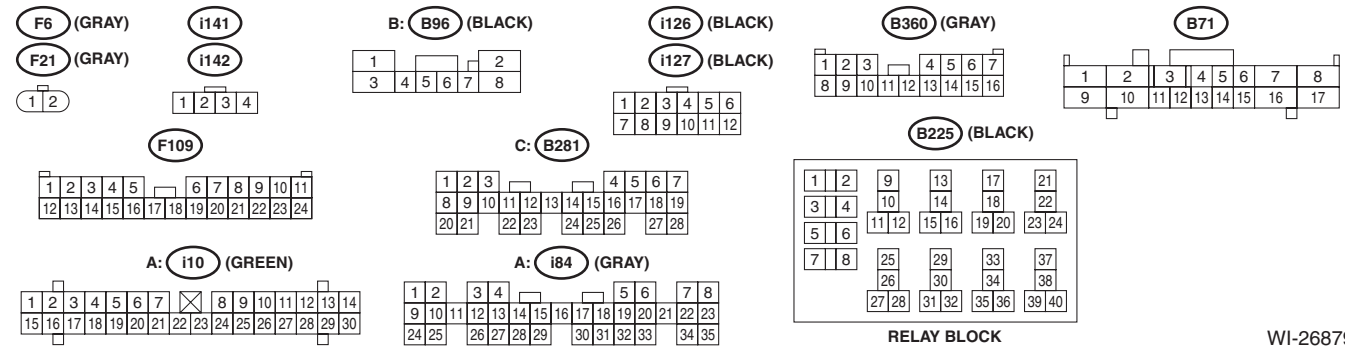
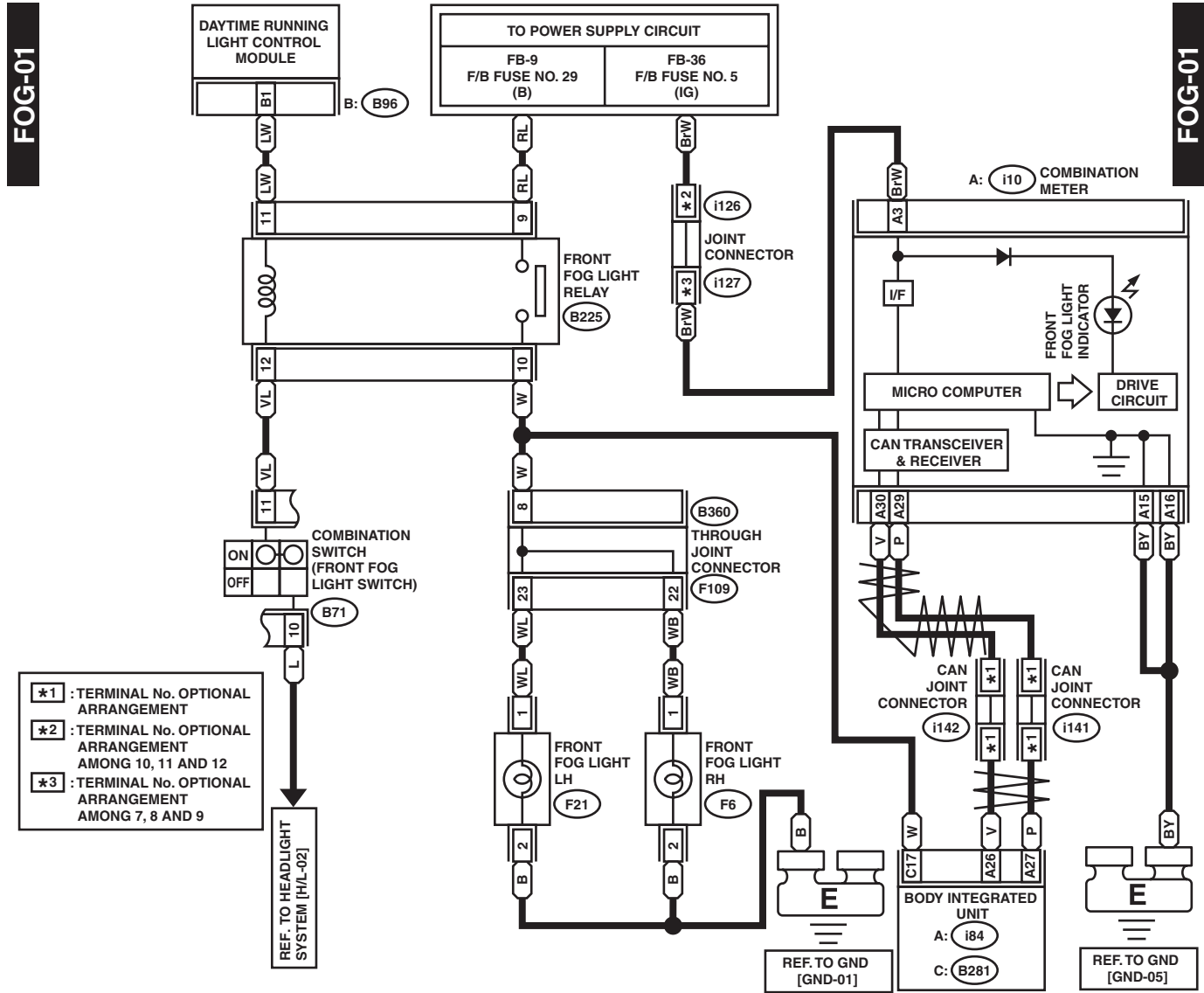
### A: WIRING DIAGRAM



WI-26878

## 26. Front Fog Light System

### A: WIRING DIAGRAM



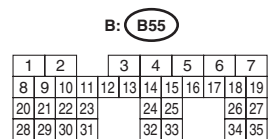
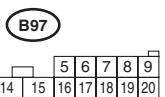
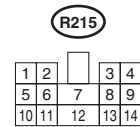
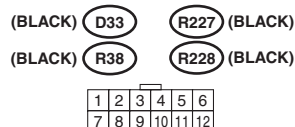
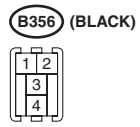
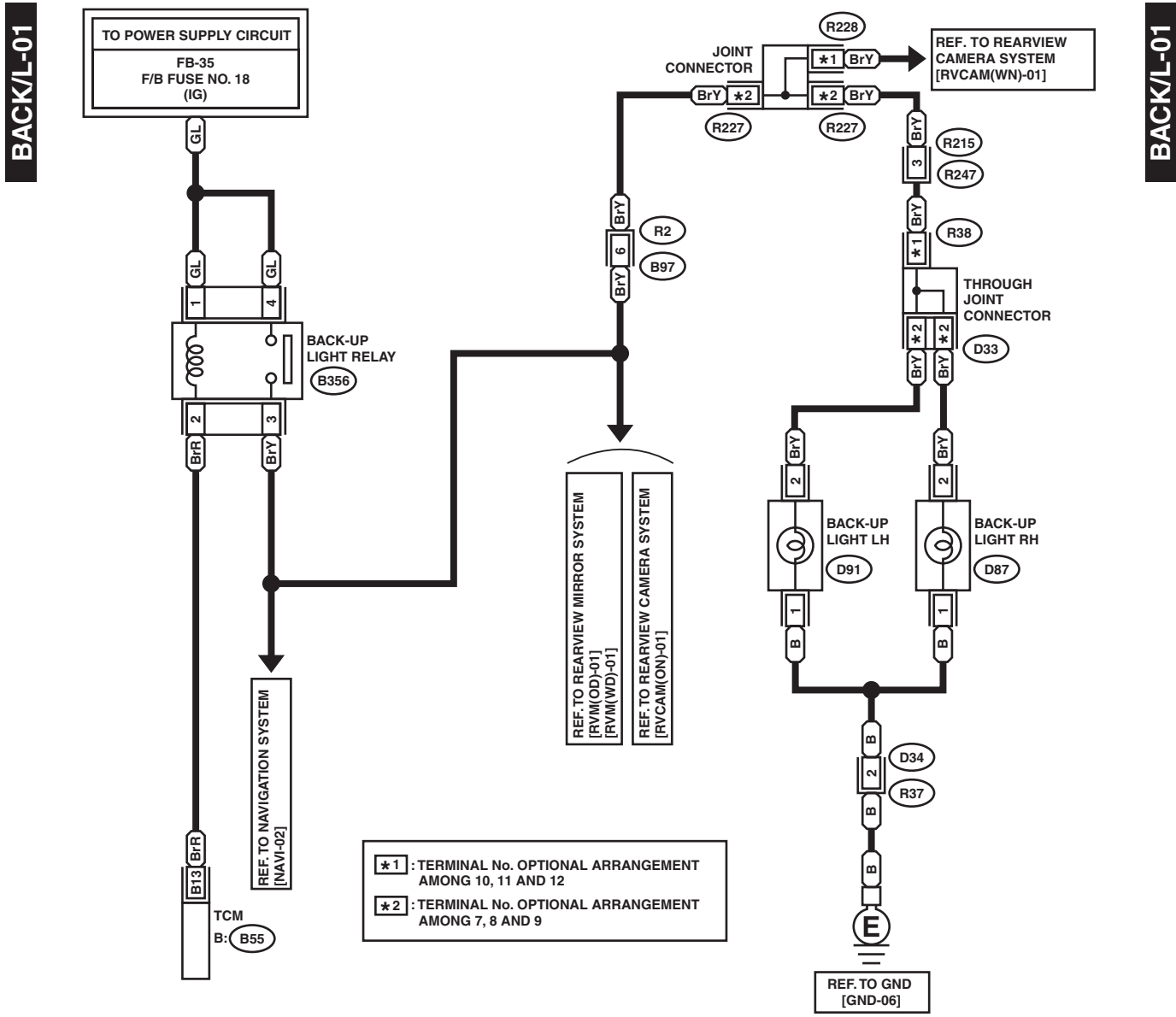
WI-26879

# Back-up Light System

WIRING SYSTEM

## 27. Back-up Light System

### A: WIRING DIAGRAM

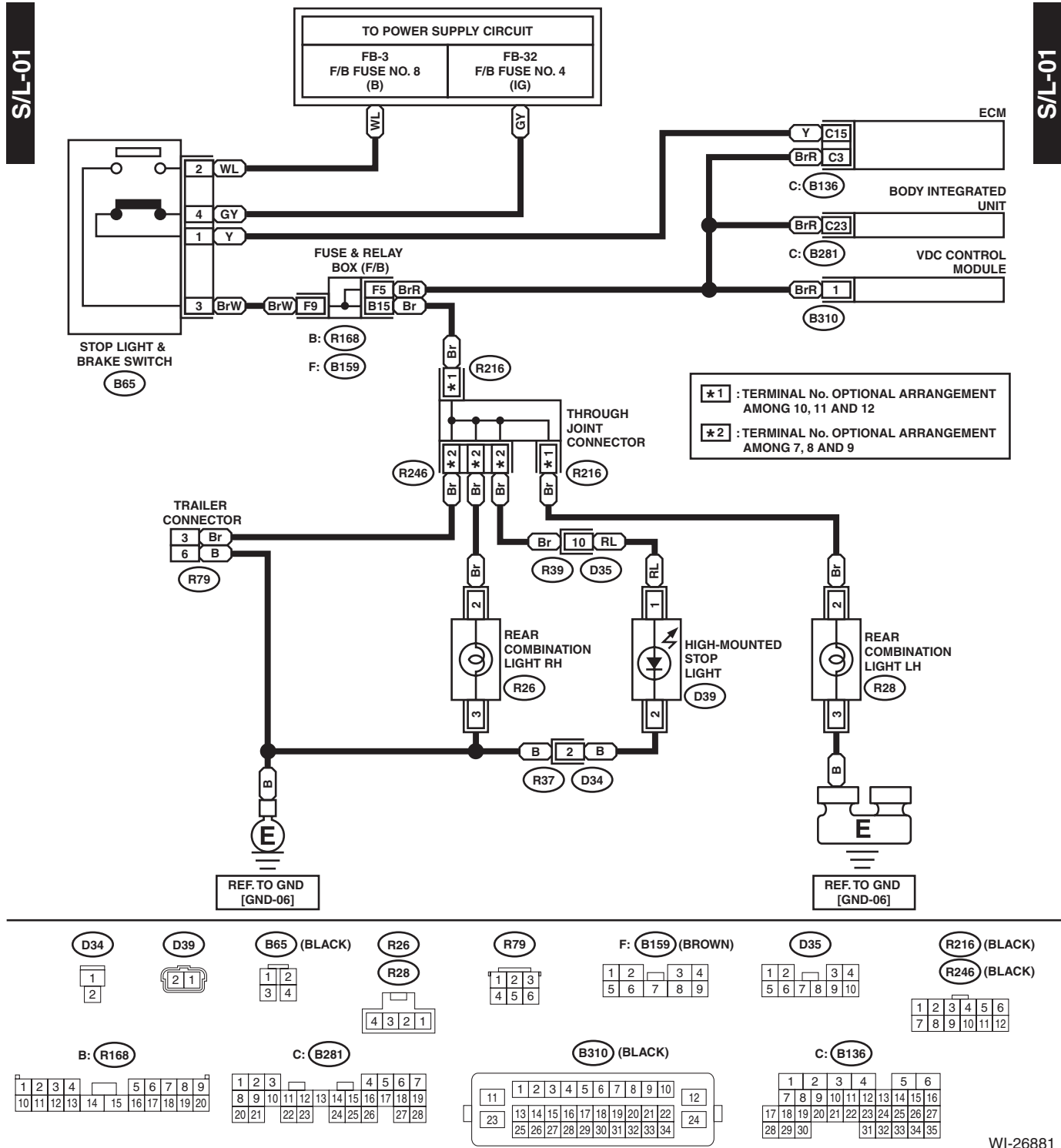


WI-26880

# Stop Light System

## 28. Stop Light System

### A: WIRING DIAGRAM



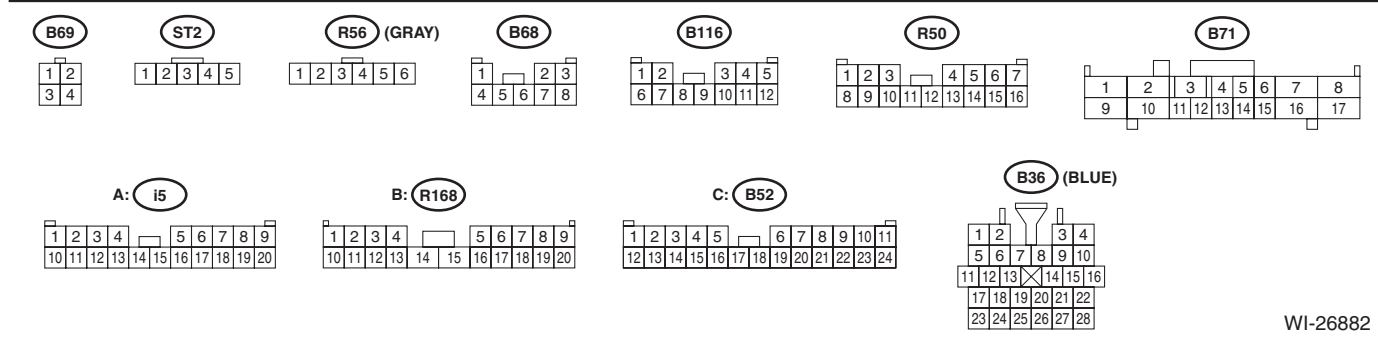
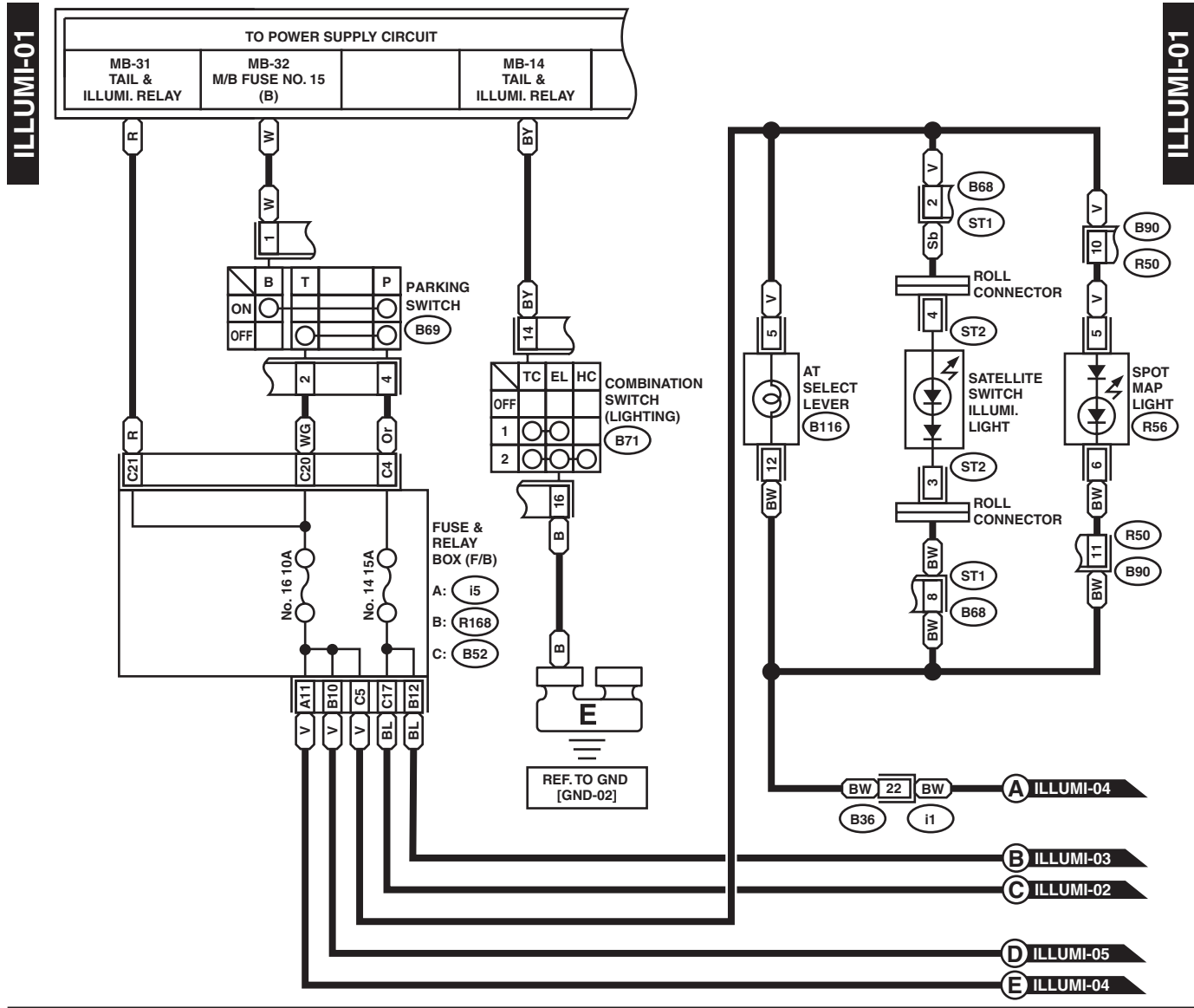
WI-26881

# Clearance Light and Illumination Light System

WIRING SYSTEM

## 29. Clearance Light and Illumination Light System

### A: WIRING DIAGRAM



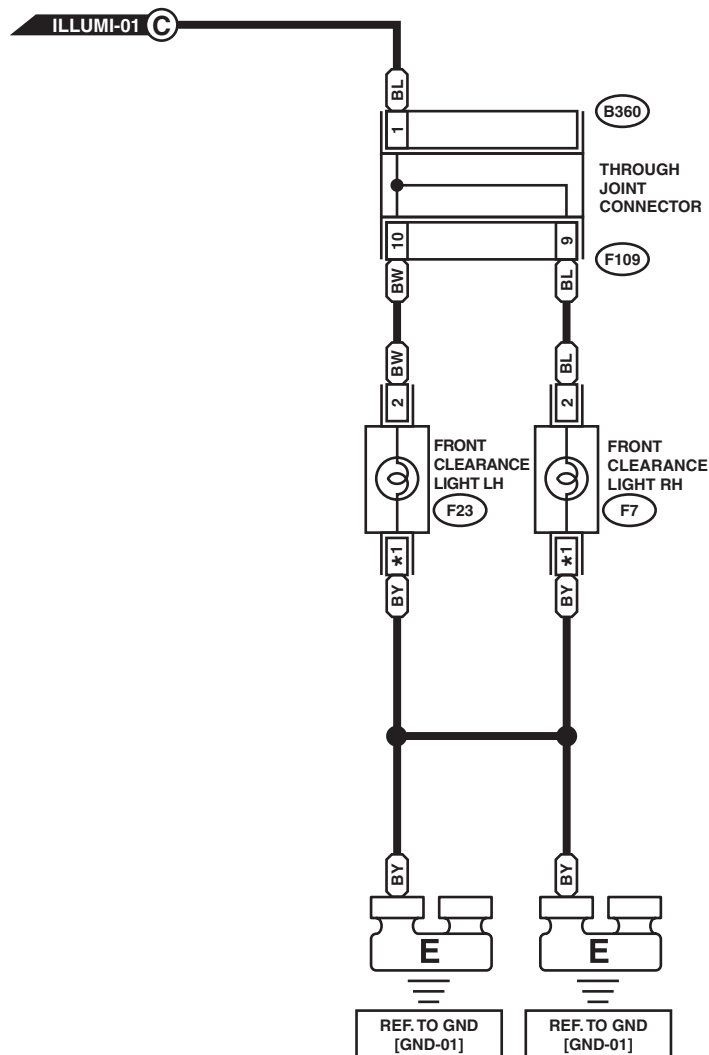
WI-26882

# Clearance Light and Illumination Light System

WIRING SYSTEM

ILLUMI-02

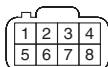
ILLUMI-02



**WH** : HID MODEL  
**OH** : EXCEPT FOR HID MODEL  
**\*1** : HID MODEL : 7  
 EXCEPT FOR HID MODEL : 6

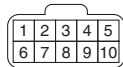
**OH** : F7 (GRAY)

**OH** : F23 (GRAY)



**WH** : F7 (GRAY)

**WH** : F23 (GRAY)



**B360** (GRAY)



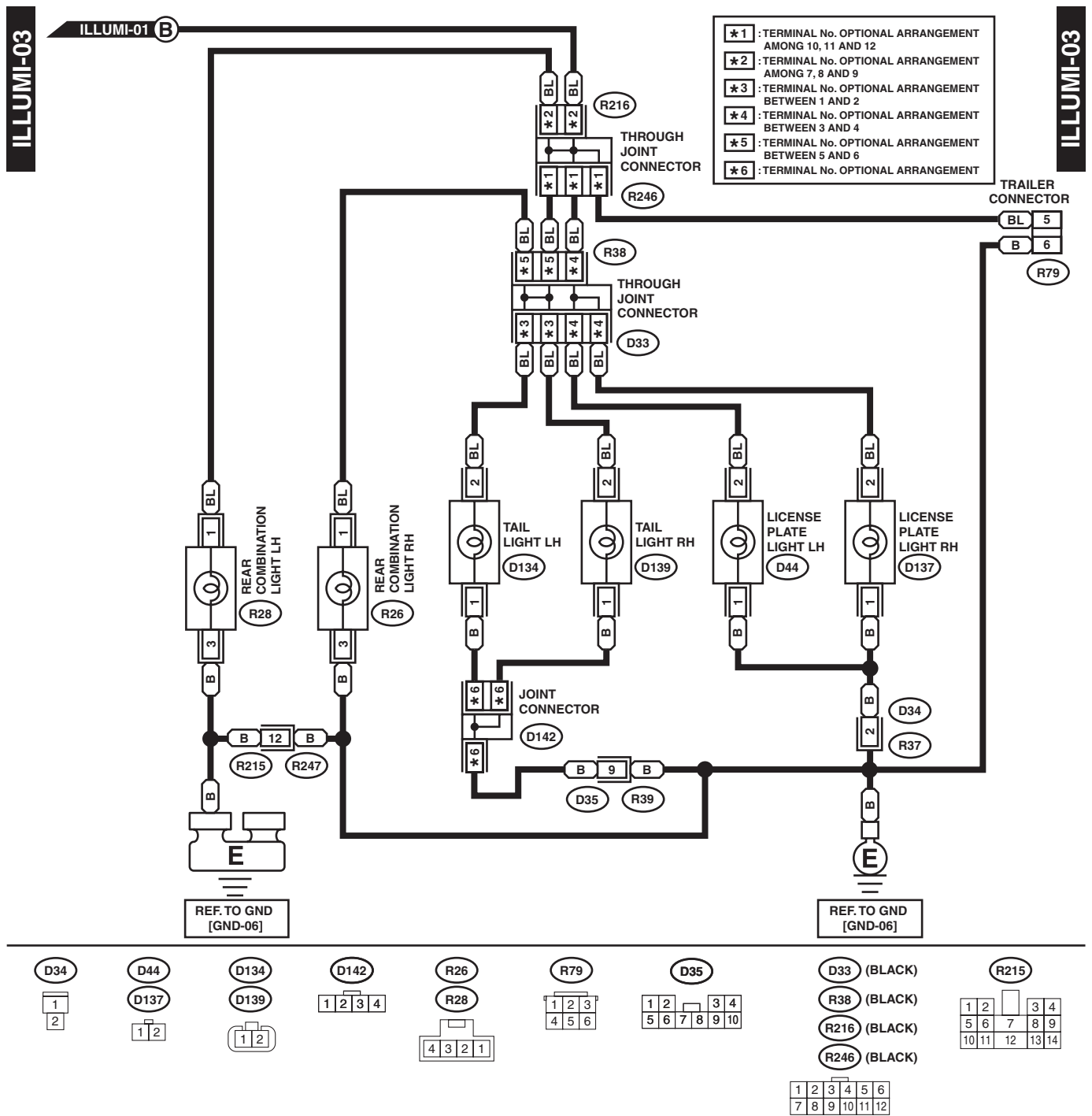
**F109**



WI-21031

# Clearance Light and Illumination Light System

WIRING SYSTEM

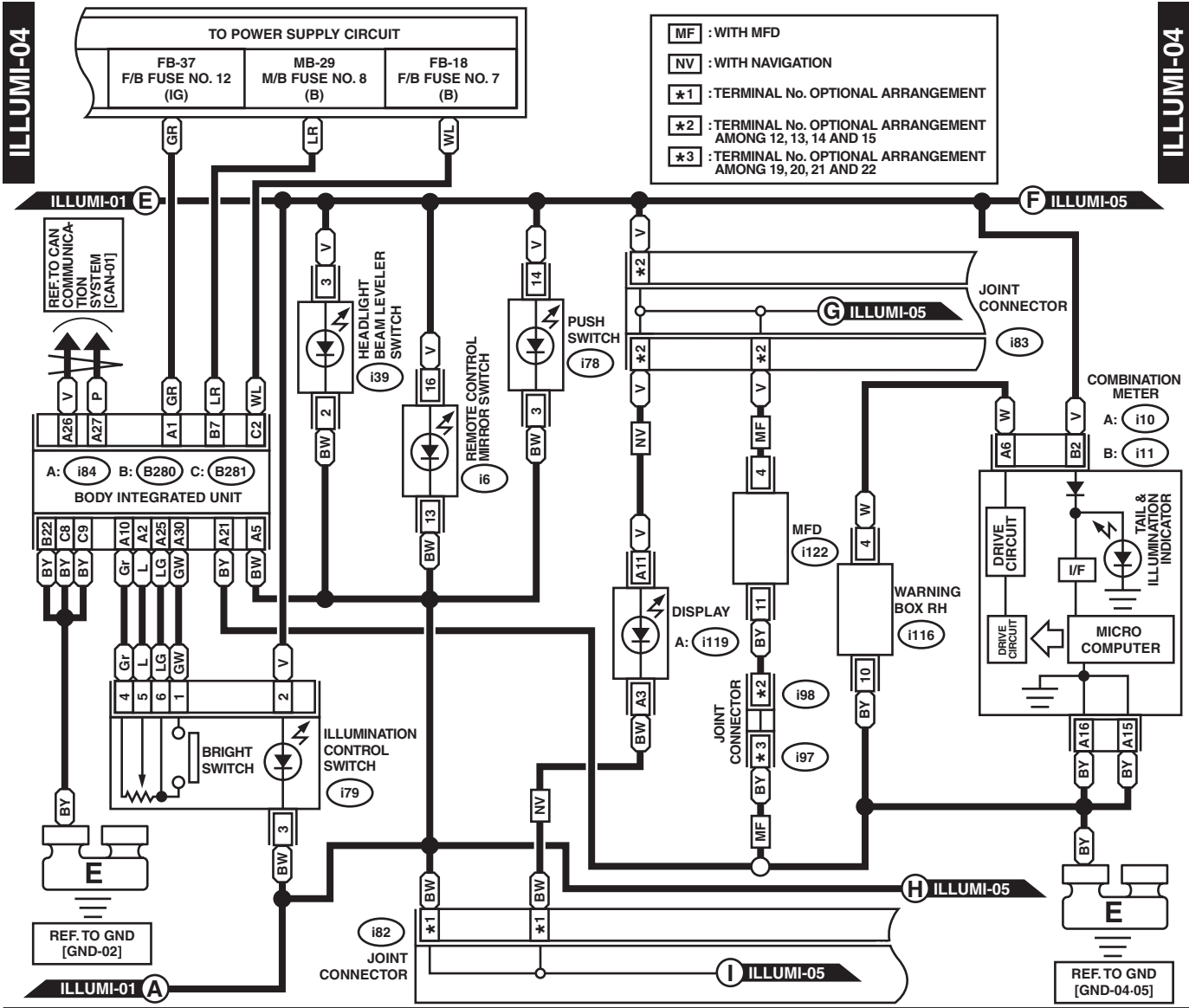


WI-26883

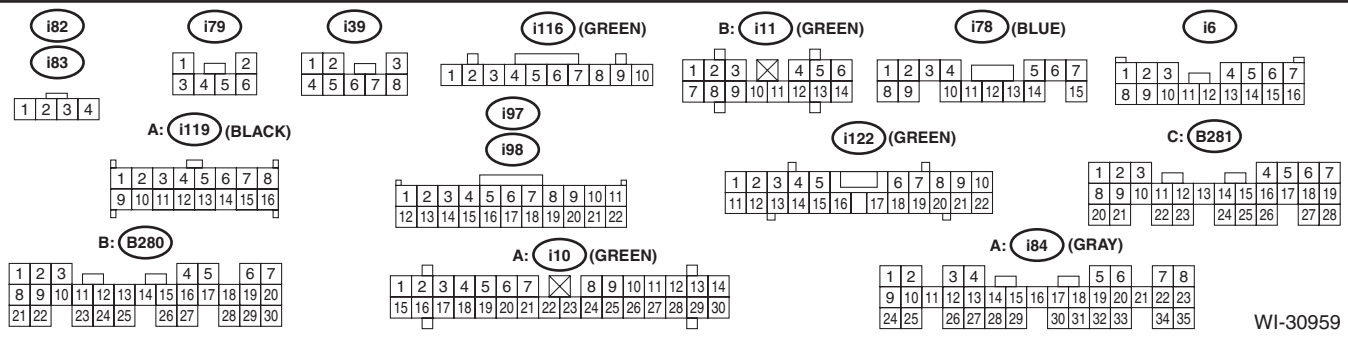


# Clearance Light and Illumination Light System

WIRING SYSTEM



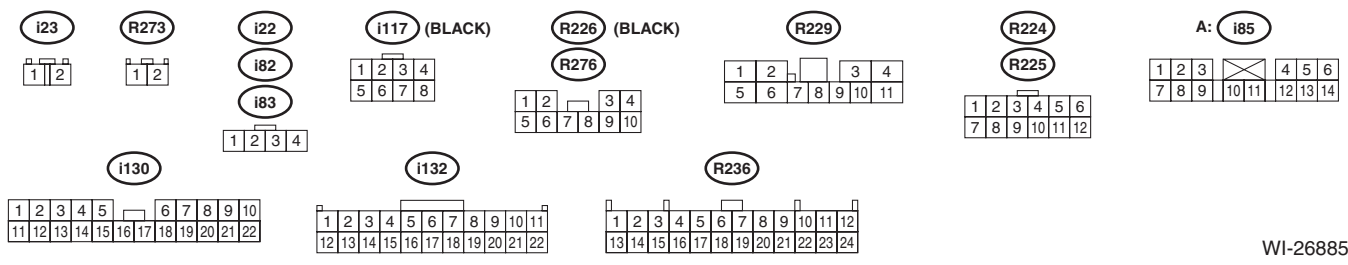
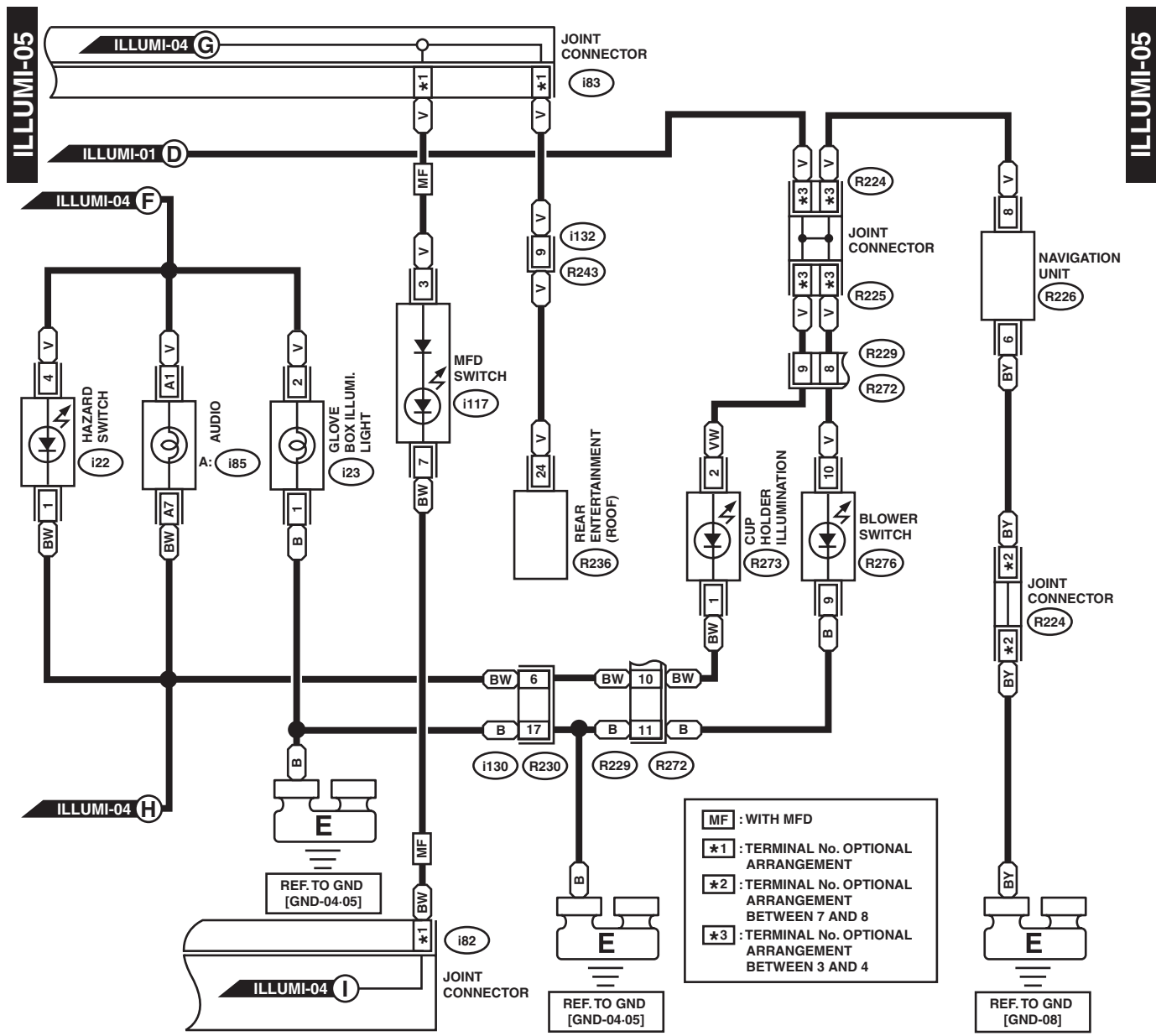
- MF** : WITH MFD
- NV** : WITH NAVIGATION
- \*1** : TERMINAL No. OPTIONAL ARRANGEMENT
- \*2** : TERMINAL No. OPTIONAL ARRANGEMENT AMONG 12, 13, 14 AND 15
- \*3** : TERMINAL No. OPTIONAL ARRANGEMENT AMONG 19, 20, 21 AND 22



WI-30959

# Clearance Light and Illumination Light System

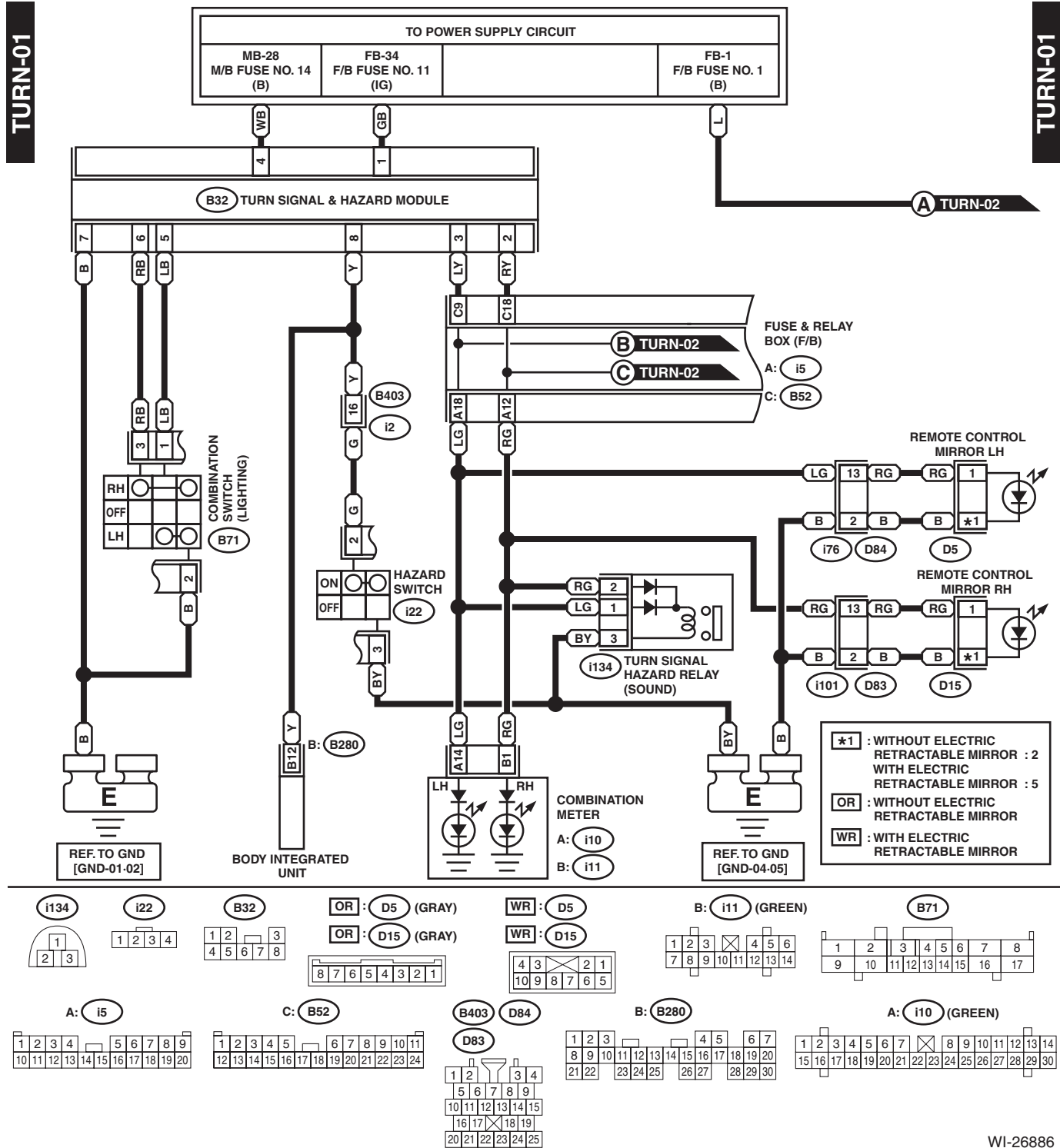
## WIRING SYSTEM



WI-26885

## 30. Turn Signal Light and Hazard Light System

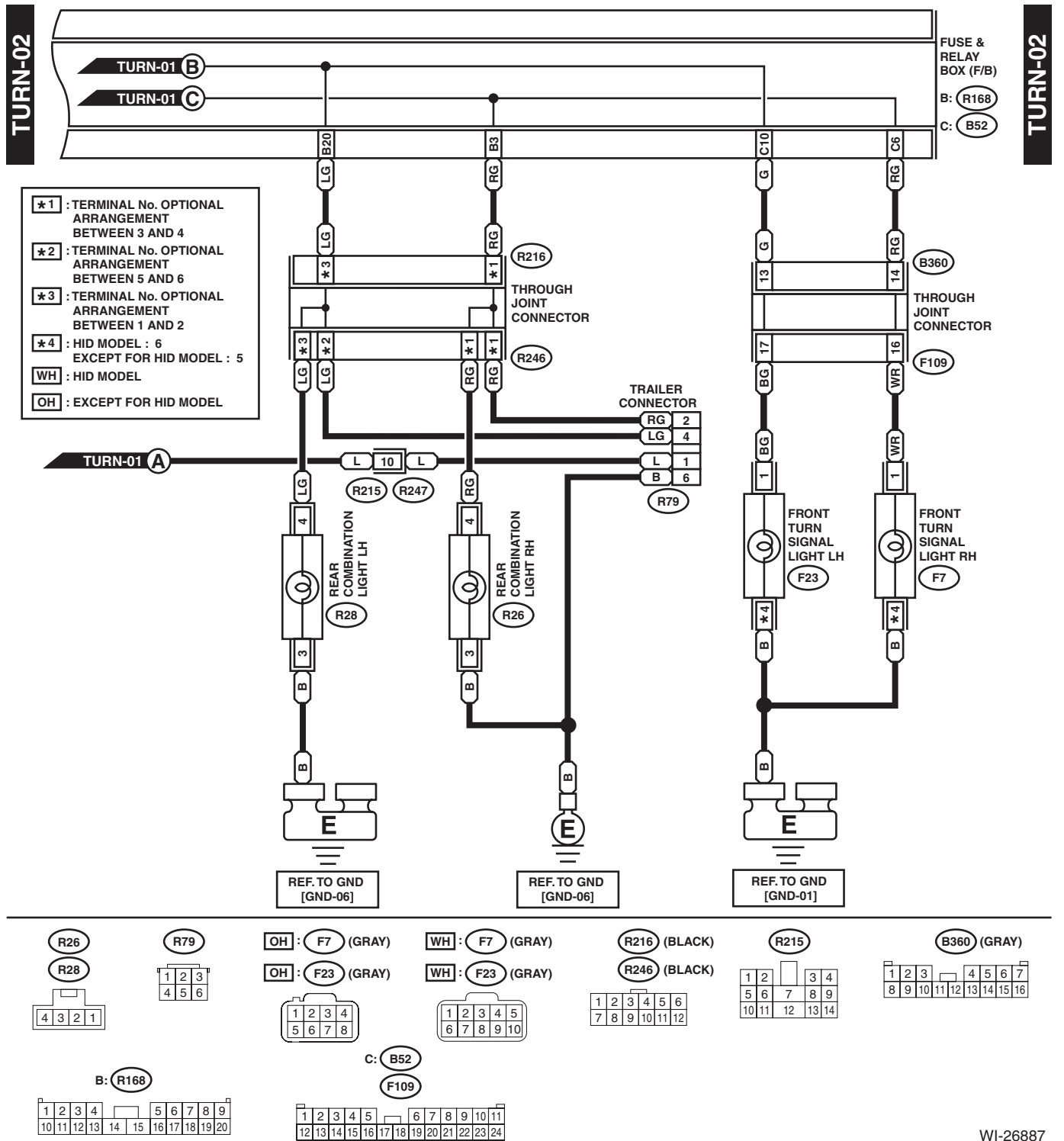
### A: WIRING DIAGRAM



WI-26886

# Turn Signal Light and Hazard Light System

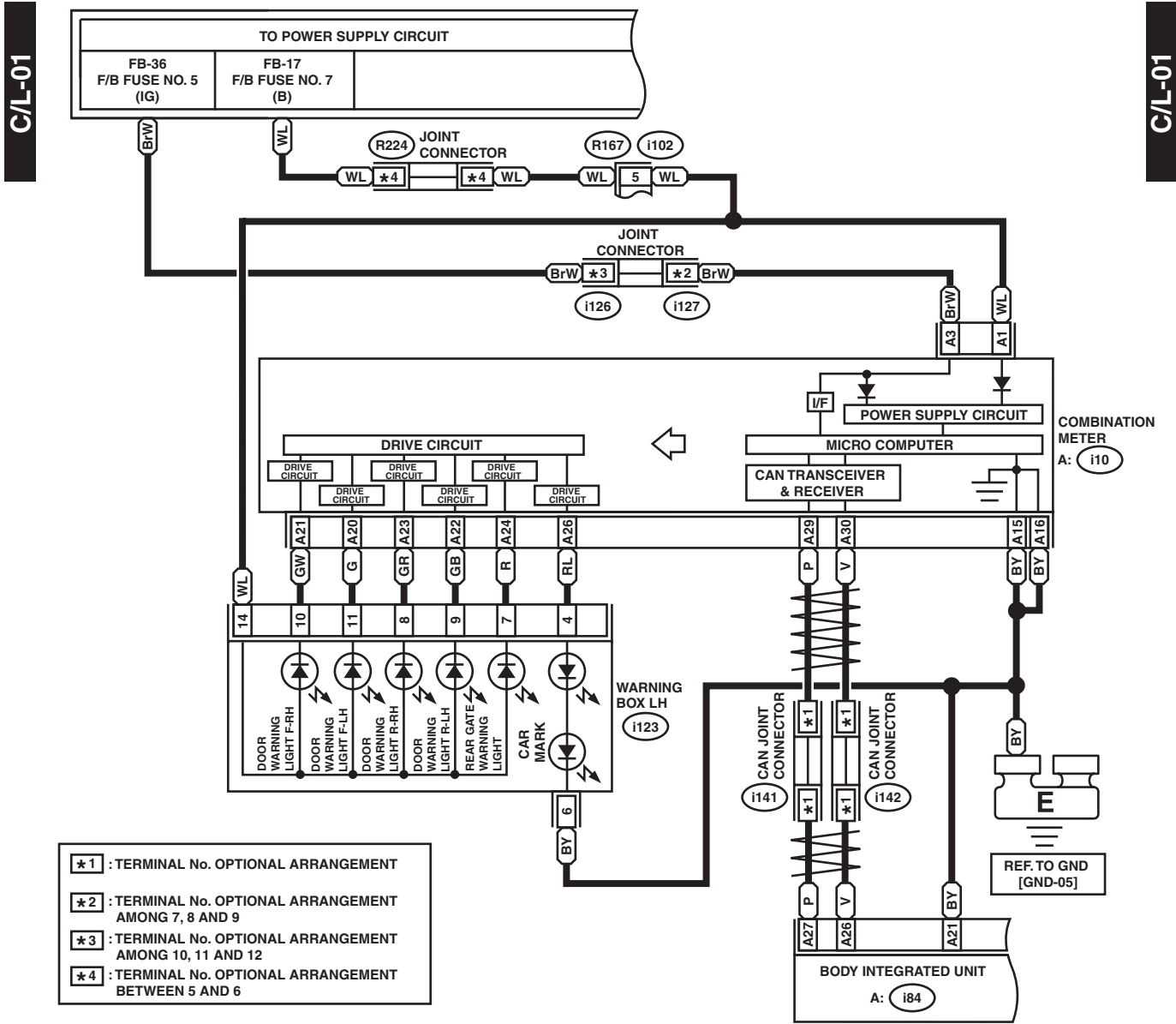
## WIRING SYSTEM



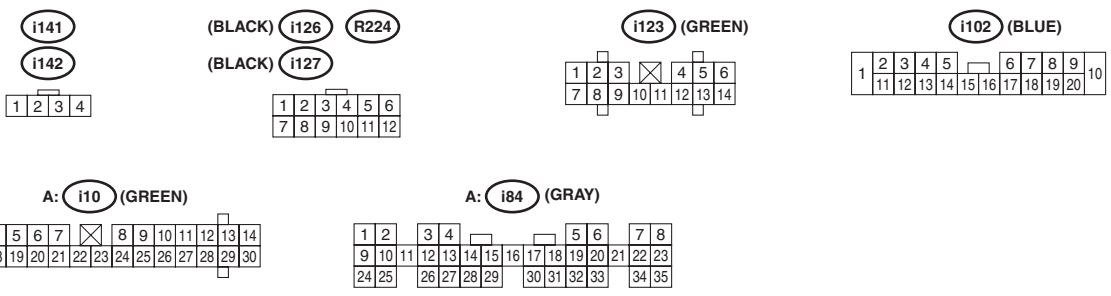
WI-26887

## 31. Interior Light System

### A: WIRING DIAGRAM



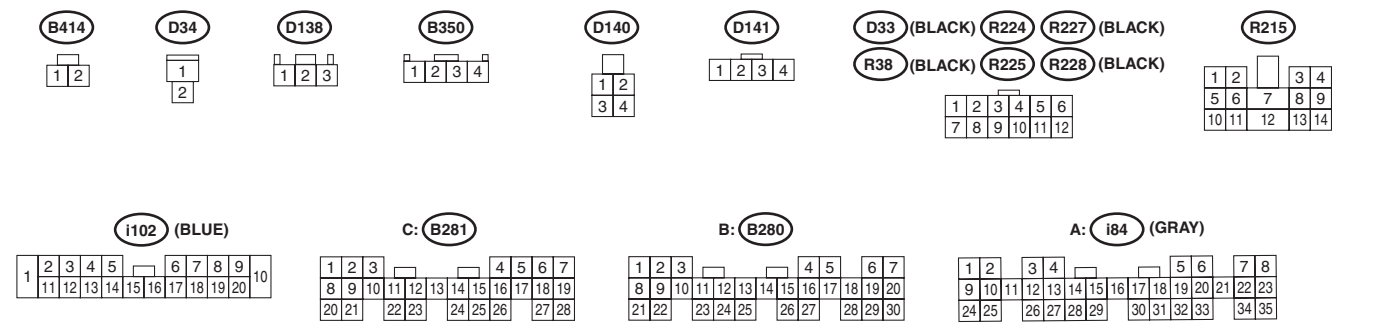
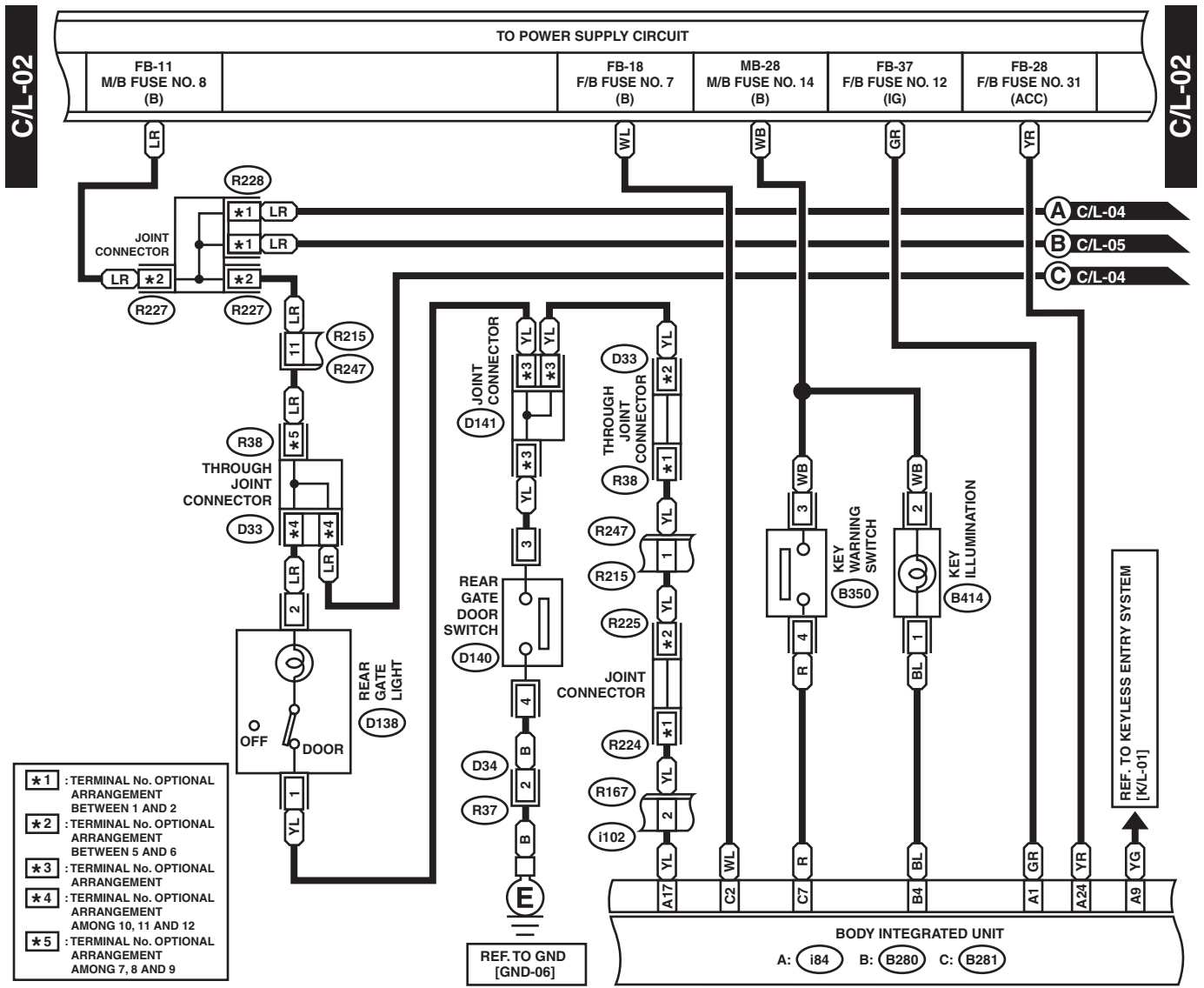
- ★1 : TERMINAL No. OPTIONAL ARRANGEMENT
- ★2 : TERMINAL No. OPTIONAL ARRANGEMENT AMONG 7, 8 AND 9
- ★3 : TERMINAL No. OPTIONAL ARRANGEMENT AMONG 10, 11 AND 12
- ★4 : TERMINAL No. OPTIONAL ARRANGEMENT BETWEEN 5 AND 6



WI-26888

# Interior Light System

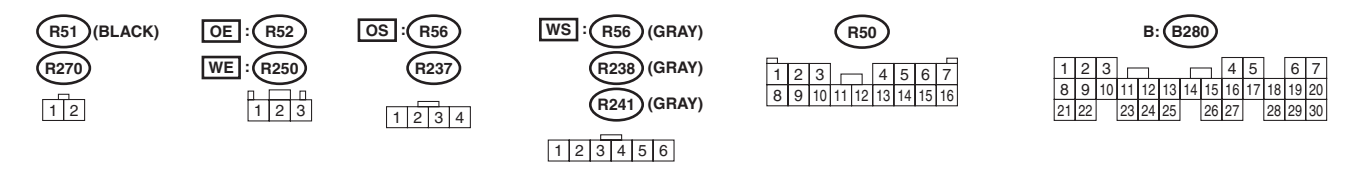
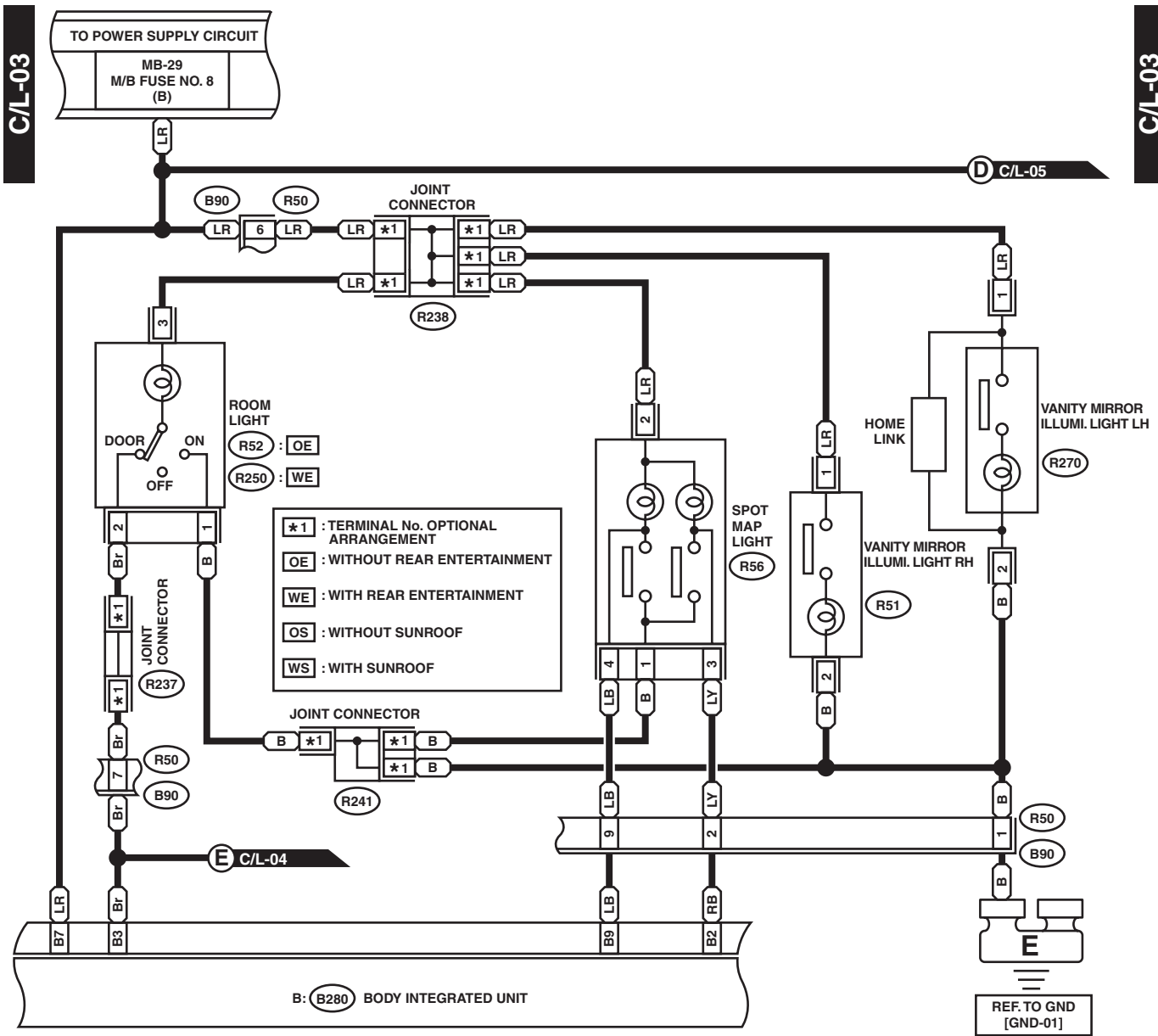
## WIRING SYSTEM



WI-26889

# Interior Light System

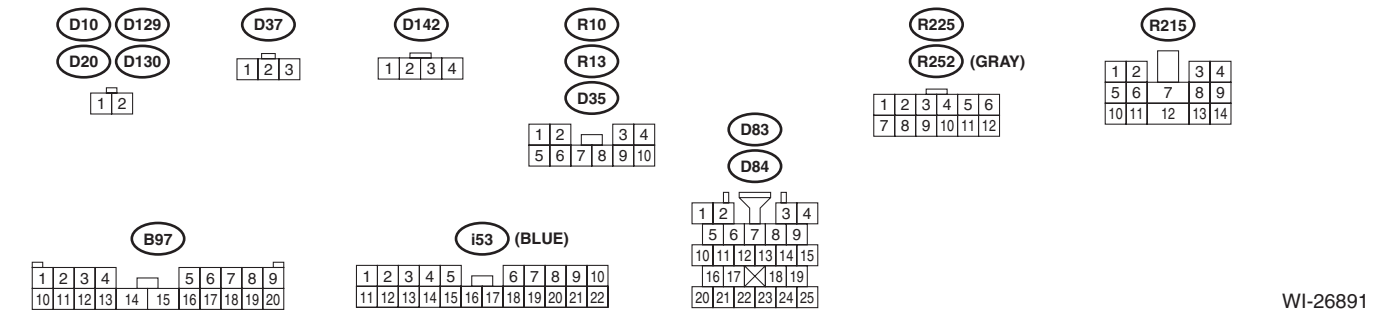
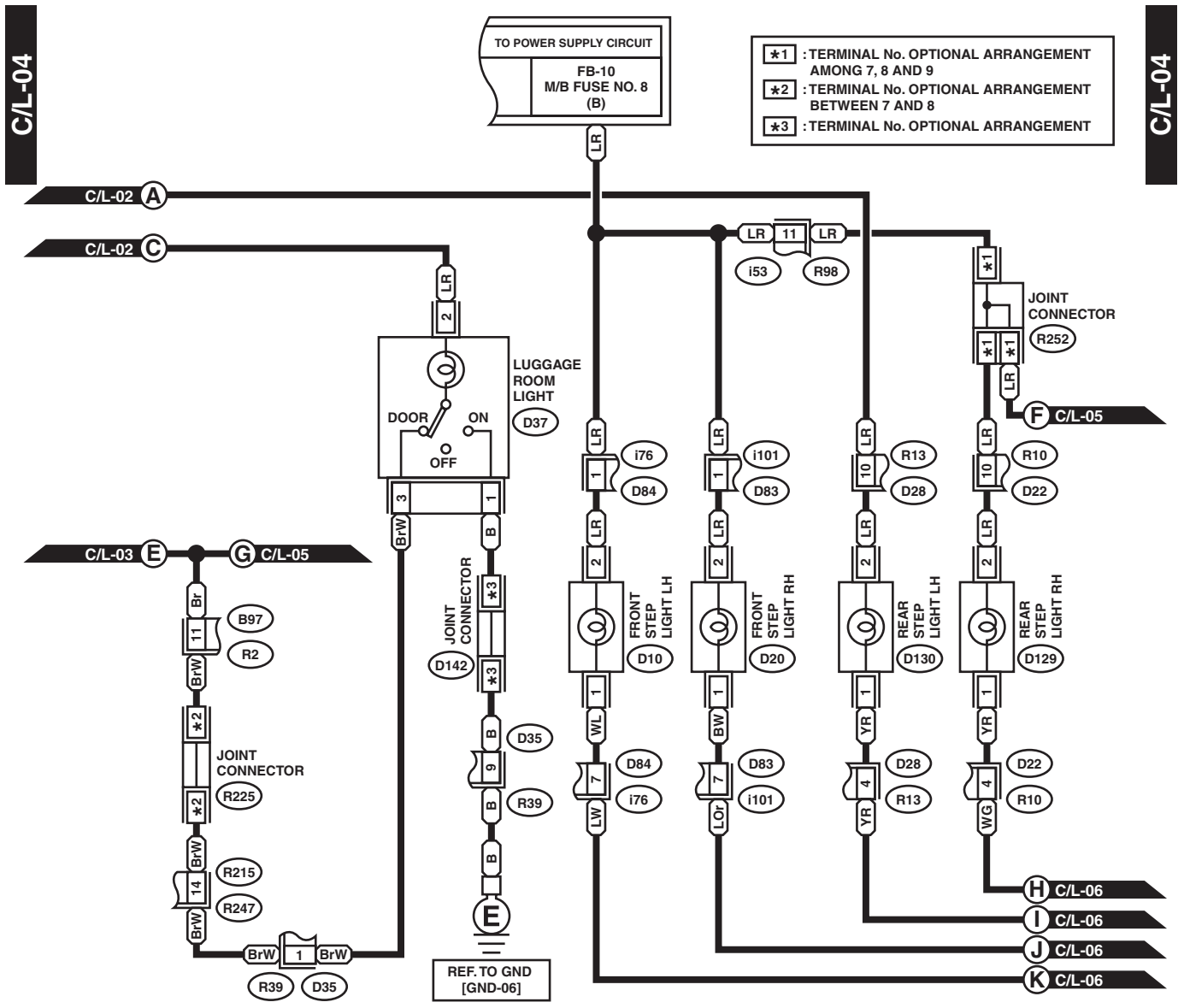
WIRING SYSTEM



WI-31736

# Interior Light System

WIRING SYSTEM

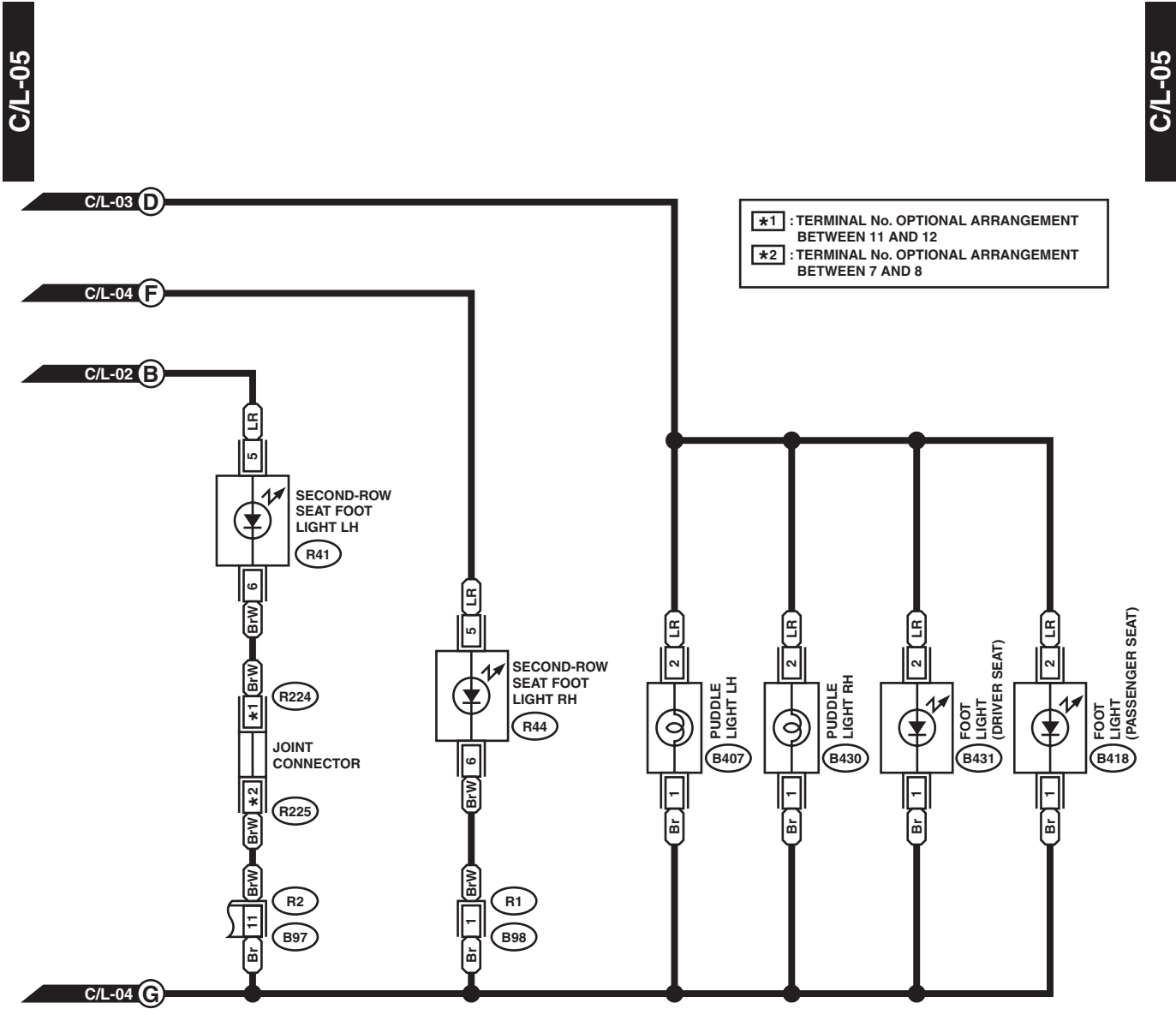


WI-26891



# Interior Light System

WIRING SYSTEM

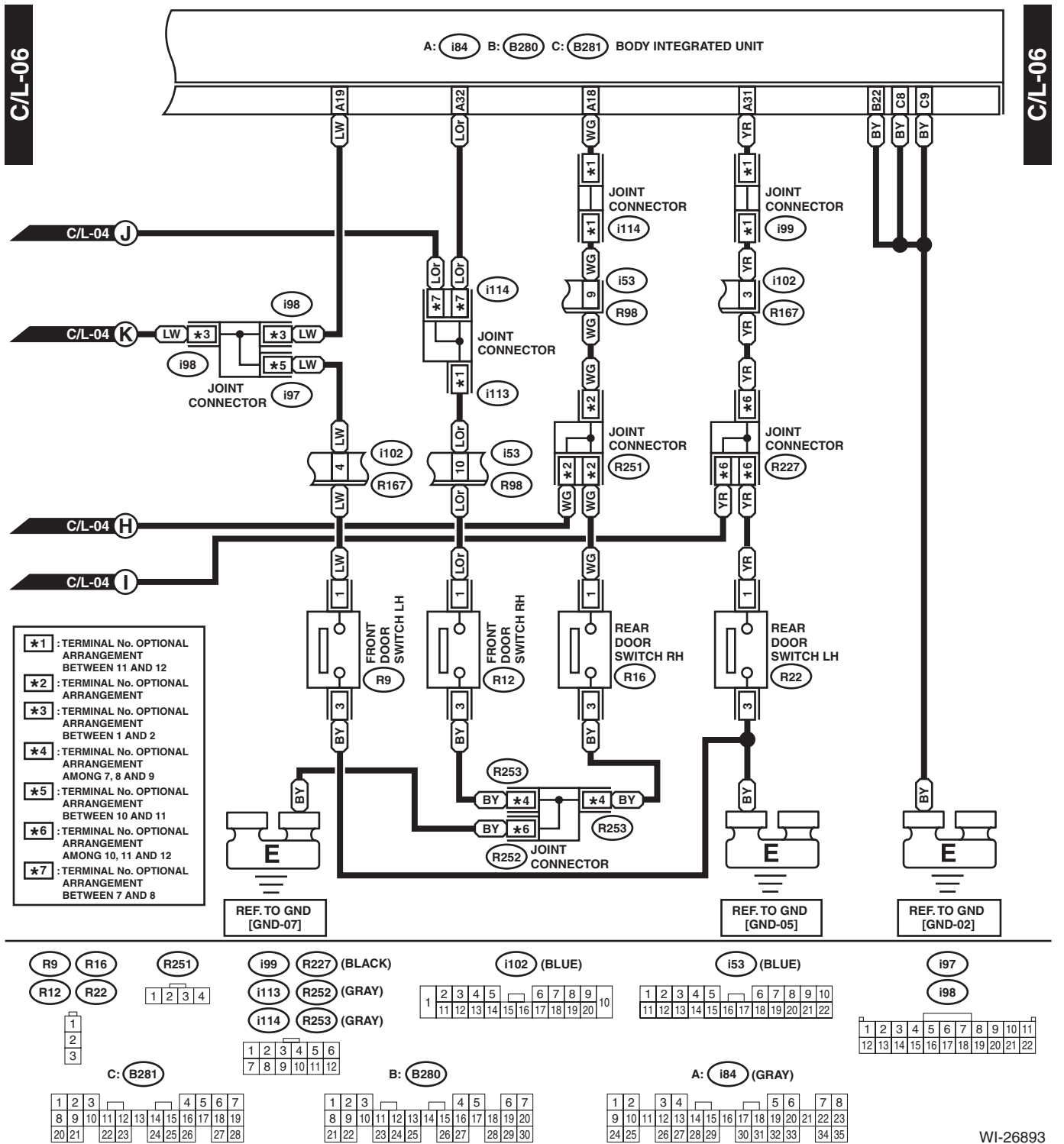


<b>(B407)</b> (BLACK)	<b>(B418)</b>	<b>(R41)</b>	<b>(R224)</b>	<b>(B97)</b>	<b>(B98)</b> (BLACK)																																												
<b>(B430)</b> (BLACK)	<b>(B431)</b>	<b>(R44)</b>	<b>(R225)</b>	<table border="1"> <tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td></tr> <tr><td>10</td><td>11</td><td>12</td><td>13</td><td>14</td><td>15</td><td>16</td><td>17</td><td>18</td><td>19</td><td>20</td></tr> </table>	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	<table border="1"> <tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td><td>11</td></tr> <tr><td>12</td><td>13</td><td>14</td><td>15</td><td>16</td><td>17</td><td>18</td><td>19</td><td>20</td><td>21</td><td>22</td><td>23</td><td>24</td></tr> </table>	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
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12	13	14	15	16	17	18	19	20	21	22	23	24																																					
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4	5	6																																															
1	2	3	4	5	6																																												
7	8	9	10	11	12																																												

WI-26892

# Interior Light System

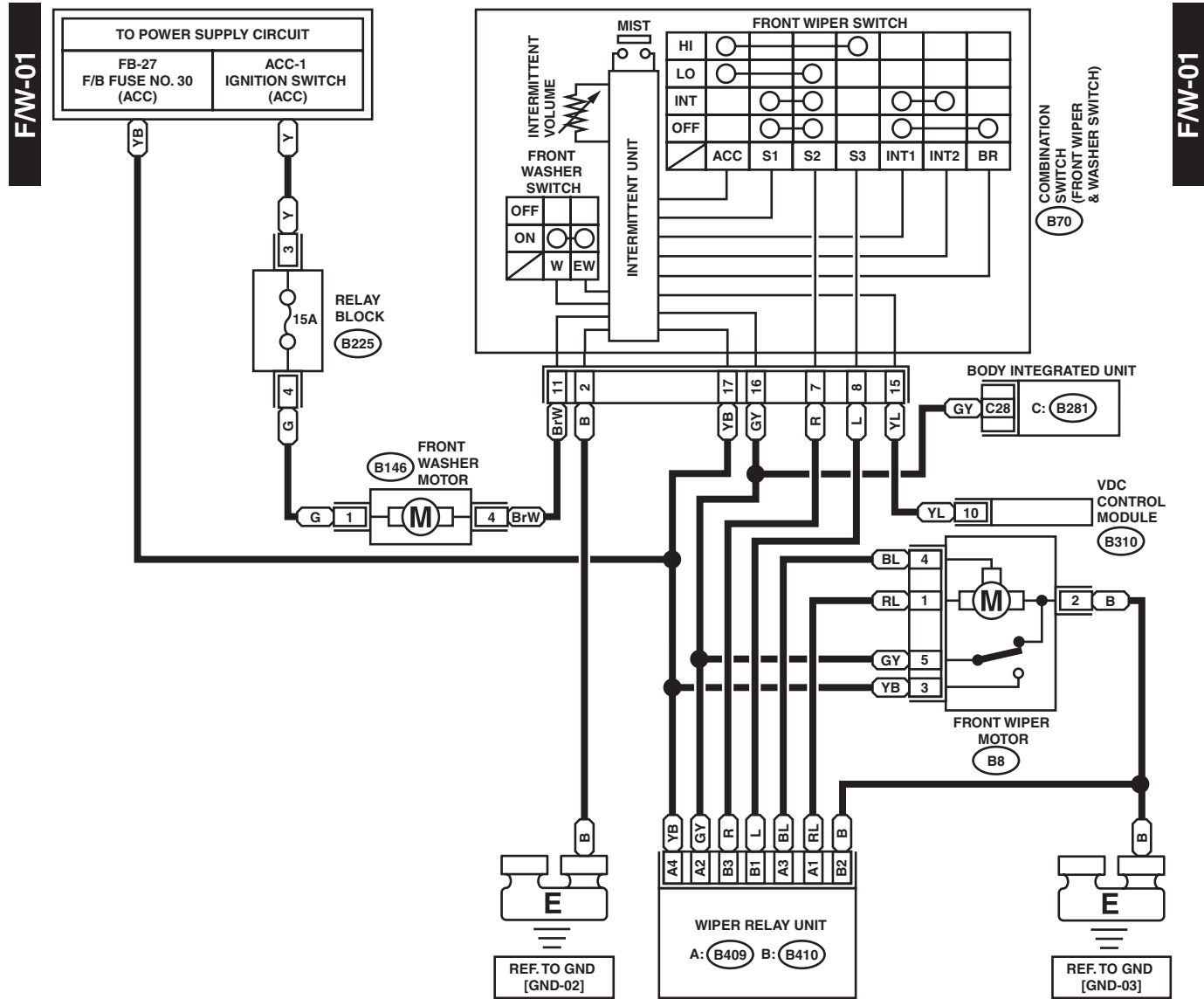
WIRING SYSTEM



WI-26893

## 32. Front Wiper and Washer System

### A: WIRING DIAGRAM



B: (B410) (DARK GRAY)



A: (B409) (BLACK)



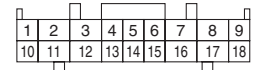
(B8) (GRAY)



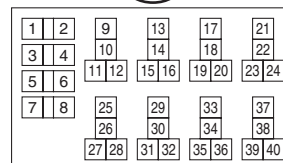
(B146) (GRAY)



(B70)

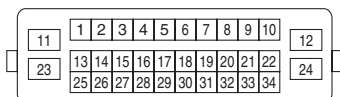


(B225) (BLACK)



RELAY BLOCK

(B310) (BLACK)



C: (B281)



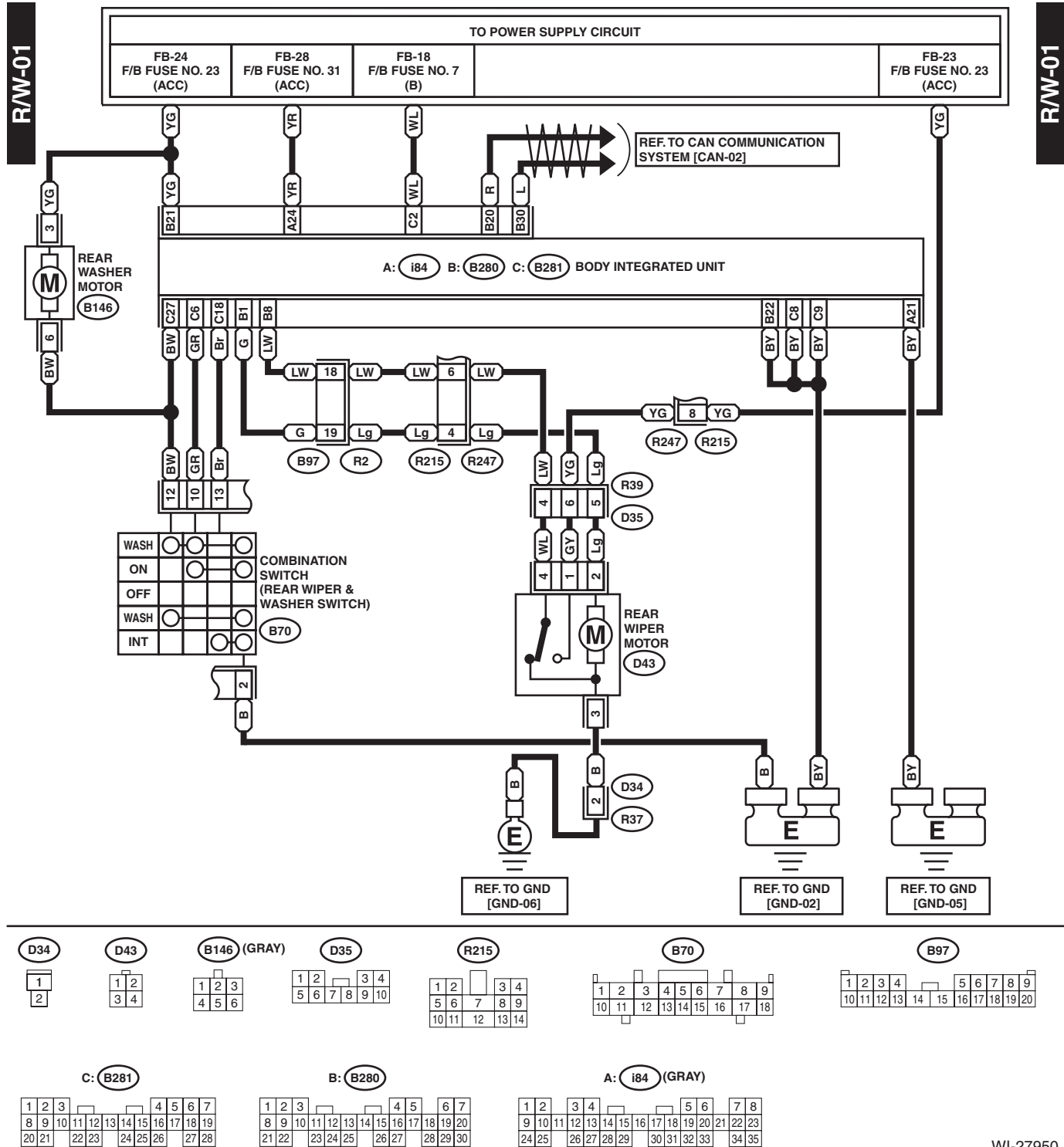
WI-26894

# Rear Wiper and Washer System

WIRING SYSTEM

## 33.Rear Wiper and Washer System

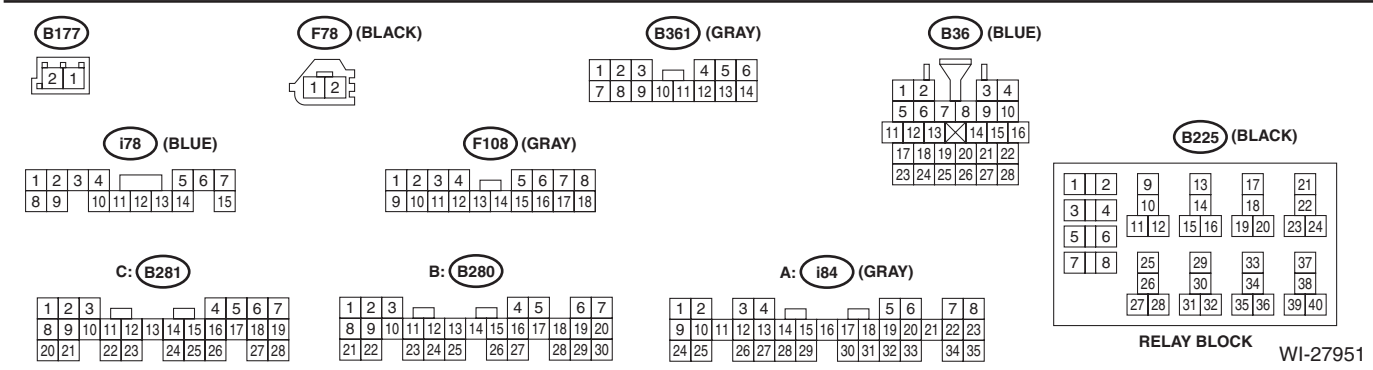
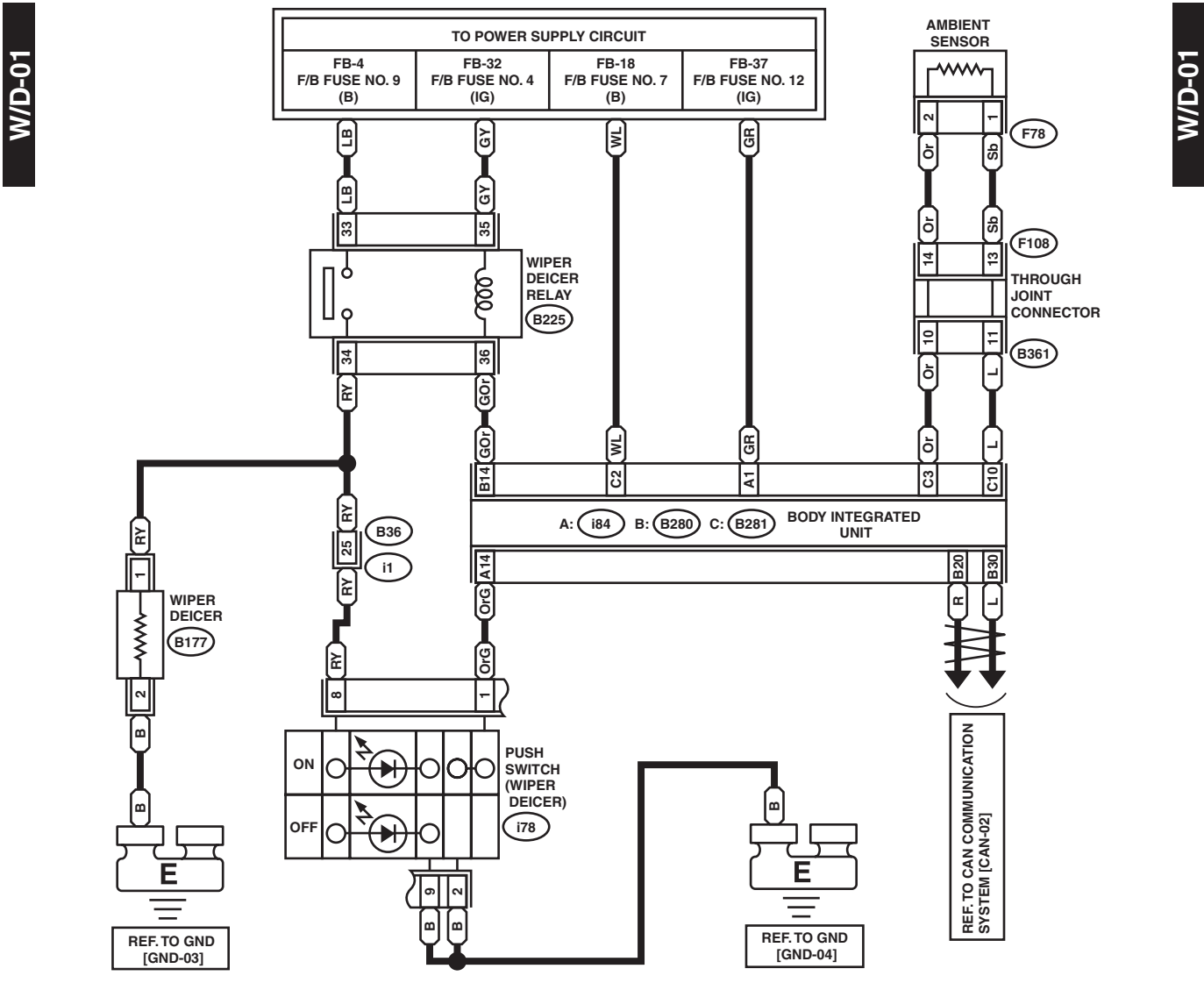
### A: WIRING DIAGRAM



WI-27950

## 34. Wiper Deicer System

### A: WIRING DIAGRAM



# Washer Level Warning Light System

WIRING SYSTEM

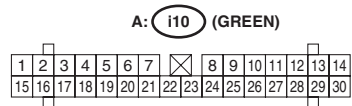
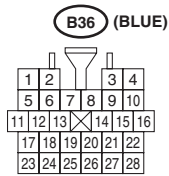
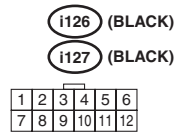
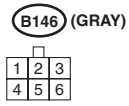
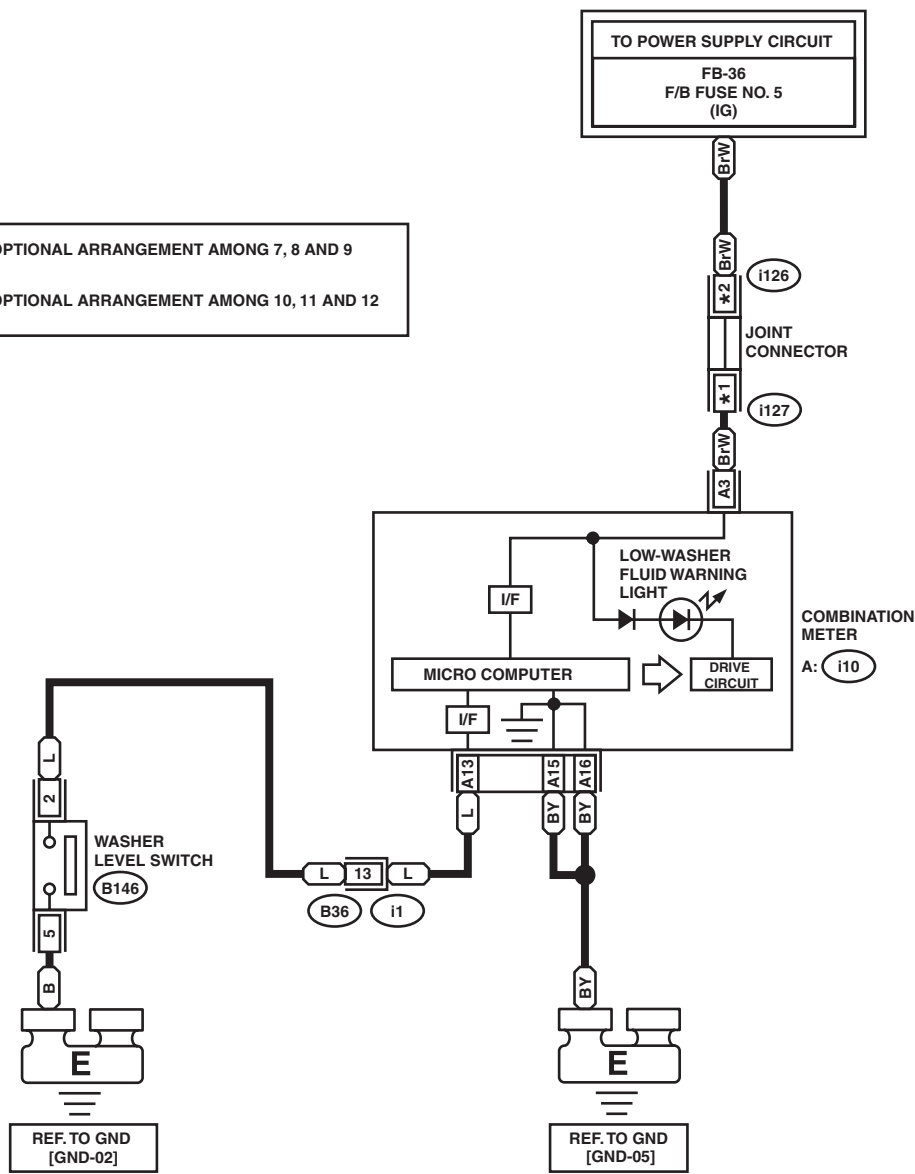
## 35. Washer Level Warning Light System

### A: WIRING DIAGRAM

W/L-01

W/L-01

\*1 : TERMINAL No. OPTIONAL ARRANGEMENT AMONG 7, 8 AND 9  
 \*2 : TERMINAL No. OPTIONAL ARRANGEMENT AMONG 10, 11 AND 12

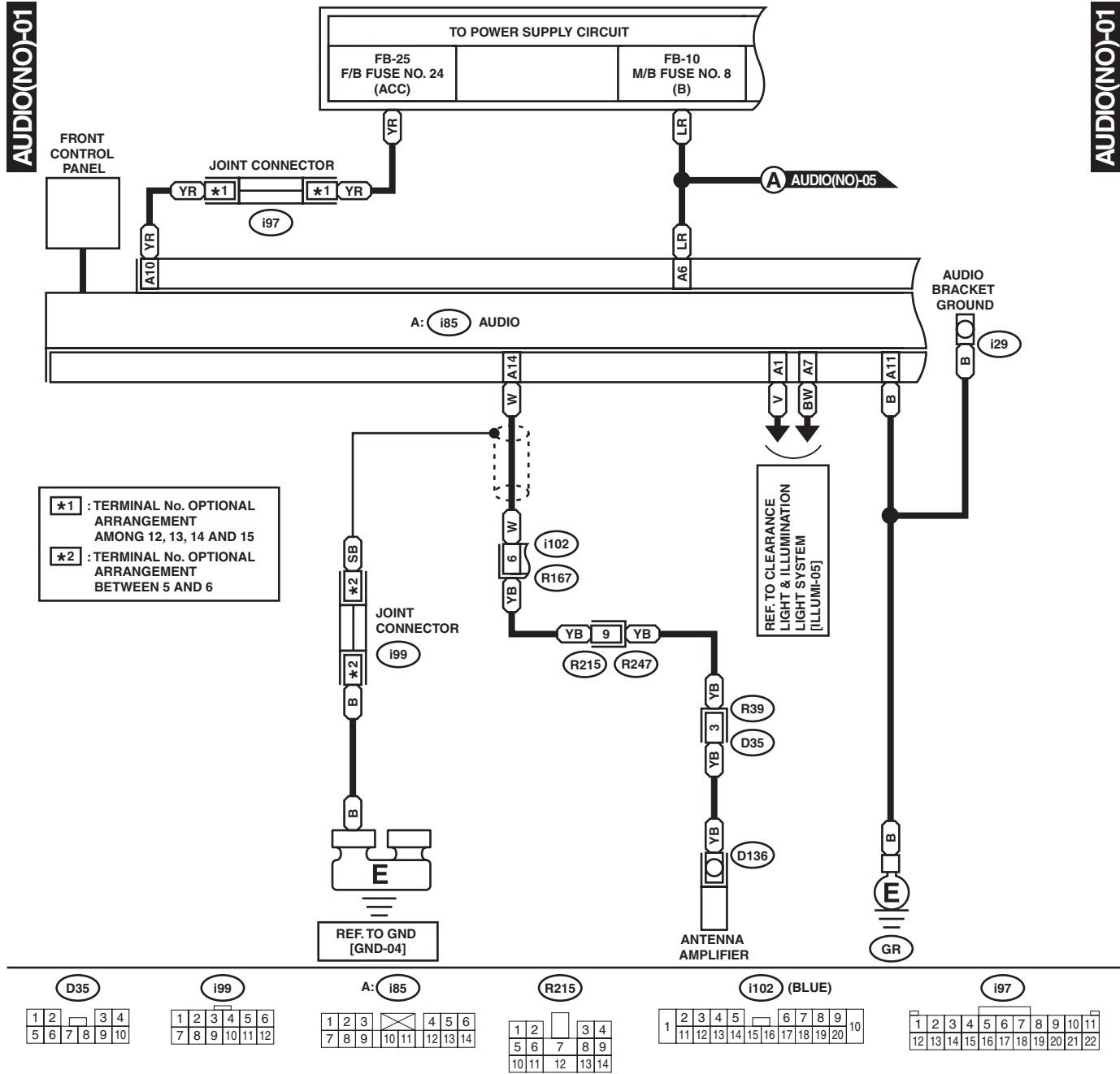


WI-26895

## 36. Audio System

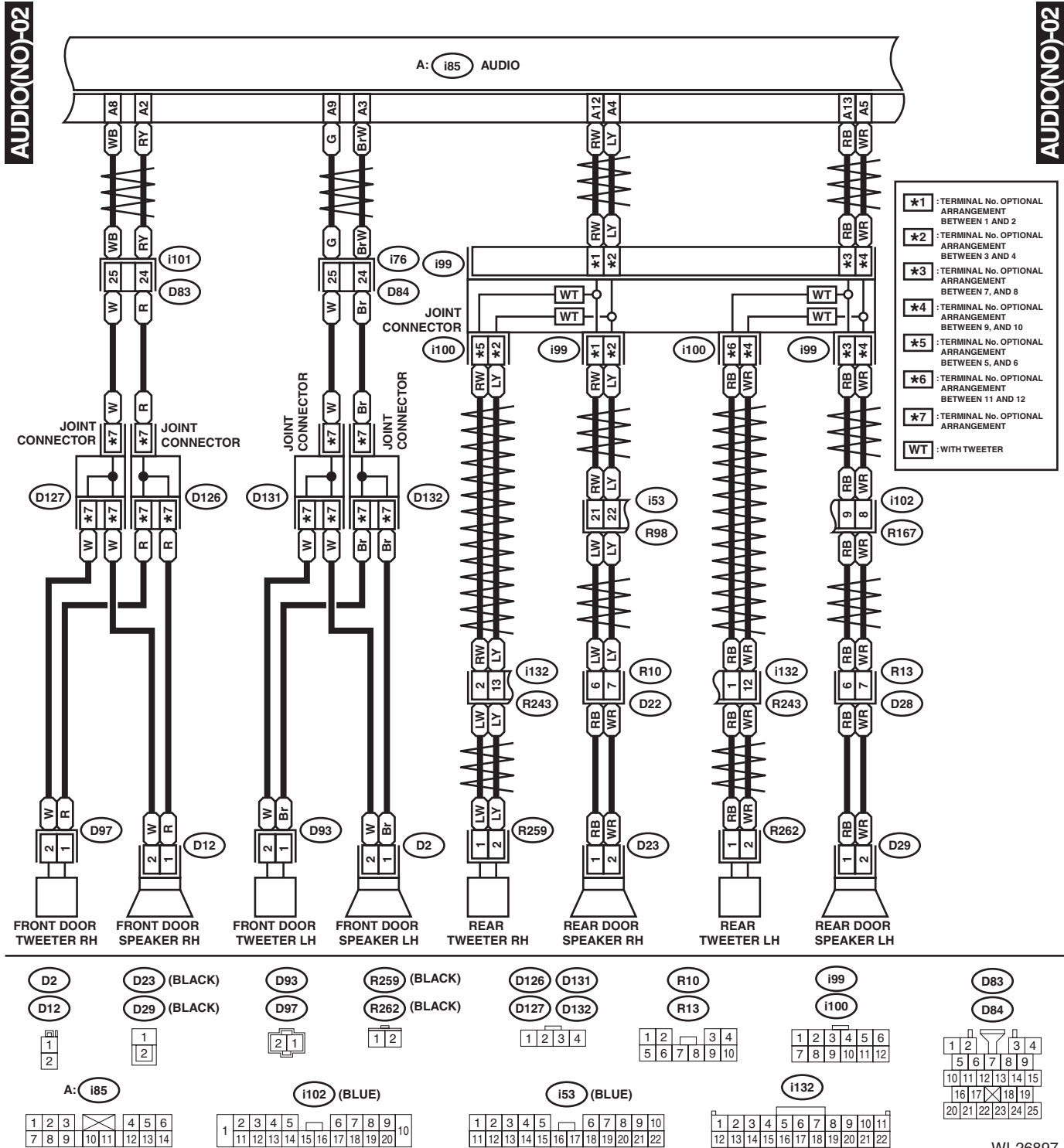
### A: WIRING DIAGRAM

#### 1. MODEL WITH NORMAL AUDIO



# Audio System

## WIRING SYSTEM





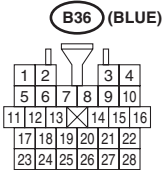
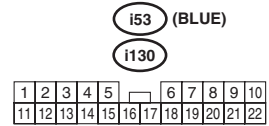
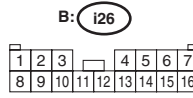
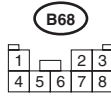
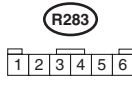
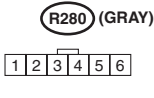
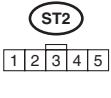
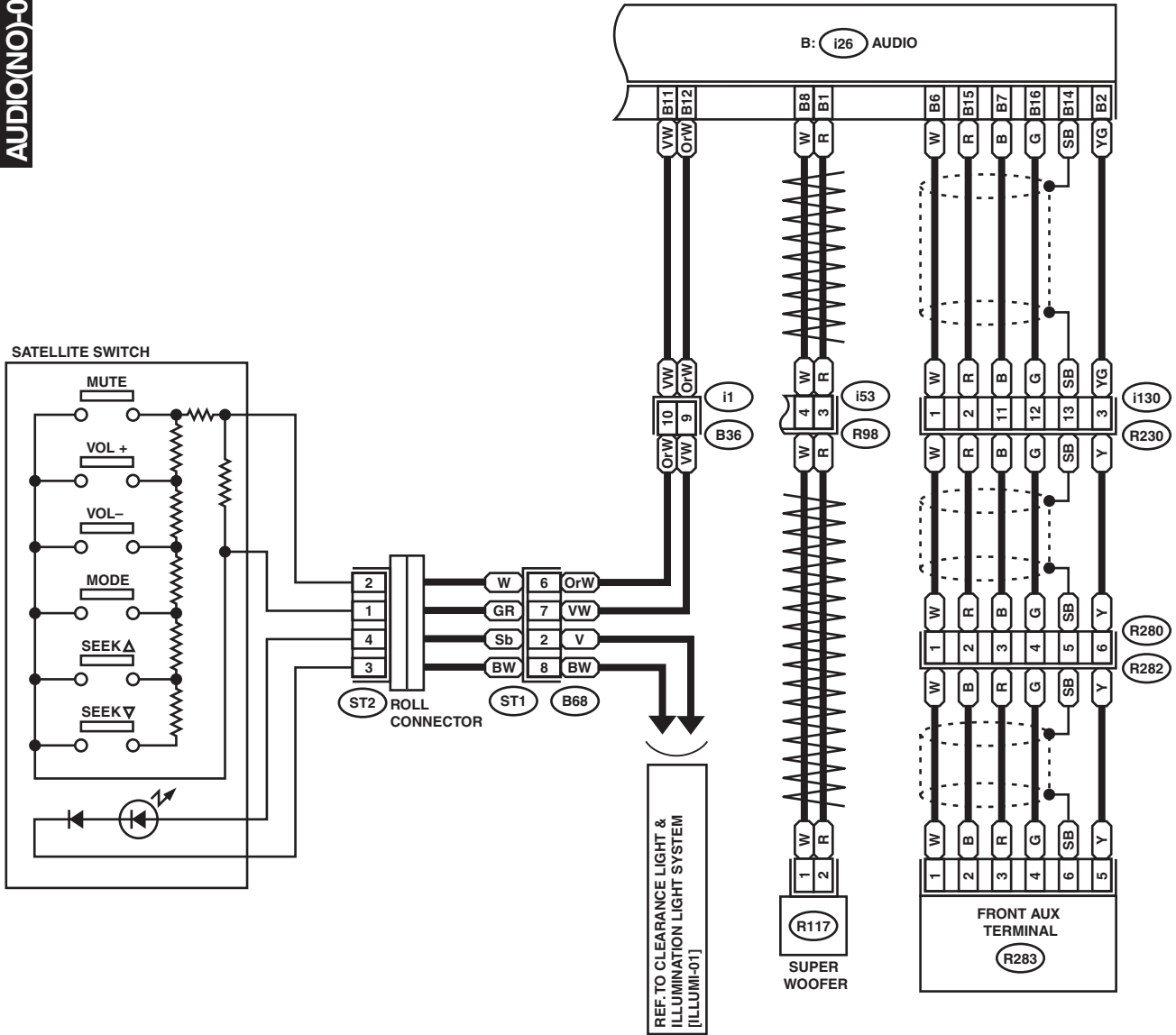
# Audio System

WIRING SYSTEM

- Without rear entertainment

AUDIO(NO)-03

AUDIO(NO)-03



WI-26898

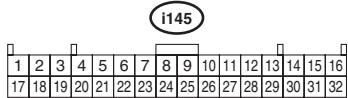
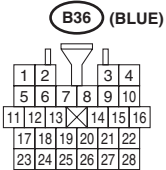
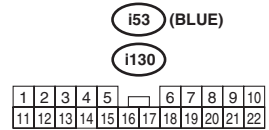
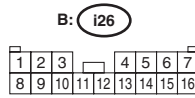
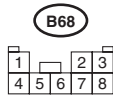
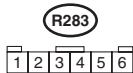
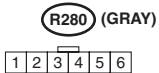
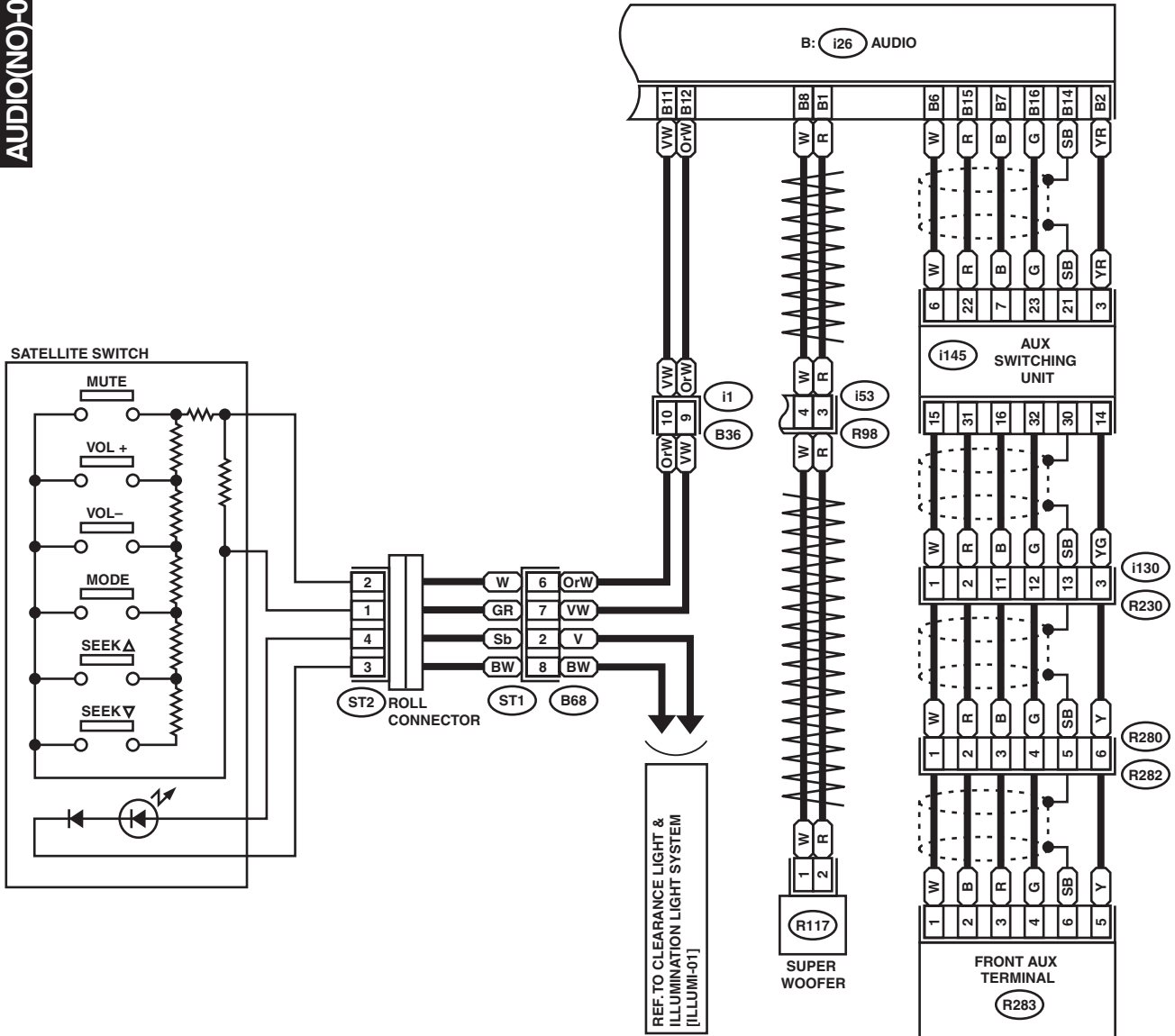
# Audio System

## WIRING SYSTEM

- With rear entertainment

AUDIO(NO)-04

AUDIO(NO)-04

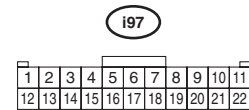
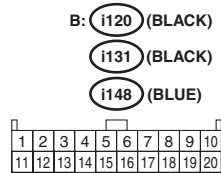
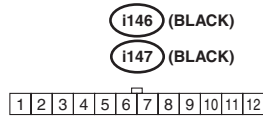
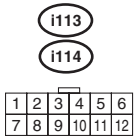
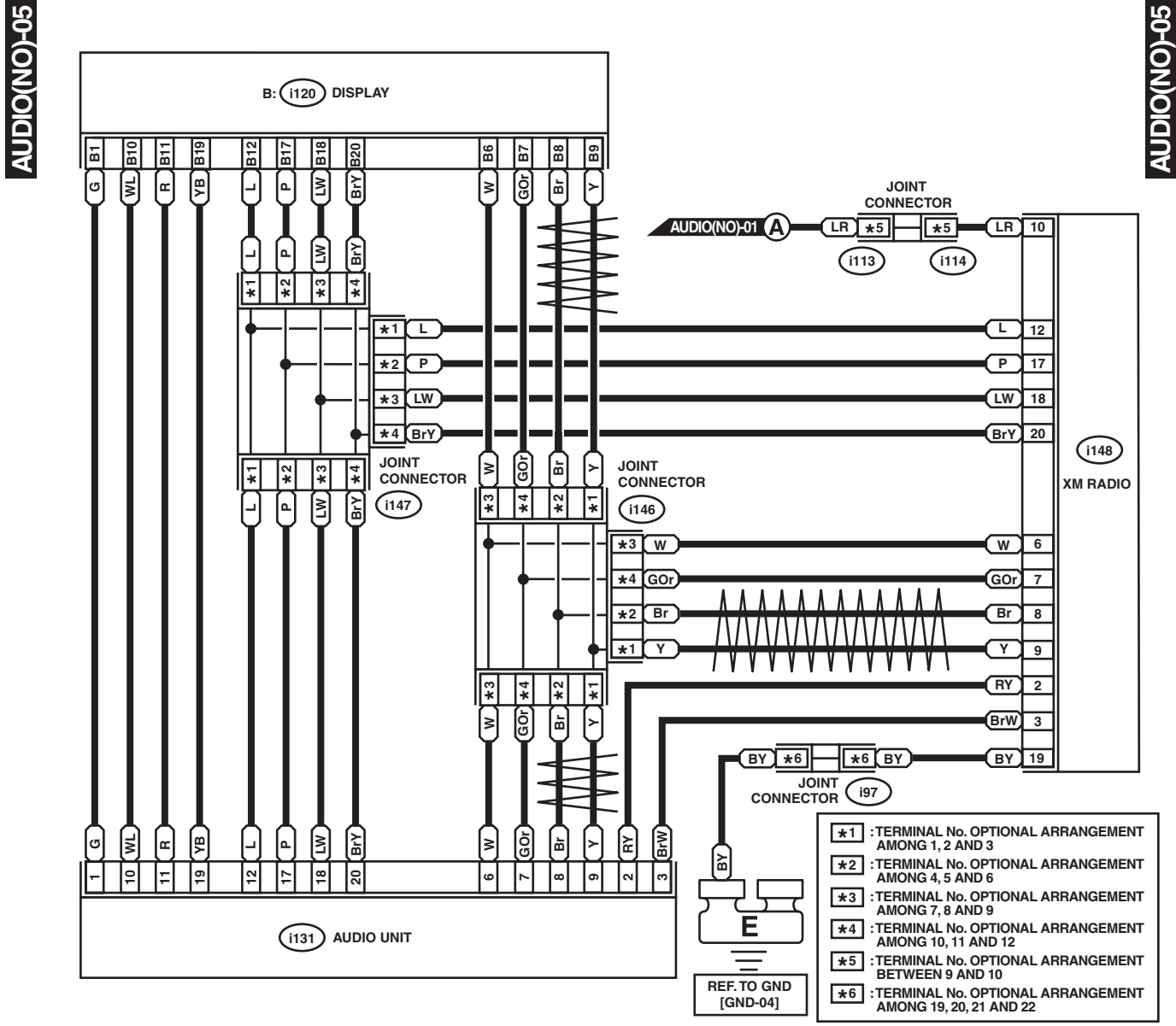


WI-26899

# Audio System

WIRING SYSTEM

- With XM radio

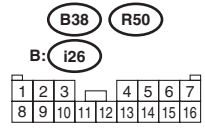
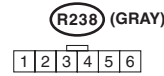
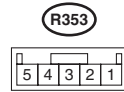
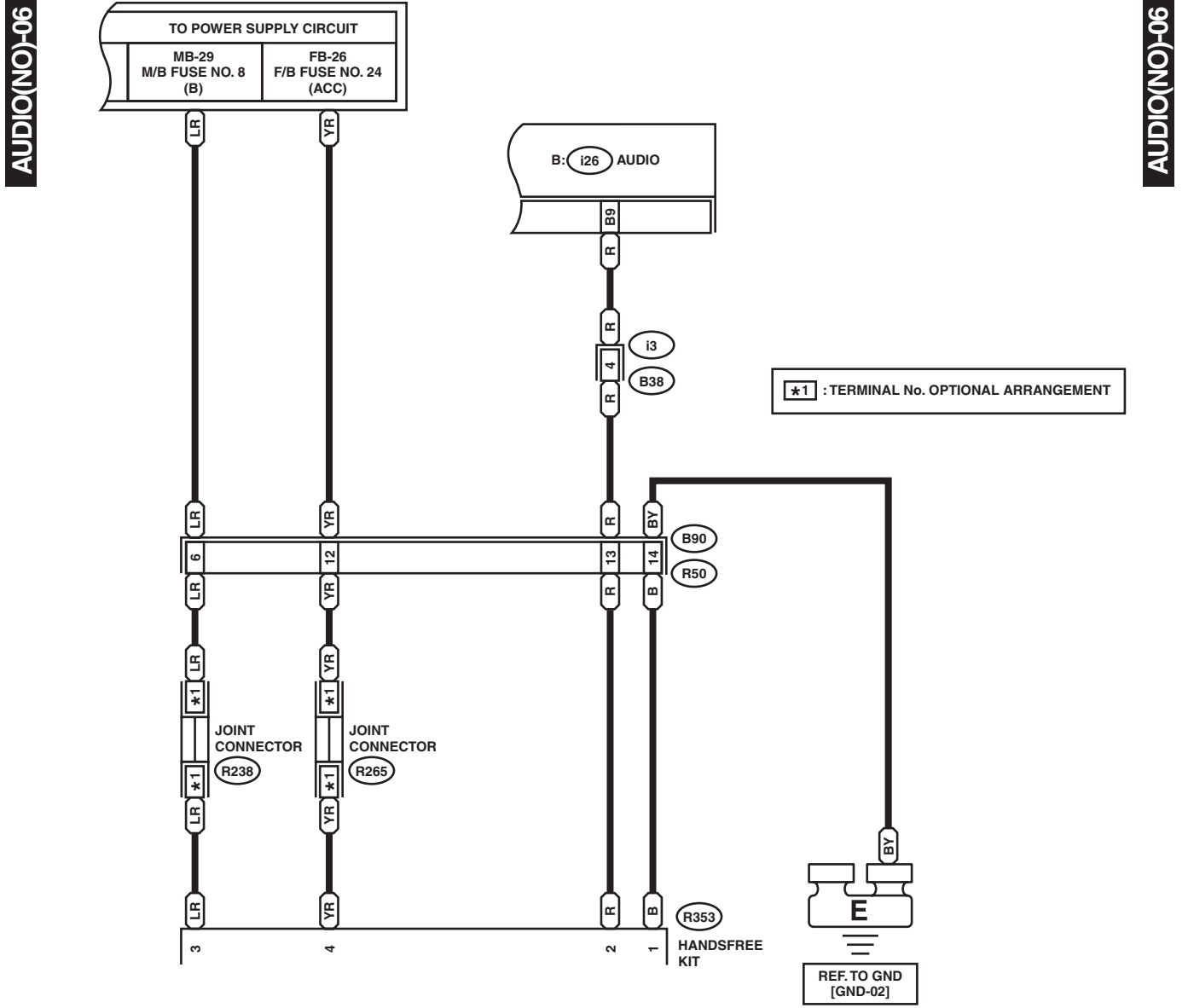


WI-30947

# Audio System

## WIRING SYSTEM

### • With handsfree microphone

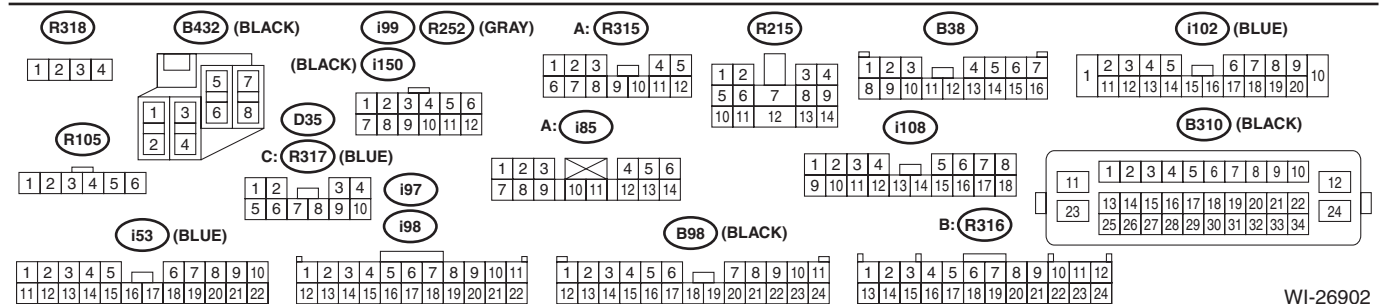
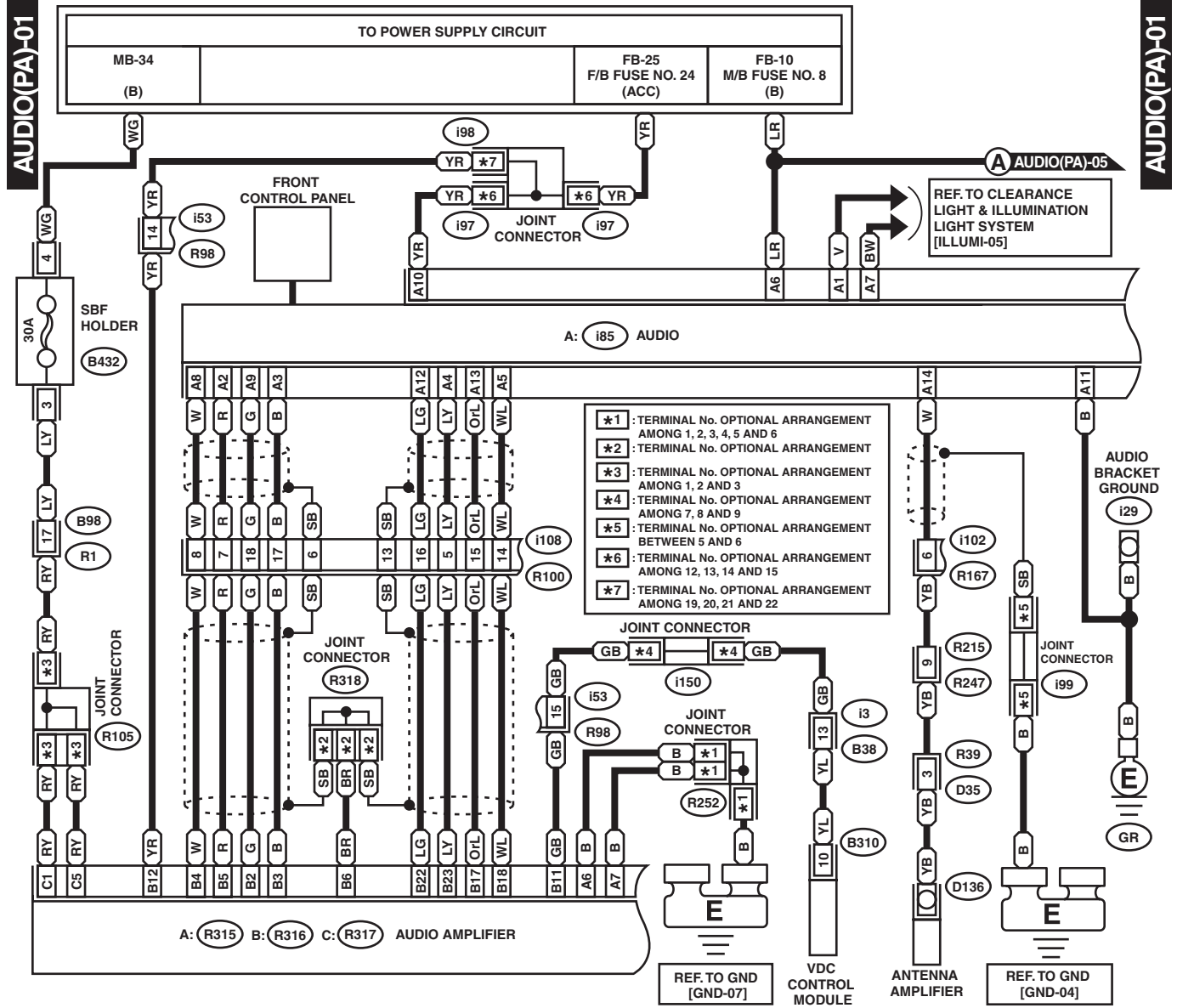


WI-30948

# Audio System

WIRING SYSTEM

## 2. MODEL WITH PREMIUM AUDIO



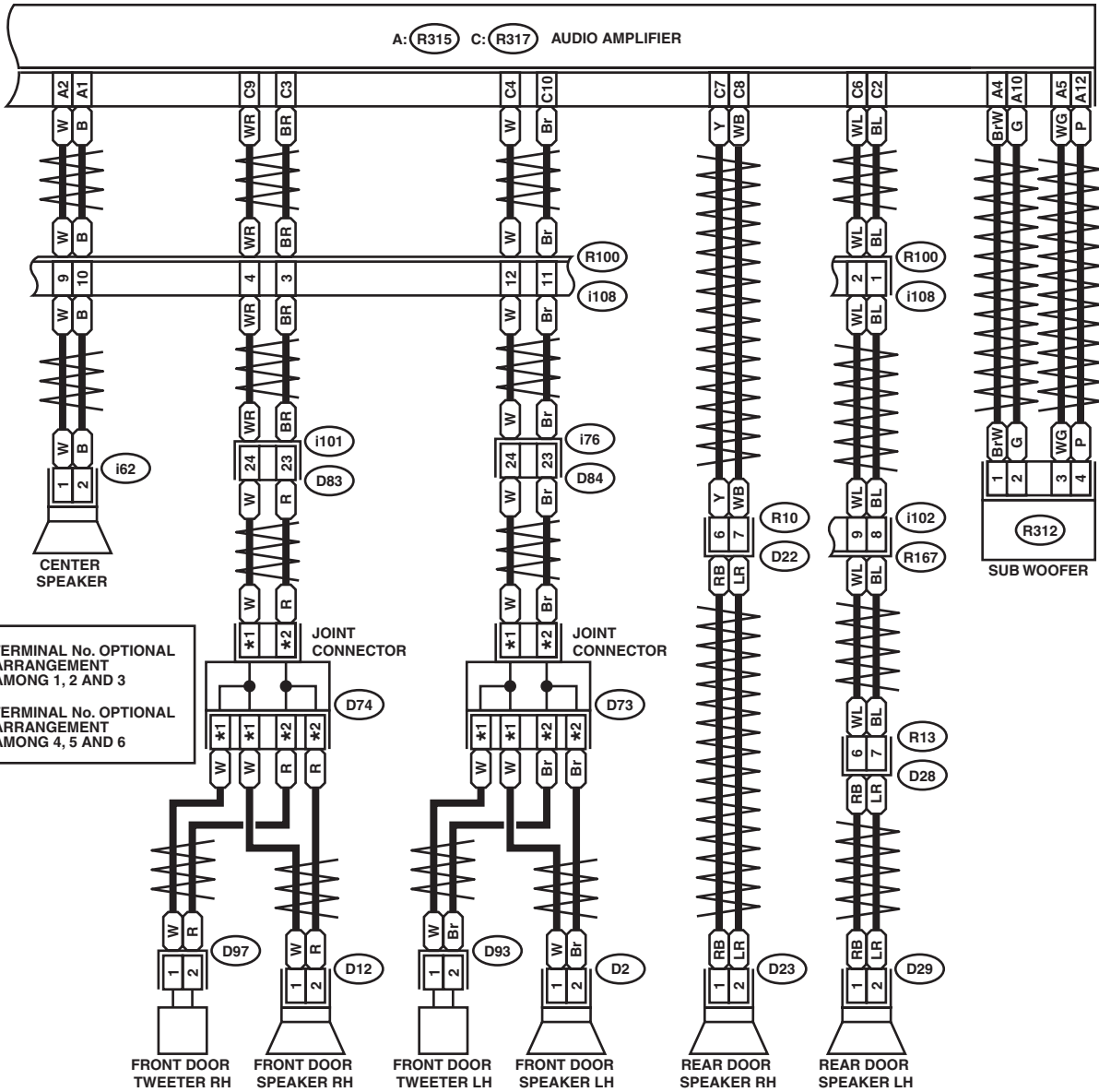
WI-26902

# Audio System

## WIRING SYSTEM

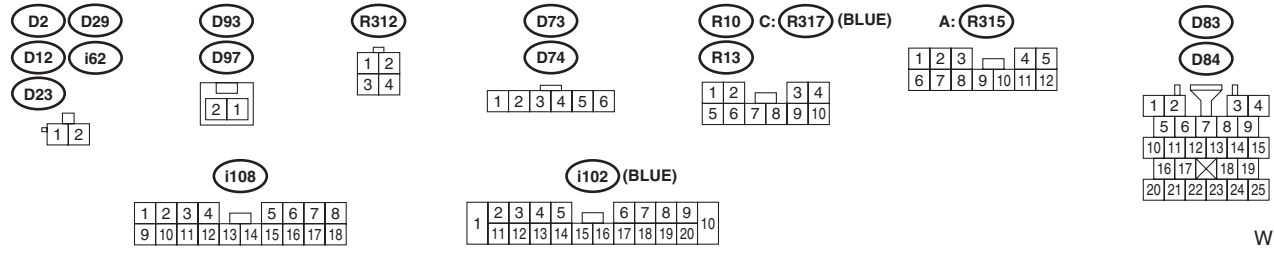
AUDIO(PA)-02

AUDIO(PA)-02



\*1 : TERMINAL No. OPTIONAL ARRANGEMENT AMONG 1, 2 AND 3

\*2 : TERMINAL No. OPTIONAL ARRANGEMENT AMONG 4, 5 AND 6



WI-31737

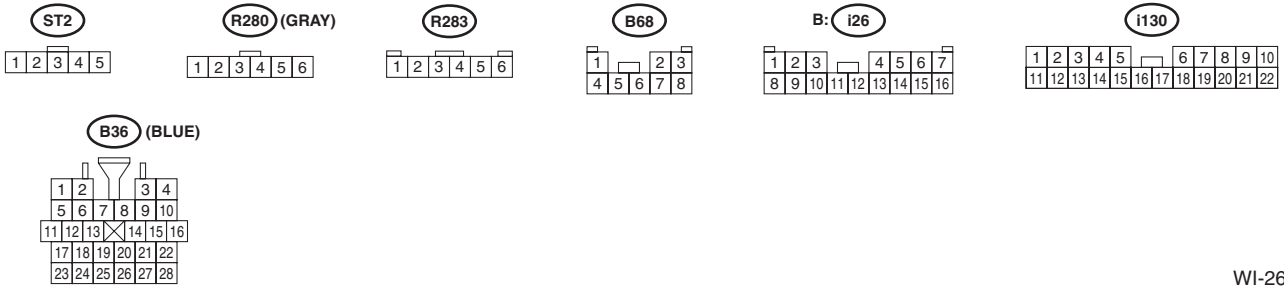
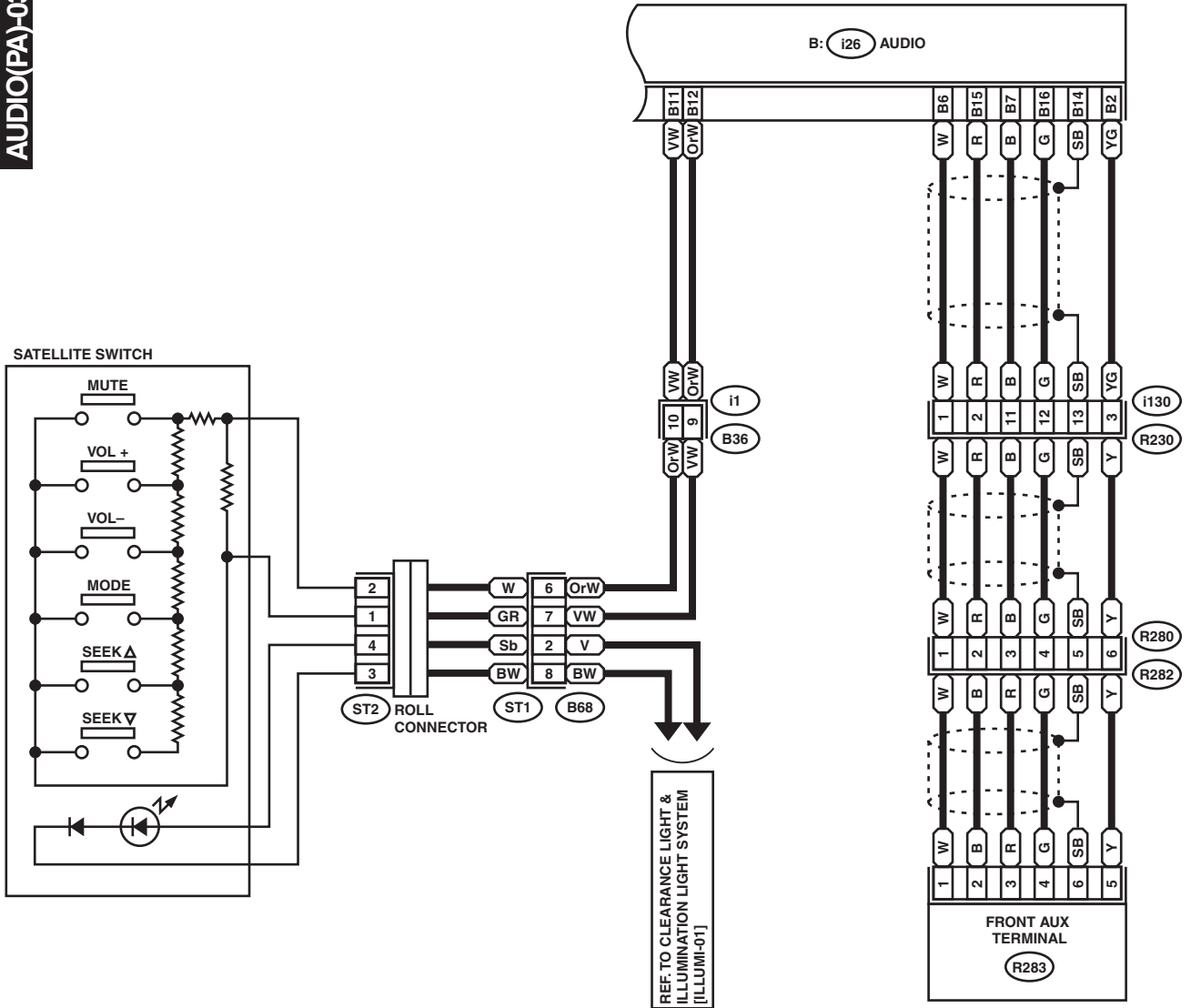
# Audio System

WIRING SYSTEM

- Without rear entertainment

AUDIO(PA)-03

AUDIO(PA)-03



WI-26904

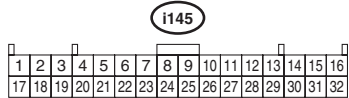
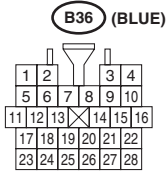
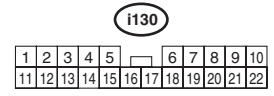
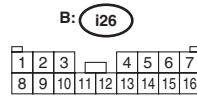
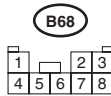
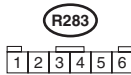
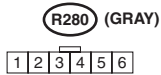
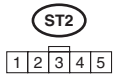
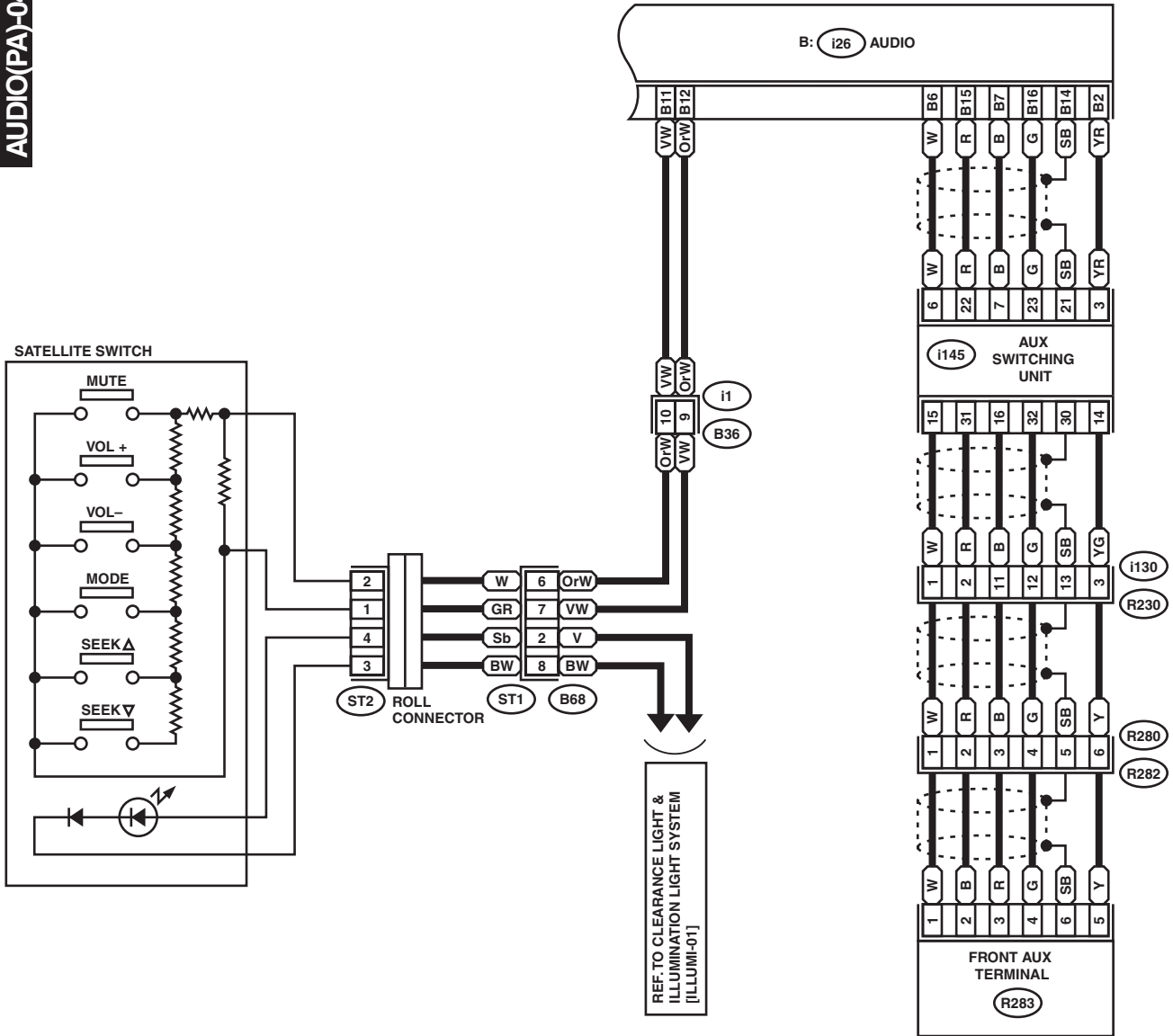
# Audio System

## WIRING SYSTEM

- With rear entertainment

AUDIO(PA)-04

AUDIO(PA)-04



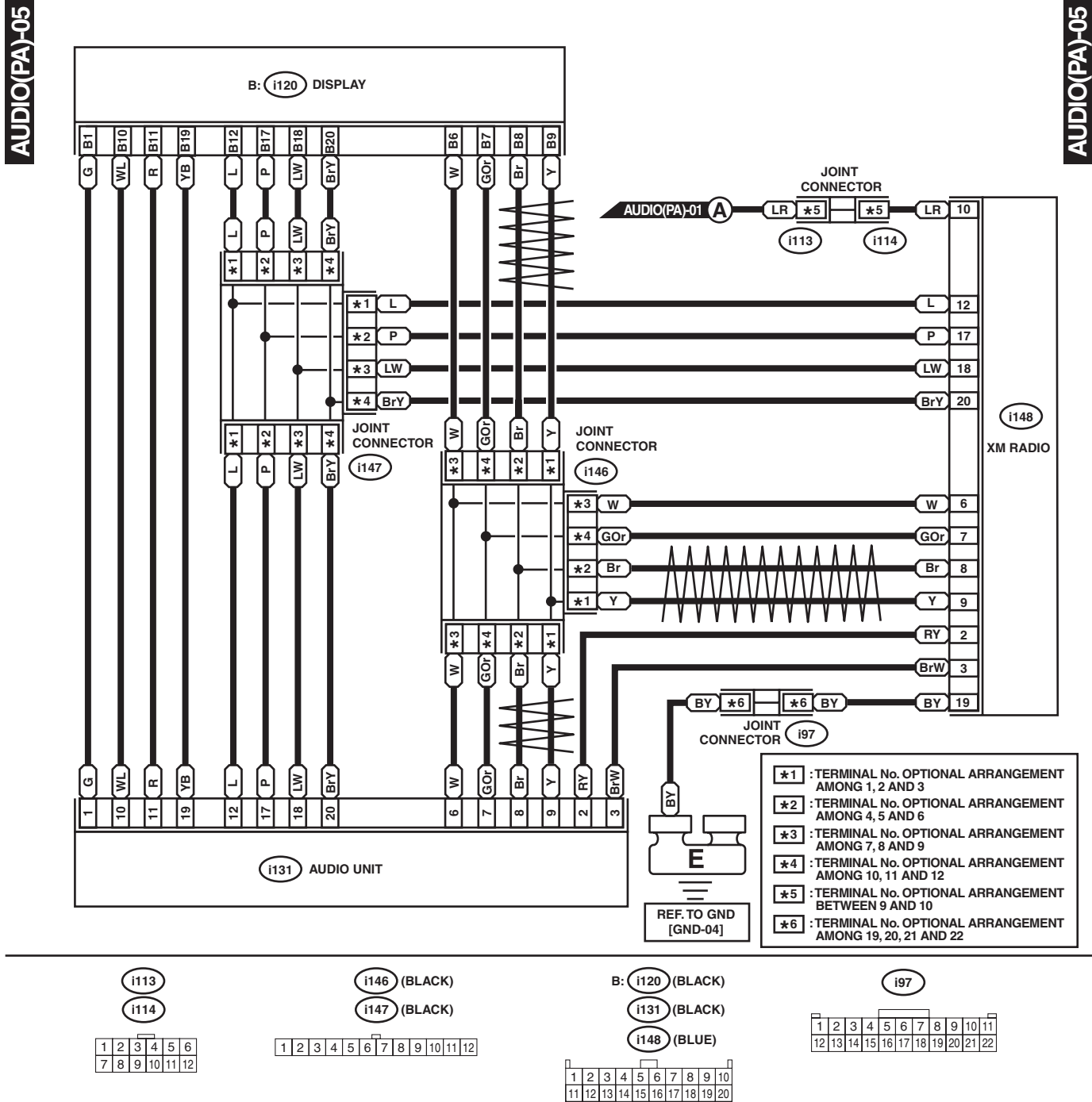
WI-26905



# Audio System

WIRING SYSTEM

- With XM radio

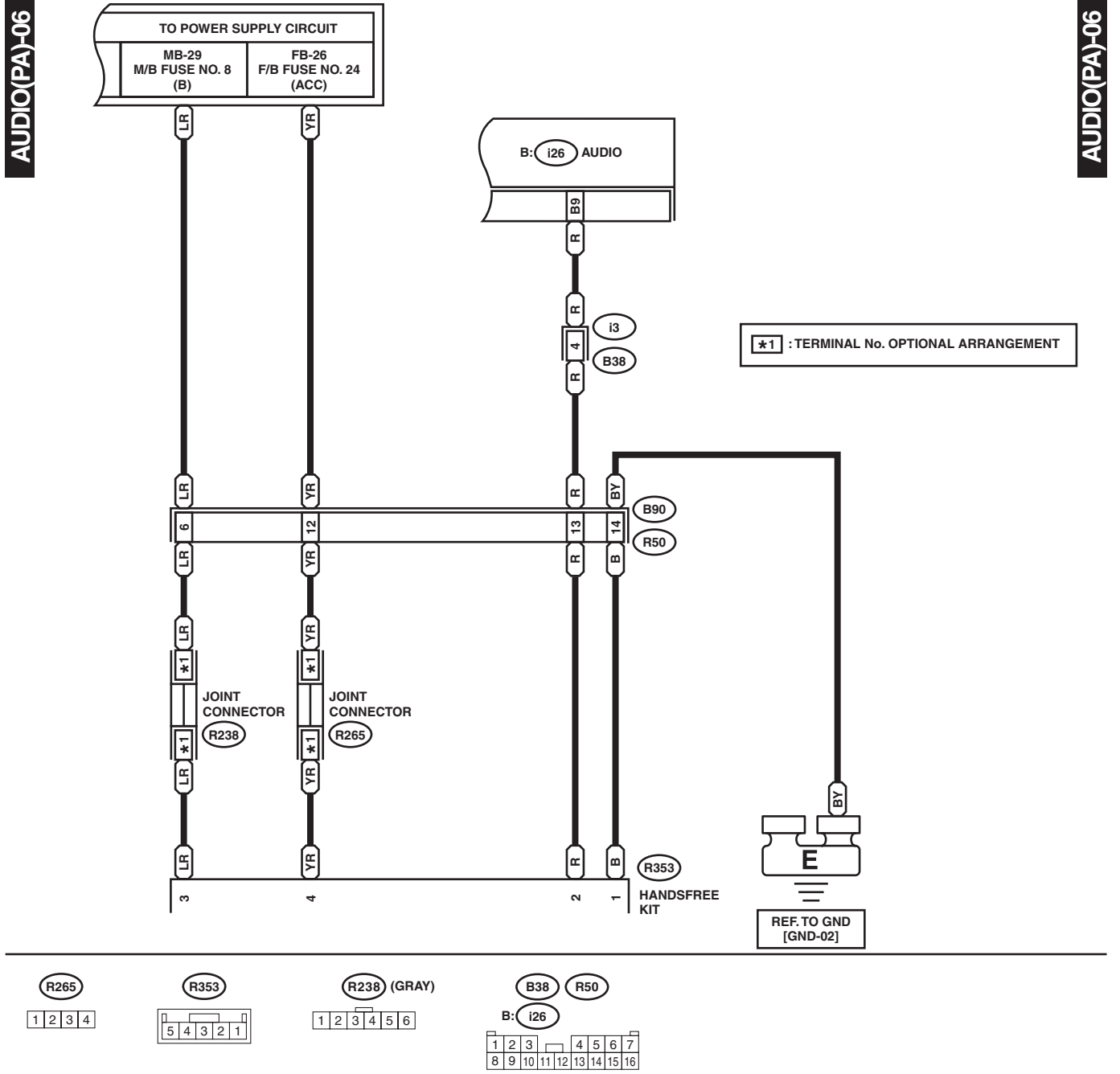


WI-30949

# Audio System

## WIRING SYSTEM

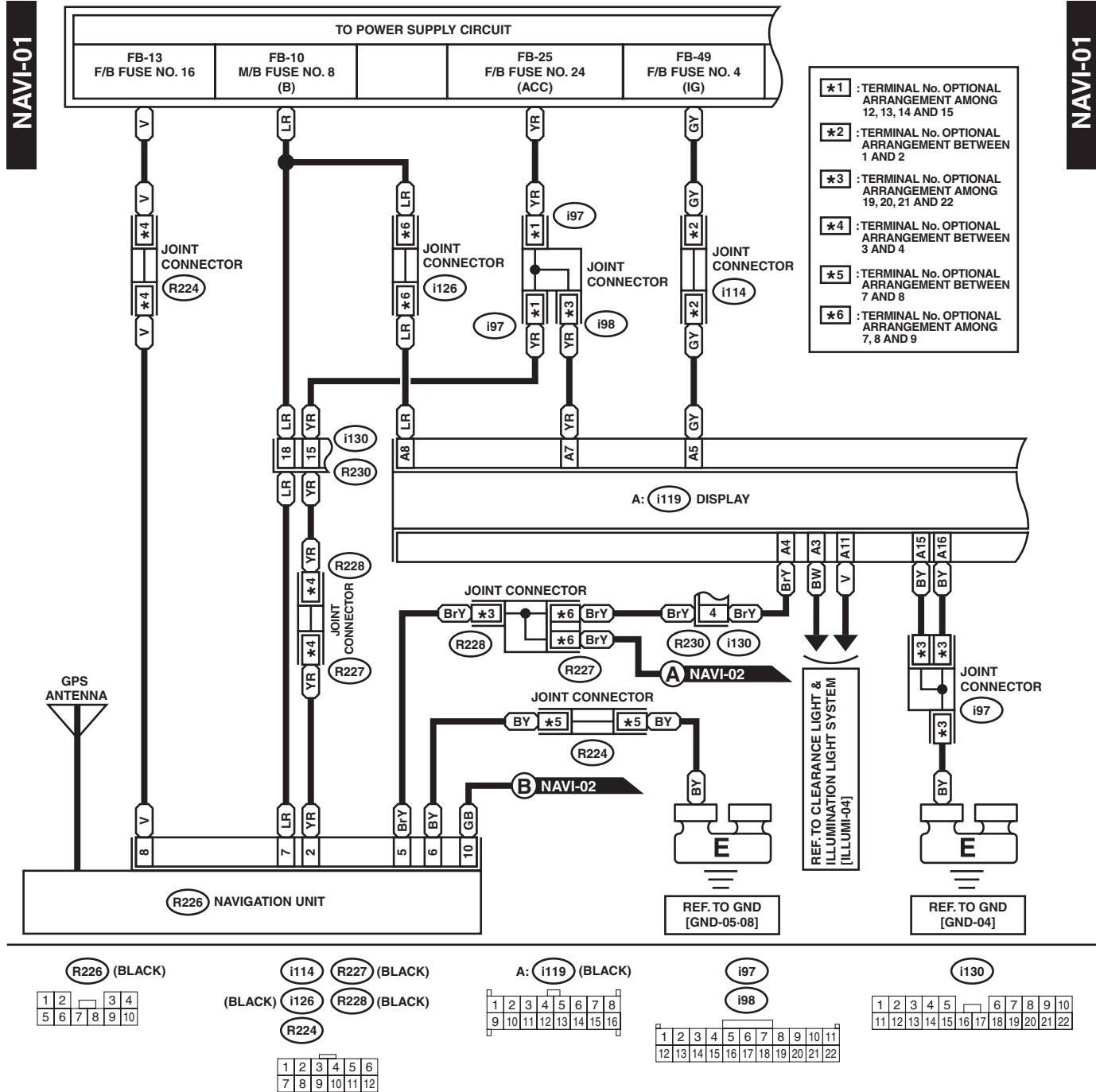
### • With handsfree microphone



WI-30950

## 37. Navigation System

### A: WIRING DIAGRAM

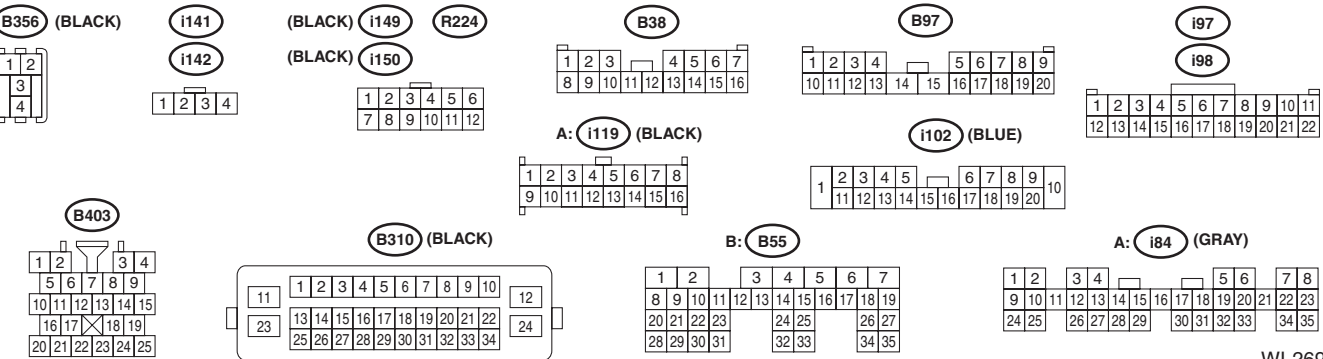
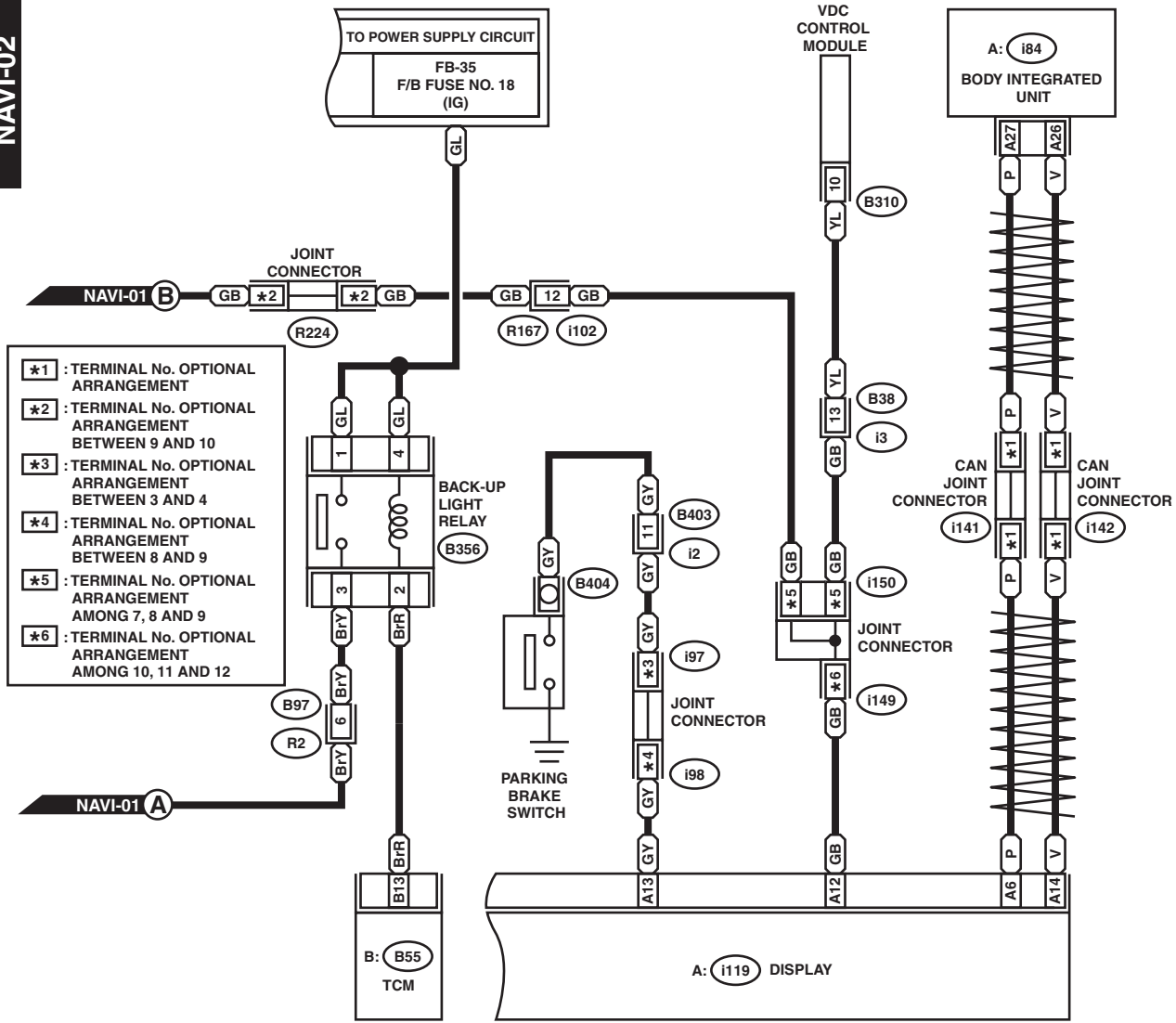


# Navigation System

## WIRING SYSTEM

NAVI-02

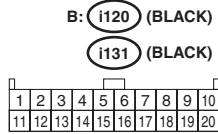
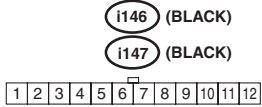
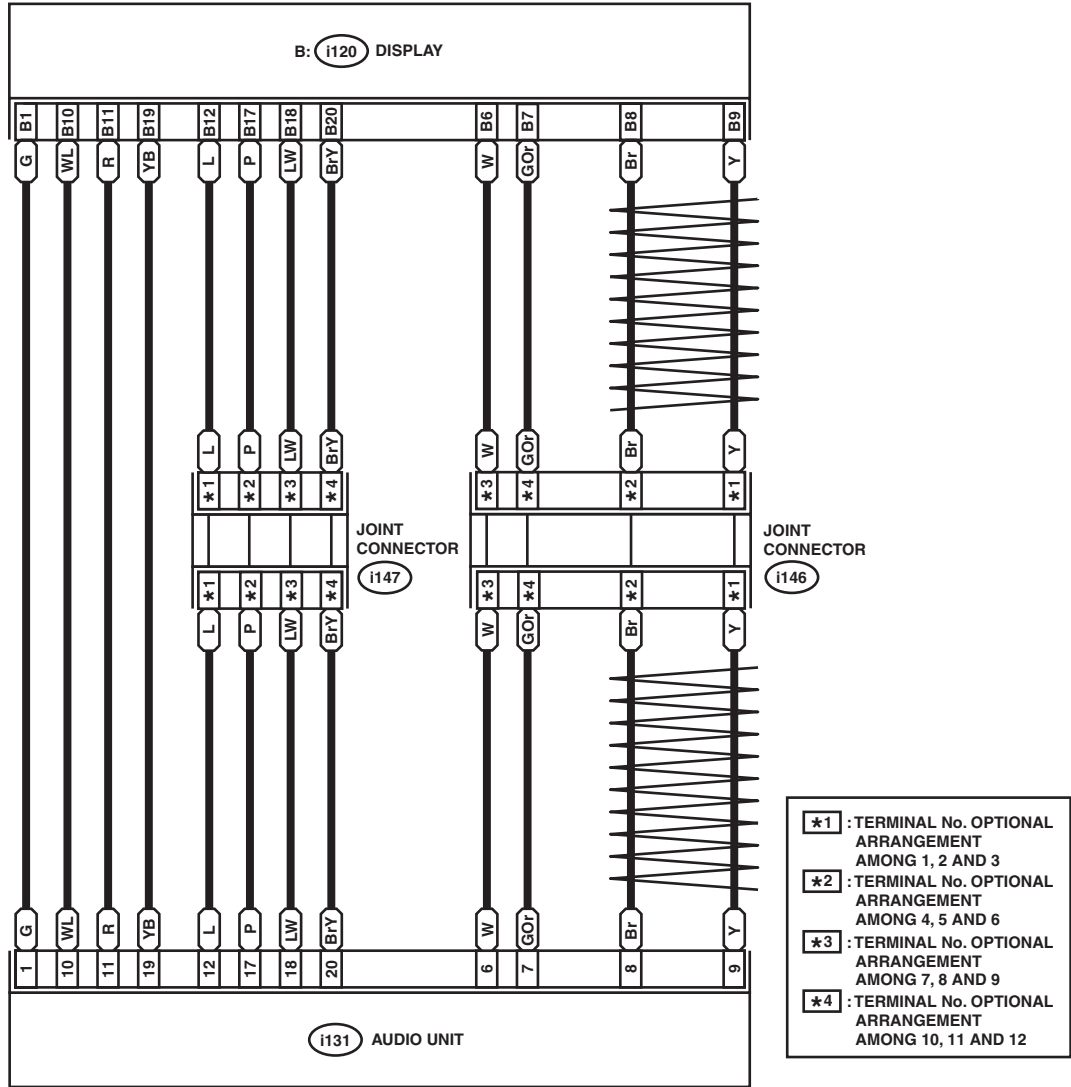
NAVI-02



WI-26909

NAVI-03

NAVI-03



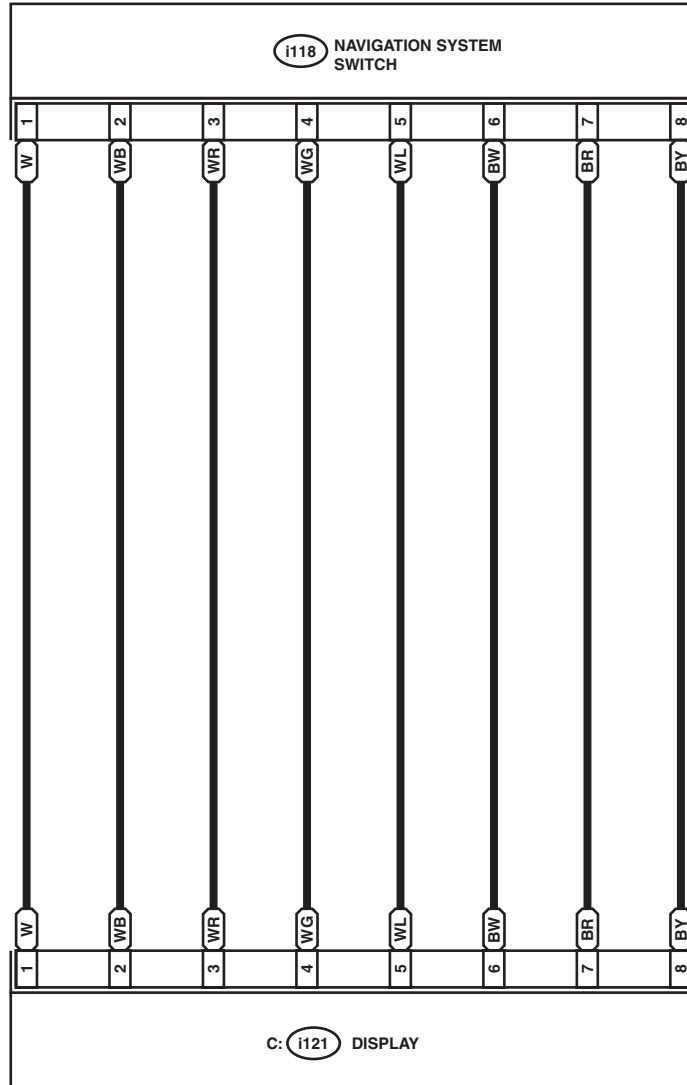
WI-27952

# Navigation System

## WIRING SYSTEM

NAVI-04

NAVI-04



i118 (BLACK)

C: i121 (BLACK)

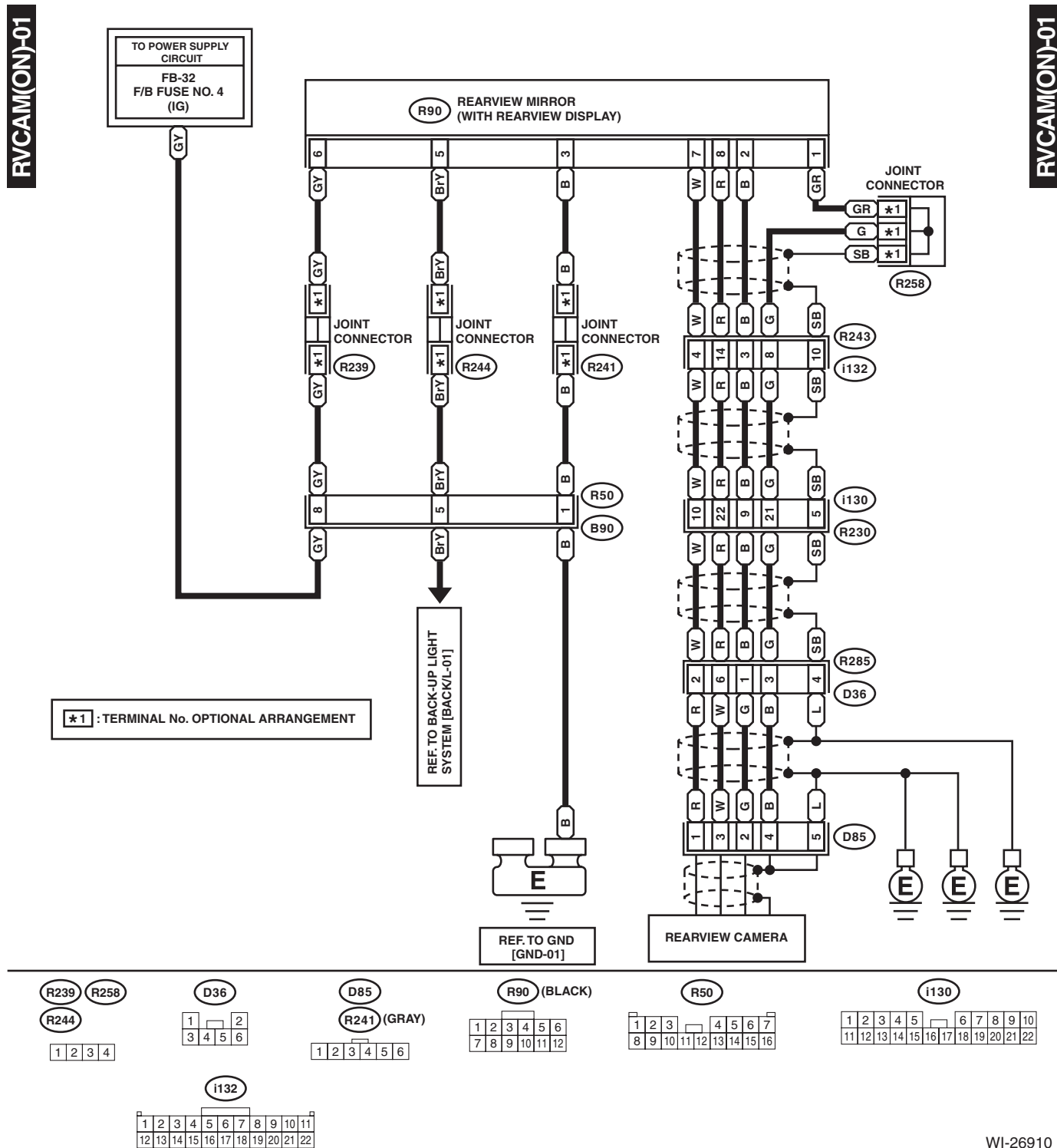
1	2	3	4
5	6	7	8

WI-27953

## 38.Rearview Camera System

### A: WIRING DIAGRAM

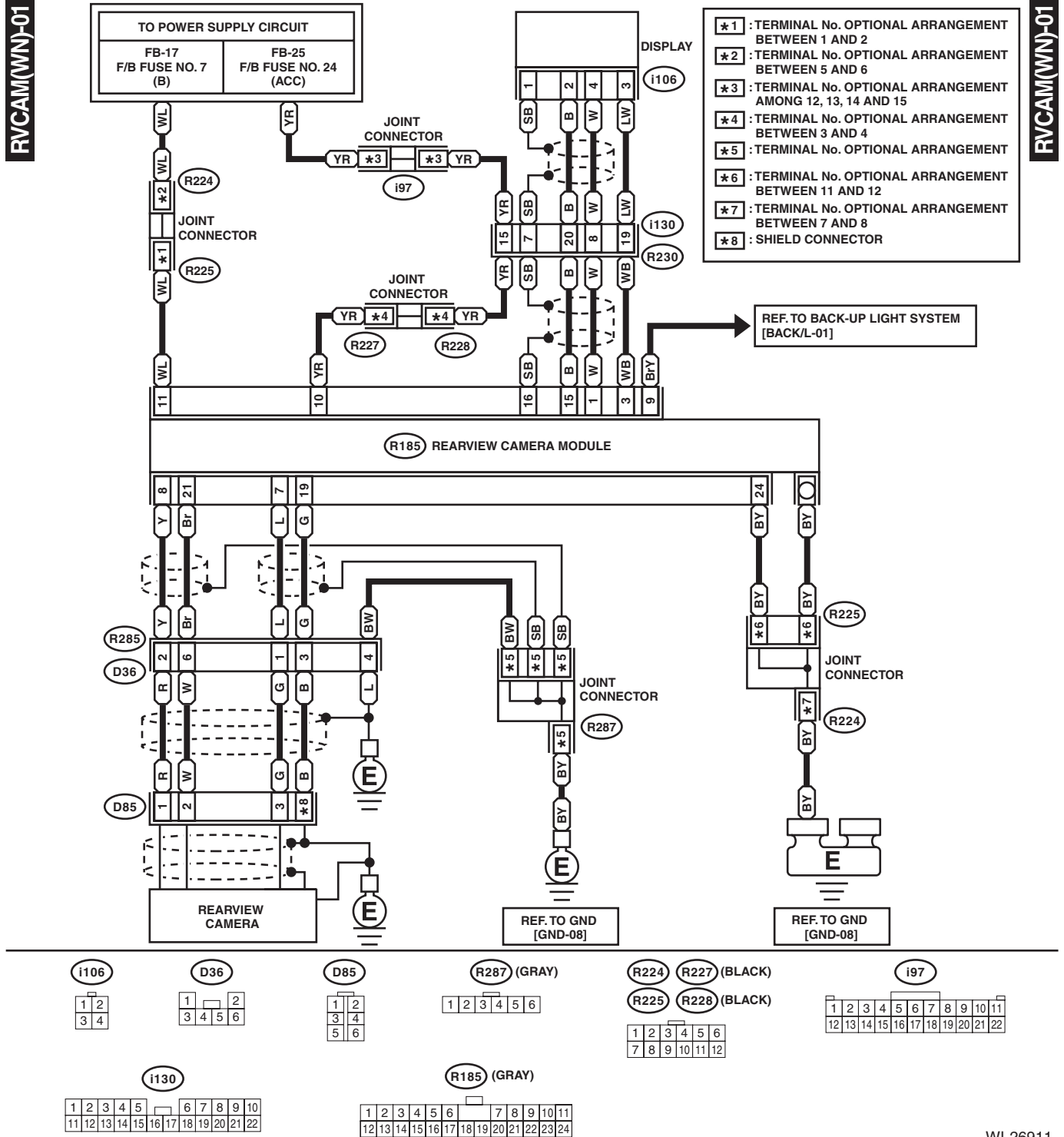
#### 1. MODEL WITHOUT NAVIGATION SYSTEM



# Rearview Camera System

## WIRING SYSTEM

### 2. MODEL WITH NAVIGATION SYSTEM

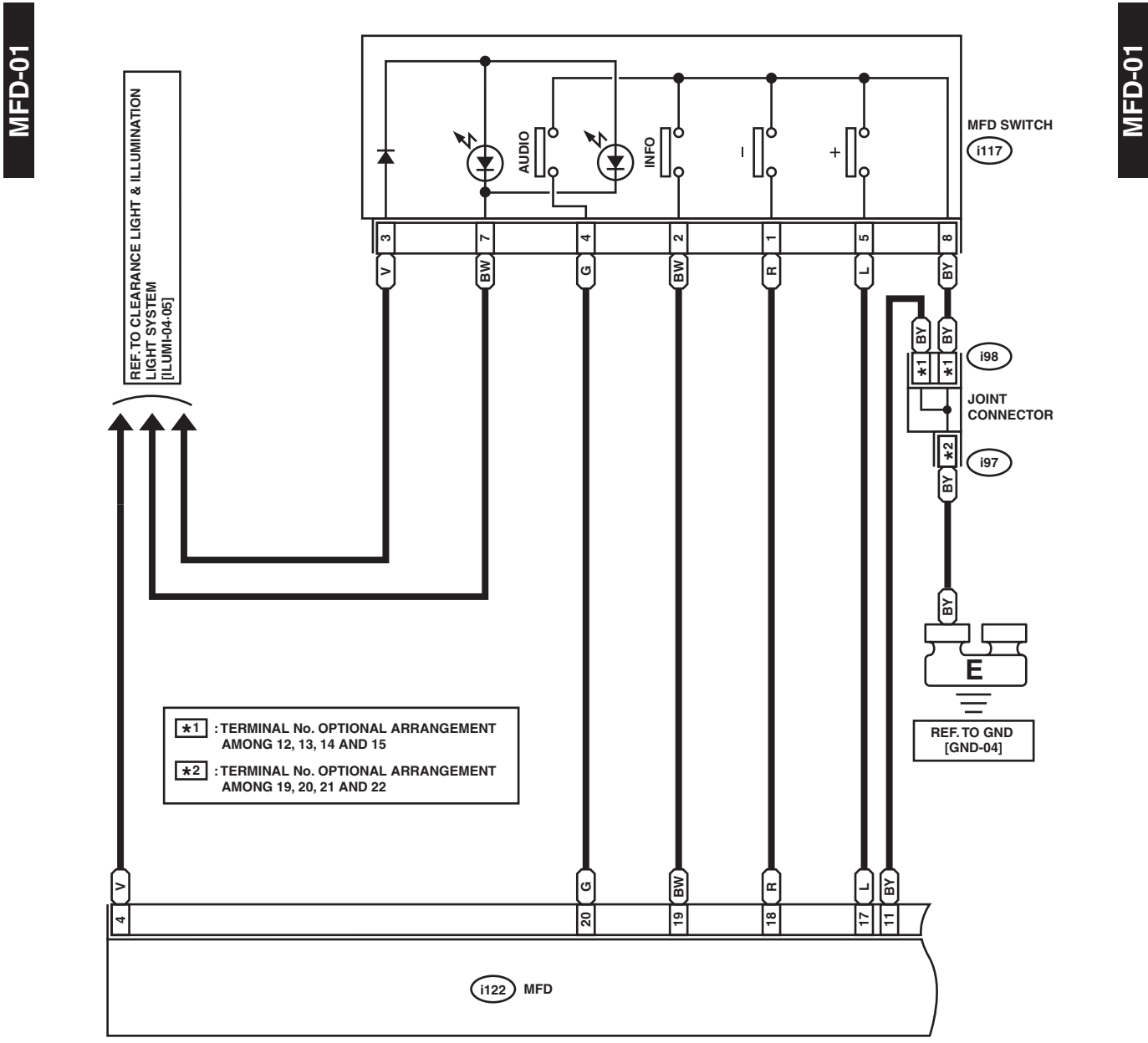


WI-26911



## 39. Multi-function Display (MFD) System

### A: WIRING DIAGRAM



(i117) (BLACK)

1	2	3	4
5	6	7	8

(i97)

(i98)

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

(i122) (GREEN)

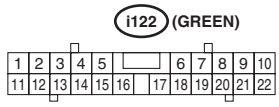
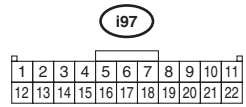
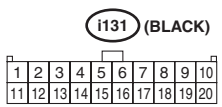
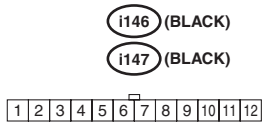
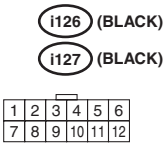
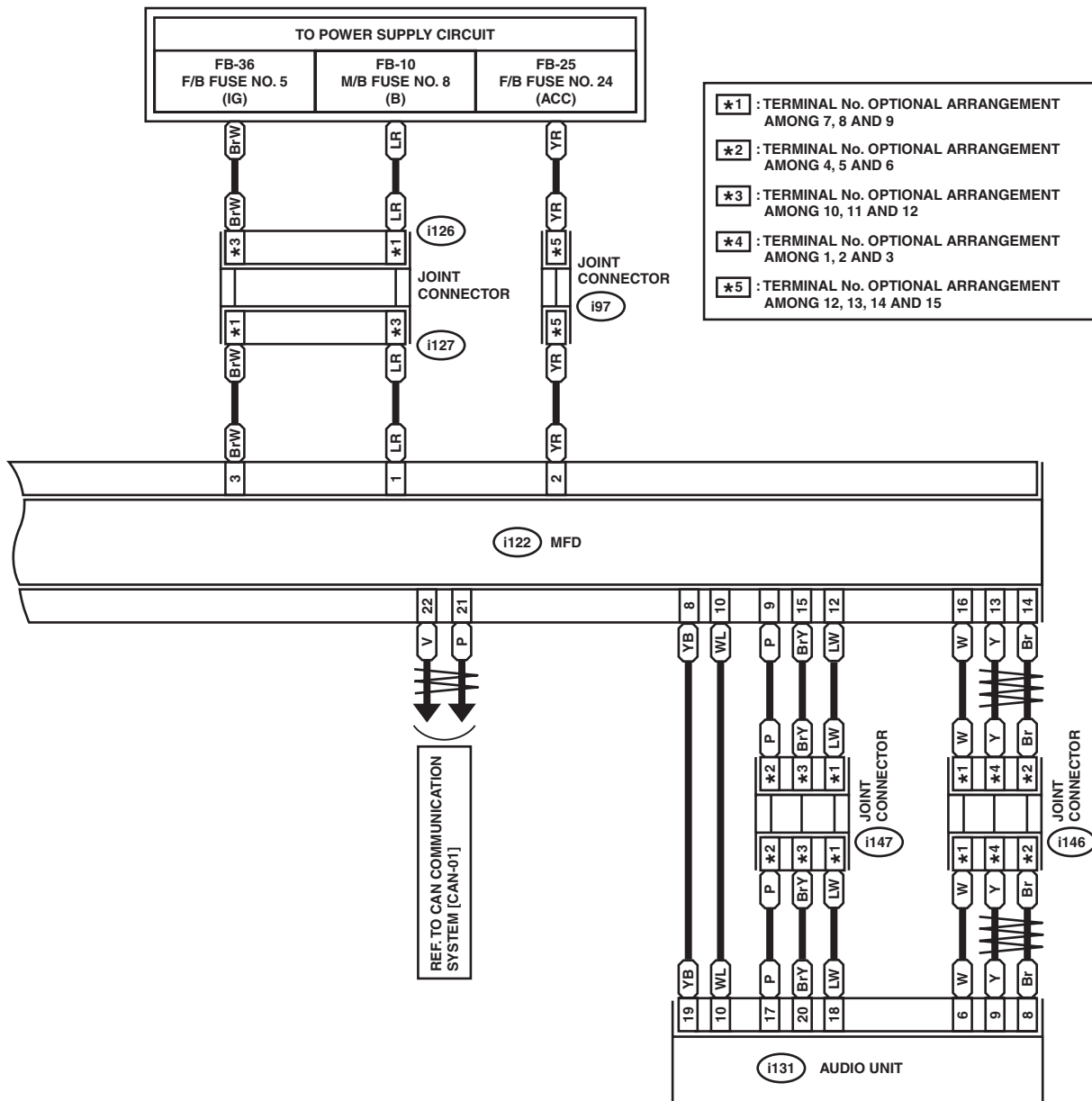
1	2	3	4	5	6	7	8	9	10		
11	12	13	14	15	16	17	18	19	20	21	22

# Multi-function Display (MFD) System

## WIRING SYSTEM

MFD-02

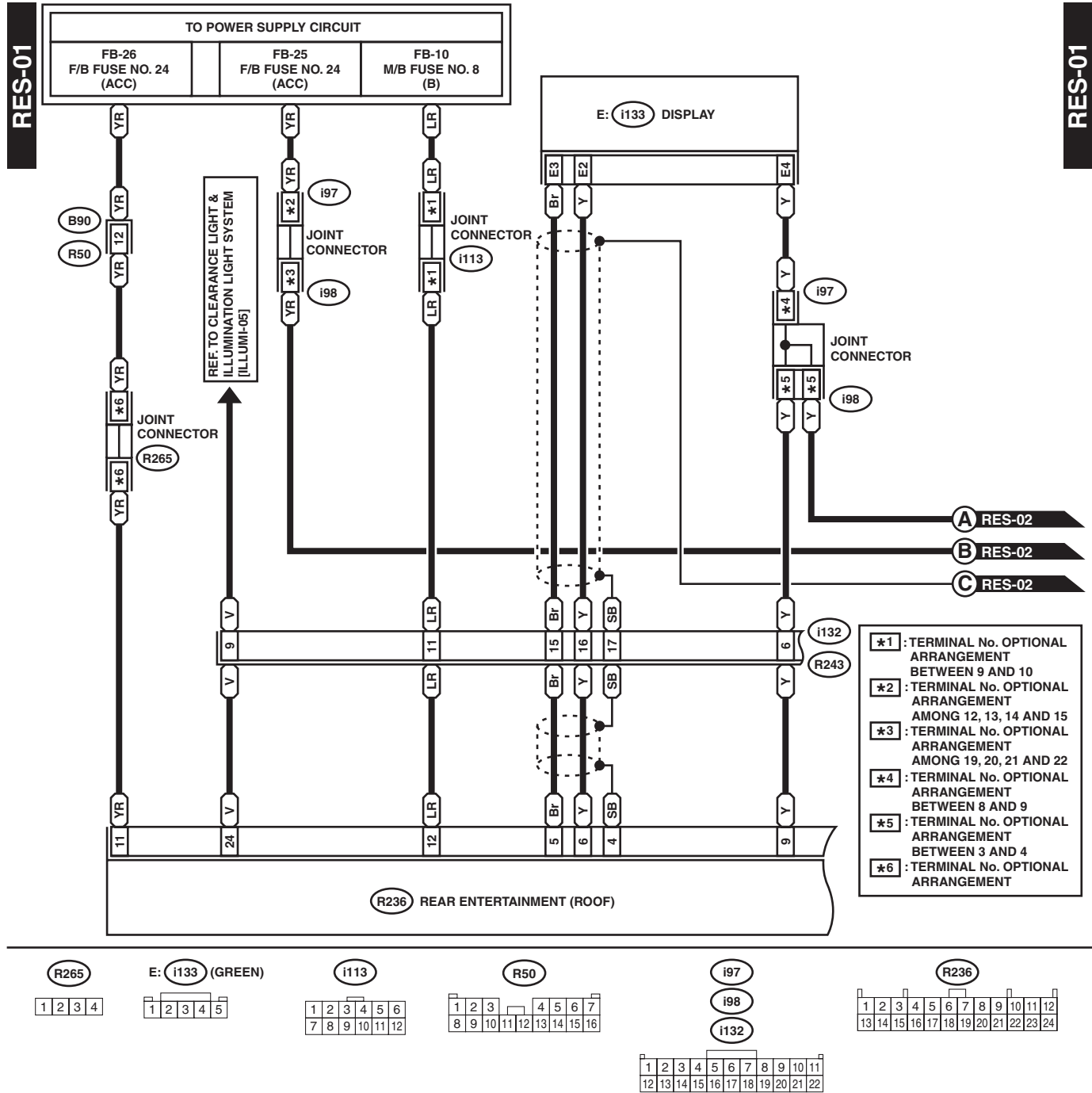
MFD-02



WI-26913

## 40.Rear Entertainment System

### A: WIRING DIAGRAM

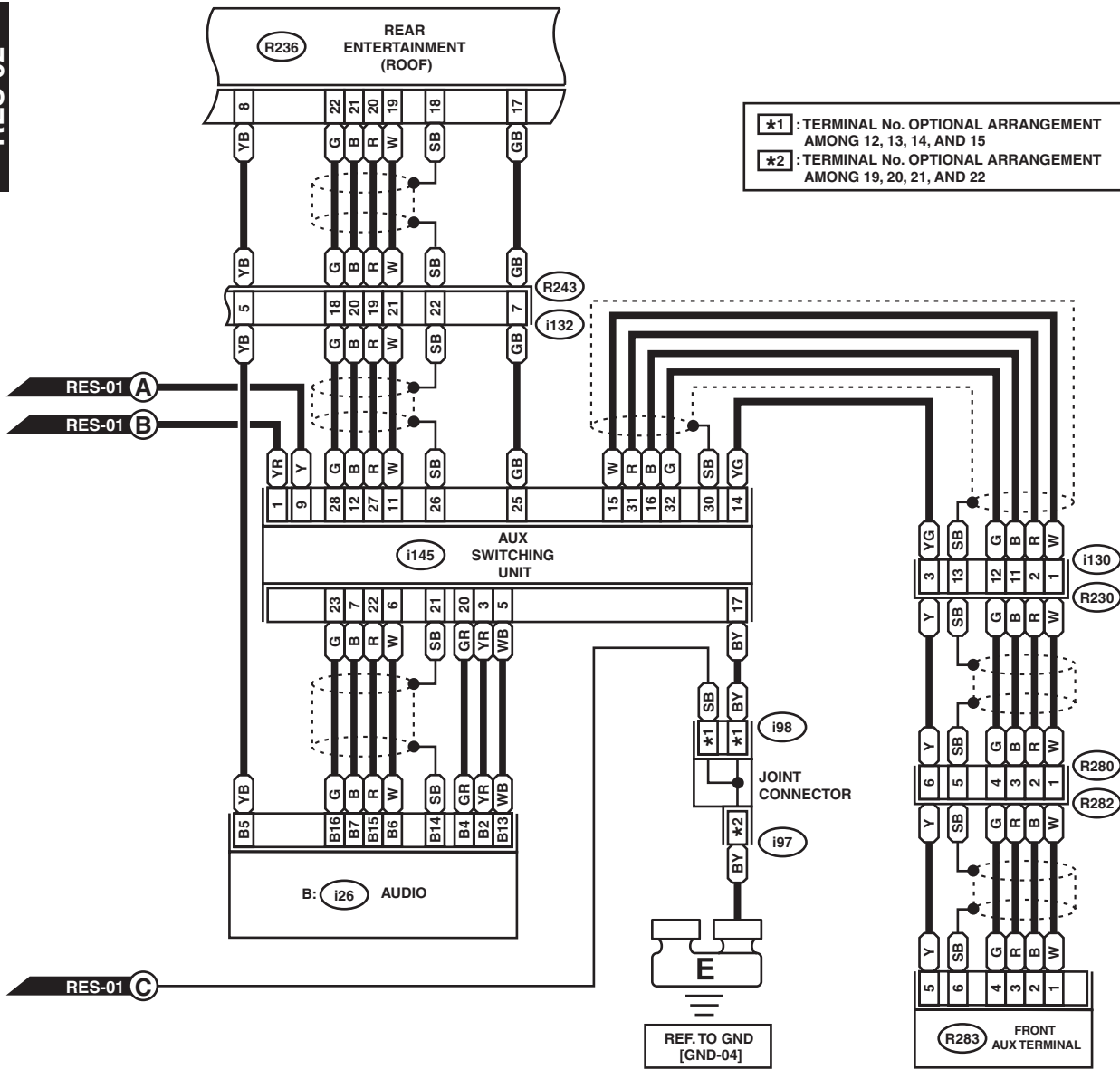


# Rear Entertainment System

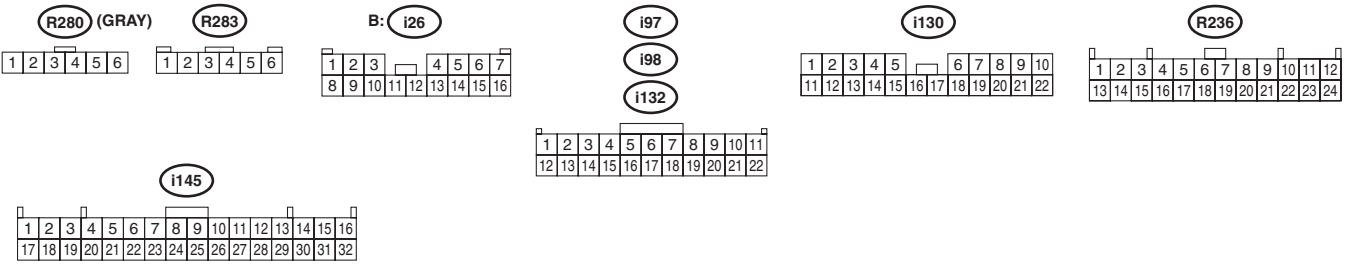
WIRING SYSTEM

RES-02

RES-02



\*1 : TERMINAL No. OPTIONAL ARRANGEMENT AMONG 12, 13, 14, AND 15  
 \*2 : TERMINAL No. OPTIONAL ARRANGEMENT AMONG 19, 20, 21, AND 22



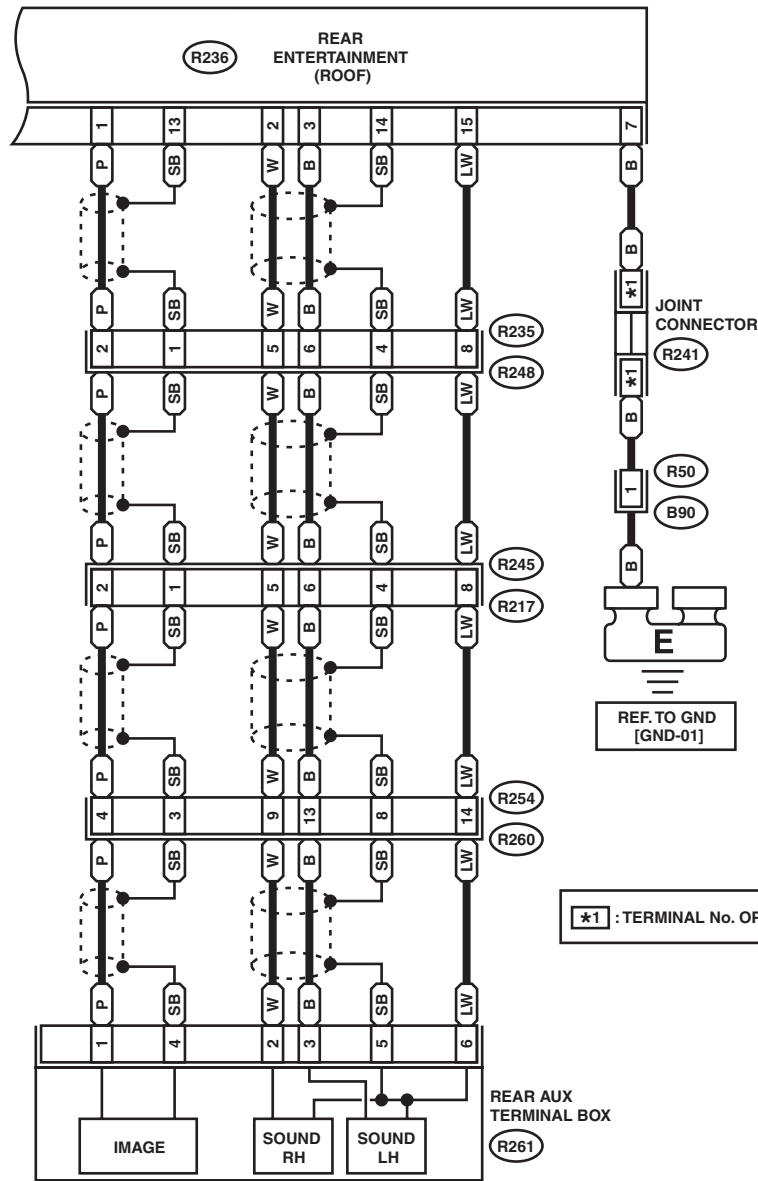
WI-26915

# Rear Entertainment System

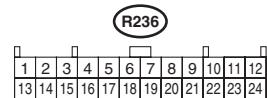
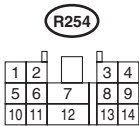
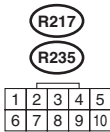
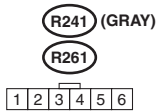
WIRING SYSTEM

RES-03

RES-03



\*1 : TERMINAL No. OPTIONAL ARRANGEMENT



WI-26916

# Front Accessory Power Supply Socket System

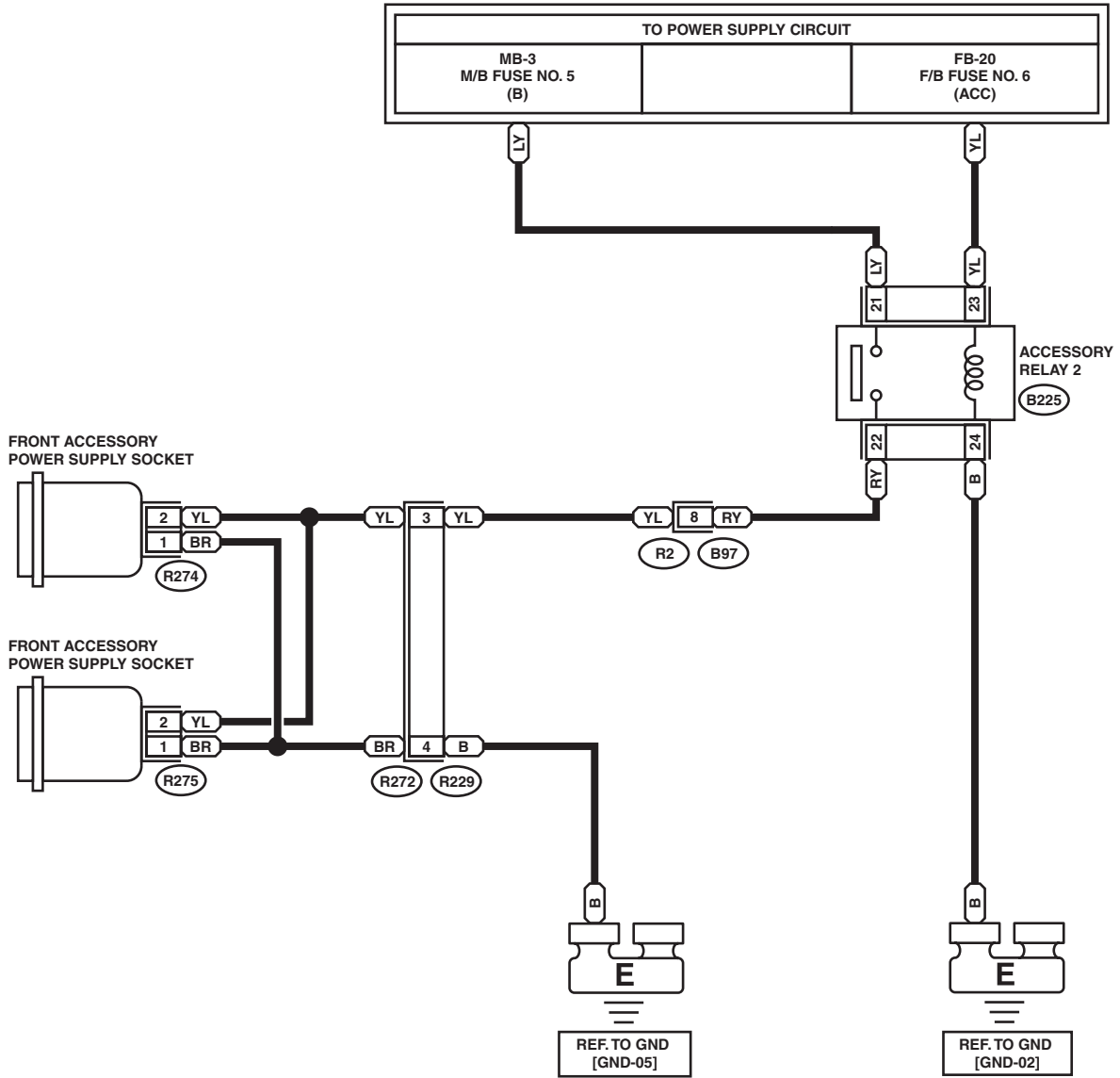
WIRING SYSTEM

## 41. Front Accessory Power Supply Socket System

### A: WIRING DIAGRAM

FAPS-01

FAPS-01



R274

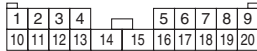
R275



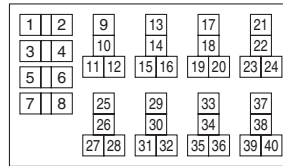
R229



B97



B225 (BLACK)



RELAY BLOCK

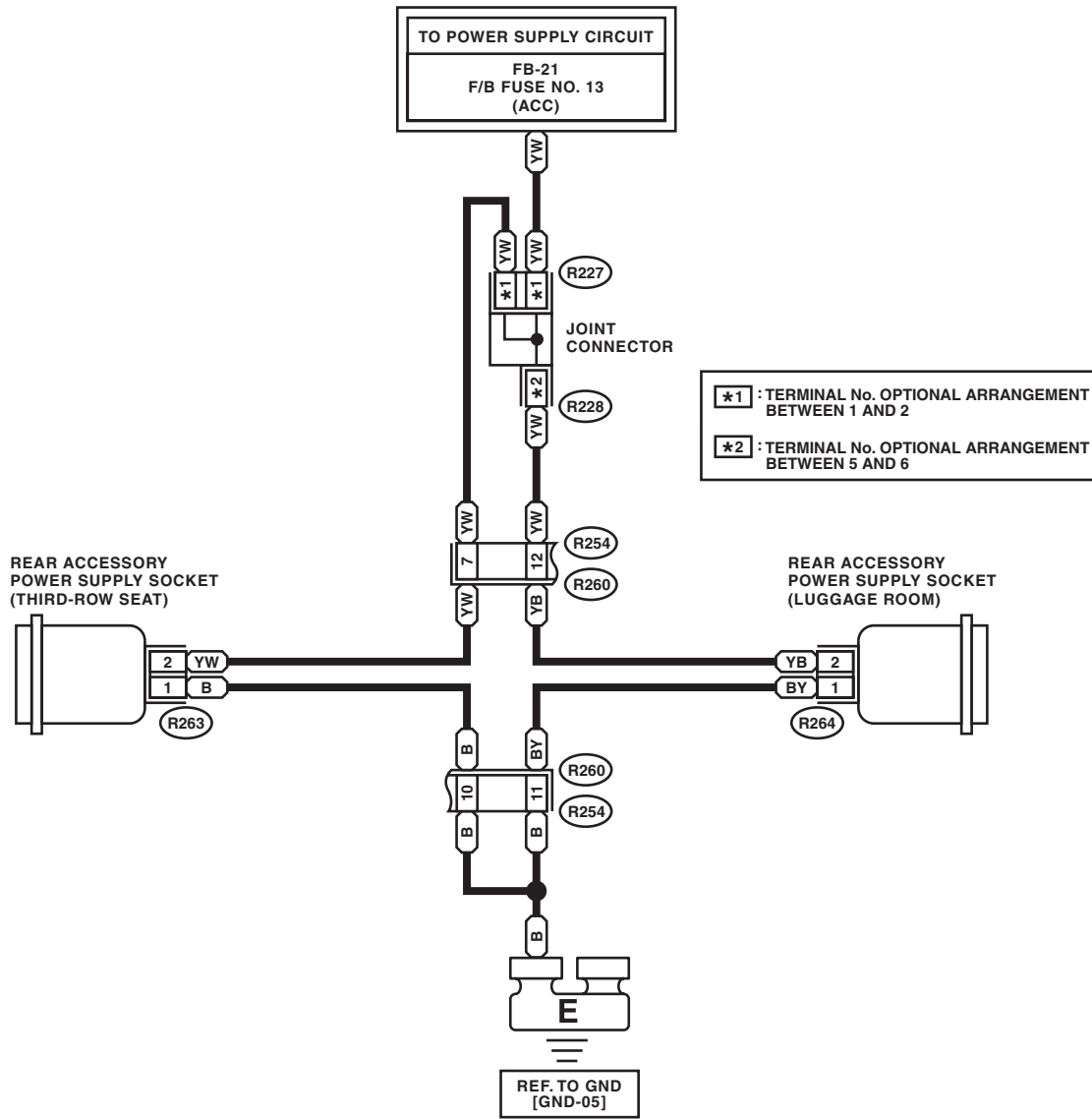
WI-27956

## 42.Rear Accessory Power Supply Socket System

### A: WIRING DIAGRAM

RAPS-01

RAPS-01



R263

R264

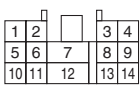


R227 (BLACK)

R228 (BLACK)



R254

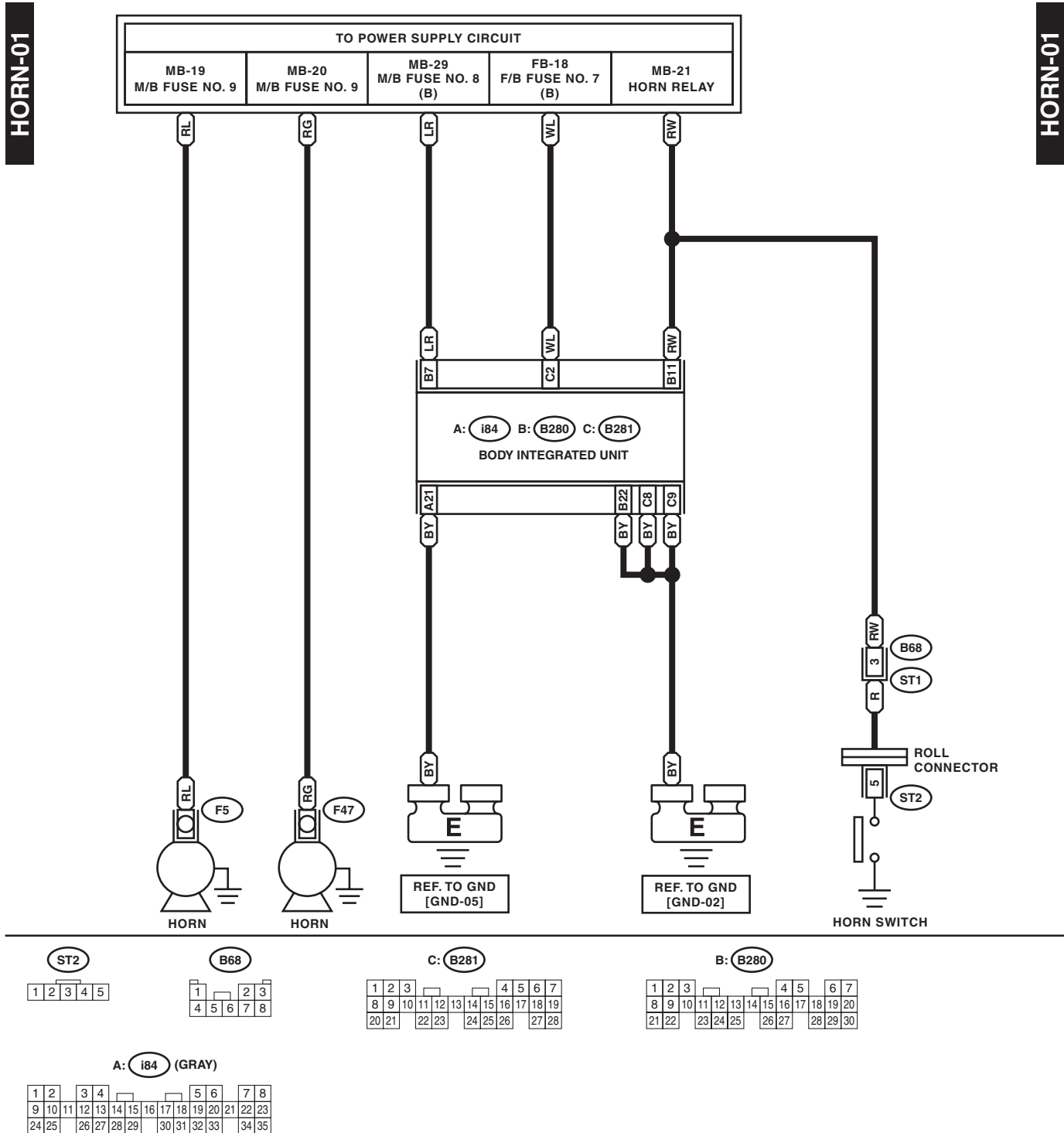


# Horn System

WIRING SYSTEM

## 43.Horn System

### A: WIRING DIAGRAM

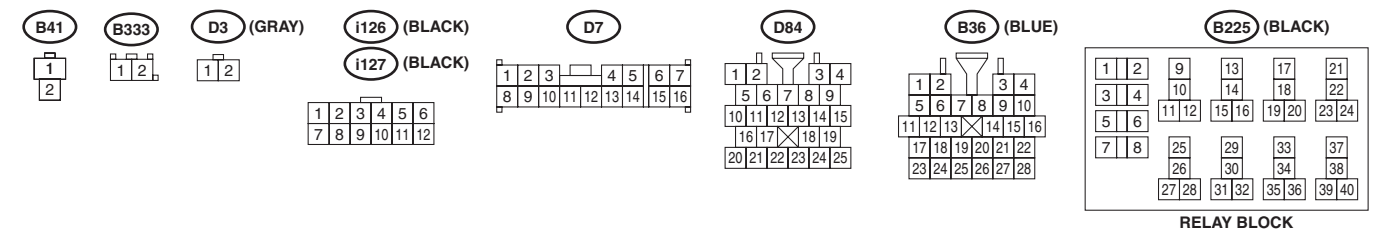
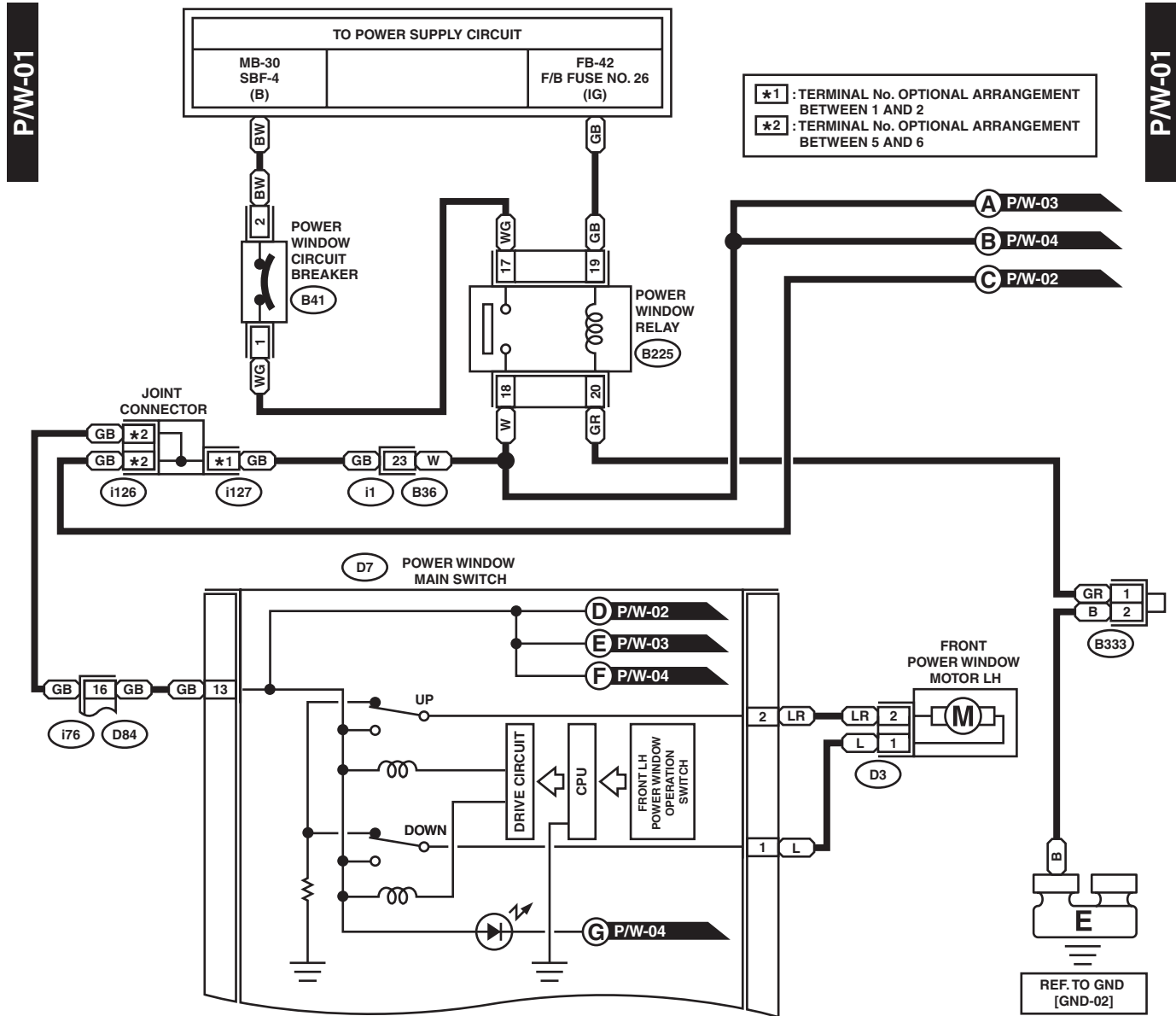


WI-16085



## 44. Power Window System

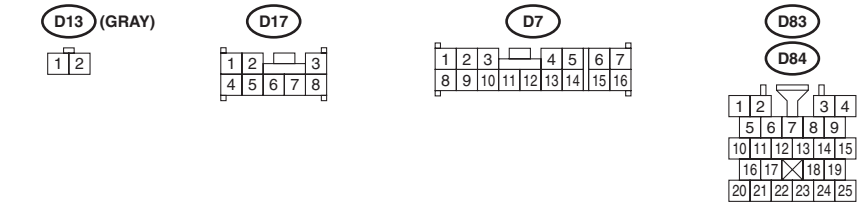
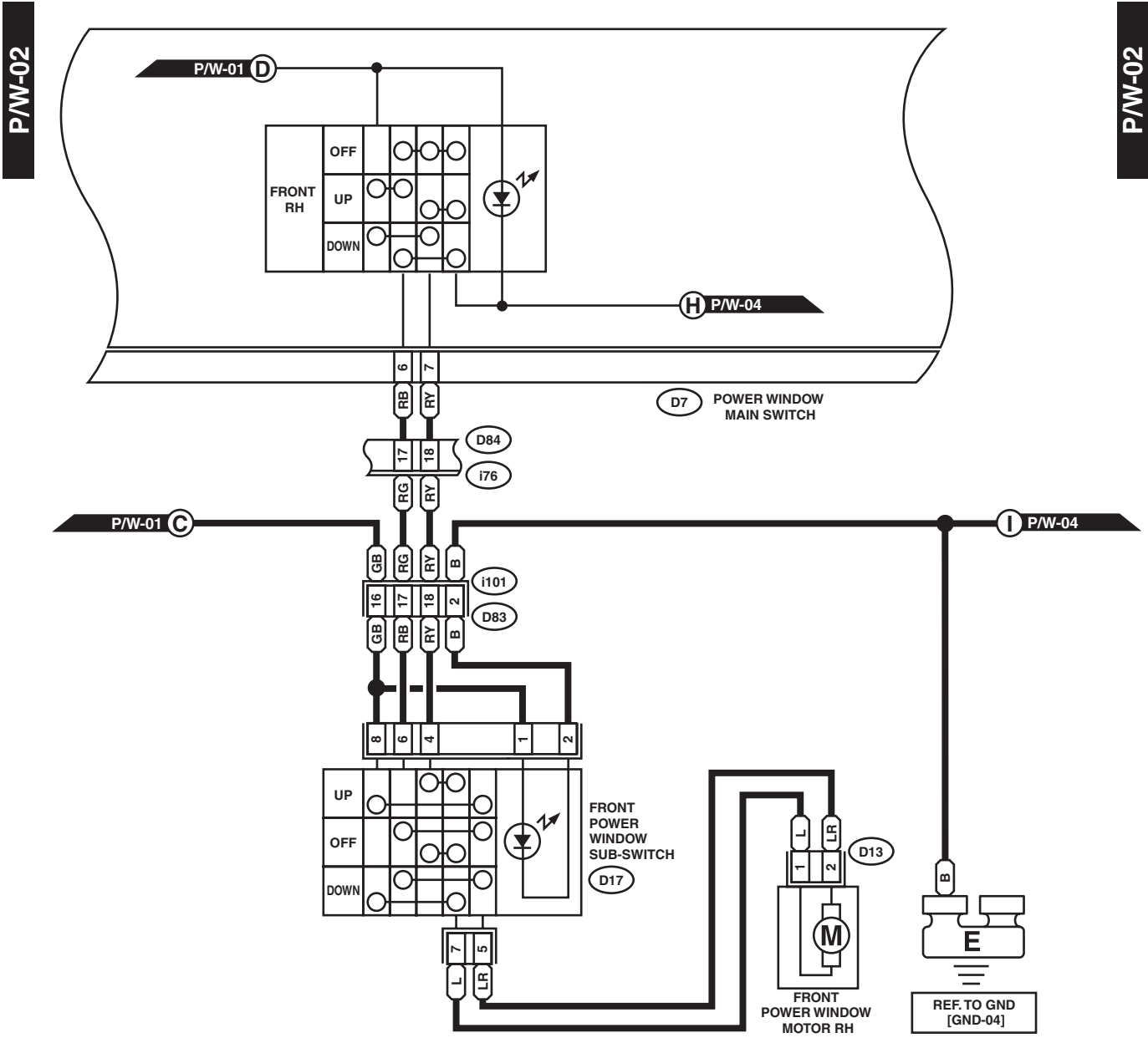
### A: WIRING DIAGRAM



WI-26917

# Power Window System

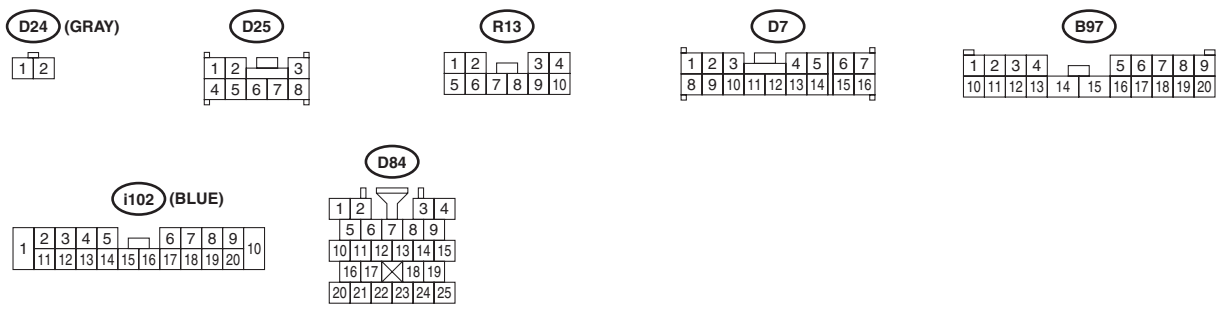
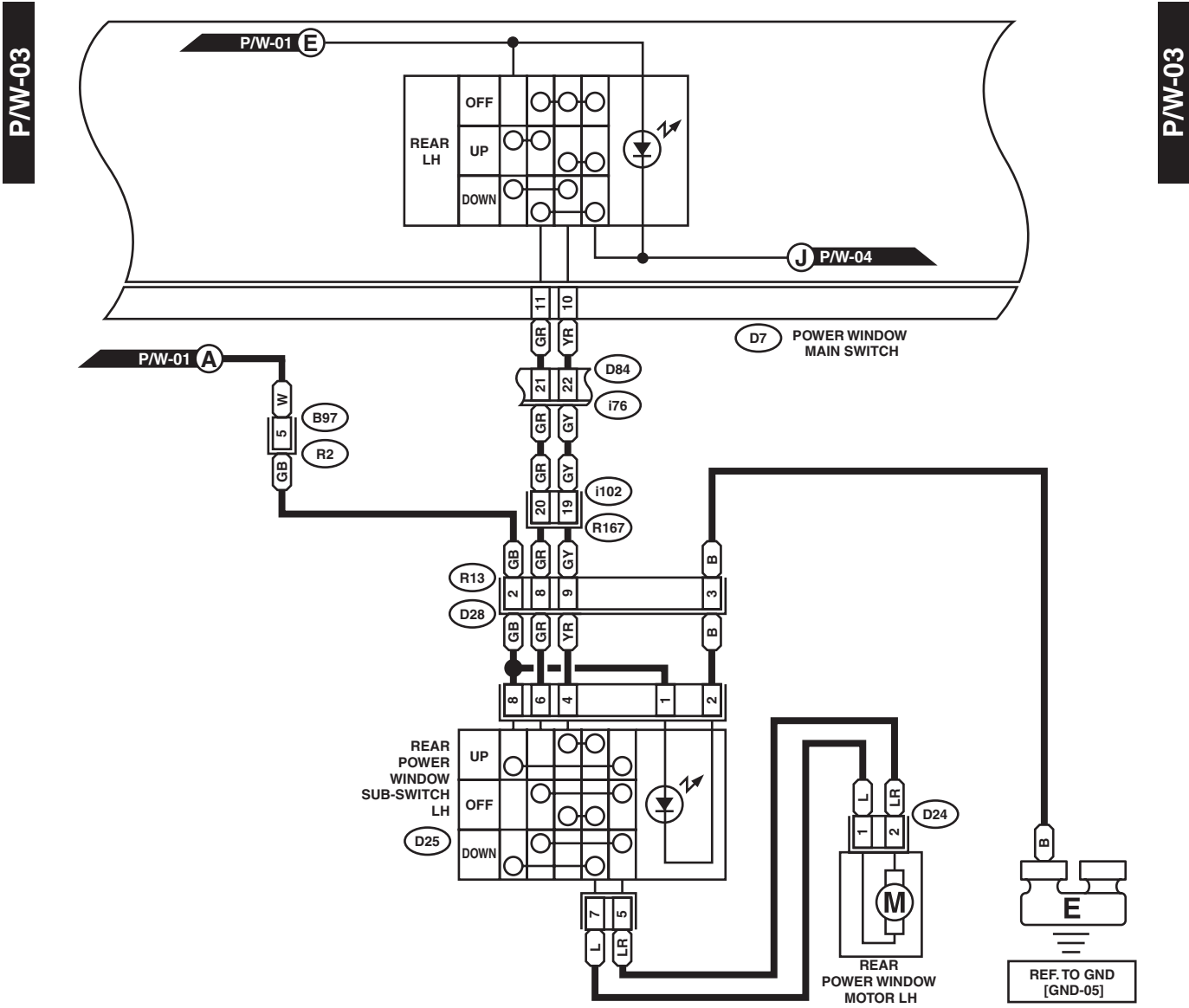
## WIRING SYSTEM



WI-26918

# Power Window System

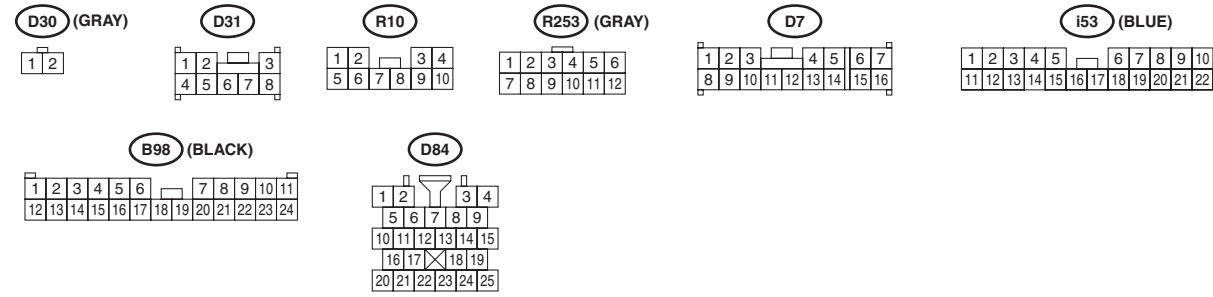
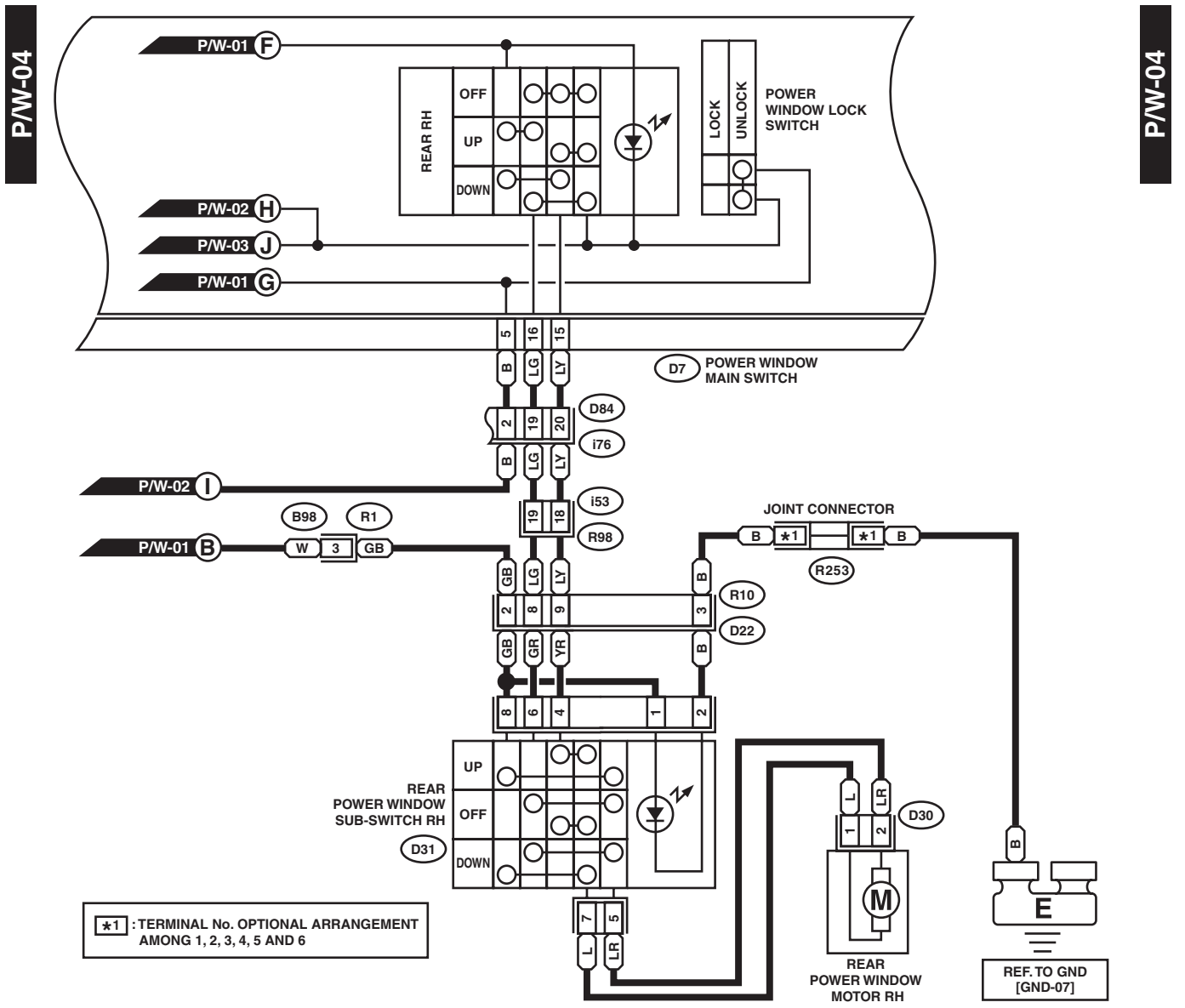
WIRING SYSTEM



WI-26919

# Power Window System

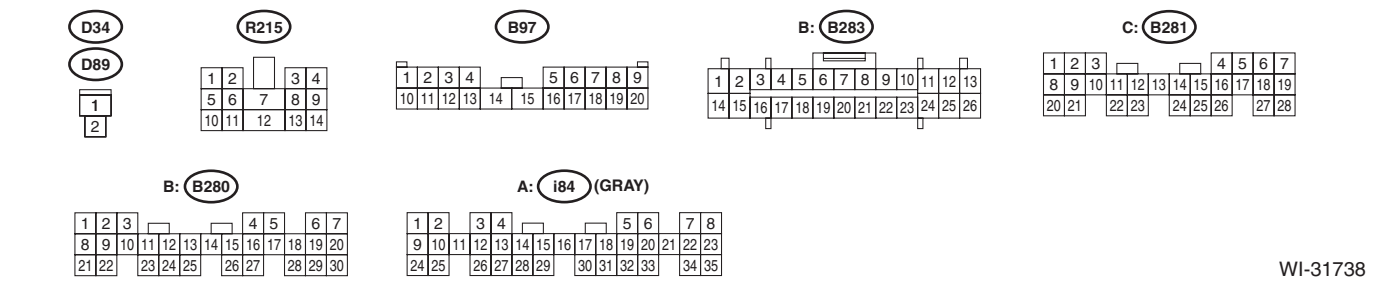
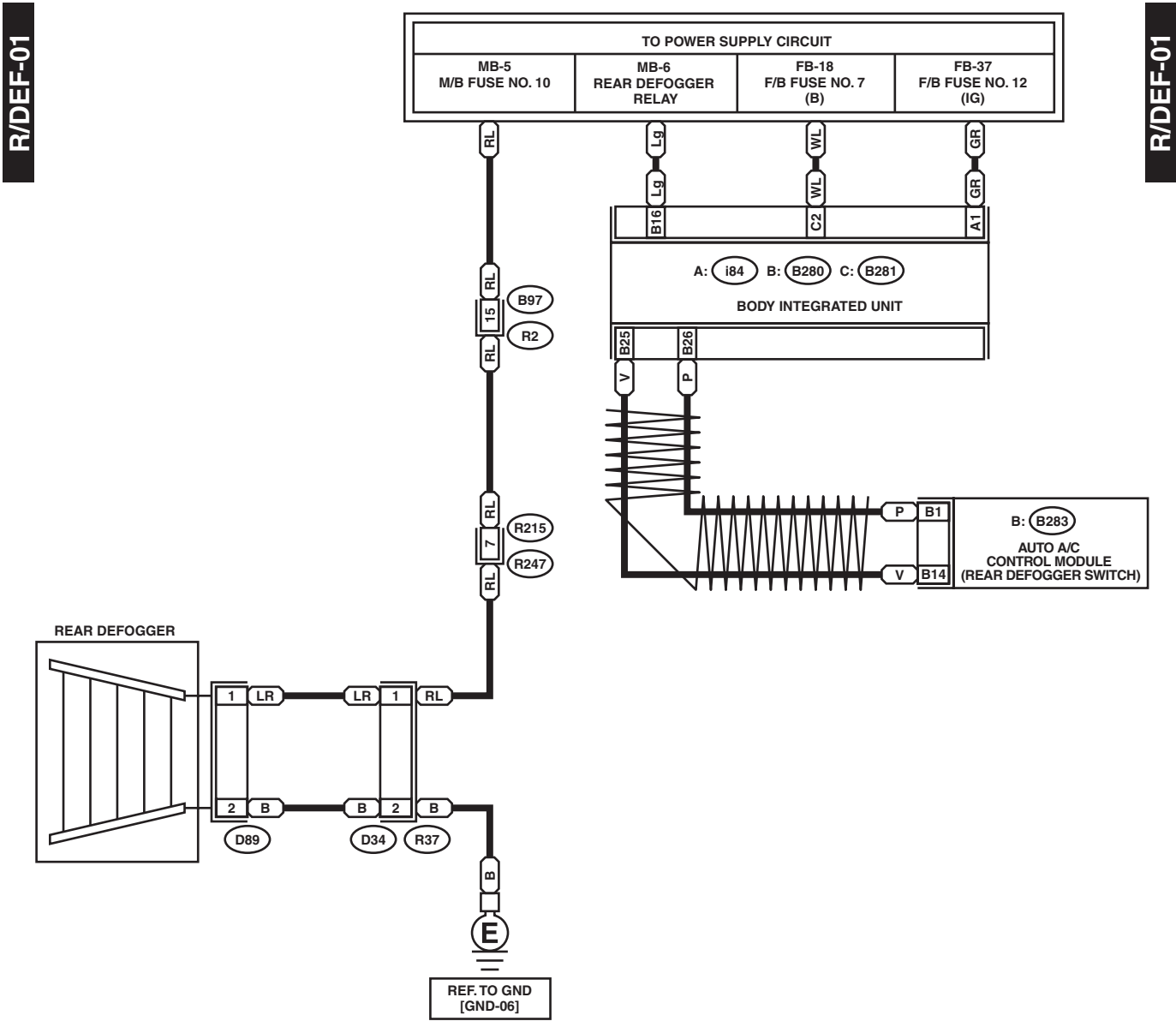
## WIRING SYSTEM



WI-34404

## 45. Rear Defogger System

### A: WIRING DIAGRAM



WI-31738



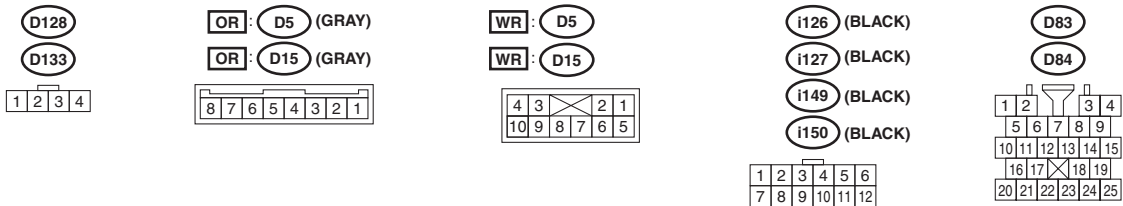
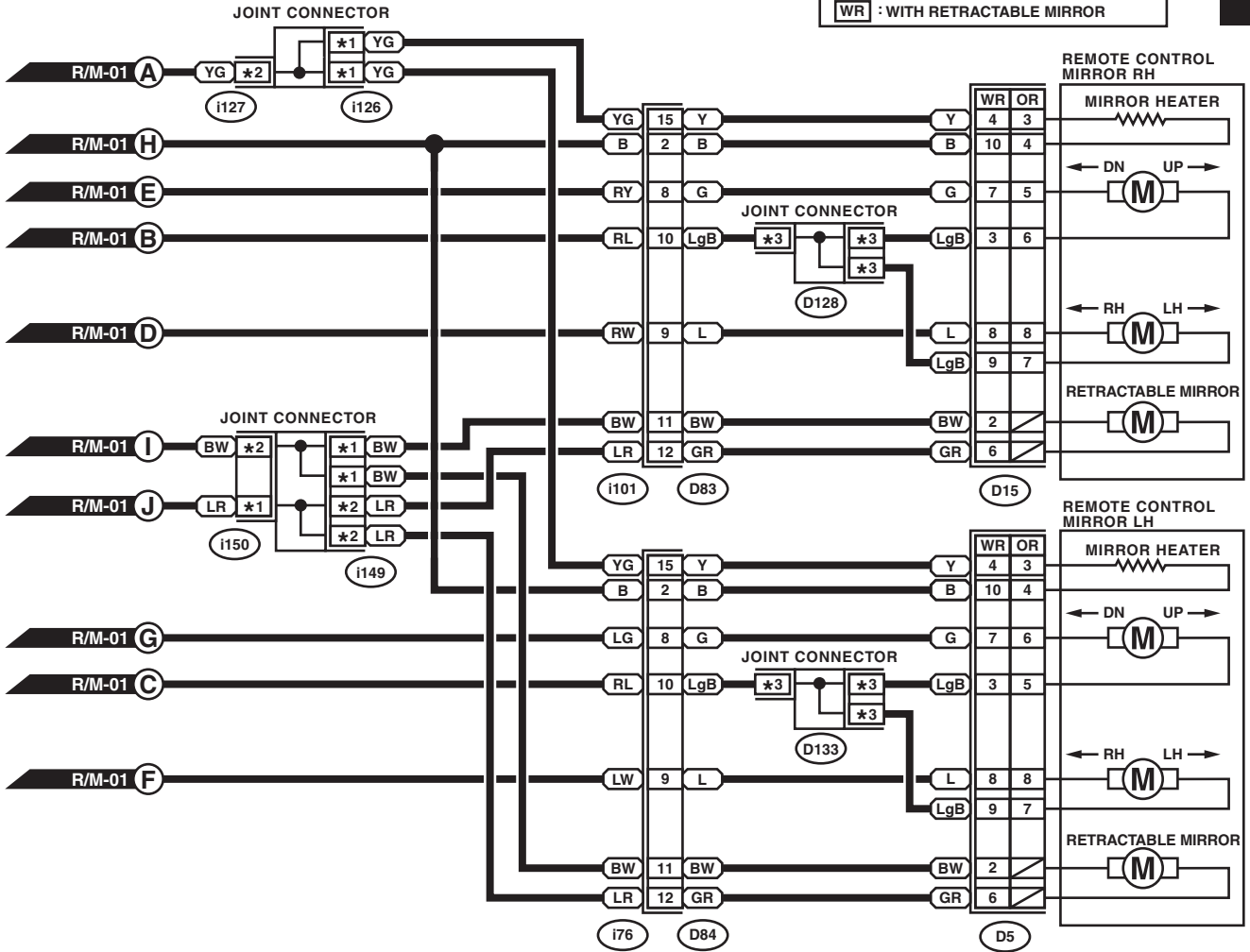
# Remote Control Mirror System

WIRING SYSTEM

R/M-02

R/M-02

- \*1** : TERMINAL No. OPTIONAL ARRANGEMENT BETWEEN 1 AND 2
- \*2** : TERMINAL No. OPTIONAL ARRANGEMENT BETWEEN 5 AND 6
- \*3** : TERMINAL No. OPTIONAL ARRANGEMENT
- OR** : WITHOUT RETRACTABLE MIRROR
- WR** : WITH RETRACTABLE MIRROR



WI-16092

# Combination Meter System

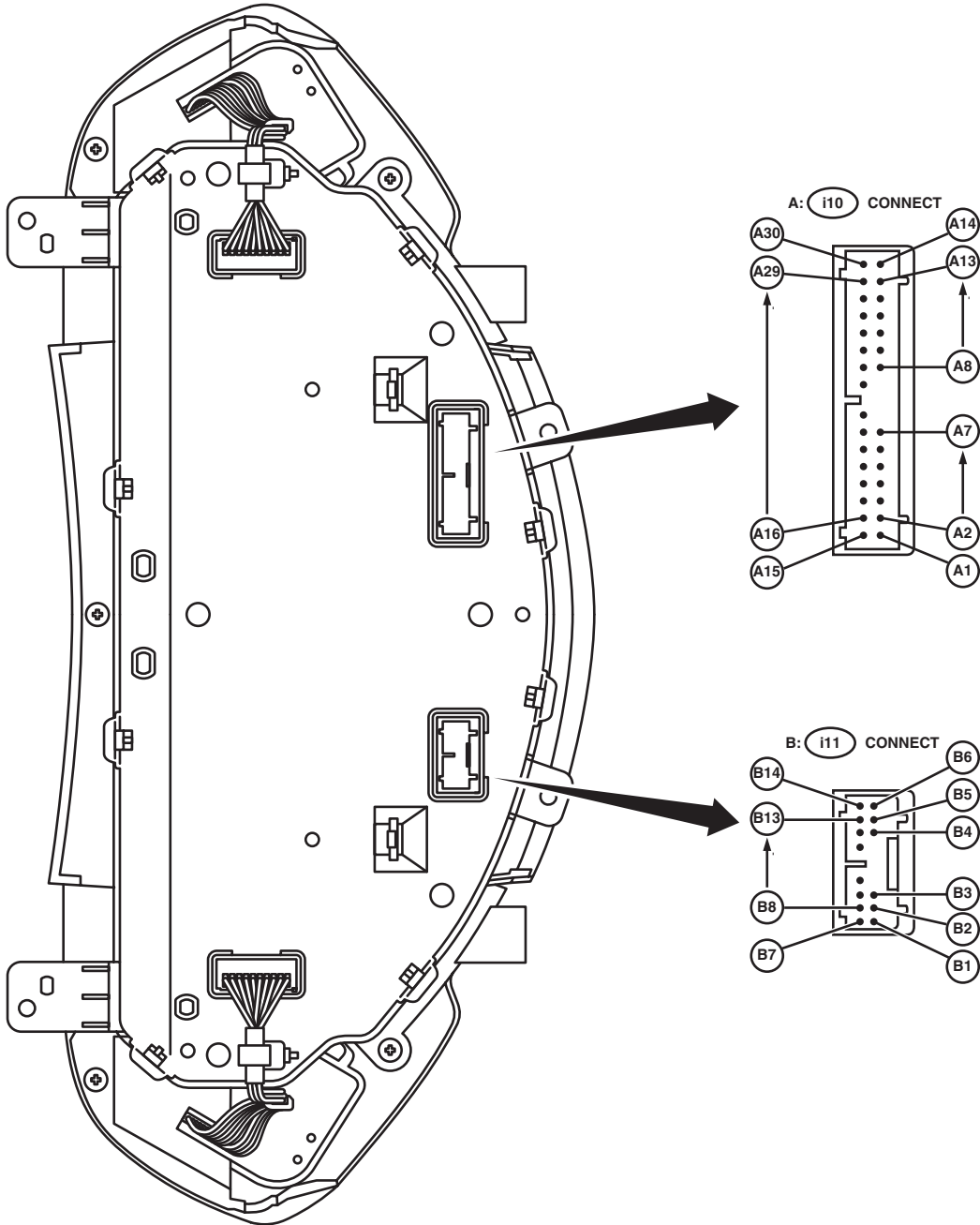
WIRING SYSTEM

## 47. Combination Meter System

### A: WIRING DIAGRAM

METER-01

METER-01



WI-11750

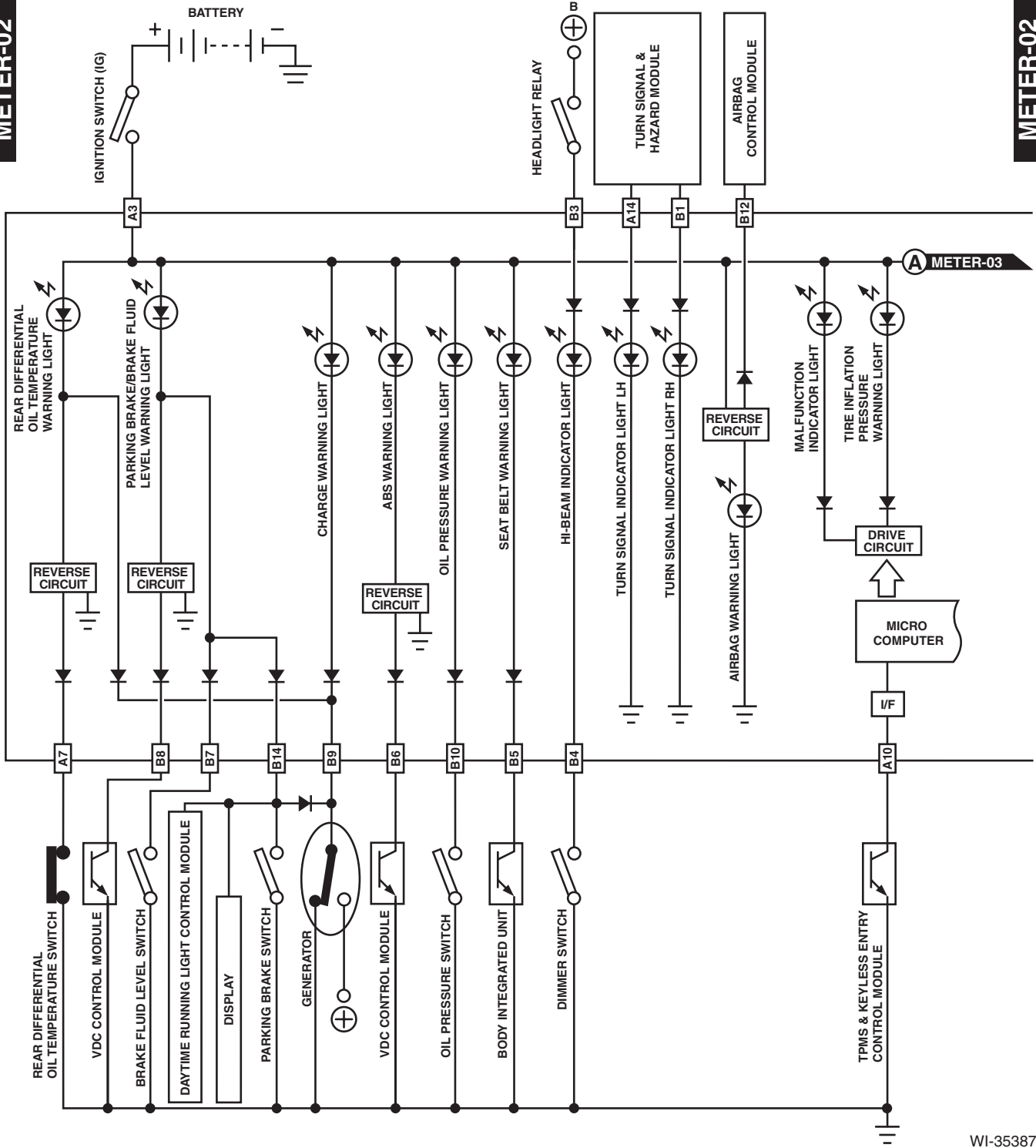


# Combination Meter System

WIRING SYSTEM

METER-02

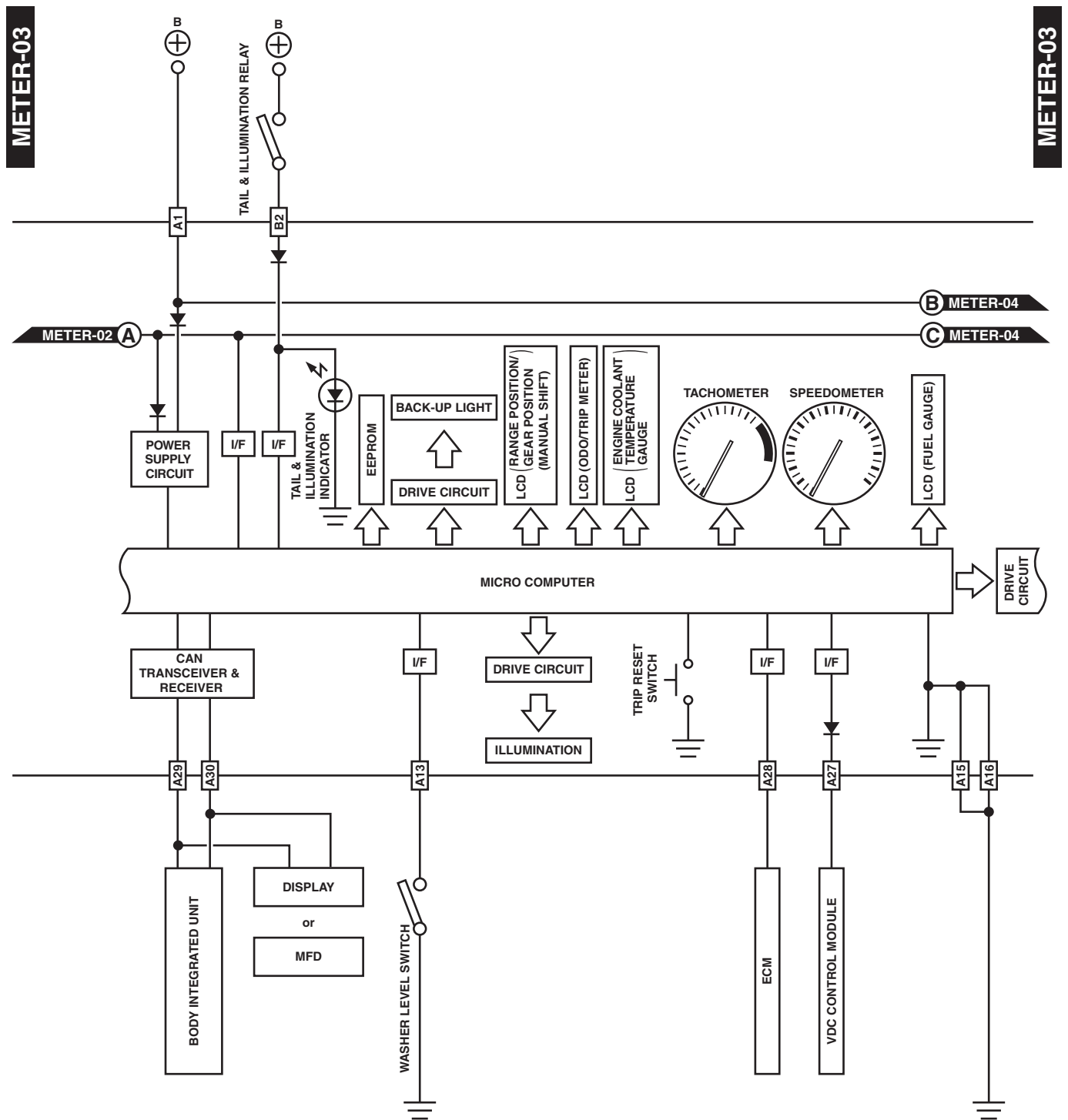
METER-02



WI-35387

# Combination Meter System

WIRING SYSTEM



WI-34405

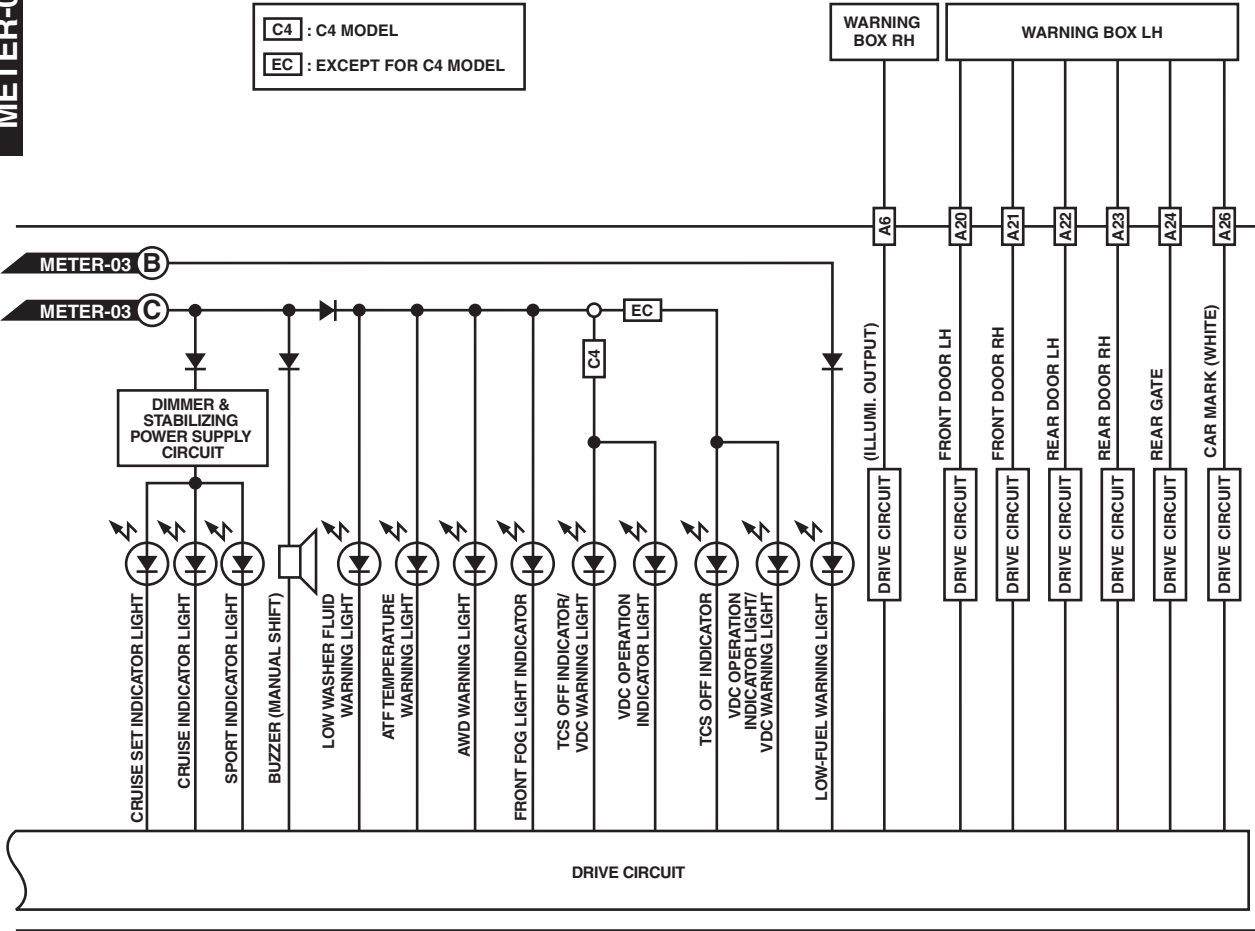
# Combination Meter System

WIRING SYSTEM

METER-04

METER-04

C4 : C4 MODEL  
 EC : EXCEPT FOR C4 MODEL



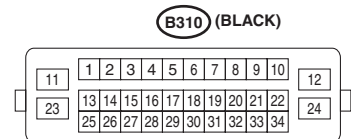
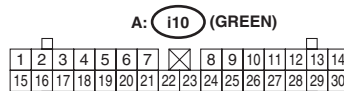
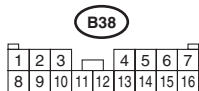
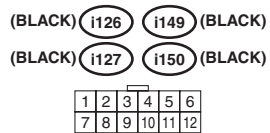
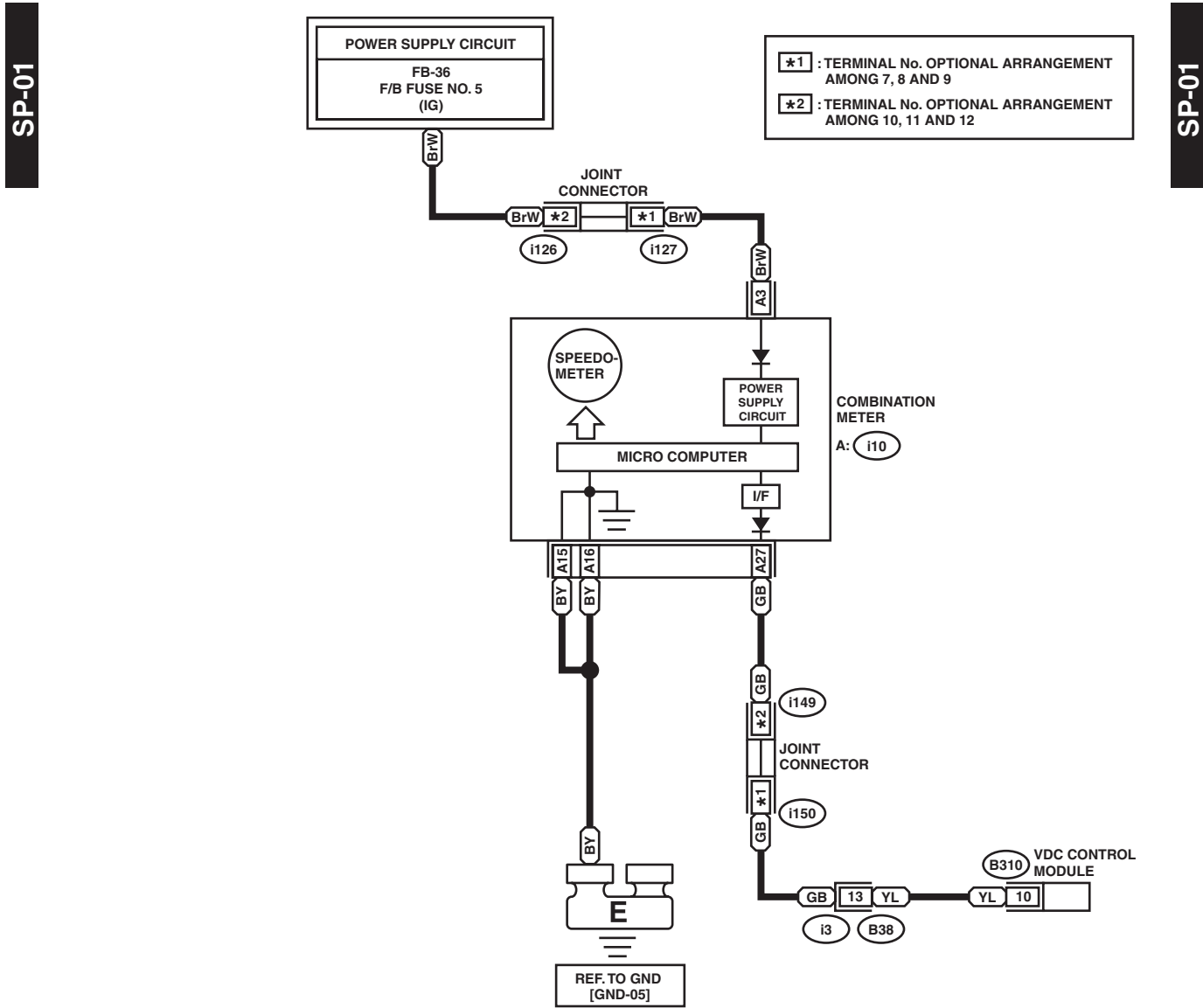
WI-34406

# Speedometer System

WIRING SYSTEM

## 48.Speedometer System

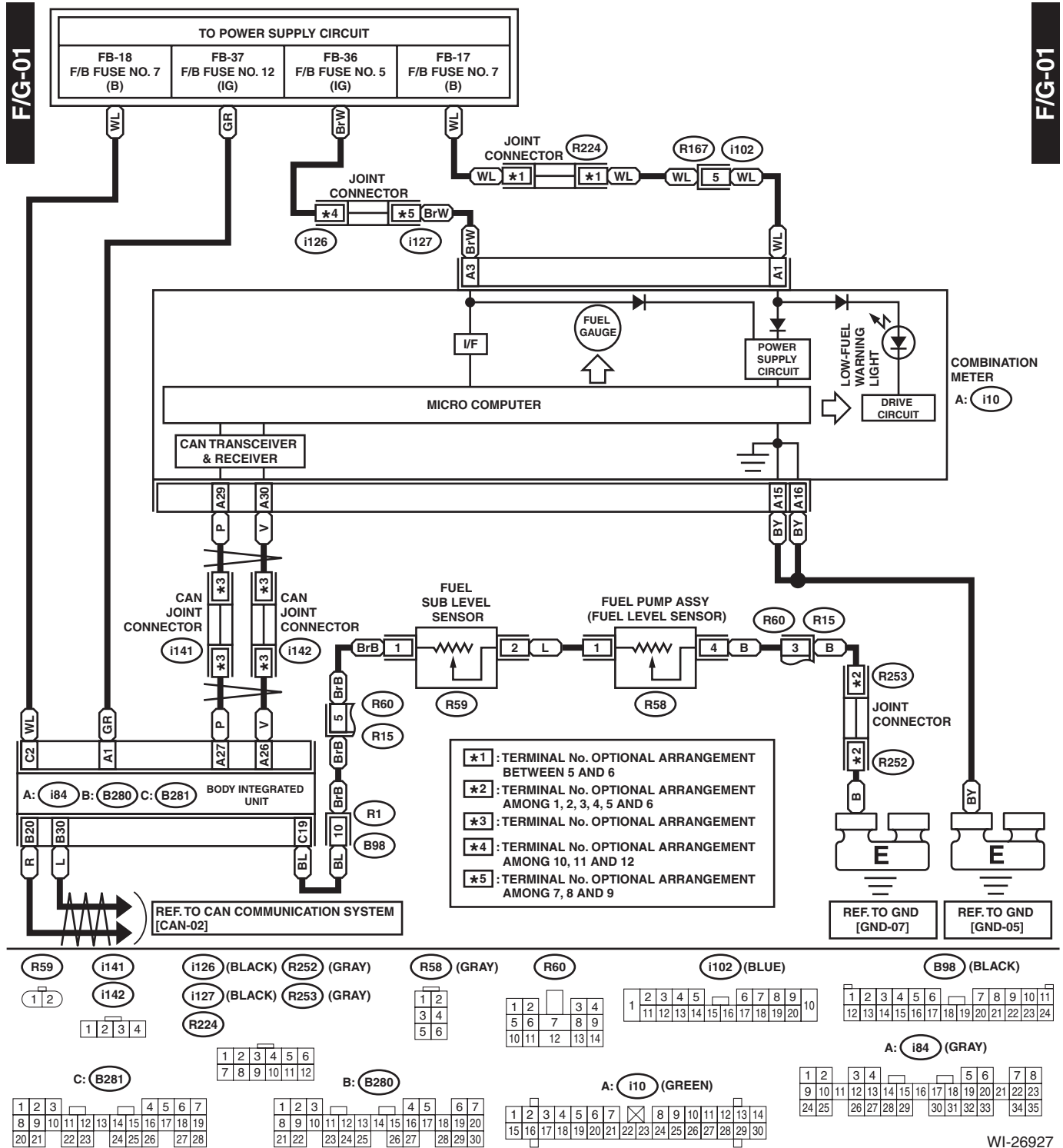
### A: WIRING DIAGRAM



WI-26926

## 49. Fuel Gauge System

### A: WIRING DIAGRAM



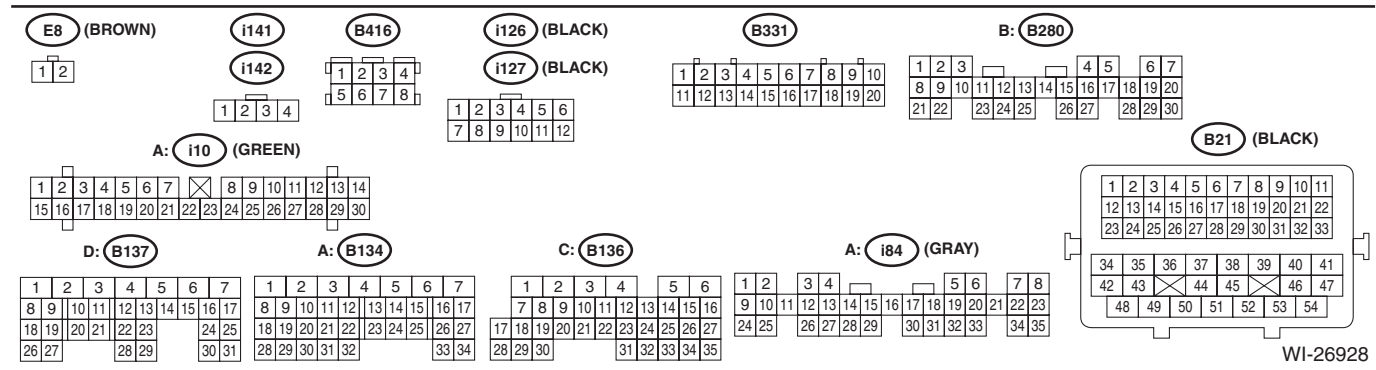
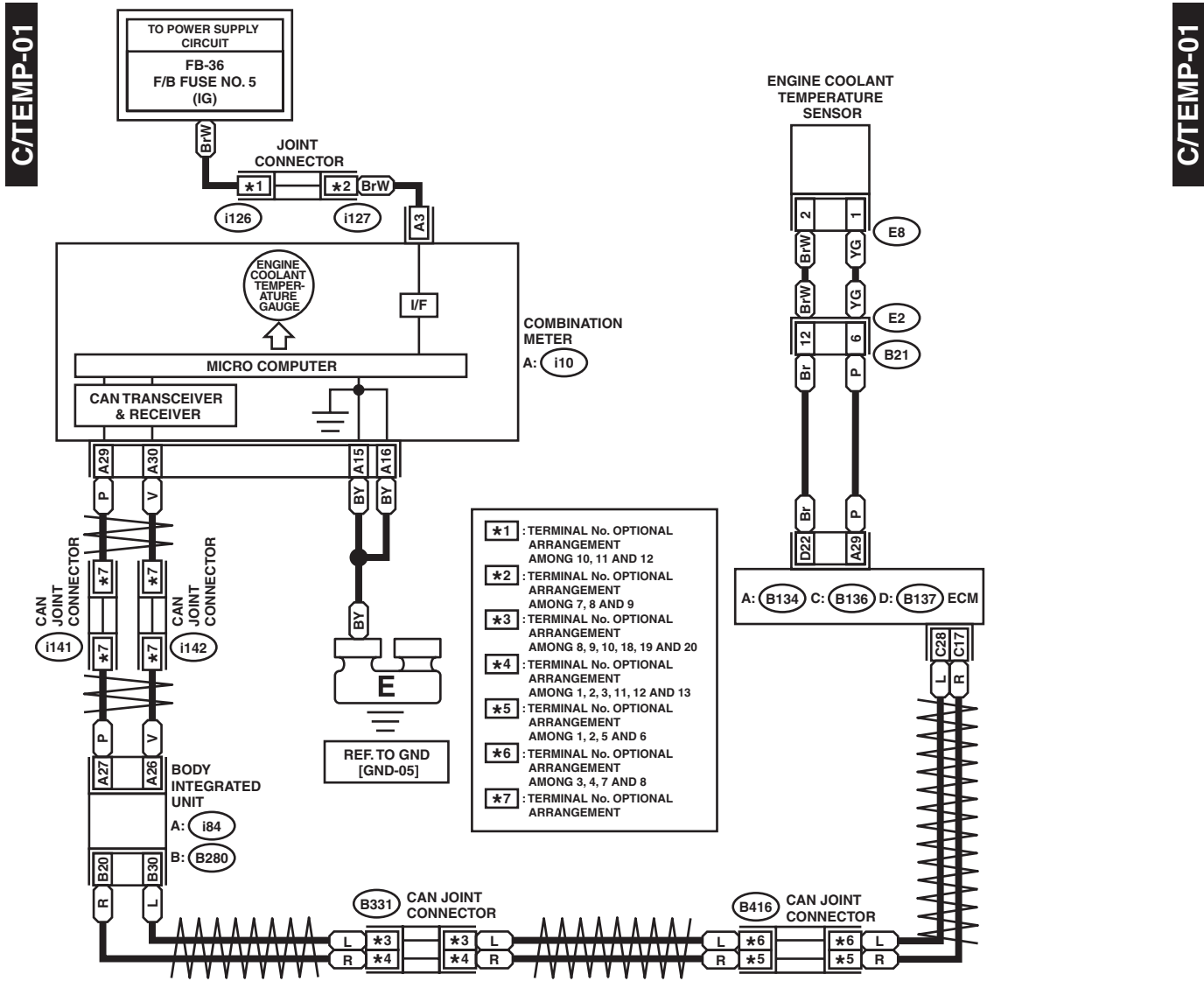
WI-26927

# Coolant Temperature System

WIRING SYSTEM

## 50. Coolant Temperature System

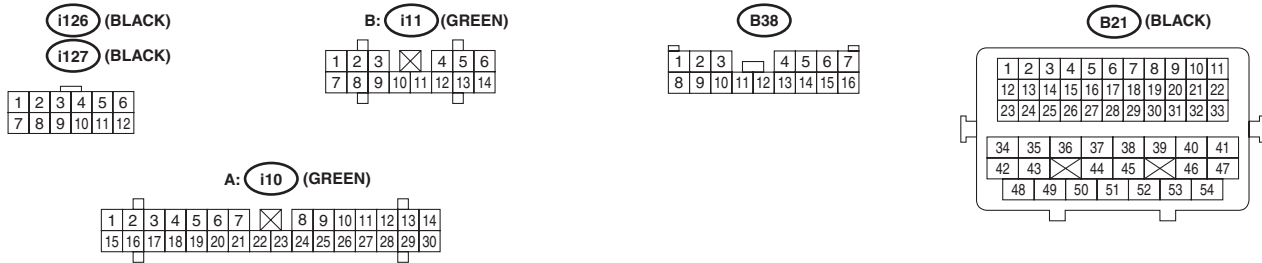
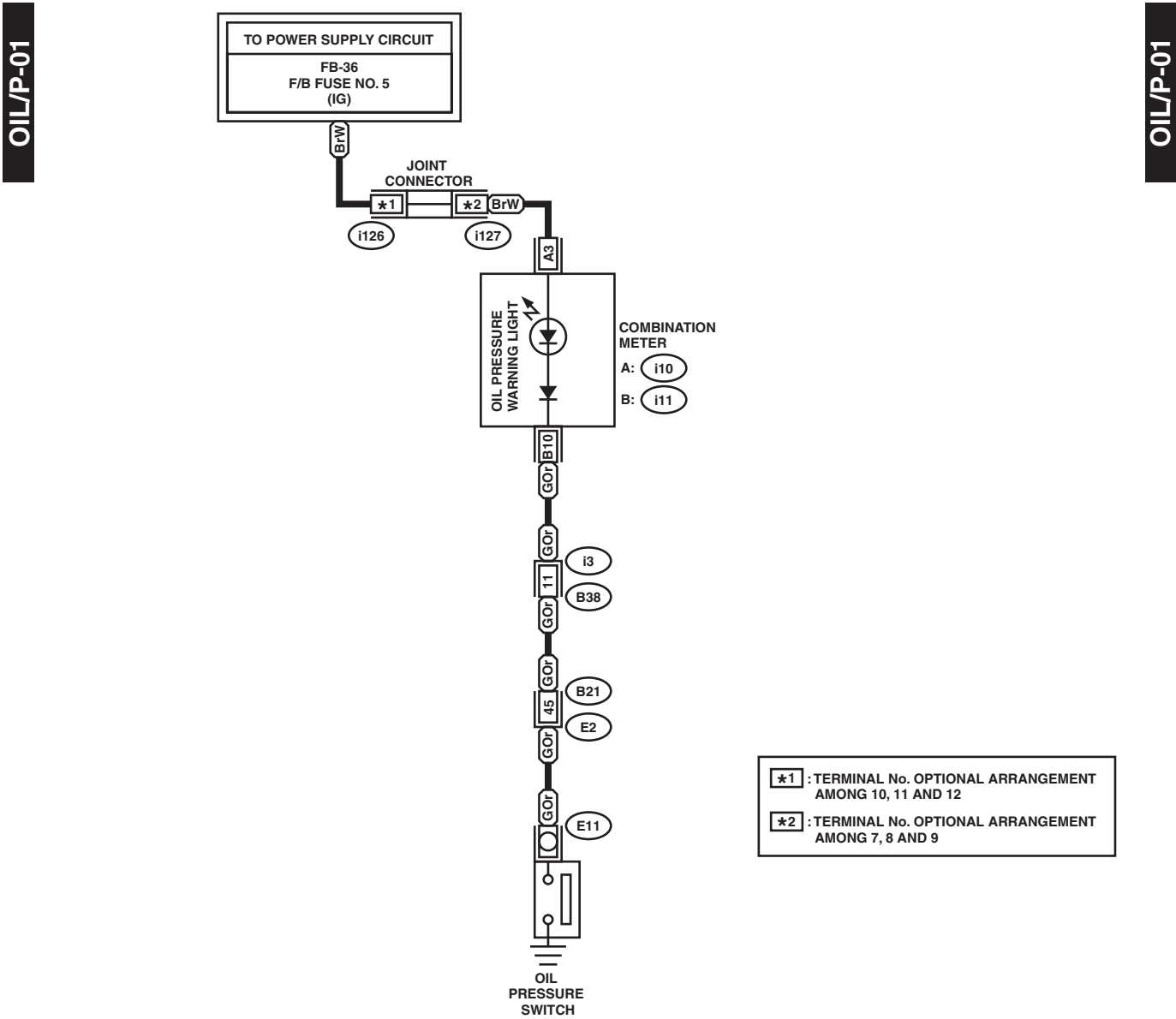
### A: WIRING DIAGRAM



WI-26928

## 51.Oil Pressure Warning Light System

### A: WIRING DIAGRAM



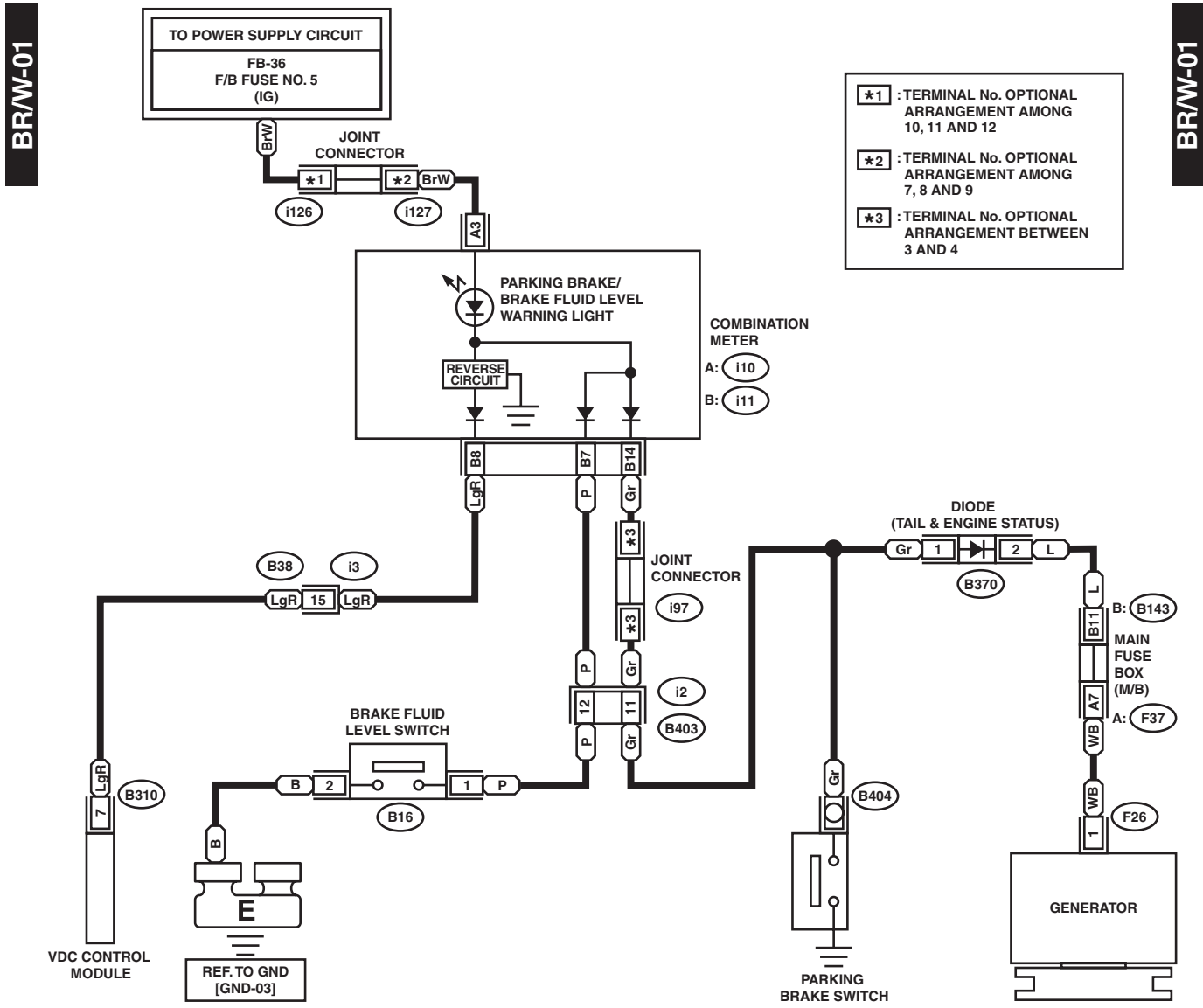
WI-26929

# Parking Brake / Brake Fluid Level Warning Light System

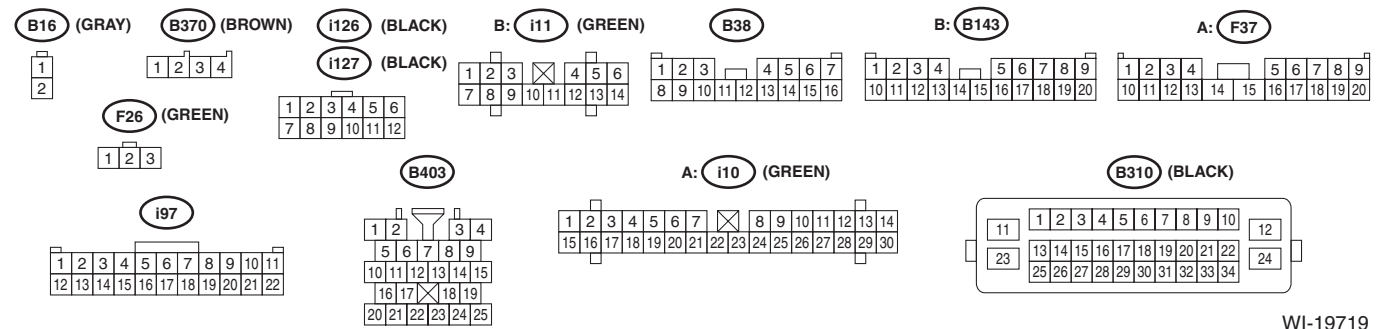
WIRING SYSTEM

## 52. Parking Brake / Brake Fluid Level Warning Light System

### A: WIRING DIAGRAM



- \*1 : TERMINAL No. OPTIONAL ARRANGEMENT AMONG 10, 11 AND 12
- \*2 : TERMINAL No. OPTIONAL ARRANGEMENT AMONG 7, 8 AND 9
- \*3 : TERMINAL No. OPTIONAL ARRANGEMENT BETWEEN 3 AND 4

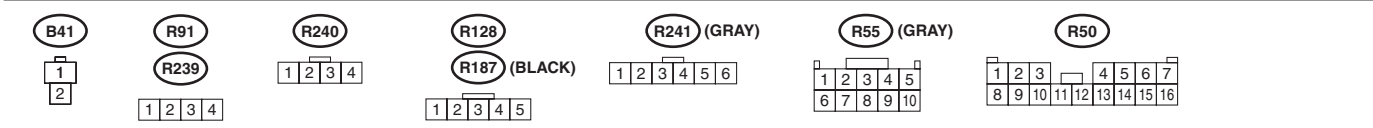
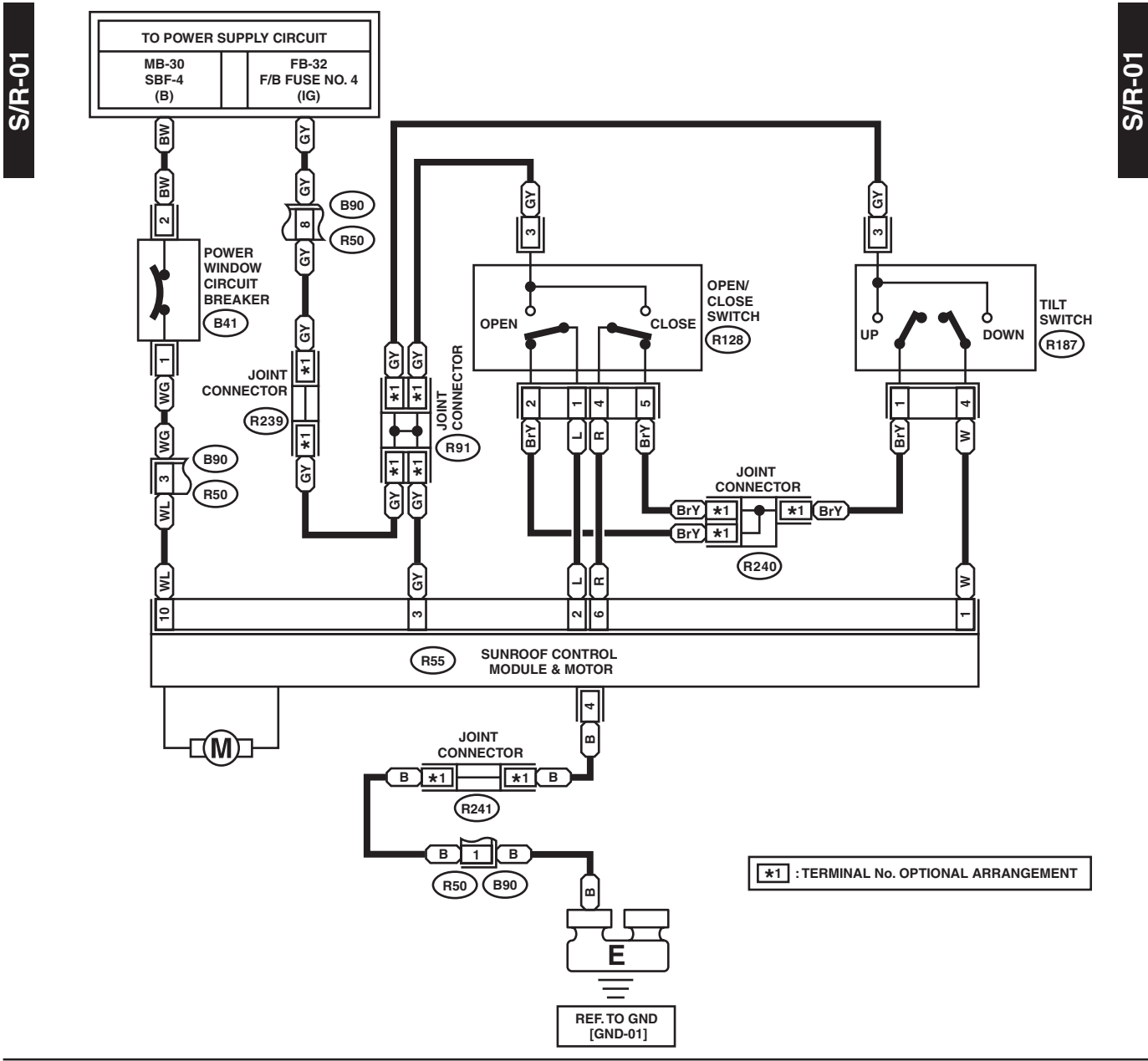


WI-19719



## 53.Sunroof Control System

### A: WIRING DIAGRAM

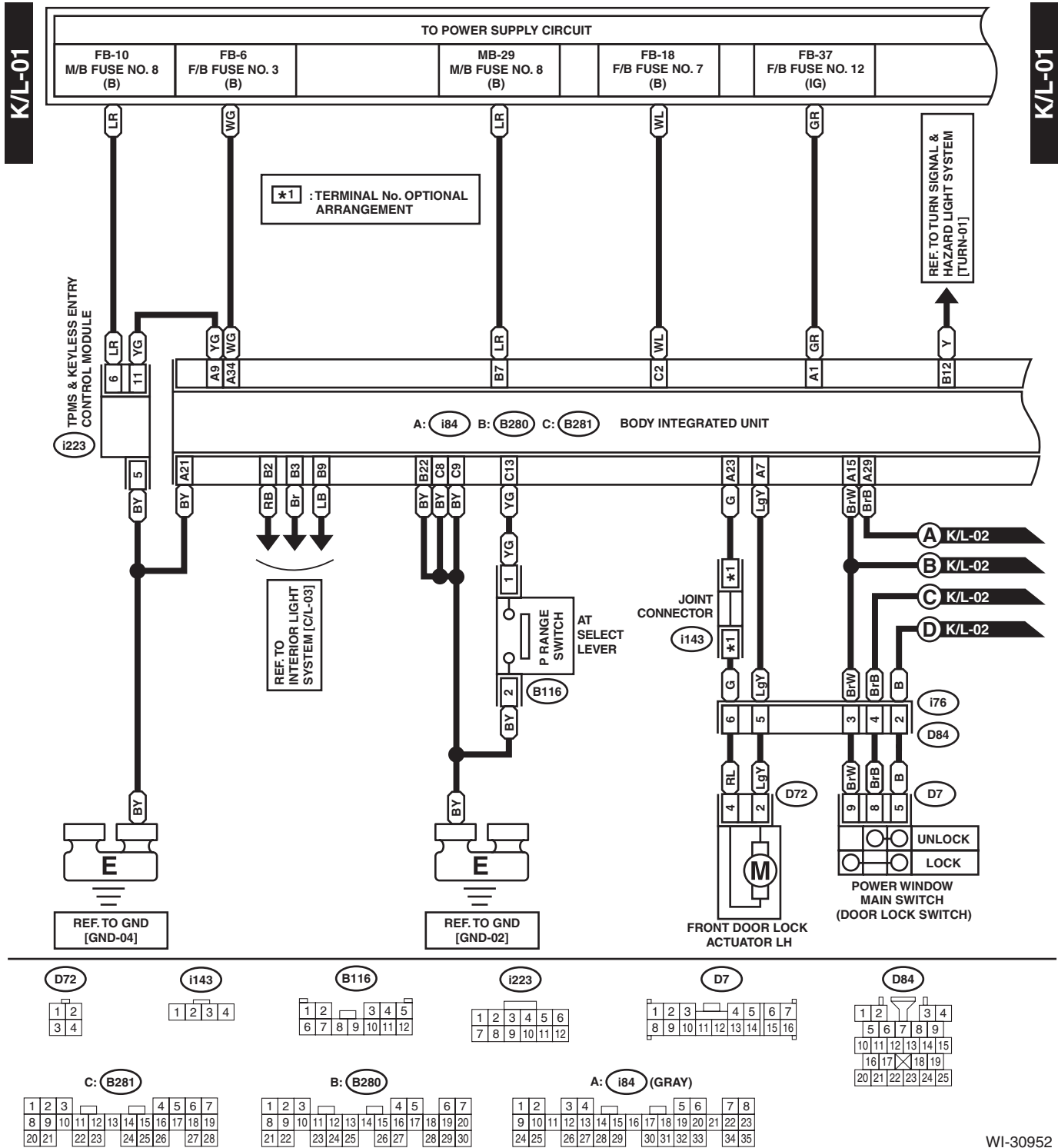


# Keyless Entry System

WIRING SYSTEM

## 54. Keyless Entry System

### A: WIRING DIAGRAM



WI-30952

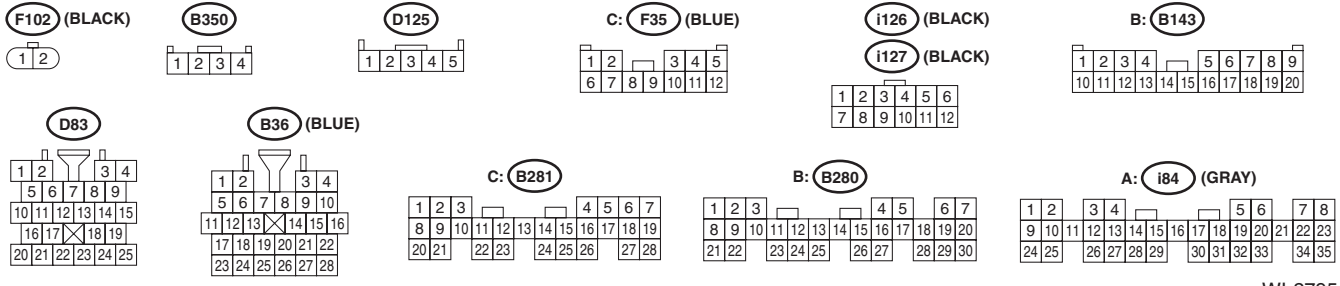
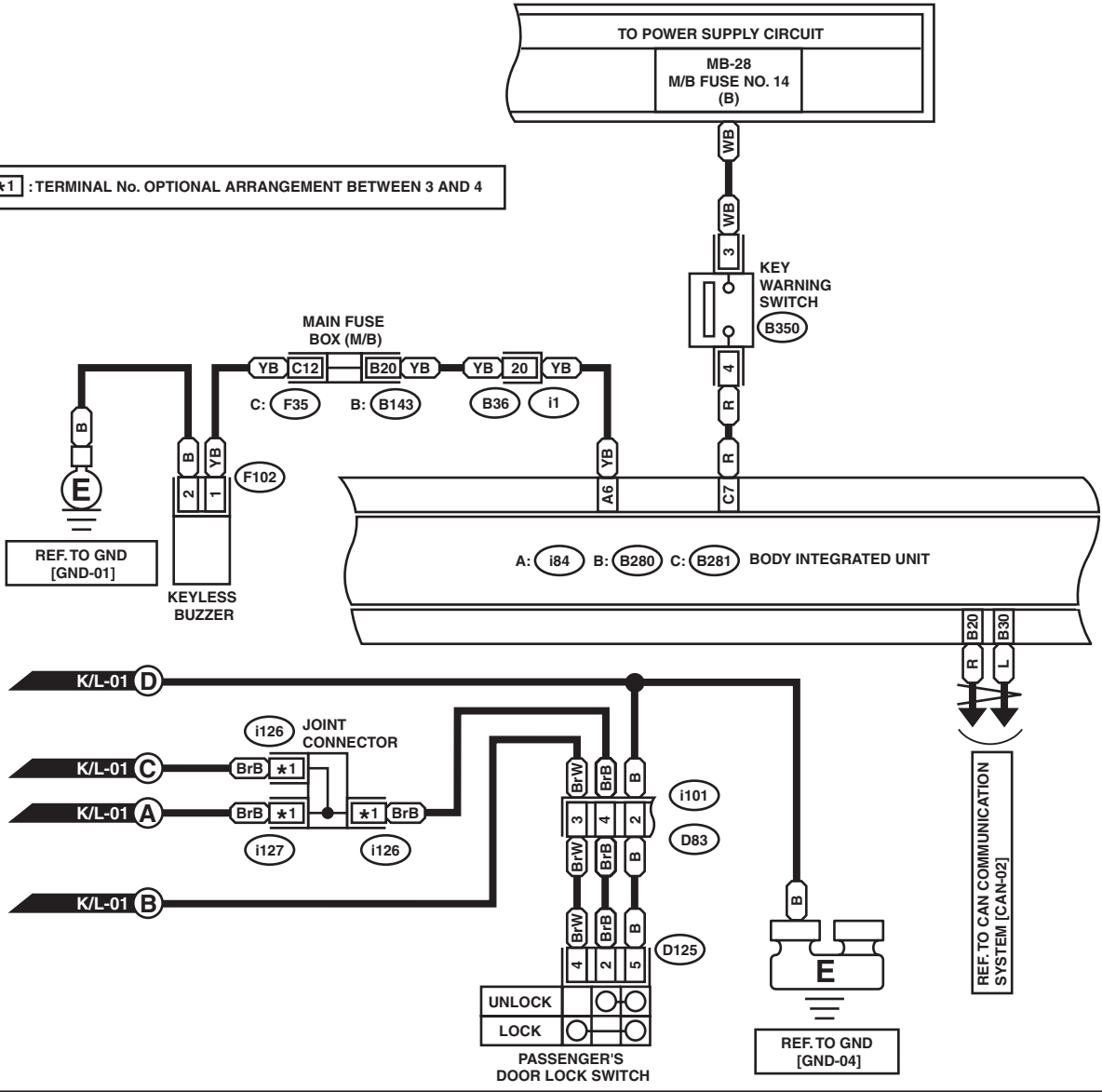
# Keyless Entry System

WIRING SYSTEM

K/L-02

K/L-02

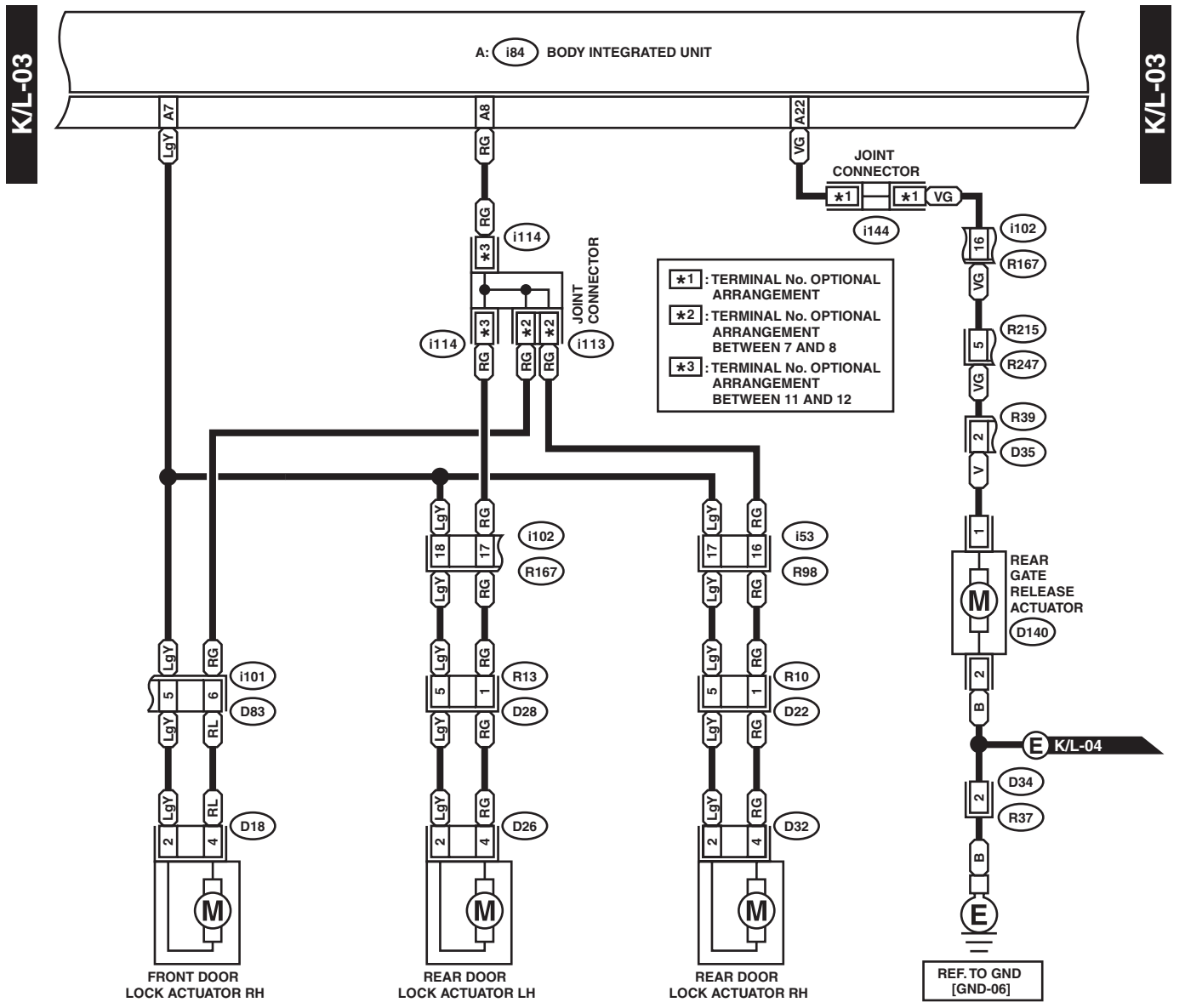
\*1 : TERMINAL No. OPTIONAL ARRANGEMENT BETWEEN 3 AND 4



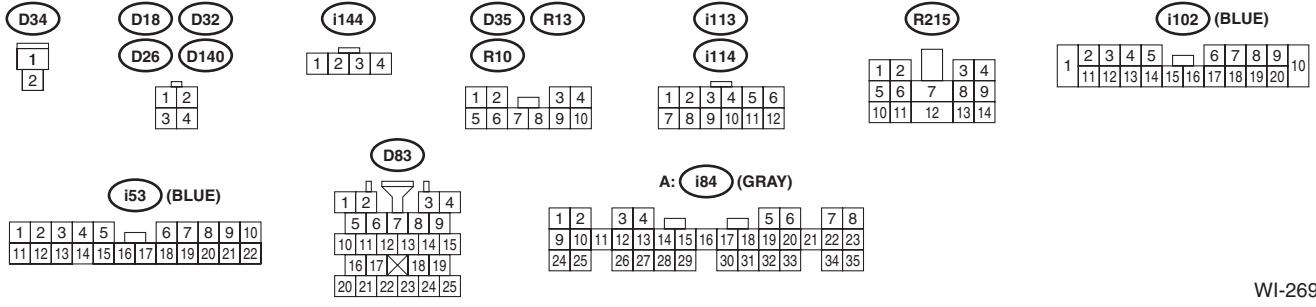
WI-27954

# Keyless Entry System

WIRING SYSTEM



\*1 : TERMINAL No. OPTIONAL ARRANGEMENT  
 \*2 : TERMINAL No. OPTIONAL ARRANGEMENT BETWEEN 7 AND 8  
 \*3 : TERMINAL No. OPTIONAL ARRANGEMENT BETWEEN 11 AND 12



WI-26932

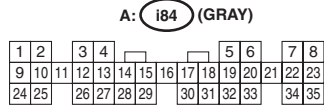
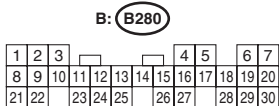
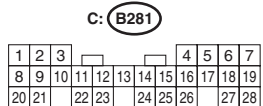
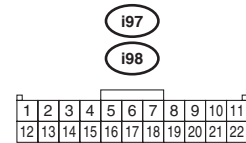
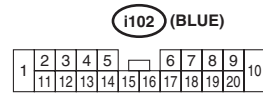
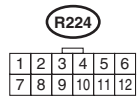
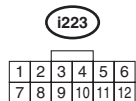
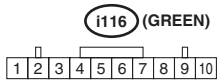
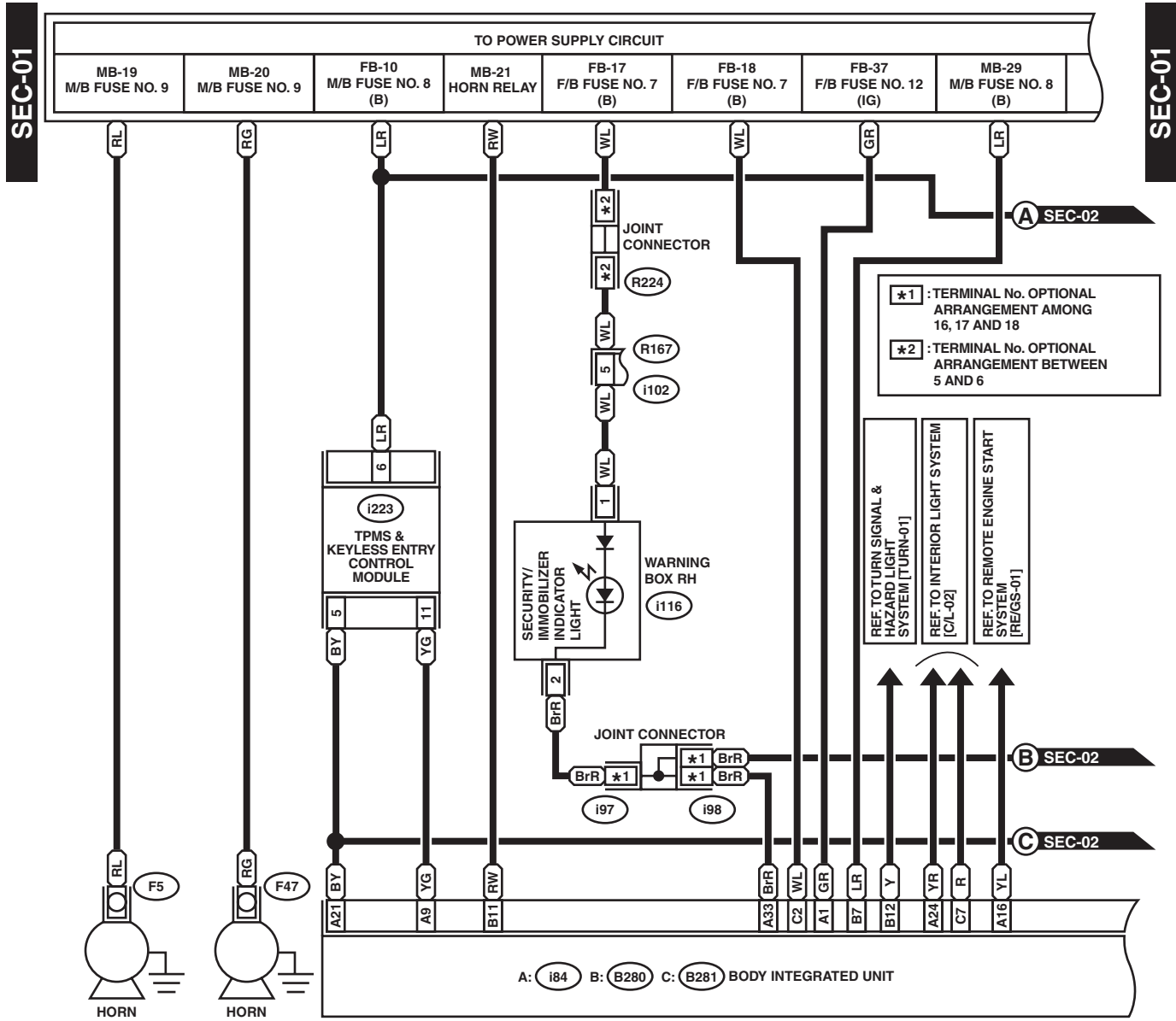


# Security System

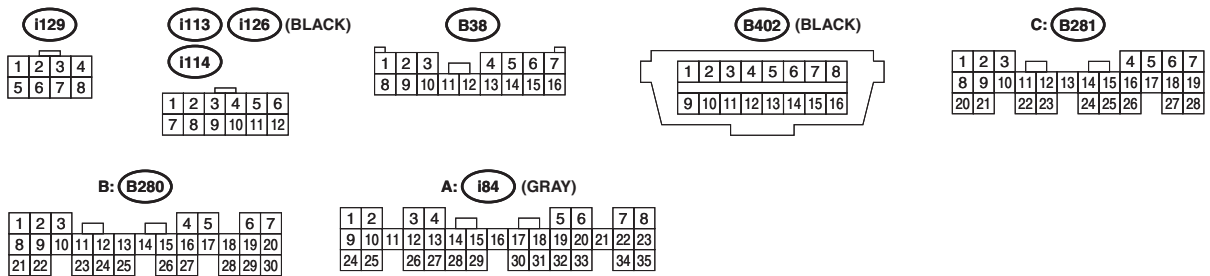
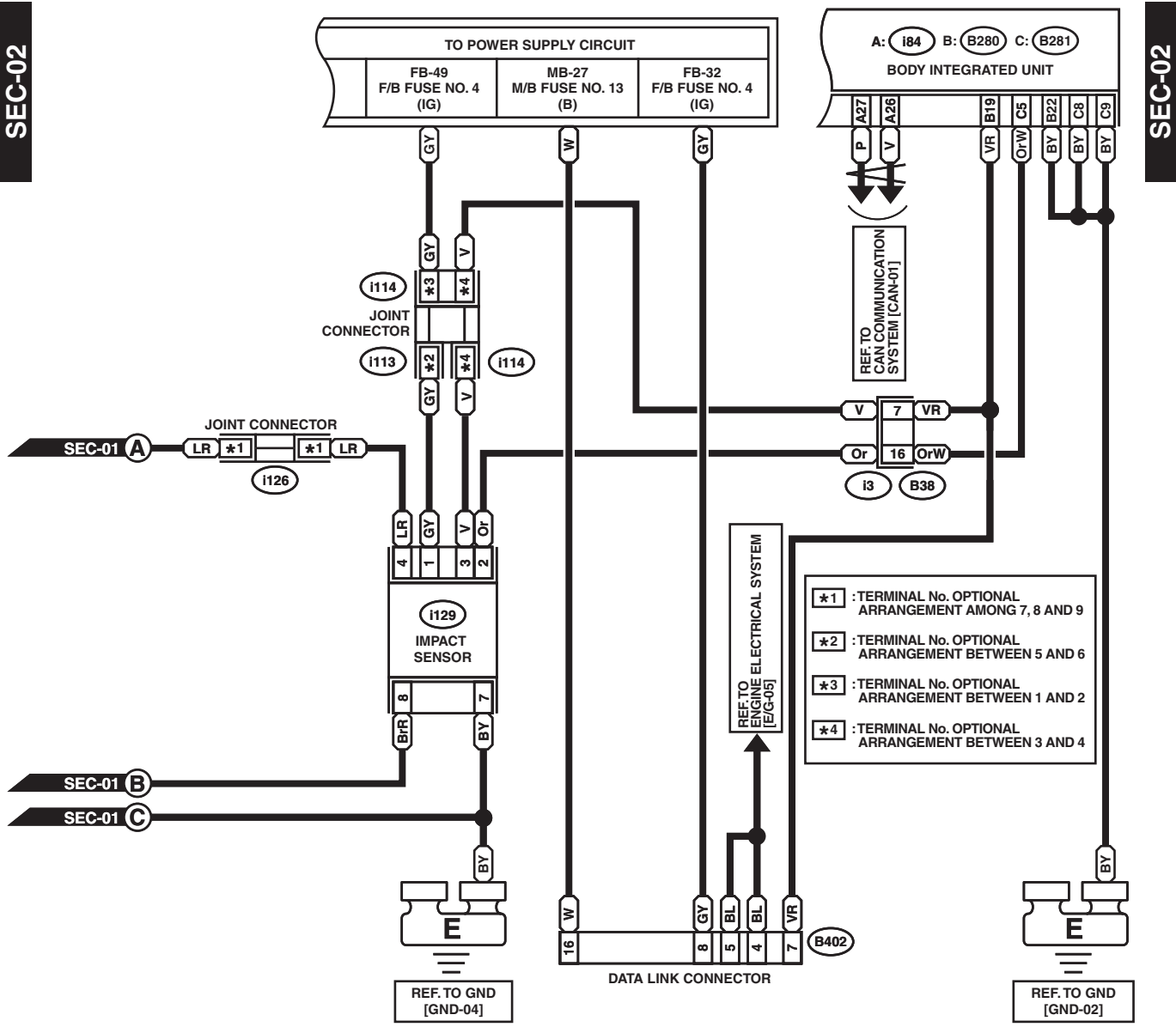
WIRING SYSTEM

## 55.Security System

### A: WIRING DIAGRAM



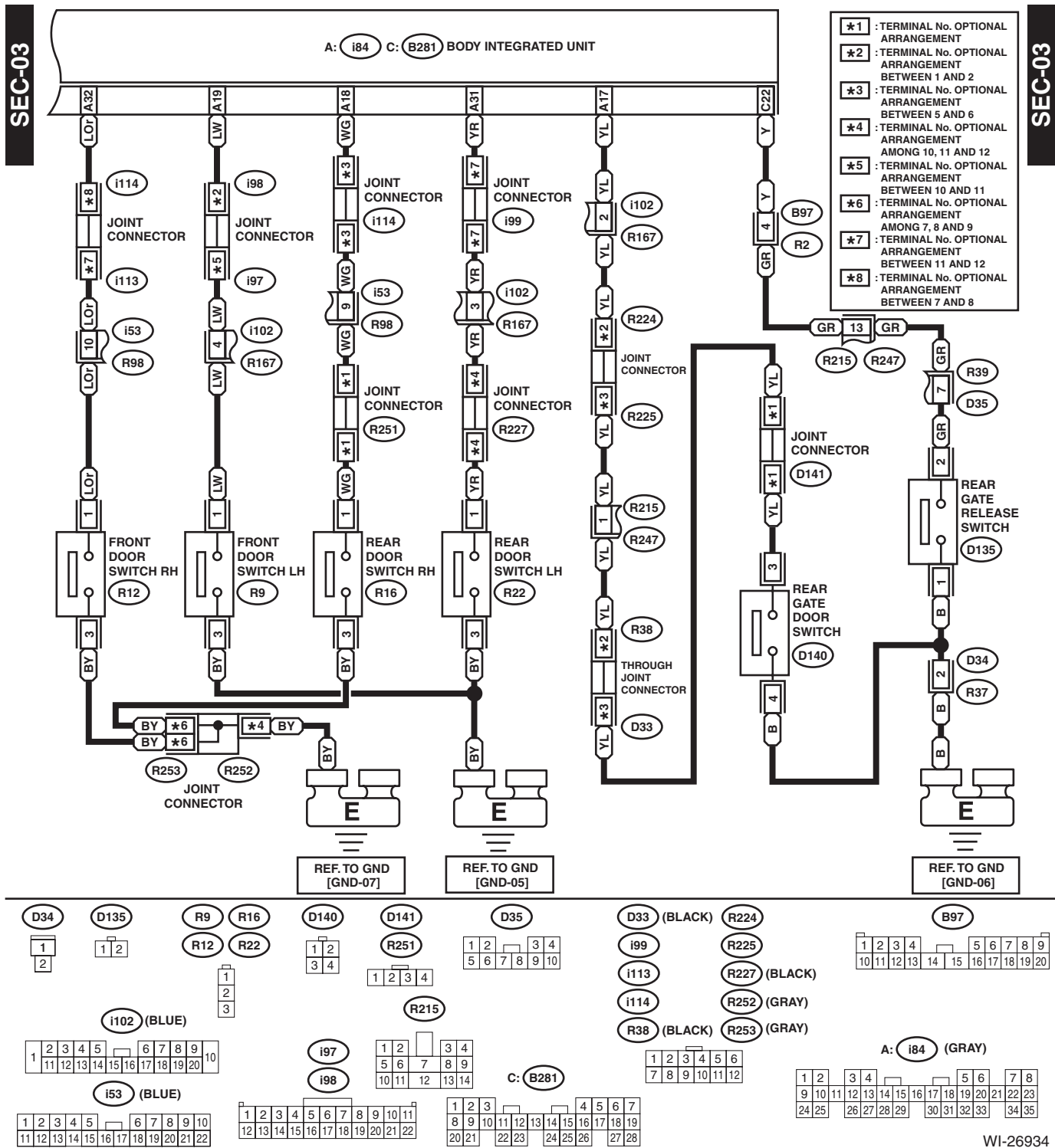
WI-35388



WI-30954

# Security System

## WIRING SYSTEM







# Rearview Mirror System

WIRING SYSTEM

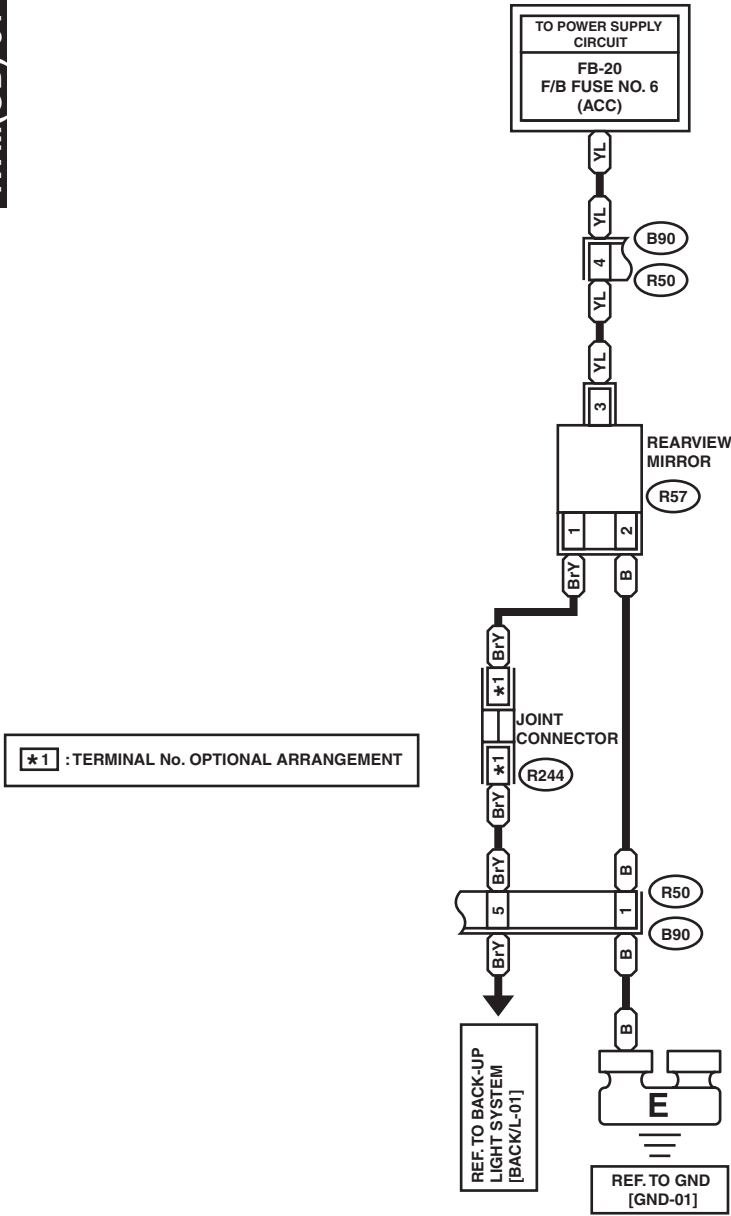
## 57.Rearview Mirror System

### A: WIRING DIAGRAM

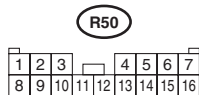
#### 1. WITHOUT REARVIEW DISPLAY

RVM(OD)-01

RVM(OD)-01



\*1 : TERMINAL No. OPTIONAL ARRANGEMENT

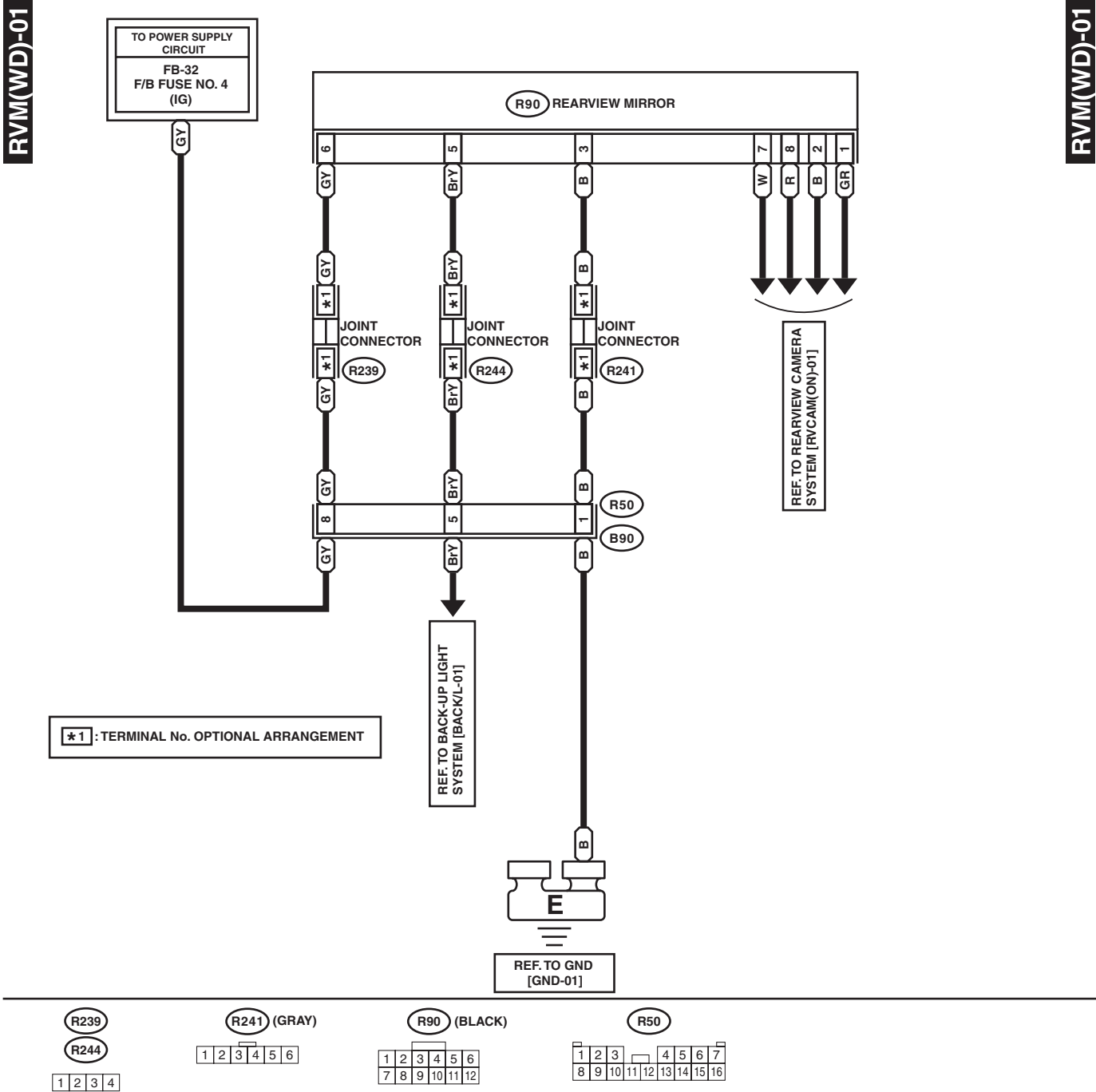


WI-26936

# Rearview Mirror System

WIRING SYSTEM

## 2. WITH REARVIEW DISPLAY



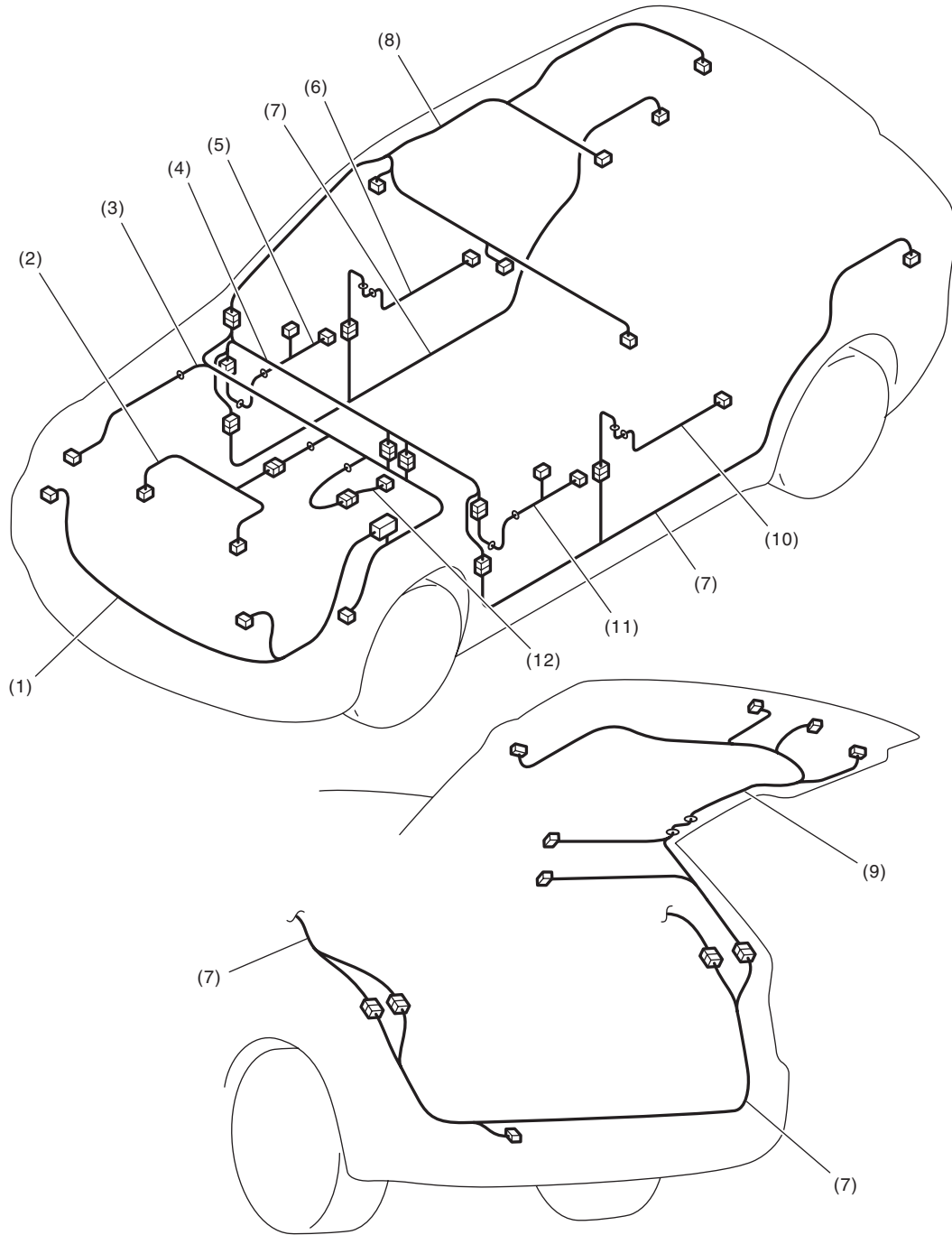
WI-26937

# Harness Components Location

WIRING SYSTEM

## 58.Harness Components Location

### A: LOCATION



WI-16110

- |                                     |                         |                         |
|-------------------------------------|-------------------------|-------------------------|
| (1) Front wiring harness            | (5) Front door cord RH  | (9) Rear gate cord      |
| (2) Engine wiring harness           | (6) Rear door cord RH   | (10) Rear door cord LH  |
| (3) Bulkhead wiring harness         | (7) Rear wiring harness | (11) Front door cord LH |
| (4) Instrument panel wiring harness | (8) Roof cord           | (12) Transmission cord  |

## 59. Front Wiring Harness

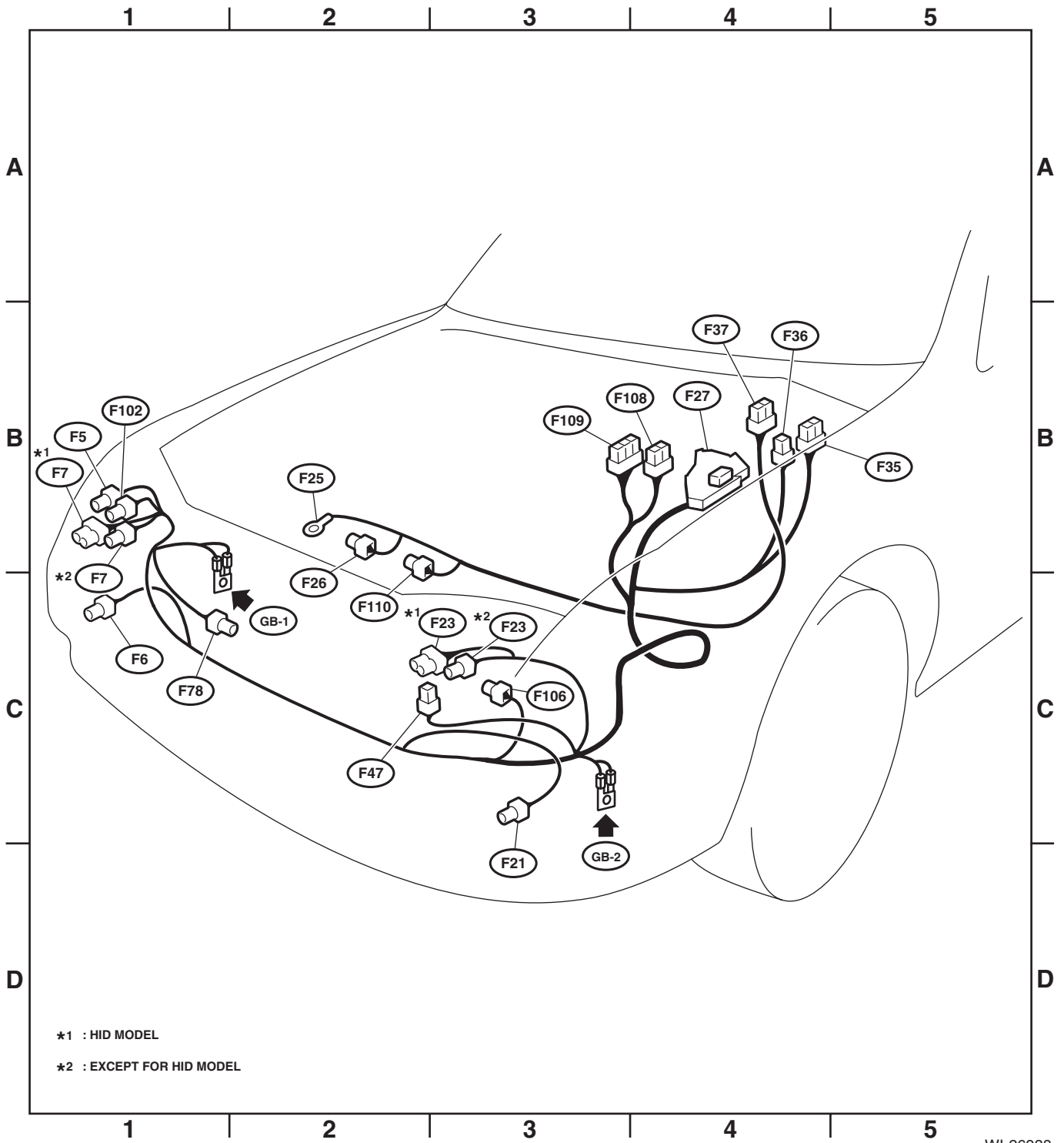
### A: LOCATION

Connector				Connecting to	
No.	Pole	Color	Area	No.	Description
F5	1	Black	B-1		Horn
F6	2	Gray	C-1		Front fog light RH
F7	8	Gray	B-1		Headlight and front clearance light & front turn signal light RH (except for HID model)
	10	Gray	B-1		Headlight & headlight beam leveler & front clearance light & front turn signal light RH (HID model)
F21	2	Gray	C-3		Front fog light LH
F23	8	Gray	C-3		Headlight and front clearance light & front turn signal light LH (except for HID model)
	10	Gray	C-3		Headlight & headlight beam leveler & front clearance light & front turn signal light LH (HID model)
F25	1	★	B-2		Generator terminal B
F26	3	Green	B-2		Generator
F27	22	Black	B-4		Relay holder
F35	12	Blue	B-4		Main fuse box (M/B)
F36	7	★	B-4		
F37	20	★	B-4		
F47	1	Black	C-2		Horn
F78	2	Black	C-1		Ambient sensor
F102	2	Black	B-1		Keyless buzzer
F106	3	Gray	C-3		Radiator fan control unit
F108	18	Gray	B-4	B361	Through joint connector
F109	24	★	B-3	B360	
F110	1	Black	B-2		Magnet clutch

★ : White or natural color

# Front Wiring Harness

WIRING SYSTEM



WI-26938

# Bulkhead Wiring Harness (In Engine Compartment)

WIRING SYSTEM

## 60. Bulkhead Wiring Harness (In Engine Compartment)

### A: LOCATION

Connector				Connecting to	
No.	Pole	Color	Area	No.	Description
B3	5	Black	B-2		Mass air flow and intake air temperature sensor
B6	2	Gray	B-2		Front ABS wheel speed sensor RH
B8	5	Gray	B-4		Front wiper motor
B10	4	Gray	B-4		Pressure switch
B11	20	Gray	B-3	T4	Transmission harness
B12	8	Light gray	B-3	T3	
B14	1	Black	B-4		Starter motor
B15	2	Gray	B-4		Front ABS wheel speed sensor LH
B16	2	Gray	B-4		Brake fluid level switch
B21	54	Black	B-3	E2	Engine wiring harness
B22	16	Brown	B-3	E3	
B143	20	★	B-4		Main fuse box (M/B)
B144	9	Brown	B-4		
B145	7	Brown	B-4		
B146	6	Gray	C-4		Front washer motor & rear washer motor & washer level switch
B186	8	★	B-4		Main fuse box (M/B)
B310	34	Black	B-2		VDC control module
B329	2	Black	B-2		Hood switch
B360	16	Gray	B-4	F109	Through joint connector
B361	14	Gray	B-4	F108	
B407	2	Black	B-5		Puddle light LH
B409	4	Black	B-5		Wiper relay unit
B410	3	Dark gray	B-5		
B411	3	Black	B-4		Pressure sensor
B417	2	Dark gray	B-3		Vacuum pump
B422	4	Black	B-4		Vacuum pump relay
B430	2	Black	B-2		Puddle light RH
B432	8	Black	B-4		SBF holder
B433	2	★	B-4		Main fuse box (M/B)

★ : White or natural color

Connector				Connecting to	
No.	Pole	Color	Area	No.	Description
AB13	2	Yellow	C-3		Front sub sensor LH
AB16	2	Yellow	B-1		Front sub sensor RH





# Bulkhead Wiring Harness (In Compartment)

WIRING SYSTEM

## 61. Bulkhead Wiring Harness (In Compartment)

### A: LOCATION

Connector				Connecting to	
No.	Pole	Color	Area	No.	Description
B31	10	★	B-3	AB1	Airbag wiring harness
B32	8	★	C-2		Turn signal and hazard unit
B36	28	Blue	B-2	i1	Instrument panel wiring harness
B38	16	★	B-5	i3	
B41	2	★	C-2		Power window circuit breaker
B47	6	Brown	B-5		Main relay
B52	24	★	B-2		Fuse & relay box (F/B)
B54	35	★	C-3		TCM
B55	35	★	B-3		
B65	4	Black	B-3		Stop light and brake switch
B68	8	★	B-3		Roll connector
B69	4	★	B-4		Parking switch
B70	18	★	B-3		Combination switch (wiper)
B71	17	★	B-3		Combination switch (lighting)
B72	6	★	B-3		Ignition switch
B77	7	Green	B-4		Mode door actuator
B86	5	★	B-4		Power transistor
B87	2	★	B-4		Blower motor
B88	2	★	B-4		Evaporator thermo switch
B90	16	★	B-4	R50	Roof cord
B91	7	Green	B-4		Intake door actuator
B96	8	Black	B-2		Daytime running light control module
B97	20	★	C-1	R2	Rear wiring harness
B98	24	Black	B-5	R1	
B116	12	★	D-4		AT select lever
B122	6	★	D-5		Joint connector (E/G)
B134	34	★	C-4		ECM
B135	35	★	C-4		
B136	35	★	C-4		
B137	31	★	C-5		
B152	10	Gray	B-2		Fuse & relay box (F/B)
B158	8	★	B-2		
B159	9	Brown	B-2		
B177	2	★	B-4		Wiper deicer
B225	40	Black	C-2		Seat heater relay
					Starter relay
					Power window relay
					Fuse (relay block)
					Accessory relay 2
					Front fog light relay
					Mirror heater relay
					Low beam relay
	Wiper deicer relay				
B231	4	★	B-3		Steering angle sensor
B235	7	Green	B-4		Passenger's air mix door actuator
B242	10	★	B-2		Daytime running light control module

# Bulkhead Wiring Harness (In Compartment)

## WIRING SYSTEM

Connector				Connecting to	
No.	Pole	Color	Area	No.	Description
B280	30	★	C-3		Body integrated unit
B281	28	★	C-3		
B282	16	★	C-5		Auto A/C control module
B283	26	★	B-5		Auto A/C control module & rear defogger switch
B315	6	Black	B-4		Accelerator pedal position sensor
B327	6	Brown	B-5		Main relay 2
B330	4	Black	B-5		Inhibitor relay
B331	20	★	B-4		CAN joint connector
B333	2	★	B-1		Bulkhead wiring harness
B334	24	★	B-2		Remote engine start control module
B350	4	★	B-3		Key warning switch & key lock solenoid
B351	2	Black	B-4		Antenna
B356	4	Black	B-5		Back-up light relay
B359	6	Black	D-4		Yaw rate & G sensor
B362	8	Black	B-5		Relay holder
B370	4	Brown	B-4		Diode (Tail & engine status)
B373	2	★	B-2		Fuse & relay box (F/B)
B390	7	Green	B-4		Driver's seat air mix door actuator
B402	16	Black	B-2		Data link connector
B403	25	★	B-2	i2	Instrument panel wiring harness
B404	1	Black	B-2		Parking brake switch
B405	2	Black	B-2		Diode (Daytime running light)
B413	2	★	B-3		In-vehicle sensor
B414	2	★	B-4		Key illumination
B416	8	★	D-4		CAN joint connector
B418	2	★	B-4		Foot light (Passenger's seat)
B419	7	★	B-4		Blower motor relay
B420	2	Green	C-4		Delivery (test) mode connector
B421	2	Green	C-4		
B424	8	★	D-5		Joint connector
B426	6	★	D-5		
B431	2	★	B-3		Foot light (Driver's seat)

★ : White or natural color

Connector				Connecting to	
No.	Pole	Color	Area	No.	Description
AB1	10	Gray	B-3	B31	Bulkhead wiring harness
AB2	4	Yellow	B-3	AB7	Driver's airbag module (roll connector)
AB6	30	Yellow	C-4		Airbag control module
AB9	4	Yellow	C-3		Passenger's airbag module
AB35	2	Black	B-1		Fuse & relay box (F/B)



# Engine Wiring Harness and Transmission Cord

## WIRING SYSTEM

### 62.Engine Wiring Harness and Transmission Cord

#### A: LOCATION

Connector				Connecting to	
No.	Pole	Color	Area	No.	Description
E2	54	Black	A-3	B21	Bulkhead wiring harness
E3	16	Brown	D-3	B22	
E4	2	Blue	A-2		Purge control solenoid valve
E5	2	Dark gray	A-2		Fuel injector No. 1
E6	2	Dark gray	A-2		Fuel injector No. 3
E8	2	Brown	B-4		Engine coolant temperature sensor
E10	2	Light gray	B-4		Crankshaft position sensor
E11	1	★	B-2		Oil pressure switch
E14	2	Blue	A-3		Knock sensor 1
E16	2	Dark gray	B-4		Fuel injector No. 2
E17	2	Dark gray	B-4		Fuel injector No. 4
E18	6	Dark gray	B-3		EGR control valve
E19	1	★	B-3		Power steering oil pressure switch
E24	4	Light gray	D-3		Front oxygen (A/F) sensor LH
E25	4	Dark gray	D-3		Rear oxygen sensor LH
E28	3	Black	A-3		Intake manifold pressure sensor
E31	3	Gray	B-1		Ignition coil No. 1
E32	3	Gray	C-4		Ignition coil No. 2
E33	3	Gray	B-2		Ignition coil No. 3
E34	3	Gray	B-4		Ignition coil No. 4
E43	2	Dark gray	A-2		Fuel injector No. 5
E44	2	Dark gray	B-5		Fuel injector No. 6
E45	3	Gray	B-2		Ignition coil No. 5
E46	3	Gray	B-5		Ignition coil No. 6
E47	4	Light gray	D-2		Front oxygen (A/F) sensor RH
E48	2	Blue	A-4		Knock sensor 2
E57	6	Black	A-3		Electronic throttle control
E61	4	Dark gray	C-2		Rear oxygen sensor RH
E62	3	Gray	B-1		Exhaust camshaft position sensor RH
E65	3	Gray	C-4		Exhaust camshaft position sensor LH
E67	2	Black	B-1		Intake oil flow control solenoid valve RH
E68	2	Black	B-4		Intake oil flow control solenoid valve LH
E73	3	Black	A-2		Intake camshaft position sensor RH
E74	3	Black	B-5		Intake camshaft position sensor LH
E75	2	Black	B-4		Engine oil temperature sensor
E76	10	Dark gray	A-3	E77	Engine wiring harness
E77	10	Gray	A-3	E76	
E80	2	Blue	B-2		Exhaust oil flow control solenoid valve RH
E81	2	Blue	B-4		Exhaust oil flow control solenoid valve LH

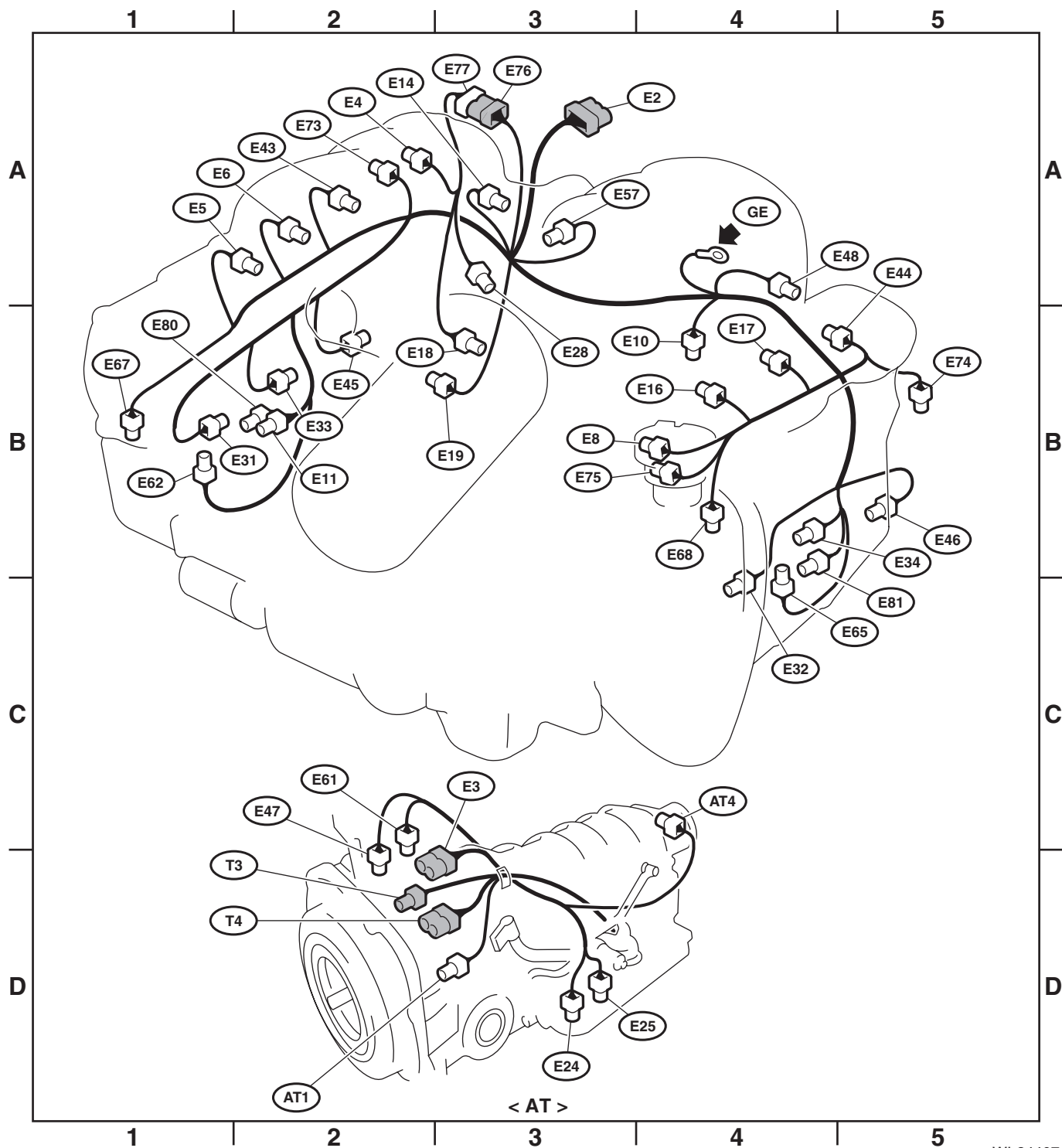
★ : White or natural color

Connector				Connecting to	
No.	Pole	Color	Area	No.	Description
AT1	3	Black	D-3		Turbine speed sensor 1
AT4	3	Black	C-4		Rear vehicle speed sensor

# Engine Wiring Harness and Transmission Cord

WIRING SYSTEM

Connector				Connecting to	
No.	Pole	Color	Area	No.	Description
T3	8	Light gray	D-2	B12	Bulkhead wiring harness
T4	20	Gray	D-3	B11	



WI-34407

# Instrument Panel Wiring Harness

WIRING SYSTEM

## 63. Instrument Panel Wiring Harness

### A: LOCATION

Connector				Connecting to	
No.	Pole	Color	Area	No.	Description
i1	28	Blue	B-1	B36	Bulkhead wiring harness
i2	25	★	B-1	B403	
i3	16	★	B-5	B38	
i5	20	★	B-1		Fuse & relay box (F/B)
i6	16	★	C-2		Remote control mirror switch
i10	30	Green	B-2		Combination meter
i11	14	Green	B-2		
i22	4	★	B-4		Hazard switch
i23	2	★	B-4		Glove box light
i26	16	★	C-4		Audio
i29	1	Black	C-4		Audio bracket ground
i39	8	★	C-2		Headlight beam leveler switch
i51	2	★	B-5		Sunload sensor
i53	22	Blue	C-5	R98	Rear wiring harness
i62	2	★	B-3		Center speaker
i76	25	★	C-1	D84	Front door cord LH
i78	15	Blue	C-2		Push switch
i79	6	★	C-2		Illumination control switch
i82	4	★	B-3		Joint connector
i83	4	★	B-3		
i84	35	Gray	B-2		Body integrated unit
i85	14	★	C-4		Audio
i88	8	Black	C-4		A/C control panel
i97	22	★	B-3		Joint connector
i98	22	★	B-2		
i99	12	★	B-5		
i100	12	★	B-5		
i101	25	★	C-5	D83	Front door cord RH
i102	20	Blue	C-1	R167	Rear wiring harness
i106	4	★	B-3		Display
i108	18	★	C-5	R100	Rear wiring harness
i113	12	★	B-5		Joint connector
i114	12	★	B-5		
i116	10	Green	B-4		Warning box RH
i117	8	Black	B-4		MFD switch
i118	8	Black	B-4		Navigation system switch
i119	16	Black	B-3		Display
i120	20	Black	B-3		
i121	8	Black	B-3		
i122	22	Green	B-3		MFD
i123	14	Green	B-3		Warning box LH
i126	12	Black	C-2		Joint connector
i127	12	Black	C-2		
i129	8	★	C-3		Impact sensor
i130	22	★	C-3	R230	Rear wiring harness LH (center)
i131	20	Black	C-4		Audio unit

# Instrument Panel Wiring Harness

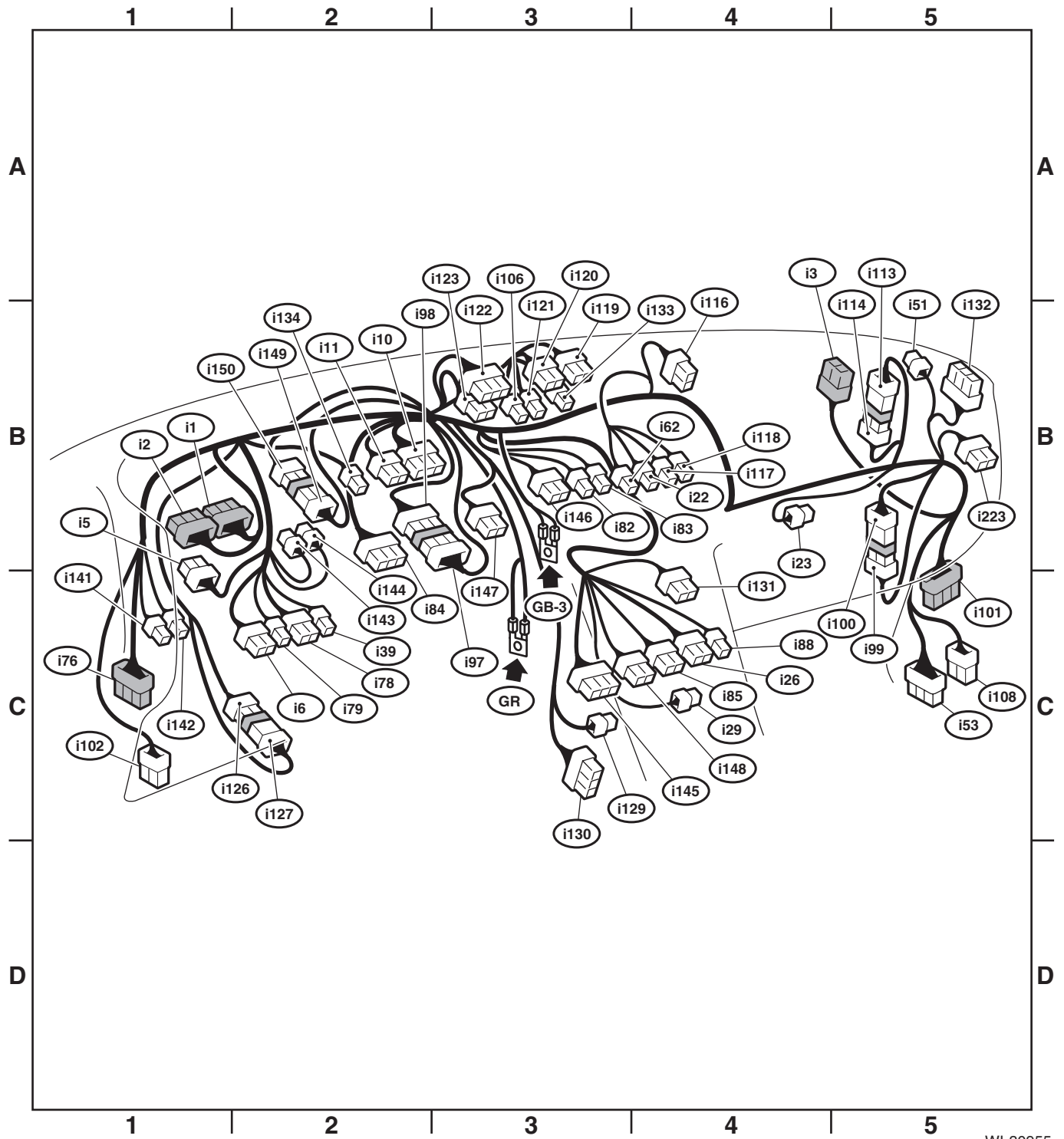
WIRING SYSTEM

Connector				Connecting to	
No.	Pole	Color	Area	No.	Description
i132	22	★	B-5	R243	Roof harness
i133	5	Green	B-3		Display
i134	3	★	B-2		Turn signal hazard relay (Sound)
i141	4	★	C-1		CAN joint connector
i142	4	★	C-1		
i143	4	★	B-2		Joint connector
i144	4	★	B-2		
i145	32	★	C-3		AUX switching unit
i146	12	Black	B-3		Joint connector
i147	12	Black	B-3		
i148	20	Blue	C-4		XM radio
i149	12	Black	B-2		Joint connector
i150	12	Black	B-2		
i223	12	★	B-5		TPMS & keyless entry control module

★ : White or natural color

# Instrument Panel Wiring Harness

WIRING SYSTEM



WI-30955



## 64.Rear Wiring Harness

### A: LOCATION

#### 1. PASSENGER'S SIDE

Connector				Connecting to	
No.	Pole	Color	Area	No.	Description
R1	24	Black	C-1	B98	Bulkhead wiring harness
R10	10	★	B-2	D22	Rear door cord RH
R12	3	★	B-2		Front door switch RH
R15	14	★	C-3	R60	Fuel cord
R16	3	★	B-3		Rear door switch RH
R44	6	★	C-3		Seat heater RH & second-row seat foot light RH
R47	3	Black	C-5		Fuel tank pressure sensor
R50	16	★	C-1	B90	Bulkhead wiring harness
R51	2	Black	B-2		Vanity mirror light RH
R52	3	★	A-5		Room light (without rear entertainment)
R55	10	Gray	B-4		Sunroof control module & motor
R56	4	★	B-3		Spot map light (without sunroof)
	6	Gray	B-3		Spot map light (with sunroof)
R57	3	★	B-3		Rearview mirror (without rearview display)
R58	6	Gray	C-4		Fuel pump ASSY
R59	2	★	C-4		Fuel sub level sensor
R60	14	★	C-3	R15	Rear wiring harness
R90	12	Black	B-3		Rearview mirror (with rearview display)
R91	4	★	B-3		Joint connector
R98	22	Blue	C-1	i53	Instrument panel wiring harness
R100	18	★	C-1	i108	
R105	6	★	C-2		Joint connector
R109	2	Black	C-2		Power seat RH
R117	2	★	A-4		Super woofer (model with normal audio)
R122	10	Black	B-4		Fuel pump control unit
R128	5	★	B-3		Open/Close switch
R143	2	Light gray	C-5		Drain valve
R187	5	Black	B-3		Tilt switch
R233	4	★	C-3		Joint connector
R234	1	Black	C-5		Rear differential oil temperature switch
R235	10	★	A-5	R248	Rear gate cord
R236	24	★	B-4		Rear entertainment (Roof)
R237	4	★	B-3		Joint connector
R238	6	Gray	B-3		
R239	4	★	B-3		
R240	4	★	B-3		
R241	6	Gray	B-3		
R243	22	★	C-1	i132	Instrument panel wiring harness
R244	4	★	B-3		Joint connector
R249	2	Gray	C-3		Rear ABS wheel speed sensor RH
R250	3	★	B-4		Room light (with rear entertainment)

# Rear Wiring Harness

## WIRING SYSTEM

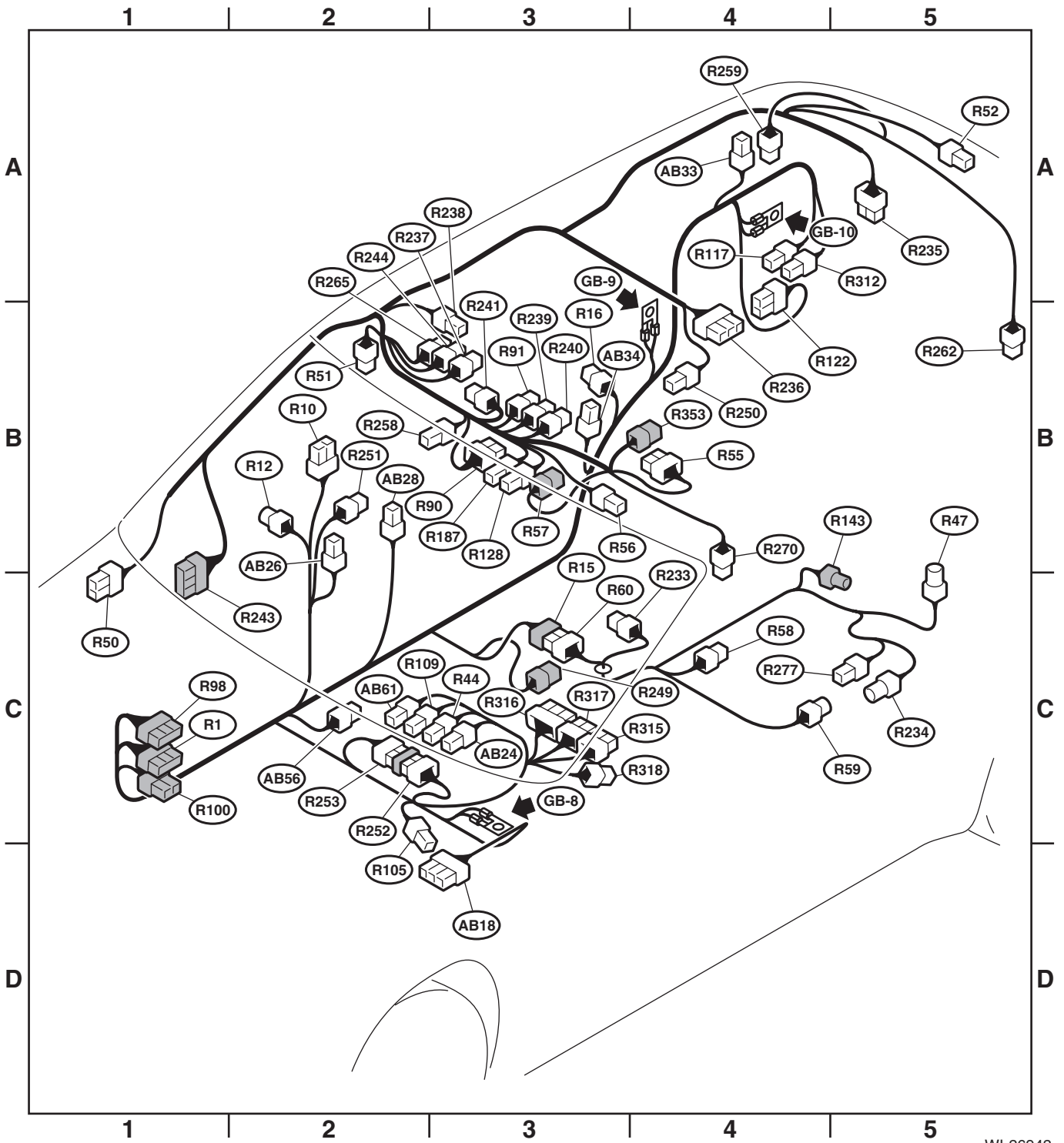
Connector				Connecting to	
No.	Pole	Color	Area	No.	Description
R251	4	★	B-2		Joint connector
R252	12	Gray	C-2		
R253	12	Gray	C-2		
R258	4	★	B-3		
R259	2	Black	A-4		Rear tweeter RH
R262	2	Black	B-5		Rear tweeter LH
R265	4	★	B-3		Joint connector
R270	2	★	B-4		Vanity mirror light LH & home link
R277	1	Black	C-5		Bracket ground (rear differential gear oil temperature switch)
R312	4	★	A-4		Sub woofer (model with premium audio)
R315	12	★	C-3		Audio amplifier (model with premium audio)
R316	24	★	C-3		
R317	10	Blue	C-3		
R318	4	★	C-3		Joint connector
R353	5	★	B-4		Handsfree kit

★ : White or natural color

Connector				Connecting to	
No.	Pole	Color	Area	No.	Description
AB18	24	Yellow	D-3		Airbag control module
AB24	2	Yellow	C-3		Side airbag module RH
AB26	2	Black	B-2		Pretensioner RH
AB28	4	Yellow	B-2		Side airbag sensor RH
AB33	2	Black	A-4		Curtain airbag module RH
AB34	4	Yellow	B-3		Curtain airbag sensor RH
AB56	3	Brown	C-2		Belt tension sensor (Occupant detection control module)
AB61	6	Gray	C-2	AB59	Occupant detection control module

# Rear Wiring Harness

WIRING SYSTEM



WI-26942

# Rear Wiring Harness

## WIRING SYSTEM

### 2. DRIVER'S SIDE

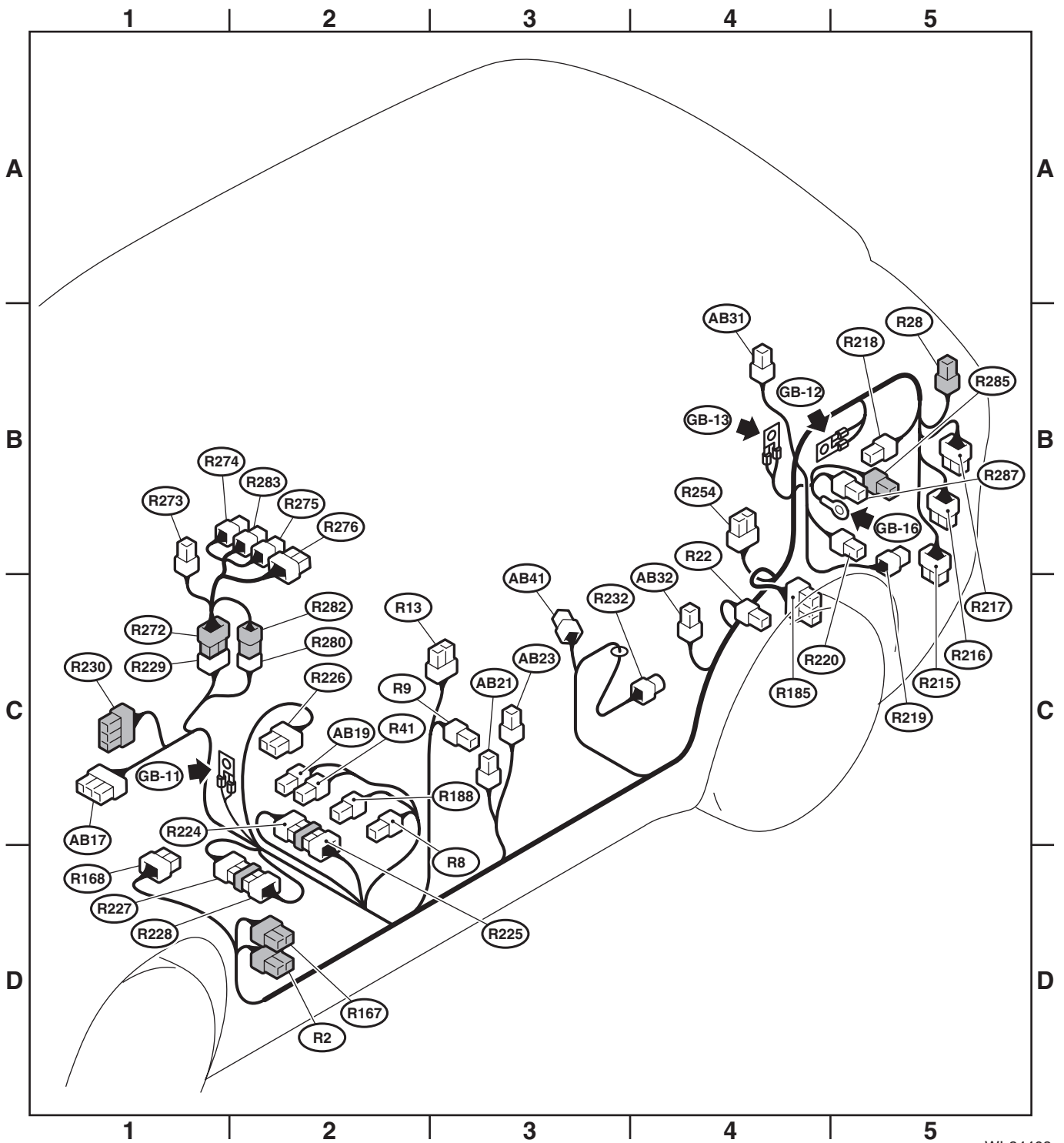
Connector				Connecting to	
No.	Pole	Color	Area	No.	Description
R2	20	Black	D-2	B97	Bulkhead wiring harness
R8	4	★	C-2		Front seat belt switch LH
R9	3	★	C-3		Front door switch LH
R13	10	★	C-3	D28	Rear door cord LH
R22	3	★	C-4		Rear door switch LH
R28	4	★	B-5		Rear combination light LH
R41	6	★	C-2		Seat heater LH & second-row seat foot light LH
R167	20	Blue	D-2	i102	Instrument panel wiring harness
R168	20	★	D-1		Fuse & relay box (F/B)
R185	24	Gray	C-4		Rearview camera module
R188	6	★	C-2		Power seat LH
R215	14	★	B-5	R247	Rear gate cord
R216	12	Black	B-5	R246	Through joint connector
R217	10	★	B-5	R245	Room gate cord (with rear entertainment)
R218	4	★	B-5		Rear A/C relay
R219	4	★	B-5		Blower resistor
R220	2	★	B-5		Blower motor
R224	12	★	C-2		Joint connector
R225	12	★	C-2		
R226	10	Black	C-2		Navigation unit
R227	12	Black	D-2		Joint connector
R228	12	Black	D-2		
R229	11	★	C-1	R272	Console socket
R230	22	★	C-1	i130	Instrument panel wiring harness (center)
R232	2	Gray	C-4		Rear ABS wheel speed sensor LH
R254	14	★	B-4	R260	Adapter cord
R272	11	★	C-1	R229	Rear wiring harness
R273	2	★	B-1		Cup holder illumination Front accessory power supply socket
R274	2	★	B-2		
R275	2	★	B-2		
R276	10	★	B-2		Blower switch
R280	6	Gray	C-2	R282	Console socket
R282	6	Gray	C-2	R280	Rear wiring harness
R283	6	★	B-2		Front AUX terminal
R285	6	★	B-5	D36	Feeder cord
R287	6	Gray	B-5		Joint connector

★ : White or natural color

Connector				Connecting to	
No.	Pole	Color	Area	No.	Description
AB17	24	Yellow	C-1		Airbag control module
AB19	2	Yellow	C-2		Side airbag module LH
AB21	2	Black	C-3		Pretensioner LH
AB23	4	Yellow	C-3		Side airbag sensor LH
AB31	2	Black	B-4		Curtain airbag module LH
AB32	4	Yellow	C-4		Curtain airbag sensor LH
AB41	2	Yellow	C-3		Satellite safing sensor

# Rear Wiring Harness

WIRING SYSTEM



WI-34408

# Door Cord

## WIRING SYSTEM

### 65. Door Cord

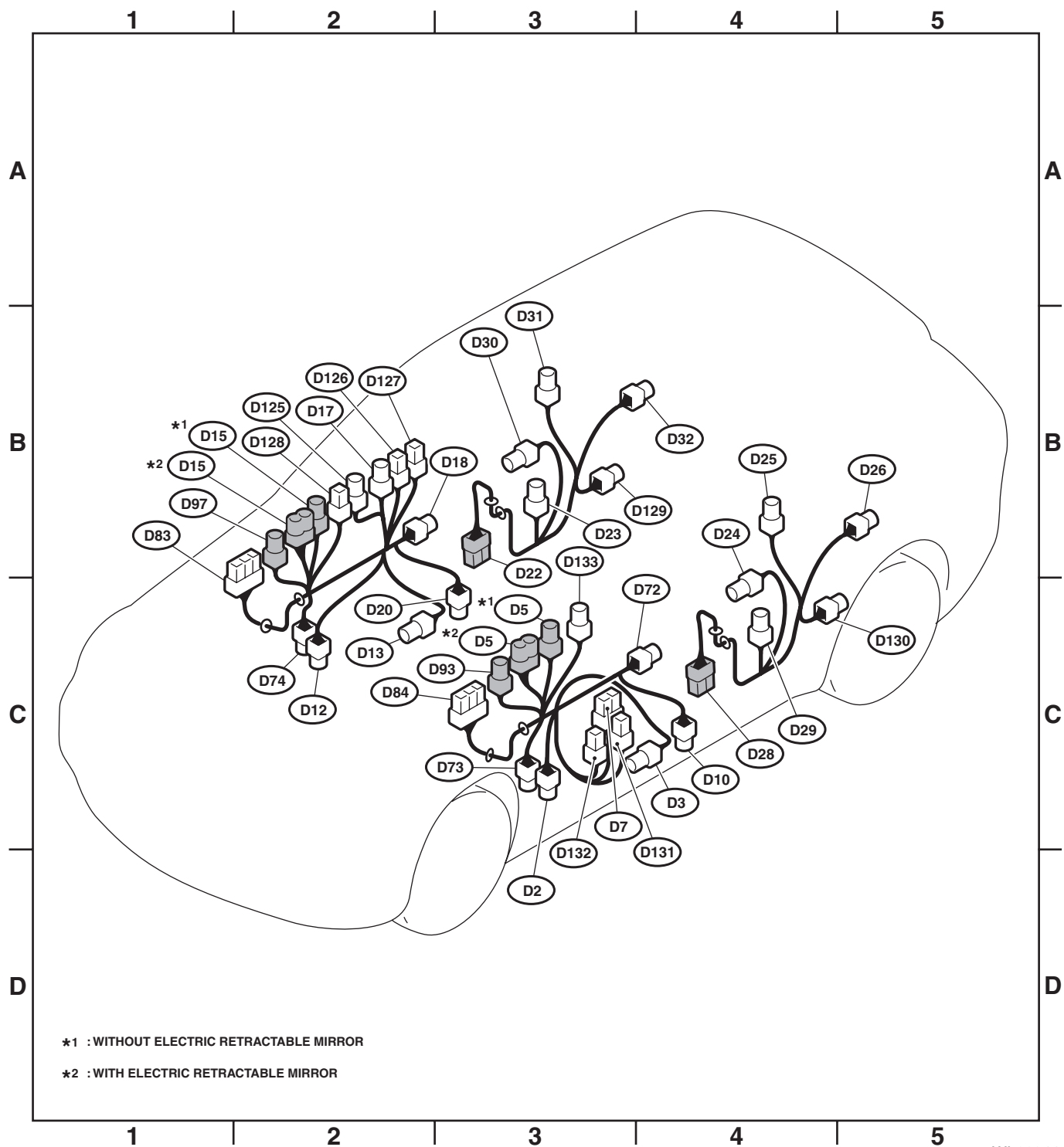
#### A: LOCATION

Connector				Connecting to	
No.	Pole	Color	Area	No.	Description
D2	2	★	C-3		Front door speaker LH
D3	2	Gray	C-4		Front power window motor LH
D5	8	Gray	C-3		Remote control mirror LH (without electric retractable mirror)
	10	★	C-3		Remote control mirror LH (with electric retractable mirror)
D7	16	★	C-3		Power window main switch
D10	2	★	C-4		Front step light LH
D12	2	★	C-2		Front door speaker RH
D13	2	Gray	C-2		Front power window motor RH
D15	8	Gray	B-2		Remote control mirror RH (without electric retractable mirror)
	10	★	B-2		Remote control mirror RH (with electric retractable mirror)
D17	8	★	B-2		Front power window sub switch
D18	4	★	B-2		Front door lock actuator RH
D20	2	★	C-3		Front step light RH
D22	10	★	B-3	R10	Rear wiring harness RH
D23	2	Black	B-3		Rear door speaker RH (model with normal audio)
	2	★	B-3		Rear door speaker RH (model with premium audio)
D24	2	Gray	C-4		Rear power window motor LH
D25	8	★	B-4		Rear power window sub switch LH
D26	4	★	B-5		Rear door lock actuator LH
D28	10	★	C-4	R13	Rear wiring harness LH
D29	2	Black	C-4		Rear door speaker LH (model with normal audio)
	2	★	C-4		Rear door speaker LH (model with premium audio)
D30	2	Gray	B-3		Rear power window motor RH
D31	8	★	B-3		Rear power window sub switch RH
D32	4	★	B-3		Rear door lock actuator RH
D72	4	★	C-4		Front door lock actuator LH
D73	6	★	C-3		Joint connector
D74	6	★	C-2		
D83	25	★	B-2	i101	Instrument panel wiring harness
D84	25	★	C-3	i76	
D93	2	★	C-3		Front door tweeter LH
D97	2	★	B-2		Front door tweeter RH
D125	5	★	B-2		Passenger's seat door lock switch
D126	4	★	B-2		Joint connector
D127	4	★	B-2		
D128	4	★	B-2		
D129	2	★	B-3		Rear step light RH
D130	2	★	C-4		Rear step light LH
D131	4	★	C-3		Joint connector
D132	4	★	C-3		
D133	4	★	C-3		

★ : White or natural color

# Door Cord

WIRING SYSTEM



WI-26944

## Rear Wiring Harness and Rear Gate Cord

### WIRING SYSTEM

## 66. Rear Wiring Harness and Rear Gate Cord

### A: LOCATION

Connector				Connecting to	
No.	Pole	Color	Area	No.	Description
D33	12	Black	C-4	R38	Through joint connector
D34	2	★	C-4	R37	Rear wiring harness
D35	10	★	B-4	R39	
D37	3	★	B-3		
D39	2	★	B-3		High-mounted stop light
D43	4	★	B-4		Rear wiper motor
D44	2	★	A-4		License plate light LH
D87	2	★	B-5		Back-up light RH
D89	2	★	A-5		Rear defogger
D91	2	★	B-3		Back-up light LH
D134	2	★	B-3		Tail light LH
D135	2	★	A-3		Rear gate release switch
D136	1	★	B-3		Antenna amplifier
D137	2	★	A-4		License plate light RH
D138	3	★	B-5		Rear gate light
D139	2	★	B-5		Tail light RH
D140	4	★	A-4		Rear gate release actuator & door switch
D141	4	★	B-4		Joint connector
D142	4	★	A-4		

★ : White or natural color

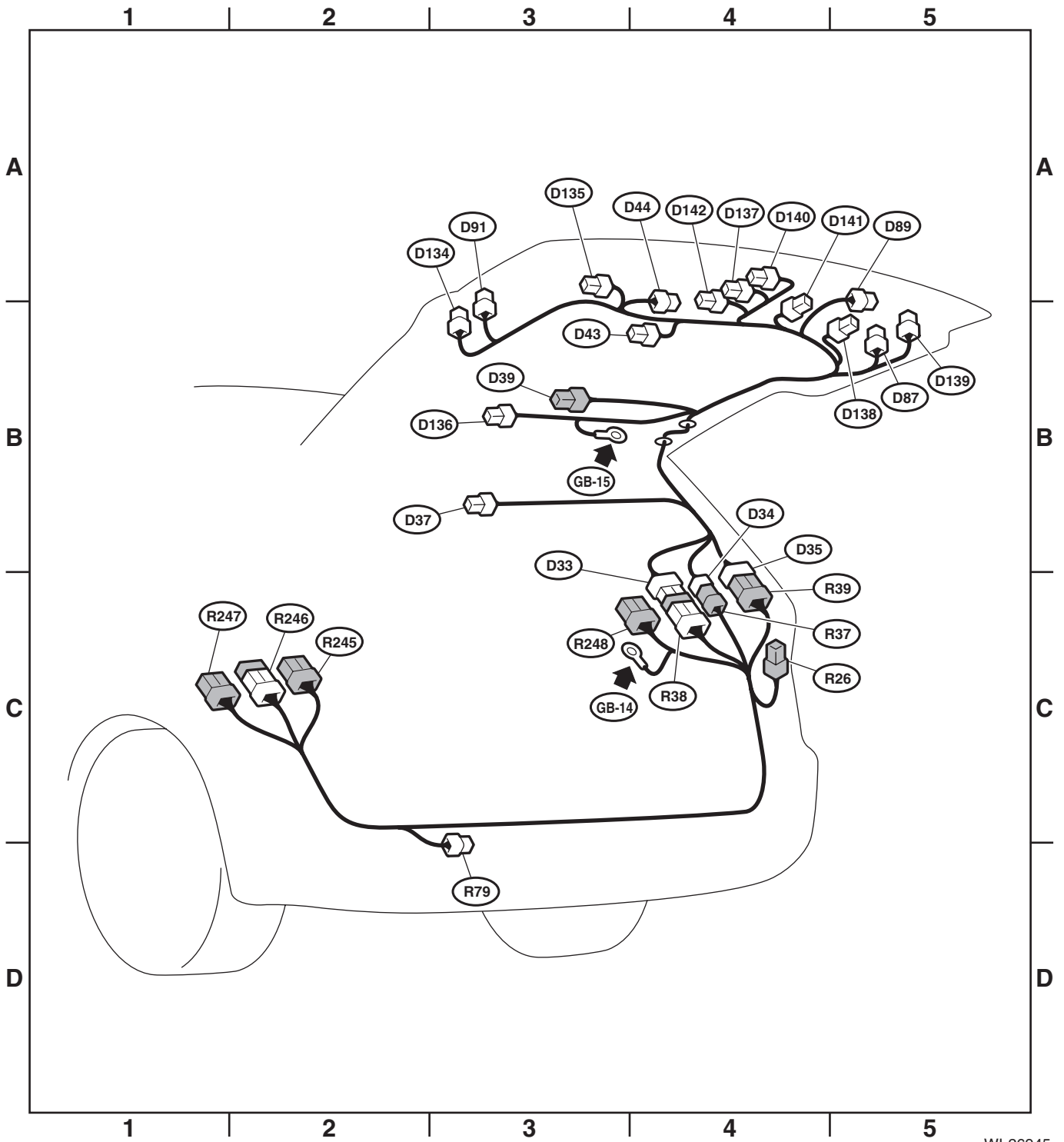
Connector				Connecting to	
No.	Pole	Color	Area	No.	Description
R26	4	★	C-4		Rear combination light RH
R37	2	★	C-4	D34	Rear gate cord
R38	12	Black	C-4	D33	Through joint connector
R39	10	★	C-4	D35	Rear gate cord
R79	6	★	D-3		Trailer connector
R245	10	★	C-2	R217	Room cord (with rear entertainment)
R246	12	Black	C-2	R216	Through joint connector
R247	14	★	C-1	R215	Rear wiring harness
R248	10	★	C-4	R235	

★ : White or natural color



# Rear Wiring Harness and Rear Gate Cord

WIRING SYSTEM



WI-26945

# Rear Wiring Harness and Rear Gate Cord

WIRING SYSTEM

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**FOREWORD**

This manual has been prepared to provide information for the construction, operation and other technical details of SUBARU vehicles.

Read this manual thoroughly and make the most of it to give better service to your customers and improve your knowledge of vehicle maintenance.

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

**GENERAL DESCRIPTION**

**ENGINE**

**BODY**



# 1. GENERAL DESCRIPTION

---

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A MODEL LINEUP .....	2
B DESCRIPTION OF MODEL CLASSIFICATION CODE .....	2
1-2 Outline of Modification.....	4

# General Description

## 1-1 General Description

### A: MODEL LINEUP

Type	Destination	Destination code	Engine	Grade	Transmission
WX	U.S., Canada	C0, U4, C4	3.6 L DOHC non-turbo	BASE	5AT

### B: DESCRIPTION OF MODEL CLASSIFICATION CODE

#### 1. VIN

]4S4WX9FDXC4400001[

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

Digit	Code	Meaning	Details
1 — 3	4S4	Manufacturer of body area	4S4: MPV
4	W	Car line	W: TRIBECA
5	X	Body type	X: SUV
6	9	Displacement	9: 3.6 L AWD
7	F	Grade	F: 7Pass G: 7Pass Limited H: 7Pass Limited w/NAVI J: 7Pass Limited w/DVD K: 7Pass Limited w/NAVI & DVD
8	D	Restraint system or GVWR class	D: Class D (GVWR 5001 — 6001 lb.) manual belt + dual airbag + side air bag (in seat back) + curtain airbag (in roof)
9	X	Check digit	X or 0 — 9
10	C	Model year	C: 2012MY
11	4	Transmission type	4: Full-time AWD 5AT
12 — 17	400001	Serial number	400001 — 599999

## General Description

### 2. MODEL NUMBER LABEL

WXFGY5U

Digit	Code	Meaning	Details
1	W	Series	W: TRIBECA
2	X	Body type	X: Cross-utility vehicle
3	F	Engine displacement Drive system Suspension system	F: 3.6 L AWD
4	G	Model year	G: 2012MY
5	Y	Destination	Y: United States of America, Canada
6	5	Grade	5: BASE
7	U	Transmission, fuel feed system	U: DOHC MFI 5AT SS

### 3. ENGINE

EZ36DBC5LB

Digit	Code	Meaning	Details
1 and 2	EZ	Engine type	EZ: 6 cylinder
3 and 4	36	Displacement	36: 3.6 L
5	D	Fuel feed system	D: MFI non-turbo (DOHC, H6)
6	B	Emission control	B: For U.S.
7	C	Mounted transmission	C: D-5AT (without ATF warmer)
8 — 10	5LB	Detailed specifications	Used when ordering parts. For details, refer to the parts catalog.

### 4. TRANSMISSION (AT)

TG5D9CJDAA

Digit	Code	Meaning	Details
1	T	Transmission code	T: Transmission
2	G	Standard transmission system	G: Full-time AWD AT center differential
3 and 4	5D	Classification	5D: 5AT
5	9	Car line series	TRIBECA
6	C	Transmission specifications	C: Full-time AWD VTD 5AT
7	J	Mounted engine	J: 3.6 L DOHC
8 — 10	DAA	Detailed specifications	Used when ordering parts. For details, refer to the parts catalog.

### 5. REAR DIFFERENTIAL

XB

Code	Reduction gear ratio	LSD
XB	3.583	None

## Outline of Modification

---

### **1-2 Outline of Modification**

- Changes in rear combination light, seat, and combination meter due to regulatory compliance
- CAN driven CHECK ENGINE warning light has been adopted.



# 2.ENGINE

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2-2 Fuel .....	3
A DETAILS OF CHANGES .....	3
2-3 Emission Control .....	4
A OUTLINE OF MODIFICATION .....	4
B DETAILS OF CHANGES .....	4

### **2-1 Engine Description**

#### **A: GENERAL DESCRIPTION**

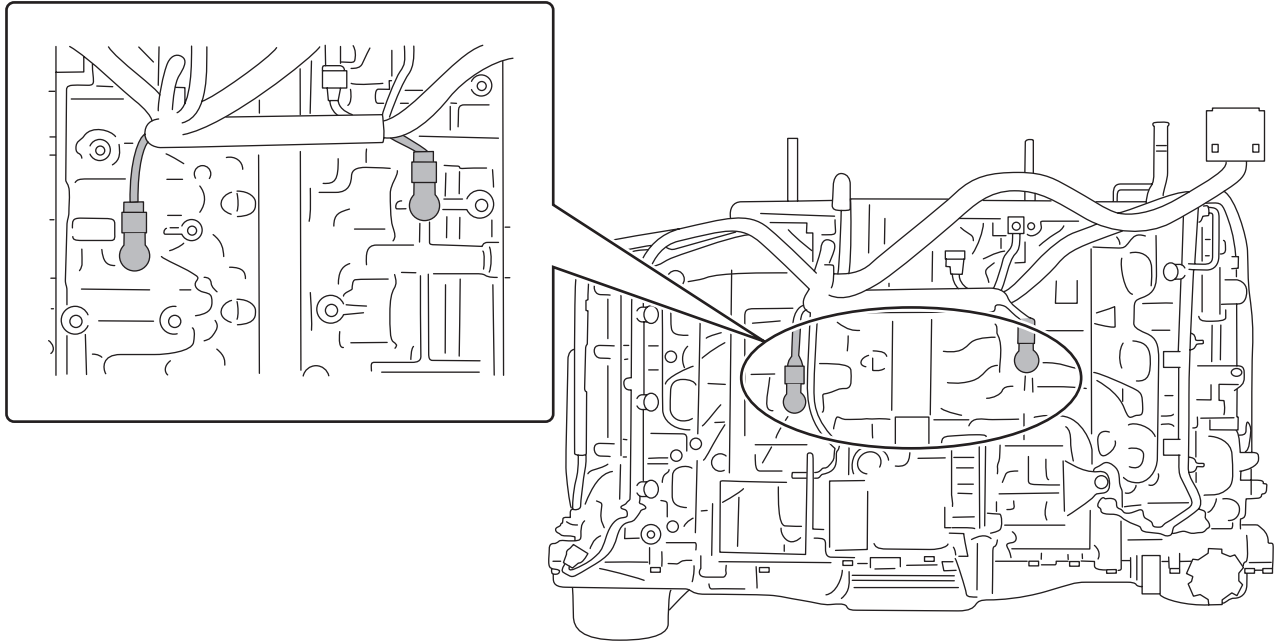
- The knock sensor used in Forester's FB engine has been adopted.
- Clamps have been added to the PCV circuits.

## 2-2 Fuel

### A: DETAILS OF CHANGES

#### 1. KNOCK SENSOR

- To improve productivity, the knock sensor used in FB engine has been adopted.
- This leads to modification of terminal specifications. Tin plating is used instead of gold plating for harness side terminals.



FU-06265

# Emission Control

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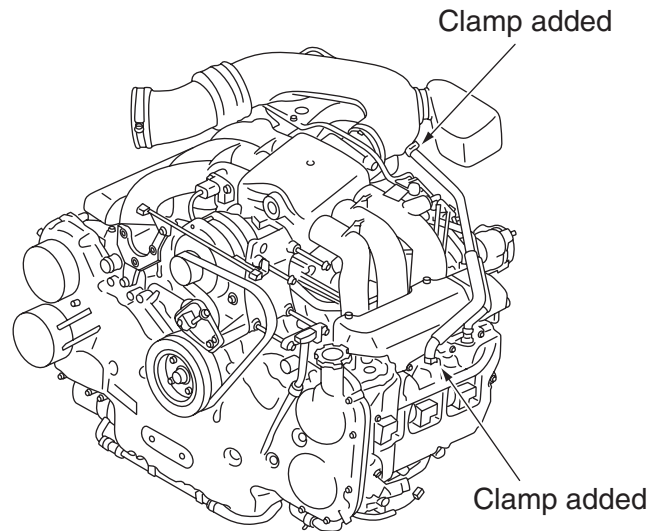
## 2-3 Emission Control

### A: OUTLINE OF MODIFICATION

Clamps have been added to all piping of the PCV circuits.

### B: DETAILS OF CHANGES

The added clamps are as follows.



EC-03068

# 3.BODY

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## **3-1 Airbag System**

### **A: DRIVER'S AIRBAG MODULE**

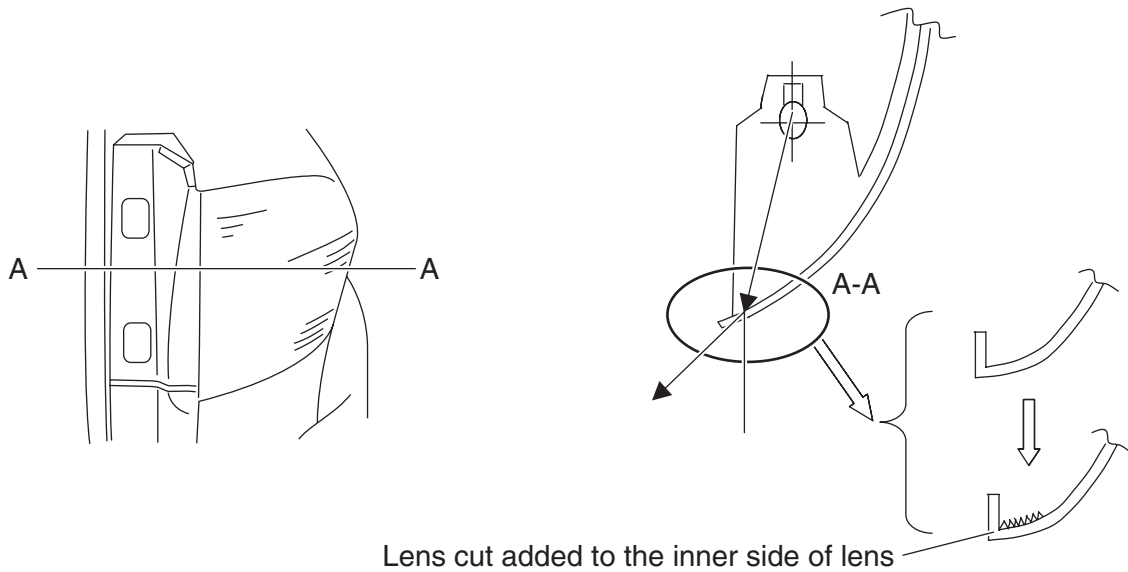
The inflator and the way airbag is folded have been modified for regulatory compliance.

# Lighting System

## 3-2 Lighting System

### A: REAR COMBINATION LIGHT

Lens cut has been added to the inner side of lens to provide a sufficient luminosity for regulatory compliance.



LI-01269

# Mirror

## 3-3 Mirror

### A: REAR VIEW MIRROR

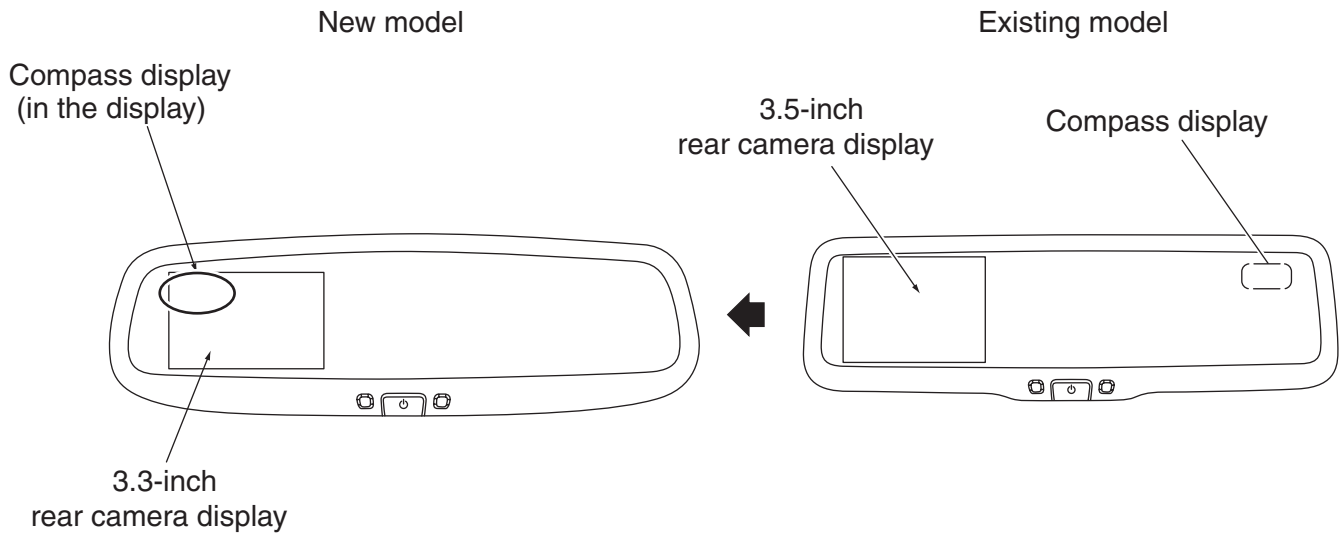
#### 1. OUTLINE OF MODIFICATION

To improve productivity, the rear view mirror has been modified.

#### 2. DETAILS OF CHANGES

The following changes have been made to the new model.

- Outer shape
- Monitor size: reduced from 3.5 to 3.3 inch
- Compass display color: changed from red to green
- The independent compass display has been moved from the upper right position to the left, inside the rear view display and has been changed to a switching display.



EI-03201



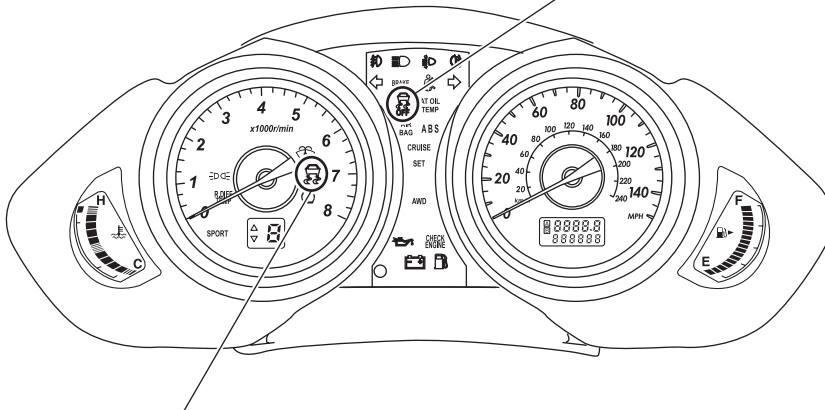
## 3-4 Instrumentation/Driver Info

### A: COMBINATION METER

#### 1. OUTLINE OF MODIFICATION

- The existing hard-wired driven CHECK ENGINE warning light has been modified to CAN driven.
- The specifications of VDC active indicator, VDC warning light, and VDC OFF indicator have been modified for regulatory compliance.

Changes in prints and functions  
 VDC active indicator → VDC OFF indicator



Changes in prints and functions  
 VDC OFF indicator/VDC warning light → VDC active indicator/VDC warning light

ID100460

Operation of the active indicator and warning light

	New model	Existing model
Display		
Functions	VDC OFF: lit	VDC active: blinking TCS active: lit
Display		
Functions	VDC, TCS active: blinking VDC warning: lit	VDC OFF: lit VDC warning: lit

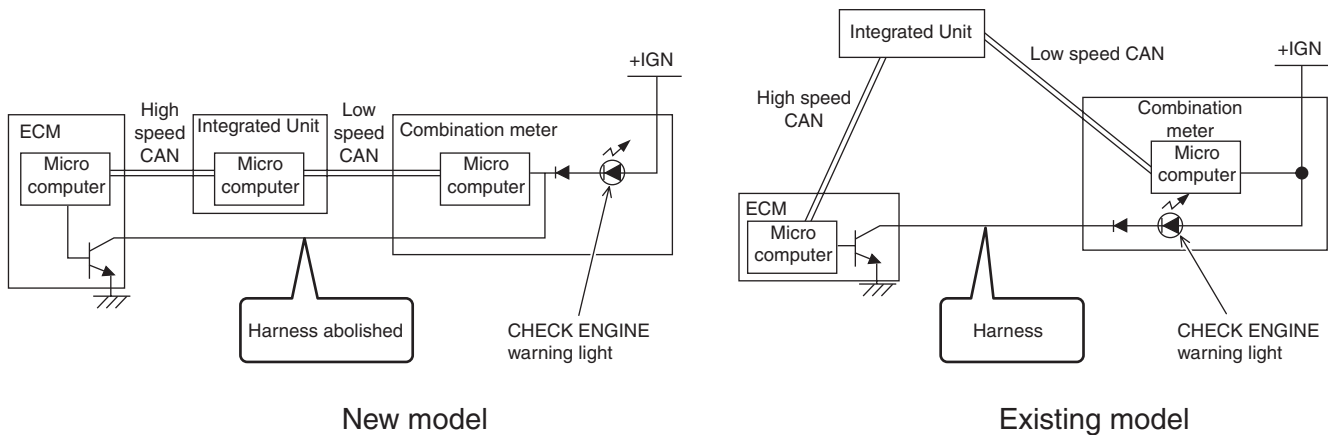
# Instrumentation/Driver Info

## 2. DETAILS OF CHANGES

The details of the CAN driven CHECK ENGINE warning light are as described below.

	New model	Existing model
Outline	<ul style="list-style-type: none"> <li>The CHECK ENGINE warning light inside the meter operates according to CAN information.</li> <li>Since the ECM is connected to the high-speed CAN and the meter is connected to low-speed CAN, the CAN information between them is relayed (gatewayed) by the integrated unit.</li> </ul>	<ul style="list-style-type: none"> <li>The ECM and meter warning light circuit is connected via hard wires.</li> <li>The CHECK ENGINE warning light inside the meter is electrically controlled by the ECM.</li> </ul>

### Details of Circuits



IDI00395

## 3-5 Seat

### A: SECOND SEAT, THIRD SEAT

#### 1. OUTLINE OF MODIFICATION

- The headrests of the second seat and third seat (outside seat only) have been modified for regulatory compliance.
- Due to the modification on the second seat headrests, the walk-in angle of the second seat and the back side shape of the front seat headrest have been also modified in order to maintain a space needed when the walk-in slide is moved.

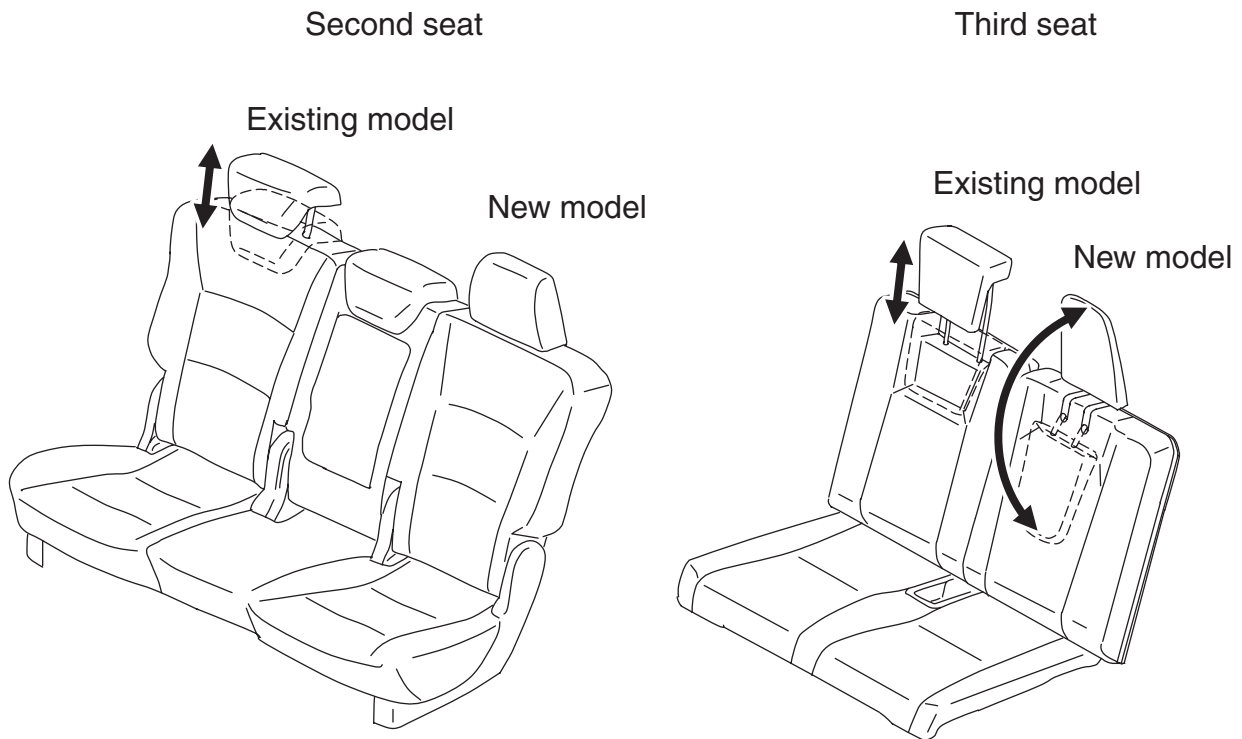
#### 2. DETAILS OF CHANGES

##### 1) Second seat

The headrests have been enlarged so that passengers can rest their heads to a proper position when seated. The vertical retractable feature has been abolished.

##### 2) Third seat

A folding retractable mechanism has been provided so that the headrest can be folded forward (over 60 degrees) and does not block the rear view sight when there is no passenger in the seat. Also, it has been designed to provide a sense of discomfort to the passenger when seated with the headrest retracted, in order to motivate the passenger to use it at the proper position.

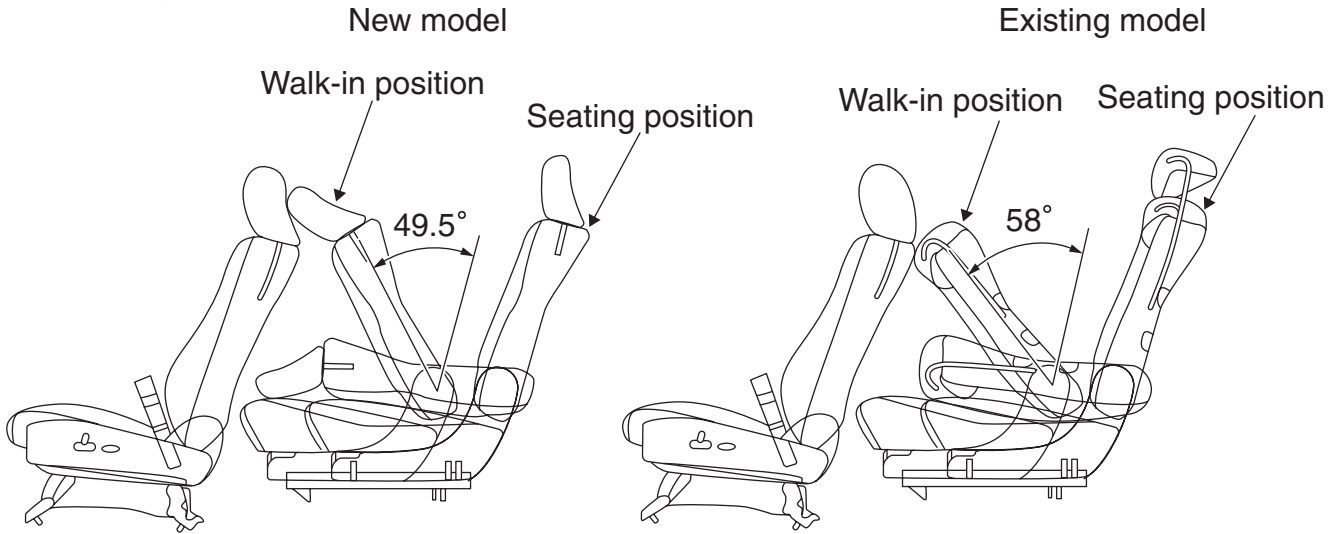


SE-01350

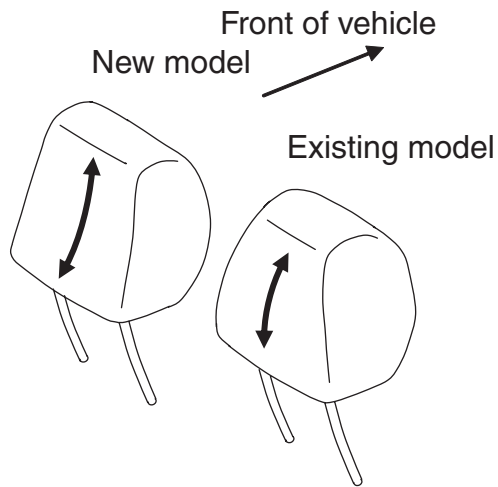
# Seat

- 3) The changes in the walk-in angle of the second seat and the back shape of the front seat headrest are as illustrated below.

Walk-in angle



Back of the front seat headrest



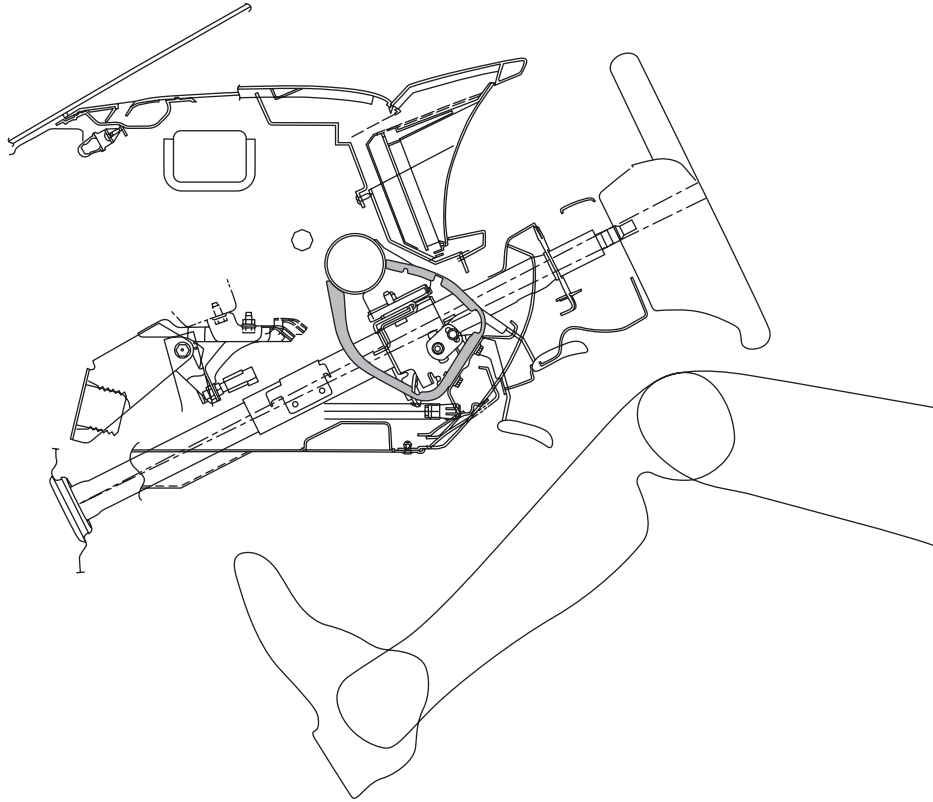
SE-01351

## 3-6 Body Interior

### A: INSTRUMENT PANEL

#### 1. OUTLINE OF MODIFICATION

The knee guard of the instrument panel beam has been reinforced for regulatory compliance.



SE-01377

### B: SUN VISOR

#### 1. OUTLINE OF MODIFICATION

Homelink is conformed (modification to software/circuit board) to the specifications of Quick train, a leading manufacturer of garage openers, to improve security and usability.

#### 2. DETAILS OF CHANGES

##### 1) Compatible to Quick train

The procedures described below have been made simpler as the result of compatibility of the garage opener with Quick train.

- The process of moving to the registration mode during homelink registration is now omitted to reduce registration procedures.
- During homelink registration, an operator may register the homelink to the garage opener just by operating the homelink, without pressing the garage opener's reset button.

##### 2) Shorter registered data clearing time

Less time is required to clear the registered data by pressing the both sides of the homelink buttons.

- 20 seconds for the existing model → 10 seconds for the new model

## Body Interior

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# Foreword

---

This booklet is a supplement to the Owner's Manual for SUBARU B9 TRIBECA and contains a detailed description and instructions for proper operation of the Rear Seat Entertainment System provided in your vehicle.

To ensure optimum and correct use of your Rear Seat Entertainment System, please read this supplement and get acquainted with the system before using it.

Please keep this supplement together with your Owner's Manual and leave it in the vehicle at the time of resale. The next owner will need the information it contains.

FUJI HEAVY INDUSTRIES LTD., TOKYO, JAPAN

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# Safety Warnings

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You will find a number of WARNINGS, CAUTIONS and NOTES in this supplement.

These safety warnings alert you to potential hazards that could result in injury to you or others.

Please read these safety warnings as well as all other portions of this supplement carefully in order to gain a better understanding of how to use your Rear Seat Entertainment System safely.

## WARNING

**A WARNING indicates a situation in which serious injury or death could result if the warning is ignored.**

## CAUTION

**A CAUTION indicates a situation in which injury or damage to your vehicle including the Rear Seat Entertainment System, or both, could result if the cautions is ignored.**

## NOTE

**A NOTE gives information or suggestions how to make better use of your Rear Seat Entertainment System.**

# Before Use

---

## WARNING

- Never try watching videos or using other entertainment programs with your Rear Seat Entertainment System by keeping the vehicle engine running in a garage or other enclosed area. Exhaust gases accumulated in such an area or entering the vehicle are dangerous, or even lethal.
- The driver must not attempt to operate or watch the Rear Seat Entertainment System while the vehicle is in motion. Doing so will distract attention from driving and the road, and could lead to an accident.
- The driver must not use headphones. Wearing headphones shuts out or drowns out outside sounds and reduces the driver's awareness of dangerous situations, which increases the risk of having an accident.
- If you wish to park your vehicle and enjoy an entertainment program on this system, select a safe place that does not hinder traffic and has no parking ban.

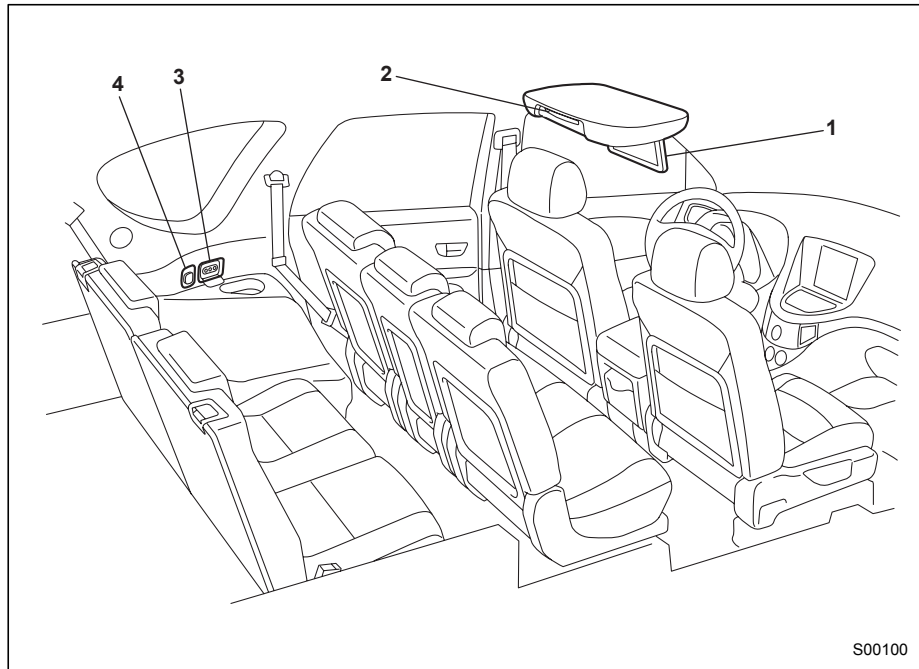
## CAUTION

The display, a component of the Rear Seat Entertainment System, contains mercury. For that reason, it is necessary to remove display before vehicle disposal. Once removed, please reuse, recycle or dispose of the display as hazardous waste.

## NOTE

- Using the Rear Seat Entertainment System with the engine stopped could lower the battery's electricity level. If the initial charge level were too low, the next engine starting would be impossible. It is recommended that the system be used only when the engine is running.
- The display screen turns off if you start the engine while using the Rear Seat Entertainment System with the ignition switch in the "ACC" or "ON" position and the engine not in operation. To turn on the display again, press the **"DVD • CD"** button on the remote control. The image will re-appear on the screen.
- Liquid-crystal displays may be difficult to read when wearing polarized glasses.

# System Components



The Rear Seat Entertainment System consists of the following components:

- 1) Display (Refer to Page 7.)
- 2) DVD player (Refer to Page 22.)
- 3) External device jacks (Refer to Page 50.)
- 4) Accessory power outlet (Refer to Page 50.)

In addition to the components listed above, there is a remote control and two sets of wireless headphones as attachments to the system.

# ***Basic Operations***

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## **What You Can Enjoy with Your Rear Seat Entertainment System**

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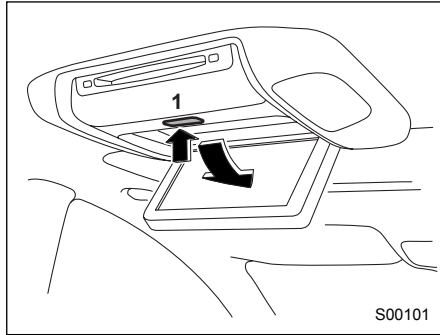
- The Rear Seat Entertainment System is designed to provide your vehicle's rear-seat passengers with video and music entertainment programs recorded on DVD video discs, video CDs and music CDs.
- The Rear Seat Entertainment System will operate when the ignition switch is in the "ACC" or "ON" position.
- Playback sounds can be listened to by using the wireless headphones accompanying the system.
- All operations with the Rear Seat Entertainment System can be managed using the remote control accompanying the system (except when ejecting a disc).
- Replacements of the dedicated headphones and remote control are available from your SUBARU dealer should you lose them.
- You can also enjoy TV games from a home-use TV game machine or video programs from a video tape player with the Rear Seat Entertainment System if such an external device is connected to one of the external device jacks of the system. For further details, refer to the instruction manual provided by the manufacturer of each external device.

### **NOTE**

- **When the vehicle is parked with the parking brake applied and the selector lever in the "P" position, you can enjoy video programs on the navigation display on the dashboard if you press the "AUDIO" button on the navigation control panel. This does not apply when the vehicle is in motion.**
- **If you press the "AUX/RSE" button on the audio panel, playback sounds from this system will be outputted through the vehicle's speakers.**

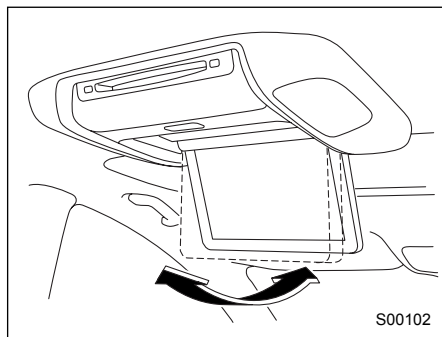
## Display

### ■ How to open and close the display

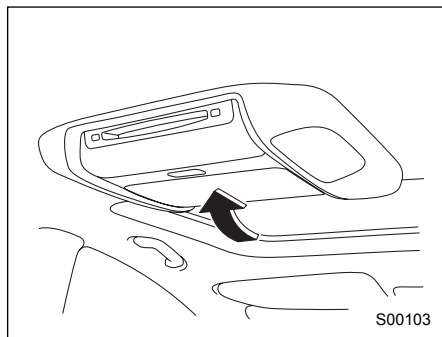


1) Release button

Push the release button to open the display.  
The display will swing down partway along its full swing angle.



Adjust the display to the desired angle.



To close the display to its storage position, swing and push it up until it locks.

**CAUTION**

**Close the display when it is not in use to help reduce the chance of injury in the event of an accident or sudden stop.**

## ■ Keeping the display clean

Do not touch the display screen with bare hands. The display screen is easily soiled with hand grease.

Use a soft, dry cloth to clean the display screen surface. Do not use organic solvents.

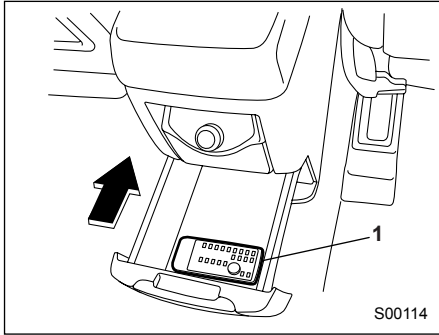
The screen surface is sensitive to scratches or other physical damage. Avoid pushing on it strongly or rubbing it with a hard cloth or any other scratchy material.

### NOTE

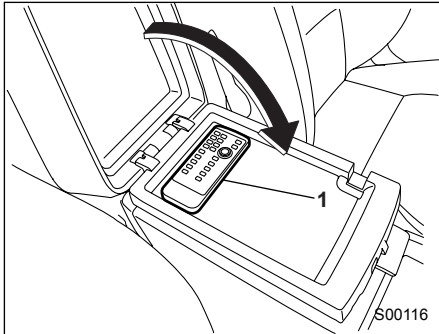
- **The screen is made of a liquid crystal display (LCD) panel. When the system is turned on in an extremely low outside temperature, the LCD takes a relatively long time to become bright. On the other hand, when the outside temperature is high, the LCD may become darker than usual. Both conditions are normal.**
- **Images on an LCD screen may contain some tiny black spots and/or bright spots. They reflect a characteristic normal to the LCD and do not indicate any abnormal condition.**



## Remote Control



1) Remote control

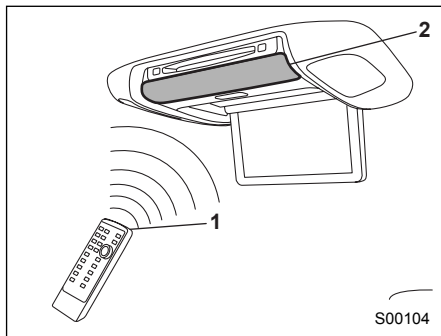


1) Remote control

The Rear Seat Entertainment System can be operated only using the remote control (except when ejecting a disc). Touching a switch on the display screen directly with your finger does not have any effect.

### CAUTION

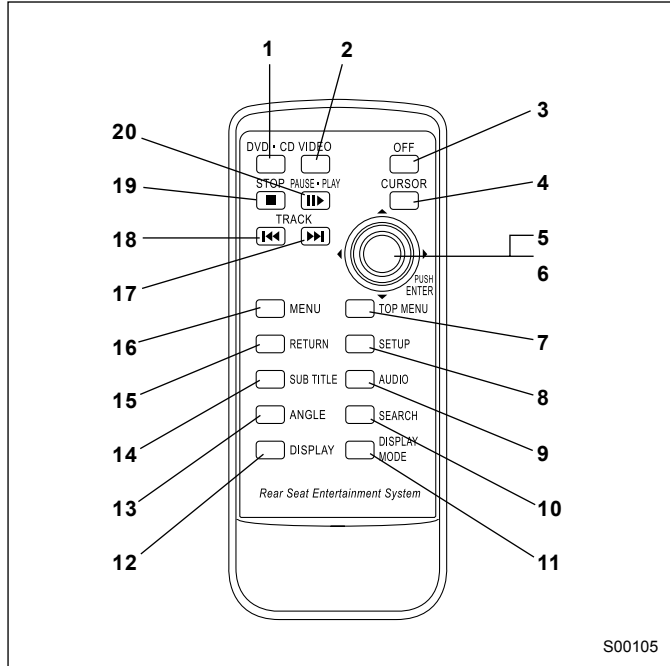
- Store the remote control in the center or rear console box when the Rear Seat Entertainment System is not being used to reduce the chance of injury in case of an accident or sudden stop.
- Be sure to keep the rear console box as well as the upper compartment of the center console box closed to reduce the chance of injury in case of an accident or sudden stop.
- Do not disassemble or modify the remote control. Doing so could cause an accident, fire or electric shock.
- Do not expose the remote control to direct sunlight, strong heat and/or a highly humid environment. The remote control case could become deformed and the battery in it could leak or even explode if exposed to these conditions.
- Avoid dropping the remote control and hitting it against hard objects.
- Do not sit or step on the remote control. Placing anything heavy on it should also be avoided.
- Avoid pressing the remote control buttons for longer than necessary, as the battery is consumed while any button is kept pressed. Also avoid placing an object on the remote control, as it may press buttons and reduce the battery life.



To use the remote control, direct its signal-emitting eye toward the signal reception window of the display.

- 1) Signal emitting eye
- 2) Signal reception window

## ■ Control buttons and joystick

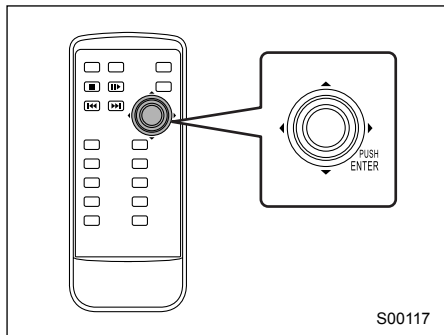


S00105

- 1) **DVD • CD button**  
When this button is pressed, the Rear Seat Entertainment System turns on. The display will show DVD mode or CD mode.
- 2) **VIDEO button**  
When this button is pressed, the system will accept and operate on the video signal from an external video device connected to the system.
- 3) **OFF button**  
When this button is pressed, the Rear Seat Entertainment System turns off.
- 4) **CURSOR button**  
When this button is pressed, control switches will appear on the display when the player is in operation.
- 5) **Joystick**  
The joystick is used to highlight a control switch or a menu item on the screen and also to make an entry. Click an appropriate one of its four arrow-marked ends (▲, ▶, ▼ and ◀) to use it.
- 6) **ENTER button**  
When this button is pressed, the system will execute a selection or entry that was made with the joystick.
- 7) **TOP MENU button**  
When this button is pressed, the title selection screen for the DVD video disc currently in the player will appear on the display.
- 8) **SETUP button**  
When this button is pressed, the initial setup screen will appear on the display, where you can make your initial settings.

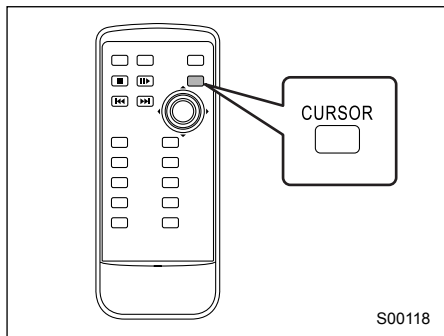
- 9) AUDIO button  
When this button is pressed, the desired audio language or MAIN/SUB sound channel can be selected when the player is in operation.
- 10) SEARCH button  
When this button is pressed, the title search screen will appear on the display when the player is in operation. You can then start playback beginning with the title you have selected on the screen.
- 11) DISPLAY MODE button  
When pressed, this button allows you to select the screen size.
- 12) DISPLAY button  
When this button is pressed, the display condition adjustment screen will appear, where you can adjust the brightness, contrast, color and tone for images.
- 13) ANGLE button  
When this button is pressed, the angle selection screen will appear, where you can select a desired angle when the player is reproducing a multi-angle recorded DVD video disc.
- 14) SUBTITLE button  
When this button is pressed, the subtitle language selection screen will appear, where you can select a desired subtitle language when the player is playing a DVD video disc.
- 15) RETURN button  
When this button is pressed, the disc will skip to a predetermined screen.
- 16) MENU button  
When this button is pressed, the menu screen will appear for the DVD video disc currently in the player.
- 17) TRACK (▶▶) button  
Each brief push (less than 1 second) of this button during operation of the player advances the video scene chapter by chapter. If you push the button continuously, the scene advances continuously and quickly (but slowly when playback is in pause mode) until you release the button.
- 18) TRACK (◀◀) button  
Each brief push (less than 1 second) of this button during operation of the player reverses the video scene chapter by chapter. If you push the button continuously, the scene reverses continuously and quickly (but slowly when playback is in pause mode) until you release the button.
- 19) STOP (■) button  
This button stops playback when it is pressed during operation of the player.
- 20) PAUSE • PLAY (⏸) button  
Pressing this button pauses playback when the player is in operation. Pressing it again restarts playback.

## ■ How to use the remote control



You can control the operation of the DVD player using the buttons on the remote control.

You can also control the player using the joystick on the remote control to highlight a switch on the display screen and then pressing the "ENTER" button. You cannot, however, control the player by touching a switch on the screen with your finger. When a switch is selected with the joystick, the color of the switch changes from blue to white. When you then press the "ENTER" button, your selection is executed.



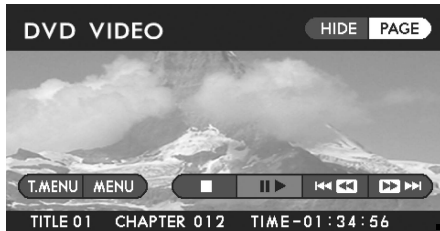
To make control switches appear on the screen when playing a DVD video disc or video CD:

You can use the "CURSOR" button on the remote control to make the control switches appear on the screen. The control switches shown on the next page will be displayed when the button is pressed.

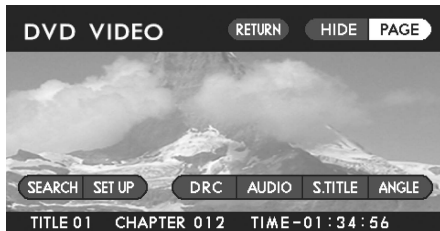
To make control switches appear on the screen when playing a music CD:

When a music disc is loaded in the player, playback will start automatically and the control switches shown on the next page will appear on the screen without the need for operating the remote control.

## DVD Video Menu 1



## DVD Video Menu 2



When playing a DVD video disc, different control switches are displayed on the screens for Menu 1 and Menu 2 (Menu 1 screen appears first when the “CURSOR” button is pressed). Switch between the two screens when necessary by highlighting the “PAGE” switch on the screen with the joystick and then pressing the “ENTER” button.

To make the switches disappear from the

screen, push the remote control’s “CURSOR” button again or highlight the “HIDE” switch on the screen with the joystick and then press the “ENTER” button. If you highlight and execute the “HIDE” switch, the TITLE number, CHAPTER number and playback time at the bottom of the screen also disappear.

## Video CD Menu



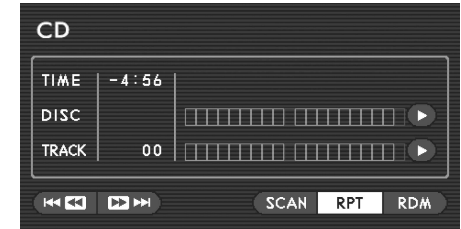
To make the switches disappear from the screen, push the remote control’s “CURSOR” button again or highlight the “HIDE” switch on the screen with the joystick and then press the “ENTER” button. If you highlight and execute the “HIDE” switch, the TRACK number and playback time at the bottom of the screen also disappear.

## NOTE

The “RETURN” switch is displayed on

the VIDEO CD menu only when you play a video CD version 2.0.

## Music CD Menu



## NOTE



If the “⊘” mark appears on the screen when you select a control switch, it will not be possible to select or execute the switch.

## ■ Replacing the battery

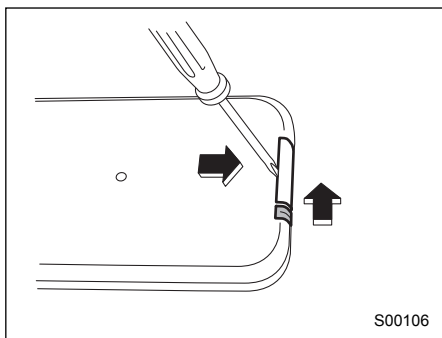
### ⚠ WARNING

Take great care not to allow children to swallow batteries or any other removed part, as these could cause serious injury or death if swallowed.

### ⚠ CAUTION

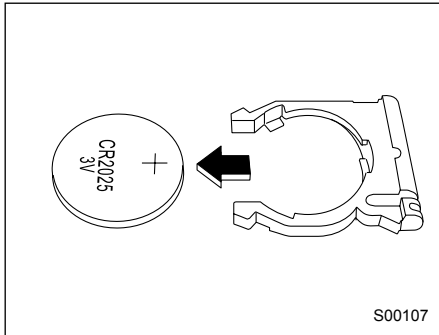
Do not let dust, oil or water get on or in the remote control when replacing the battery.

When the battery begins to get weak, the signal transmission range of the remote control becomes shorter. If this is the case, replace the battery as soon as possible.

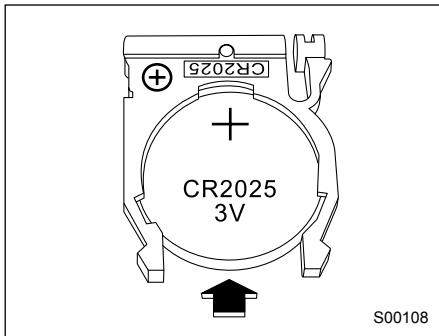


While holding the battery holder pushed in the direction of the arrow with your fingernail inserted in the slot, slide out the holder in the direction of the arrow using a cross-head mini screwdriver.

Remove the battery from the holder.



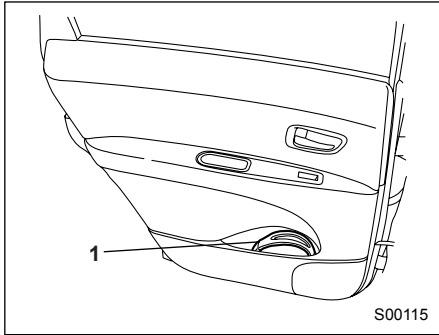
Install a new battery (Type CR2025 or equivalent) in the holder. Make sure the battery's positive (+) side and the "+" mark on the holder are on the same side. Slide the battery holder into the remote control until it clicks.





## Wireless Headphones

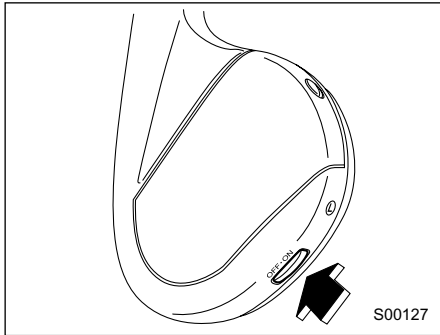
Use the wireless headphones to listen to audio outputted from your Rear Seat Entertainment System.



1) Wireless headphone

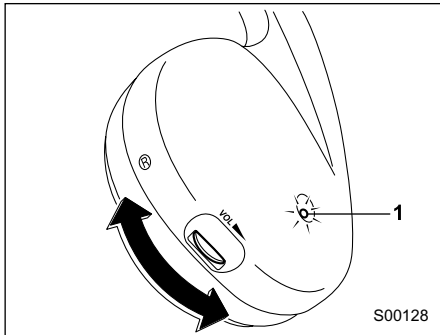
### CAUTION

- Store the headphones in a door pocket when they are not being used in order to reduce the chance of injury in case of an accident or sudden stop.
- Do not disassemble or modify the headphones. Doing so could cause an accident, fire or electric shock.
- Do not expose the headphones to direct sunlight, strong heat and/or a highly humid environment. The headphones could become deformed and the batteries in them could leak or even explode under these conditions.
- Avoid dropping the headphones and hitting them against hard objects.
- Do not sit on the headphones or place anything heavy on them.
- Human voices may have been recorded intentionally at low levels in some DVDs for special acoustic effects. If you carelessly adjust the volume in order to hear these voices more clearly, your ears may be exposed to unexpectedly loud sounds at a later point. This may also happen when you switch to a different audio source. Very loud sounds could damage your hearing and pose a driving hazard. Keep this in mind when you adjust the volume.



Press the “OFF • ON” button on the left earpiece to turn on the headphones: the power lamp on the right earpiece will come on.

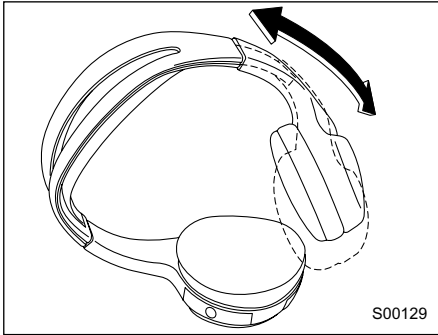
Sentence has been changed according to the power lamp has been removed from left earpiece to right earpiece.



Adjust the sound level as desired with the volume dial on the right earpiece.

Graphics have been changed. Because the headphone has been changed to new ones.

1) Power lamp



Adjust the earpieces to comfortable positions by extending or retracting the headband.

### NOTE

For longer battery life, turn off the headphones whenever they are not being used. Press the **“OFF • ON”** button to turn off the headphones and make sure the **power** lamp has gone out.

## ■ Replacing the batteries

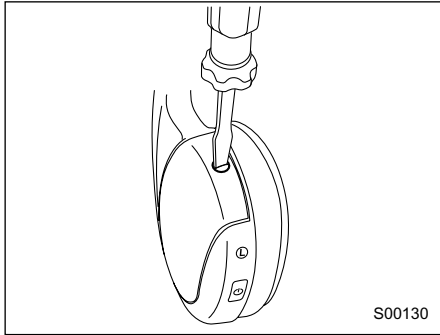
### ⚠ WARNING

Take great care not to allow children to swallow batteries or any other removed part, as these could cause serious injury or death if swallowed.

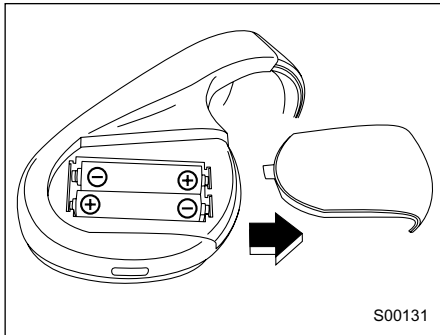
### ⚠ CAUTION

Do not let dust, oil or water get on or in the headphones when replacing the batteries.

When the batteries begin to get weak, the **power** lamp will not come on even if you press the **“OFF • ON”** button. If this is the case, replace the batteries as soon as possible.

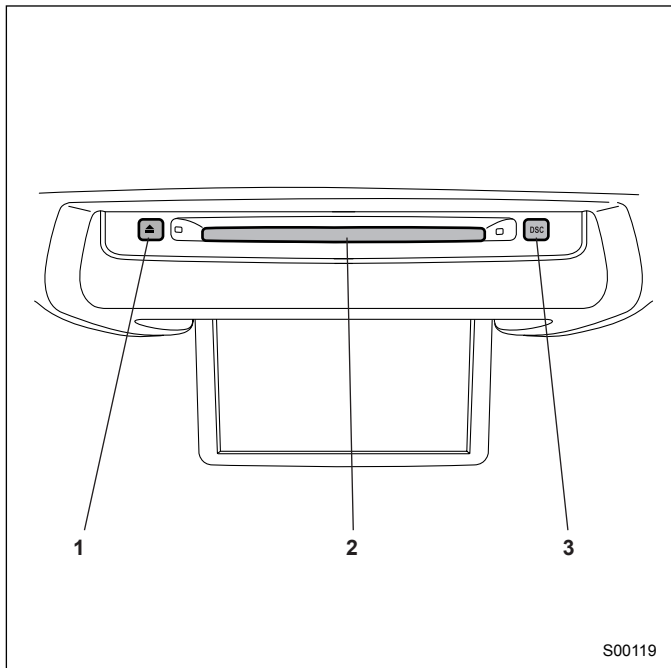


Remove the battery cover on the left earpiece by loosening the screw with a flat-head screwdriver.



Remove the old batteries and install new ones (two AAA batteries). Pay careful attention to the (+) and (-) marks on the battery case. Reinstall the cover in position by tightening the screw with a flat-head screwdriver.

## DVD Player



The DVD player can be operated when the ignition switch is in the “ACC” or “ON” position. Load a disc by inserting it into the disc slot of the player, with the label side facing up. The disc will be carried inward automatically when you insert it partially. The disc indicator light will turn on when the disc reaches the full inward position. To eject the disc, press the “Eject (▲)” button. The disc will come out and the indicator light will go out.

- 1) Eject button
- 2) Disc slot
- 3) Disc indicator light

# Precautions to Observe When Handling Discs

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## Types of Discs Playable with the Rear Seat Entertainment System

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Your Rear Seat Entertainment System can play back music CDs, DVD video discs and video CDs that have any of the marks indicated below.

### NOTE

- The system is not compatible with DVD audio discs and MP3-file or WAV-file based music CDs.
- The system does not support 8-cm/3-inch CDs; if inserted, they will automatically be ejected.

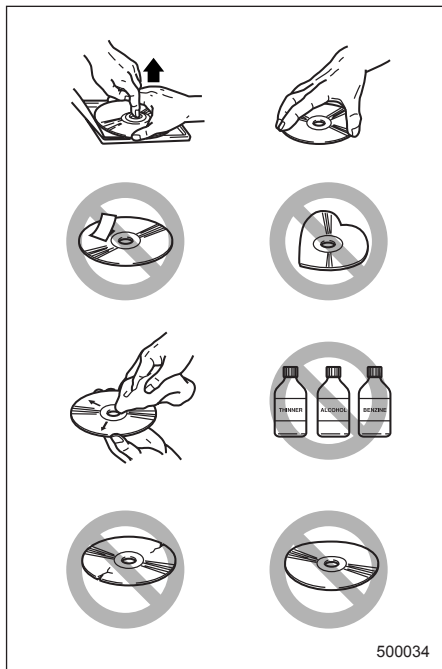
Music CDs	
DVD video discs	
Video CDs	

The following products may not play back on the Rear Seat Entertainment System.

SACD  
CCCD  
Dual disc  
CD-R  
CD-RW  
CD-ROM  
DVD-R  
DVD+R  
DVD-RW  
DVD+RW  
DVD-ROM  
DVD-RAM

## Precautions to Observe When Handling Discs

When handling discs, follow these precautions:









- In cold and/or rainy weather, condensation can form inside the DVD player, preventing normal operation. If this happens, eject the disc and wait for the player to dry out.
- Skipping may occur when the DVD player is subjected to severe vibration (for example, when the vehicle is driven on a rough surface).
- To remove a disc from its case, press the center of the case and hold both edges of the disc. If the disc surface is touched directly, contamination could cause poor image or sound quality. Do not touch the disc surface.
- Use a clean disc whenever possible. If there are any deposits, wipe the disc surface from the center outward with a dry, soft cloth. Be sure not to use a hard cloth, thinner, benzene, alcohol, etc.
- Do not use any disc that is scratched, deformed, transparent/semi-transparent, glue-labeled, or cracked. Also, do not use any disc that has a non-standard shape (for example, a heart shape) or 8-cm/3-inch CDs. Malfunctions or other problems might result.
- Discs are vulnerable to heat. Never keep discs in places exposed to direct sunlight, near heaters or in vehicles parked in the sun or on hot days.

## ■ DVD video discs

The DVD player of your Rear Seat Entertainment System can play back DVD video discs that conform to NTSC color TV formats. Any DVD video discs produced conforming to other formats such as PAL or SECAM cannot be used with the player.

The following are example logos that may be indicated on DVD video discs and what they mean:

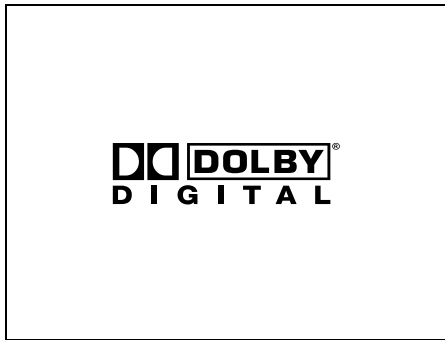
	The disc conforms to NTSC format of color TV.
	The disc has two audio tracks.
	The disc's subtitles are available in two languages.
	The disc's multi-angle recorded scenes are viewable from three different angles.
	Two screen aspect ratios (ratio of width to height) are selectable: wide screen of 16:9 and standard screen of 4:3.
	Region code indicating the area in which this video disc can be played. "ALL" stands for all countries; "1" stands for the United States and Canada.

### NOTE

Some DVD video discs have a region code, each indicating where it can be used. If a disc is not labeled "ALL" or "1", you cannot use it in your system's DVD player. If you attempt to play it in the player, a "REGION CODE ERROR" message will appear on the screen. Some DVD video discs without any region code may not be usable with your system's DVD player.



## ■ Copyright



The Dolby system is manufactured under license from Dolby Laboratories.

Dolby, DOLBY, and the double-D symbol are trademarks of Dolby Laboratories.

The Rear Seat Entertainment System incorporates copyright protection technology that is covered by method claims of certain U.S. patents and other intellectual property rights owned by Macrovision Corporation and other rights owners. Use of this copyright protection technology must be authorized by Macrovision Corporation, and is intended for home and other limited viewing uses only, unless otherwise authorized by Macrovision Corporation. Reverse engineering and modification is prohibited.



"dts" is a trademark of Digital Theater Systems, Inc.

# Playing Discs

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## Playing DVD Video Discs

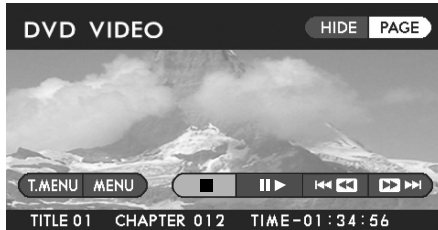
---

### ■ Starting playback

With the vehicle's ignition switch in the "ACC" or "ON" position, insert the disc into the disc slot of the DVD player, with the label side facing up. The player automatically starts playback of the disc.

If a disc is already in the player, press the "DVD • CD" button on your remote control to start playback.

### ■ Stopping playback



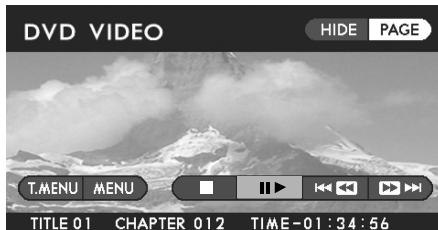
#### Method using screen and remote control:

Highlight the "■" switch on the screen with your remote control joystick, then press the "ENTER" button.

#### Method using remote control alone:

Press the remote control "STOP (■)" button.

### ■ Pausing



#### Method using screen and remote control:

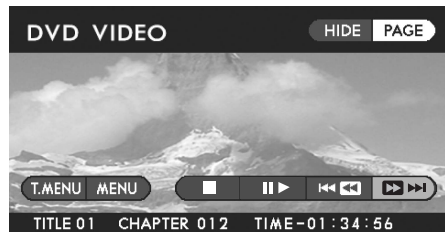
Highlight the "||" switch on the screen with the remote control joystick, then press the "ENTER" button.

#### Method using remote control alone:

Press the remote control "PAUSE • PLAY (||)" button.

To restart playback, perform either of the above operations again.

## ■ Fast-forwarding



### **Method using screen and remote control:**

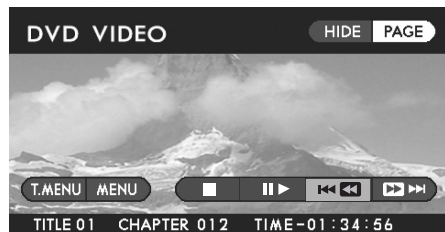
Highlight the “▶▶▶▶” switch on the screen with the remote control joystick, then press the “ENTER” button continuously until reaching the desired scene.

### **Method using remote control alone:**

Press the remote control “TRACK (▶▶)” button continuously until reaching the desired scene.

When you perform either of the above operations while the player is in pause mode, the disc will advance slowly.

## ■ Fast-reversing



### **Method using screen and remote control:**

Highlight the “◀◀◀◀” switch on the screen with the remote control joystick, then press the “ENTER” button continuously until reaching the desired scene.

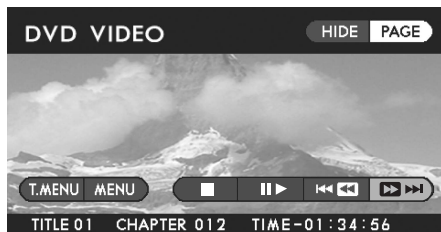
### **Method using remote control alone:**

Press the remote control “TRACK (◀◀)” button continuously until reaching the desired scene.

When you perform either of the above operations while the player is in pause mode, the disc will reverse slowly.

## ■ Skipping chapters forward

The data recorded on DVD video discs is divided into fragments called “titles”, and each title is further divided into smaller fragments called “chapters”. These titles and chapters are given specific numbers, which are indicated in the guide accompanying each disc. You can skip chapter(s) using the following procedure:



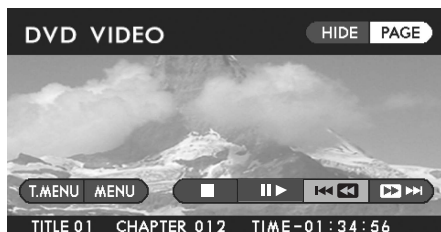
### Method using screen and remote control:

Highlight the “▶▶▶▶” switch on the screen with the remote control joystick, then briefly press the “ENTER” button. The disc skips the current chapter and advances to the beginning of the next chapter. Repeat this operation as many times as necessary to reach the desired chapter.

### Method using remote control alone:

Briefly press the remote control “TRACK (▶▶)” button. Refer to the above for the subsequent process and operation.

## ■ Skipping chapters backward



### Method using screen and remote control:

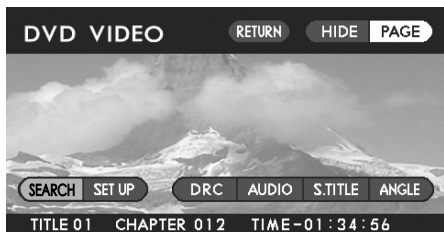
Highlight the “◀◀◀◀” switch on the screen with the remote control joystick, then briefly press the “ENTER” button. The disc reverses to the beginning of the current chapter. If you briefly press the button again, the disc reverses to the beginning of the preceding chapter. Repeat this operation as many times as necessary to reach the desired chapter.

### Method using remote control alone:

Briefly press the remote control “TRACK (◀◀)” button. Refer to the above for the subsequent process and operation.

## ■ Title search

If you enter a desired title number using the remote control joystick, the disc is played back beginning with the specified title. The number of titles differs from disc to disc. Refer to the guide attached to each disc for its title numbers.



### Method using screen and remote control:

Highlight the "SEARCH" switch on the screen with the remote control joystick, then press the "ENTER" button. The display switches to the title number entry screen.



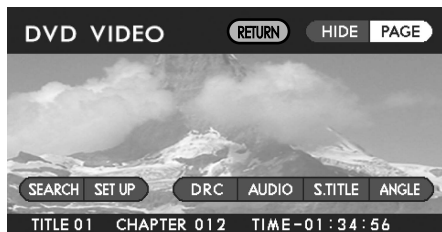
Enter the title number using the remote control joystick, then press the "ENTER" button. The player will play back the disc beginning with the specified title. To revert to the original video screen, highlight the "5" switch with the joystick, and then press the "ENTER" button.

### Method using remote control alone:

Press the remote control "SEARCH" button. Refer to the above for the subsequent process and operation.

## ■ Skipping to a predetermined screen

You can start playing a disc beginning with a registered predetermined screen. Some discs may not be compatible with this function. For the predetermined screen of each disc, refer to the guide accompanying it.



### Method using screen and remote control:

Highlight the "RETURN" switch on the screen with the remote control joystick, then press the "ENTER" button. Playback will start at the predetermined screen.

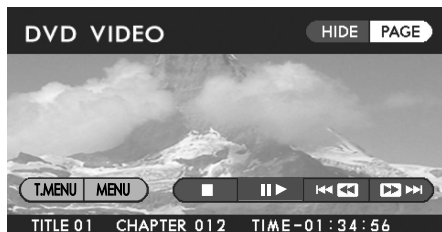
### Method using remote control alone:

Press the "RETURN" button on the remote control. Playback will start at the predetermined screen.

## ■ Displaying each disc's menu on the screen

You can display the menu stored in the disc.

Menus and their contents differ from disc to disc. After displaying a menu using the method below, follow the indications that each disc will show on its screen. Some discs may not allow you to select the top menu. For further details, please refer to the guide accompanying each disc.



### Method using screen and remote control:

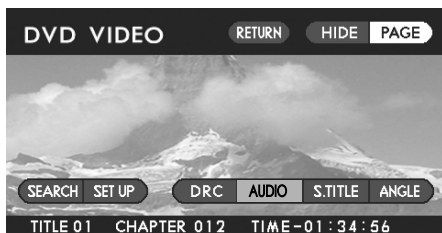
With the remote control joystick, highlight the "T. MENU" switch on the screen when displaying the top menu, or the "MENU" switch when displaying other menus. Then press the remote control "ENTER" button. The top menu or other menu will appear on the screen.

### Method using the remote control alone:

Press the "TOP MENU" button to display the top menu, or the "MENU" button to display other menus.

## ■ Changing the audio language

You can select a desired audio language from those available with the disc currently loaded in the player.



### Method using screen and remote control:

Highlight the "AUDIO" switch on the screen with the remote control joystick, then press the "ENTER" button. The display will switch to the audio language selection screen.



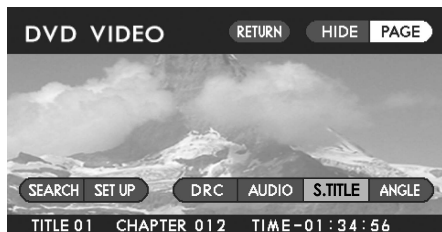
Click the "▼" end of the remote control joystick to highlight the desired language on the screen and then press the "ENTER" button. To revert to the original video screen, highlight the "↩" switch with the joystick, and then press the "ENTER" button.

### Method using remote control alone:

Press the remote control "AUDIO" button. Refer to the above for the subsequent operation.

## ■ Changing the subtitle language

You can select a desired subtitle language from those available with the disc currently in the player.



### Method using screen and remote control:

Highlight the “S. TITLE” switch on the screen with the remote control joystick, then press the “ENTER” button. The display will switch to the subtitle language selection screen.

Click the “▼” end of the remote control joystick to highlight the desired language on the screen, then press the “ENTER” button. To revert to the original video screen, highlight the “↩” switch with the joystick, and then press the “ENTER” button.

### Method using remote control alone:

Press the “**SUBTITLE**” button on the remote control. Refer to the above for the subsequent operation.

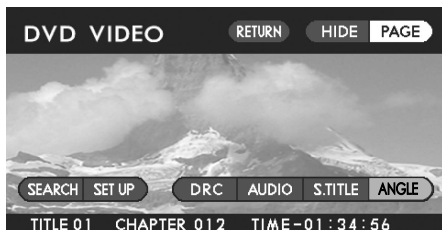
### NOTE

If you select “OFF” in the above operation, no subtitle is displayed on the screen.



## ■ Image angle selection on multi-angle recorded scenes

If you play back a DVD video disc containing scenes recorded using the multi-angle technology, you can enjoy viewing them from different angles. For example, you can view the image of the same mountain from both the right and left sides. Some discs may not be compatible with this function.



### Method using screen and remote control:

Highlight the "ANGLE" switch on the screen with the remote control joystick, then press the "ENTER" button. The display will switch to the angle selection screen.



Click the "▼" end of the remote control joystick to highlight the desired angle on the screen, then press the "ENTER" button. To revert to the original video screen, highlight the "↵" switch with the joystick, and then press the "ENTER" button.

### Method using remote control alone:

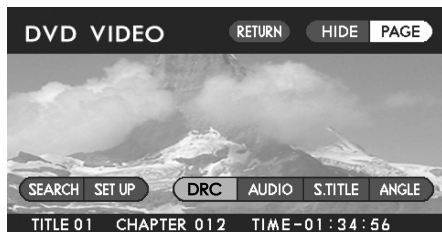
Press the "ANGLE" button on the remote control. Refer to the above for the subsequent operation.

### NOTE

- The default setting is "01" for all multi-angle recorded scenes.
- You may have to wait a short while for the change in angle to take place.
- You can make multi-angle scenes identifiable with the angle mark shown on the display screen. For details of the method, refer to Page 47.

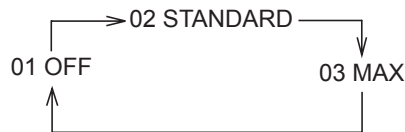
## ■ Selecting a dynamic range control setting

You can reduce (or compress) the difference between the maximum and minimum sound levels for your listening comfort during playback of a disc. There are three settings available, each having a different level of compression. If you select the “MAX” setting, the dynamic range control lowers the maximum sound level while raising the minimum sound level. This makes the audio sounds gentler to your ears.



Highlight the “DRC” switch on the screen with the remote control joystick, then press the “ENTER” button. The display will switch to the dynamic range control selection screen.

Click the “▼” end of the remote control joystick. Each time it is clicked, the setting changes in the following sequence:



### NOTE

The default setting of the dynamic range control is “02 STANDARD”.

With the desired setting selected, press the “ENTER” button. To revert to the original video screen, highlight the “➔” switch with the joystick, and then press the “ENTER” button.

## Playing Video CDs

---

### ■ Starting playback

With the ignition switch in the “ACC” or “ON” position, insert the CD into the disc slot of the DVD player, with the label side facing up. The player automatically starts playing the disc.

If a disc is already in the player, press the remote control “DVD • CD” button on your remote control to start playback.

### ■ Stopping playback



#### Method using screen and remote control:

Highlight the “■” switch on the screen with the remote control joystick, then press the “ENTER” button.

#### Method using remote control alone:

Press the remote control “STOP (■)” button.

### ■ Pausing



#### Method using screen and remote control:

Highlight the “||▶” switch on the screen with the remote control joystick, then press the “ENTER” button.

#### Method using remote control alone:

Press the remote control “PAUSE • PLAY (||▶)” button.

To restart playback, perform either of the above operations again.

## ■ Fast-forwarding



### Method using screen and remote control:

Highlight the “▶▶▶▶” switch on the screen with the remote control joystick, then press the “ENTER” button continuously until reaching the desired scene.

### Method using remote control alone:

Press the remote control “TRACK (▶▶)” button continuously until reaching the desired scene.

When you perform either of the above operations while the player is in pause mode, the disc advances slowly.

## ■ Fast-reversing



### Method using screen and remote control:

Highlight the “◀◀◀◀” switch on the screen with the remote control joystick, then press the “ENTER” button continuously until reaching the desired scene.

### Method using remote control alone:

Press the remote control “TRACK (◀◀)” button continuously until reaching the desired scene.

## ■ Skipping tracks forward

The data recorded on video CDs is divided into fragments called “tracks”. These tracks are given specific numbers, which are indicated in the guide accompanying each disc. You can advance the disc skipping a track or tracks as follows:



### **Method using screen and remote control:**

Highlight the “▶▶▶▶” switch on the screen with the remote control joystick, then briefly press the “ENTER” button. The disc skips the current track and advances to the beginning of the next track. Repeat this operation as many times as necessary to reach the desired track.

### **Method using remote control alone:**

Briefly press the remote control “TRACK (▶▶)” button. Refer to the above for the subsequent process and operation.

### **NOTE (Ver 2.0 video CD only)**

**Track skipping is not possible with some Ver 2.0 video CDs. For information on track skipping of each Ver 2.0 video CD, refer to the guide accompanying it.**

## ■ Skipping tracks backward



### Method using screen and remote control:

Highlight the “⏮⏮⏮⏮” switch on the screen with the remote control joystick, then briefly press the “ENTER” button. The disc reverses to the beginning of the current track. If you briefly press the button again, the disc reverses to the beginning of the preceding track. Repeat this operation as many times as necessary to reach the desired track.

### Method using remote control alone:

Briefly press the remote control “TRACK (⏮⏮)” button. Refer to the above for the subsequent process and operation.

### NOTE (Ver 2.0 video CD only)

**Track skipping is not possible with some Ver 2.0 video CDs. For information on track skipping of each Ver 2.0 video CD, refer to the guide accompanying it.**

## ■ Skipping to a predetermined screen (Ver 2.0 video CD only)

You can start playing a disc beginning with a registered predetermined screen. Some discs may not be compatible with this function. For the predetermined screen of each disc, refer to the guide accompanying it.



### Method using screen and remote control:

Highlight the “RETURN” switch on the screen with the remote control joystick, then press the “ENTER” button. Playback will start at the predetermined screen.

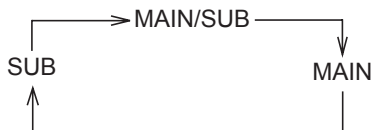
### Method using remote control only:

Press the “RETURN” button on the remote control. Playback will start at the predetermined screen.

### ■ Sound channel (MAIN/SUB) selection



Highlight the “AUDIO” switch on the screen with the remote control joystick, then press the “ENTER” button once or as many times as necessary to select the desired sound channel. Each time you press the “ENTER” button, the sound channel will change in the following sequence:



#### NOTE

The default sound channel setting is “MAIN/SUB”.

## Playing Music CDs

---

### ■ Starting playback

With the ignition switch in the “ACC” or “ON” position, insert the CD into the disc slot of the DVD player, with the label surface facing up. The player automatically starts playing the disc.

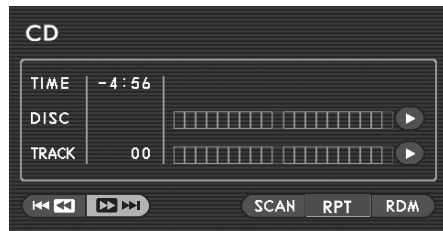
If a disc is already in the player, press the remote control “**DVD • CD**” button on your remote control to start playback.

### ■ Stopping playback

To stop playback of a music CD, perform the following:

- Press the remote control “OFF” button.
- Press the “Eject (▲)” button on the DVD player.

## ■ Fast-forwarding



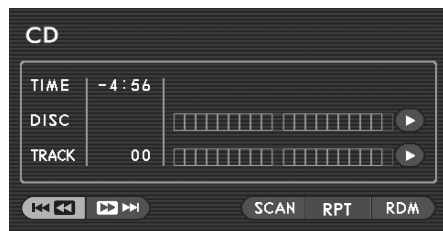
### Method using screen and remote control:

Highlight the “▶▶▶▶” switch on the screen with the remote control joystick, then press the “ENTER” button continuously.

### Method using remote control alone:

Press the remote control “TRACK (▶▶)” button continuously.

## ■ Fast-reversing



### Method using screen and remote control:

Highlight the “◀◀◀◀” switch on the screen with the remote control joystick, then press the “ENTER” button continuously.

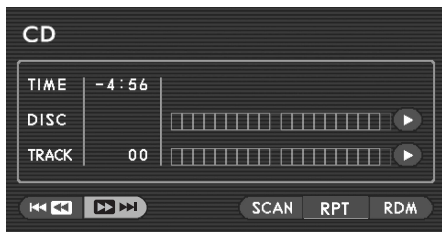
### Method using remote control alone:

Press the remote control “TRACK (◀◀)” button continuously.



## ■ Skipping tracks forward

You can advance the disc skipping one or more tracks as follows:



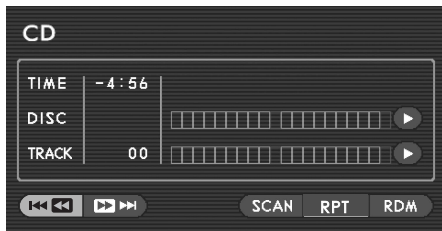
### Method using screen and remote control:

Highlight the "▶▶▶▶▶" switch on the screen with the remote control joystick, then briefly press the "ENTER" button. The disc skips the current track and advances to the beginning of the next track. Repeat this operation as many times as necessary to reach the desired track.

### Method using remote control alone:

Briefly press the remote control "TRACK (▶▶▶)" button. Refer to the above for the subsequent process and operation.

## ■ Skipping tracks backward



### Method using screen and remote control:

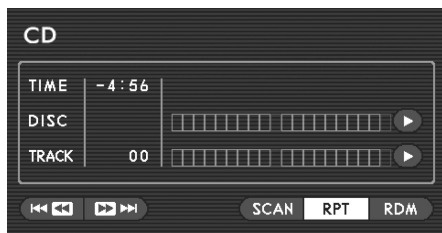
Highlight the "◀◀◀◀" switch on the screen with the remote control joystick, then press the "ENTER" button. The disc reverses to the beginning of the current track. If you briefly press the button again, the disc reverses to the beginning of the preceding track. Repeat this operation as many times as necessary to reach the desired track.

### Method using remote control alone:

Briefly press the remote control "TRACK (◀◀◀)" button. Refer to the above for the subsequent process and operation.

## ■ Repeat playback

If you want to listen to the currently playing track again, perform the following:

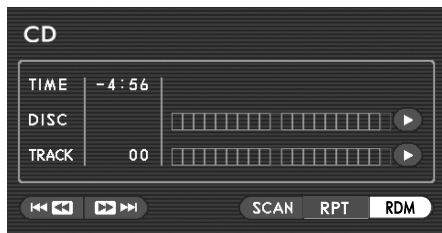


Highlight the “RTP” switch on the screen with the remote control joystick, then press the “ENTER” button.

The repeat-play mode will be cancelled if you press the “ENTER” button again.

## ■ Random playback

You can play all of the tracks on the disc currently in the player in a random order by doing the following:

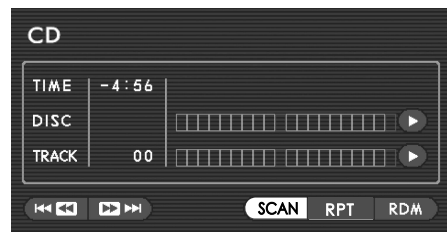


Highlight the “RDM” switch on the screen with the remote control joystick, then press the “ENTER” button.

The random playback will be cancelled if you press the “ENTER” button again.

## ■ Scan

The scan mode lets you listen to the first 10 seconds of each track on the disc in succession. Do the following to scan-play the disc:



Highlight the “SCAN” switch on the screen with the remote control joystick, then press the “ENTER” button.

The scan mode will be cancelled if you press the “ENTER” button again.

# Initial Settings

---

We recommend that you make these initial settings before enjoying DVD video discs with your Rear Seat Entertainment System in order to eliminate the inconvenience of making selections and settings each time you play a disc.

- DVD language (ENGLISH)
- Audio language (ENGLISH)
- Subtitle language (ENGLISH)
- Angle mark (ON)
- Viewer restriction level (8)
- Password

## NOTE

- **The settings shown in ( ) above are default settings made before shipment from the factory. When you highlight the “DEFAULT” switch on the “SETUP MENU” screen with the remote control joystick and then press the “ENTER” button, all settings return to the default settings.**
- **Some discs already contain audio language and other settings. These settings take priority over your settings.**
- **If the vehicle’s power supply is interrupted due to, for example, disconnection of the battery or a blown fuse, all your settings will be cancelled and the system will revert to the factory settings. If this happens, make your settings again.**

Perform these settings from the SETUP MENU screen on the display. To access the SETUP MENU screen, do the following:



### Method using screen and remote control:

Highlight the “SET UP” switch on the screen with the remote control joystick, then press the “ENTER” button. The display will switch to the SETUP MENU screen.

### Method using remote control alone:

Press the remote control “SETUP” button.

## Setting DVD/Audio/Subtitle Language

---

The following languages are available for setting:

- ENGLISH
- FRENCH
- SPANISH
- GERMAN
- ITALIAN
- DUTCH
- JAPANESE
- OTHERS

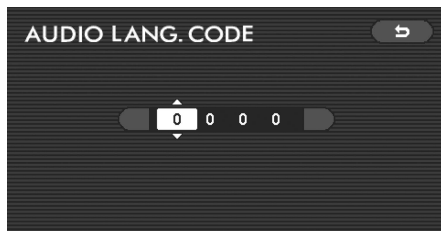


On the SETUP MENU screen, highlight a language mode (DVD, Audio, or Subtitle mode) for which you wish to set a language using the remote control joystick and then press the “ENTER” button. Once the language mode has been selected, you can now set the desired language by highlighting it with the joystick and then pressing the “ENTER” button. The switch color of the set language changes from white to gray.

Do the same for the remaining language modes.

To revert to the SETUP MENU screen, highlight the “↩” switch with the joystick, and then press the “ENTER” button.

\* This figure shows the screen for setting the audio language.



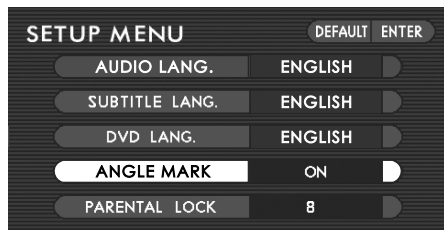
\* This figure shows the screen for setting the audio language.

## Setting the Angle Mark Display



Angle mark

If you wish to set a language not included in the list of languages that appears on the SETUP MENU screen, highlight “OTHERS” in the second step above and enter the code of the desired language (refer to the language code list on Page 55) using the joystick. After entering the code, press the “ENTER” button. To revert to the SETUP MENU screen, highlight the “↵” switch with the joystick, and then press the “ENTER” button.



On the SETUP MENU screen, highlight “ANGLE MARK” with the remote control joystick, followed by pressing the “ENTER” button. Then, the angle mark display switches between “ON” and “OFF” each time the “ENTER” button is pressed. Select either “ON” or “OFF” as desired.

### NOTE

- Image angle selection is not possible for DVD video discs that do not contain multi-angle recorded scenes.
- You can enjoy multi-angle recorded scenes by changing their angle even when “OFF” is set for the angle mark display.

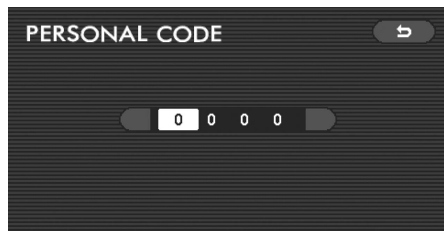
## Setting the Viewer Restriction Level

---

If you make this setting, certain scenes contained in the DVD video disc in the player are prevented from appearing on the screen. The highest restriction level is 1 and the lowest is 8.

### NOTE

**This setting is not effective for discs without a pre-programmed viewer restriction feature.**



With an appropriate DVD video disc loaded in the player, access the SETUP MENU screen. Highlight “PARENTAL LOCK” with the remote control joystick, then press the “ENTER” button. The display will change to the “PERSONAL CODE” screen.



Enter your four-digit password using the joystick, then press the “ENTER” button. The display will change to the “RESTRICTION LEVEL” screen.

Select a restriction level number (1 – 8) with the joystick, then press the “ENTER” button. The switch color of the set number changes from white to gray.

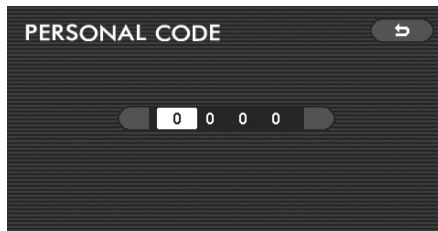
To return to the SETUP MENU screen, highlight the “↵” switch with the joystick, and then press the “ENTER” button.

#### NOTE

- No default has been set for the password. The “PERSONAL CODE” screen will show “- - - -”. Register your password as instructed in “Password registration” below.
- Entry of a wrong password results in an “⚠ INCORRECT CODE” message. If this message appears, you cannot continue the viewer restriction setting operation unless you re-enter the correct password. (Refer to Page 54.)
- If you forget your password, return the system to the state before registering the password. The method for doing this is described in NOTE of “Password registration” below. Next, register a new password.

## ■ Password registration

Use this method to register your password, which is necessary when setting the viewer restriction level.



With a DVD video disc loaded in the player, access the SETUP MENU screen. Highlight the “PARENTAL LOCK” with the remote control joystick, then press the “ENTER” button. The display will change to the “PERSONAL CODE” screen.

Enter a numerical four-digit password using the joystick, then press the “ENTER” button.

#### NOTE

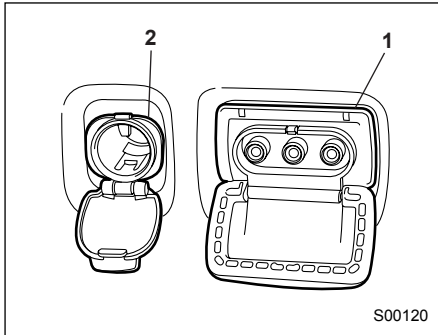
If necessary, you can return the system to the state before registration of the password by doing the following:

On the “PERSONAL CODE” screen, highlight the first digit position with the joystick, and then click the “◀” mark end of the joystick 10 times. The screen will show “- - - -”, indicating that no password has been set.



# Connecting External Devices to Your Rear Seat Entertainment System

You can enjoy TV games from a home-use TV game machine or video programs from a video tape player with the Rear Seat Entertainment System if such an external device is connected to one of the external device jacks of the system. For further details, refer to the instruction manual provided by the manufacturer of each external device.



- 1) External device jacks
- 2) Accessory power outlet

Before you can use an external source device connected to the system, push the remote control's "VIDEO" button.

The external device jacks are located on the left side wall behind the second-row seat. Open the cover to use the jacks.

There are three jacks individually marked with different colors to identify their uses as follows:

- Yellow: external video devices
- Red: external audio devices
- White: external audio devices

Of the three accessory power outlets provided in your vehicle, the one located next to the external device jacks can be used to supply power to an external device. When using the power outlet, be sure to read the "Accessory power outlets" section in chapter 6 of the Owner's Manual.

## CAUTION

- **Keep the cover closed when the external device jacks are not in use.**
- **Be sure to connect only appropriate plugs that fit the jacks. Doing otherwise could cause electrical failures or short circuits in the system.**
- **Do not allow spilled drinks or other foreign matter to get into the external device jacks. That could cause failure of the system.**
- **Rear-seat passengers must be careful not to hit connected plugs with their body or anything else; failure of the system could result.**

# Adjusting Display Conditions and Selecting Display Mode

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In addition to the function that allows you to adjust the display color and other esthetic conditions, the Rear Seat Entertainment System has a function that enables you to select the display mode (normal and wide screens) according to your preference. Use the following methods for the adjustment and selection.

## Display Condition Adjustment

---

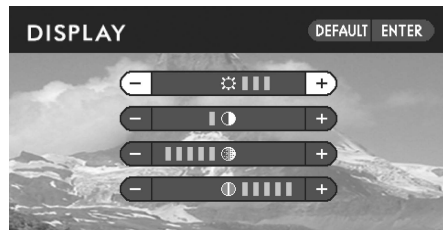
You can adjust the display conditions with respect to the following items:

- Brightness
- Contrast
- Tone (gradation)
- Color (balance)

### NOTE

- **Tone and color adjustments are not possible when a music CD is loaded in the player.**
- **This setting is defaulted to medium within the adjustable range for each of the above adjustment items.**

### ■ Adjusting method



\* This figure shows the screen when a DVD video disc or video CD is loaded in the player.

Press the remote control “DISPLAY” button. The display condition adjustment screen will appear.

Highlight the desired adjustment item with the joystick, and then click either the “◀” or “▶” end of the joystick referring to the table below. (Clicking the “◀” end results in “-” direction adjustments and clicking the “▶” end results in “+” direction adjustments.)

Set each adjustment by selecting the “ENTER” switch on the screen or pressing the remote control “ENTER” button.

### NOTE

Select the “DEFAULT” switch to revert to a default setting.

Item	“+” direction (“▶”)	“-” direction (“◀”)
BRIGHTNESS	Brighter	Darker
CONTRAST	Stronger contrast	Weaker contrast
TONE	Steeper tone gradation	Gentler tone gradation
COLOR	Stronger green colors	Stronger red colors

## Display Mode Selection

-----

The following three display modes are available for your selection:

- Normal
- Wide 1
- Wide 2

### NOTE

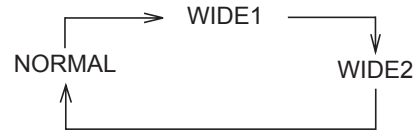
- You cannot change the display mode when a music CD is loaded in the player.
- The default display mode setting is “Wide 1”.

## ■ Selecting method



\* This figure shows a screen image when the "WIDE 1" mode is selected.

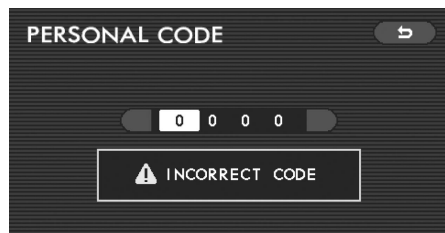
Each time you press the remote control "DISPLAY MODE" button, the mode changes in the following sequence:



Release the "DISPLAY MODE" button; 6 seconds later, a full screen will be displayed in the selected mode.

# Error Messages

The Rear Seat Entertainment System displays one of the following messages whenever it detects the relevant error condition. If an error message is displayed, take the appropriate action that is indicated on this page.



**Cause:** A wrong password (personal code) has been entered.

**Remedy:** Enter the correct password (refer to Page 49).



**Cause:**

- The disc has been inserted with the la-

bel side down.

- The disc is dirty.
- The disc is incompatible with the system.

**Remedy:** Check the inserted disc for any of the above causes. Correctly insert, clean or change the disc as necessary.



**Cause:** The inserted disc is of an inappropriate region code.

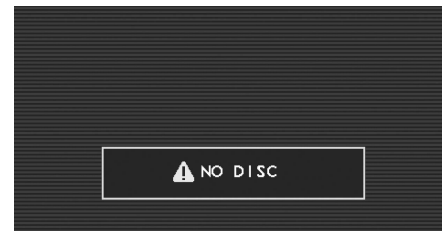
**Remedy:** Use only a disc marked "ALL" or "1".



**Cause:** Operational obstruction or other

mechanical fault has occurred during disc insertion or ejection.

**Remedy:** Have the system inspected by your SUBARU dealer.



**Cause:** Remote control "DVD • CD" button has been pressed when there is no disc in the player.

**Remedy:** Load a disc into the player.

## Language/Code List

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Language	Code
Afar	0101
Abkhazian	0102
Afrikaans	0106
Amharic	0113
Arabic	0118
Assamese	0119
Aymara	0125
Azerbaijani	0126
Bashkir	0201
Byelorussian	0205
Bulgarian	0207
Bihari	0208
Bislama	0209
Bengali; Bangla	0214
Tibetan	0215
Breton	0218
Catalan	0301
Corsican	0315

Language	Code
Czech	0319
Welsh	0325
Danish	0401
German	0405
Bhutani	0426
Greek	0512
English	0514
Esperanto	0515
Spanish	0519
Estonian	0520
Basque	0521
Persian	0601
Finnish	0609
Fiji	0610
Faroese	0615
French	0618
Frisian	0625
Irish	0701

Language	Code
Scots Gaelic	0704
Galician	0712
Guarani	0714
Gujarati	0721
Hausa	0801
Hindi	0809
Croatian	0818
Hungarian	0821
Armenian	0825
Interlingua	0901
Indonesian (formerly in)	0914
Interlingua	0905
Inupiak	0911
Icelandic	0919
Italian	0920
Inuktitut	0921
iw Hebrew (formerly iw)	0923
Japanese	1001

## Language/Code List

Language	Code
Yiddish (formerly ji)	1009
Javanese	1023
Georgian	1101
Kazakh	1111
Greenlandic	1112
Cambodian	1113
Kannada	1114
Korean	1115
Kashmiri	1119
Kurdish	1121
Kirghiz	1125
Latin	1201
Lingala	1214
Laothian	1215
Lithuanian	1220
Latvian, Lettish	1222
Malagasy	1307
Maori	1309

Language	Code
Macedonian	1311
Malayalam	1312
Mongolian	1314
Moldavian	1315
Marathi	1318
Malay	1319
Maltese	1320
Burmese	1325
Nauru	1401
Nepali	1405
Dutch	1412
Norwegian	1415
Occitan	1503
(Afan) Oromo	1513
Oriya	1518
Punjabi	1601
Polish	1612
Pashto, Pushto	1619

Language	Code
Portuguese	1620
Quechua	1721
Rhaeto-Romance	1813
Kirundi	1814
Romanian	1815
Russian	1821
Kinyarwanda	1823
Sanskrit	1901
Sindhi	1904
Sangho	1907
Serbo-Croatian	1908
Sinhalese	1909
Slovak	1911
Slovenian	1912
Samoan	1913
Shona	1914
Somali	1915
Albanian	1917

Language	Code
Serbian	1918
Siswati	1919
Sesotho	1920
Sundanese	1921
Swedish	1922
Swahili	1923
Tamil	2001
Telugu	2005
Tajik	2007
Thai	2008
Tigrinya	2009
Turkmen	2011
Tagalog	2012
Setswana	2014
Tonga	2015
Turkish	2018
Tsonga	2019
Tatar	2020

Language	Code
Twi	2023
Uighur	2107
Ukrainian	2111
Urdu	2118
Uzbek	2126
Vietnamese	2209
Volapuk	2215
Wol'of	2315
Xhosa	2408
Yoruba	2515
Zhuang	2601
Chinese	2608
Zulu	2621



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This supplement contains the descriptions and instructions for the Monitor System.  
Please read this supplement carefully before using your monitor system.  
Please keep this supplement with your Owner's Manual and leave it in the vehicle at the time of resale. The next owner will need the information it contains.

FUJI HEAVY INDUSTRIES LTD., TOKYO, JAPAN



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# Safety Warnings

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You will find a number of **WARNINGS**, **CAUTIONS** and **NOTES** in this supplement.

These safety warnings alert you to potential hazards that could result in injury to you or others.

Please read these safety warnings as well as all other portions of this supplement carefully in order to gain a better understanding of how to use your Monitor system safely.

## **WARNING**

A **WARNING** indicates a situation in which serious injury or death could result if the warning is ignored.

## **CAUTION**

A **CAUTION** indicates a situation in which injury or damage to your vehicle including Monitor system, or both, could result if the caution is ignored.

## **NOTE**

A **NOTE** gives information or suggestions how to make better use of your Monitor system.

# Before Use

## ■ Precautions when using the system

### **WARNING**

#### Read this manual first

Read this supplement carefully before using your monitor system. We are not liable for accidents or other problems resulting from failure to follow the instructions in this supplement.

#### Avoid operating the monitor while driving

You should stop the vehicle in a safe place before operating the monitor. For safety's sake, some of the monitor's functions cannot be used unless the vehicle is stationary.

#### Look at the monitor only when necessary

When you need to look at the monitor, do so for the shortest time possible. Looking away from the road for too long could lead to an accident.

#### Keep the volume low enough for you to hear outside sounds

Keep the system's volume level low enough for you to be able to hear outside sounds while driving. To do otherwise may mean that you are unable to react appropriately to traffic conditions thus resulting in an accident.

### **CAUTION**

#### Never disassemble or modify the monitor

Any attempt to disassemble or modify the monitor could lead to a fire, an electric shock, or some other type of accident.

#### Do not continue using the monitor if it malfunctions

If the system shows any sign of malfunctioning (for example, the monitor gives no picture), stop using it immediately and contact the nearest SUBARU dealer. Continuing to use the system could lead to a fire, an electric shock, or some other type of accident.

#### If the monitor gets contaminated, emits smoke or an odd smell, stop using it

If a foreign object gets inside the system, liquid is spilled onto the system, or the system emits smoke or an unusual smell, stop using it immediately and contact the nearest SUBARU dealer. Continuing to use the system could lead to a fire, an electric shock, or some other type of accident.

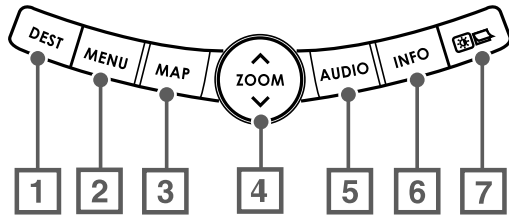
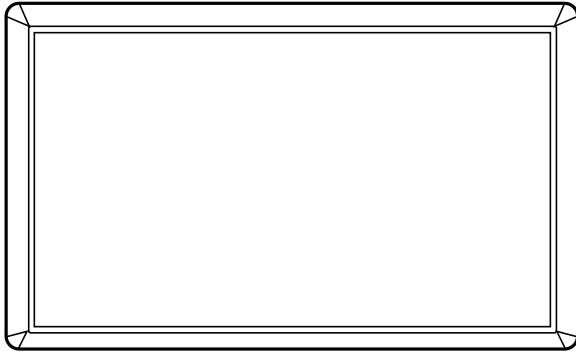
### **CAUTION**

The displays contain mercury. Therefore, the displays must be removed before vehicle disposal. Once the displays have been removed, please reuse, recycle or dispose of them as hazardous waste.

### ■ About the monitor

- Subjecting the control buttons or liquid crystal display to excessive shock could result in monitor deformation or other damage.
- Keep any heat source (including lighted cigarettes) away from the monitor. If a heat source is brought into contact with the monitor's cabinet and panel, they could be deformed or otherwise degraded.
- In extreme cold, the monitor may operate sluggishly and the display may dim. Such conditions do not indicate a problem. They will disappear when the cabin temperature rises to a normal temperature.
- Tiny black and white dots may occasionally appear in the liquid crystal display. These dots are a normal characteristic of the display. They do not indicate a problem.
- When the monitor's display requires cleaning, gently wipe it with a silicone cloth or other soft cloth. If necessary, spray the cloth with neutral cleaning fluid. Be sure to wipe away any cleaning fluid left on the display surface. Do not spray the cleaning fluid directly onto the display surface. Spraying cleaning fluid directly onto the display surface could cause an adverse effect on internal components. It is also not a good idea to wipe the display surface with a stiff cloth or attempt to clean it using thinners, alcohol, or any other volatile solvent. Doing so could leave scratches and/or erase the control button labels.
- Do not allow the monitor to get wet. If it gets wet (allowing, for example, to a spilled drink or wet umbrella), its internal electronic circuitry may malfunction.
- In hot weather, cool the passenger compartment down before using the monitor. The liquid crystal display operates correctly at temperatures between 32°F and 140°F (0°C and 60°C). When the temperature exceeds 140°F (60°C), the monitor's circuit protection function is activated, causing the display to dim.

# Control Button Names



## 1 DEST

This button is used to display the destination screen of your navigation system.  
See the Owner's Manual Supplement for the navigation system.

## 2 MENU

This button is used to display the menu screen of your navigation system.  
See the Owner's Manual Supplement for the navigation system.

## 3 MAP

This button is used to switch the screen to a navigation system screen from any other screen.  
See the Owner's Manual Supplement for the navigation system.



4

This button is used to zoom in the map displayed on the screen.

## 5 AUDIO

This button is used to display the Audio or RSE (Rear Seat Entertainment) screen.

## 6 INFO

This button is used to display the vehicle information screen.



7

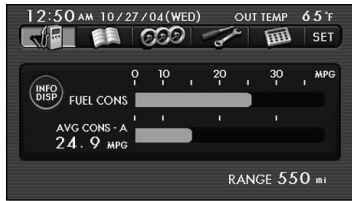
This button is used to adjust the brightness and contrast of the image as well as to display a calendar (see Page 36 through 39, 42).  
If the system has automatically turned down the brightness in order to prevent excessive brightness following the illumination of headlights or parking lights, pressing this button for more than one second will return the display to the standard brightness level.

For further details on the MENU, MAP and DEST buttons, refer to the Owner's Manual Supplement for the navigation system.

# Displaying Vehicle Information Screen

The vehicle information screen provides a variety of information on your vehicle and driving. It also gives ways to program certain functions available in your vehicle.

1



First, press the **INFO** button, then select any of the keys on the screen.



The screen displays the current fuel consumption rate, average fuel consumption rate, and the range you can drive on the remaining fuel. See Pages 8 through 10.



The screen displays the driving record data. The monitor system can retain the record data. See Pages 11 through 20.



The screen displays the reading of the following three meters: average fuel consumption rate, current fuel consumption rate and throttle opening percentage. See Page 21.



You can program your maintenance schedule and other maintenance-related items from this screen. See Pages 22 through 25.



You can use a calculator. You can also convert units, for example, between miles and kilometers.



You can program certain monitor and other system functions. See Pages 26 through 33.



### NOTE

- You can turn the outside air temperature display on or off in the map screen by selecting the **SET** key. See Page 26.
- You may not be able to use the vehicle information screen if data cannot be properly retrieved from the relevant vehicle systems.

# Displaying Vehicle Information and Programming Vehicle System Functions

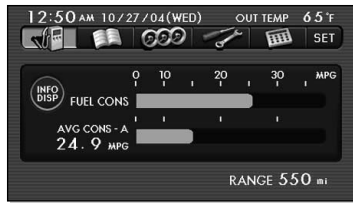
## Displaying fuel consumption information and programming for the automatic alarm display

### ■ Displaying fuel consumption information

Use the following procedure to display the current fuel consumption rate, average fuel consumption rate, and range you can drive on the remaining fuel.

Press the **INFO** button.

1



Select .

The fuel consumption information screen will be displayed.


This completes the procedure.

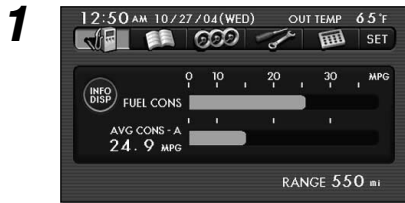
### NOTE

- Current and average fuel consumption rates will change all time due to driving and other conditions. The displayed data, including remaining fuel range data, may be different from the actual values. It is advisable that you refuel well in advance of reaching a displayed distance.
- Displayed current and average fuel consumption rates are based on estimates during running, not on accurate measurements.
- The average fuel consumption rate is associated with the driving after the last resetting of each trip meter. If the A or B trip meter is reset, the average fuel consumption rate will also be reset. After resetting the trip meter, the average fuel consumption rate will not be displayed until the vehicle has been driven approximately 1 mile from the reset point.

## ■ Programming automatic alarm display for low remaining fuel level

You can program the display to make it automatically alert you of the correspondingly low fuel level remaining.

Press the **INFO** button and then select .



Select .







Select **OFF** for the desired alarm display item ("FUEL"). The selected **OFF** should change to **ON**.

### 3

Select .

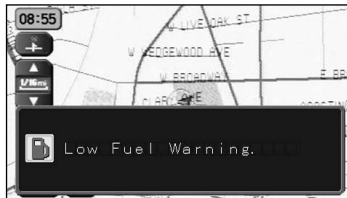
This completes the procedure.

#### NOTE

- If  is displayed for "FUEL" (remaining fuel level), the automatic alarm display function has been activated for that item. To deactivate the function, select . The indication should change from  to .
- The current fuel consumption rate alarm will be displayed only when the navigation screen is being used.



- The screen displaying an alarm looks like this:



## Displaying, retaining, and erasing driving record data

### ■ Displaying driving record data

Use the following procedure to display the current driving record data (distance, time, and average fuel consumption rate).

Press the **INFO** button.

1



Select .

The driving record screen will be displayed.


This completes the procedure.

#### NOTE

- If a vehicle's trip meter is reset, the corresponding drive distance and time display ("TRIP A" or "TRIP B") will also be reset.
- The drive time display is associated with the amount of time the ignition switch has stayed on since the trip meter was reset.
- When the vehicle battery is removed for repair or other purposes, the time is reset, but the distance is not reset. To reset the distance, press the trip meter knob. Please refer to the vehicle owner's manual for further details.
- The maximum time display possible is 240 hours (10 days).

## ■ Retaining driving record data

Use the following procedure to retain the current driving record data.

Press the **INFO** button and then select .



**1**



Select **LIST** below the trip meter designation (TRIP A or TRIP B) of the driving record data you wish to keep.

**2**



Select  or  to specify the number of the history frame (data storage location) where the driving record data are to be retained.

**3**

Select **RESET**.

4



**YES** will appear, requesting you to confirm your selection. Select it.

5

Select .


This completes the procedure.

### NOTE

- A maximum of three different driving record data sets can be retained for each of the trip meters (TRIP A and TRIP B).
- Driving record data can be retained while viewing the retained driving record data list (see Page 17).
- If the data storage location (history frame) specified in Step 2 is already occupied by data, this data will be replaced with new data once you have confirmed Step 4.
- When driving record data have been successfully retained in a history frame, the history frame's heading will change from a number to the date of data retention.

## ■ Erasing driving record data

Use the following procedure to erase retained driving record data.

Press the **INFO** button and then select .



1



Select **LIST** below the trip meter designation (TRIP A or TRIP B) about which you wish to erase the driving record data.

2



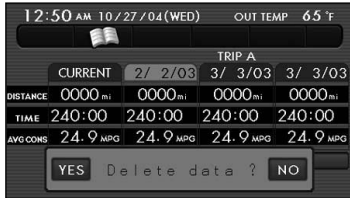
Select  or  to specify the number of the history frame (data storage location) where the driving record data to be erased are retained.

3

Select **RESET**.



4



**YES** will appear, requesting you to confirm your selection. Select it.

5

Select .


This completes the procedure.

## NOTE

There is no way to restore erased driving record data. Please use this procedure with caution so as not to accidentally erase any important data.

## ■ Displaying retained driving record data list

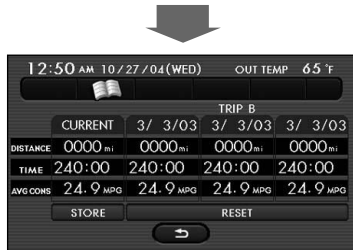
Use the following procedure to display a retained driving record data list.

Press the **INFO** button and then select .

1




Select **TABLE** for the trip meter (TRIP A or TRIP B) about which you wish to display the list.




This completes the procedure.

### NOTE

Selecting  on a driving record data list screen will cause the monitor system to go back to the driving record screen.

■ **Retaining driving record data while viewing a retained driving record data list**

Use the following procedure if you want to retain driving record data while viewing a relevant data list.

Press the **INFO** button and then select .



Select **TABLE** for the trip meter (TRIP A or TRIP B) about which you wish to retain the driving record data.



Select **STORE**.

**3**



Select the history frame (data storage location) in which the data are to be retained.

**4**

**YES** will appear, requesting you to confirm your selection. Select it if the selection is correct.

**5**

Select .


This completes the procedure.

### NOTE

- A maximum of three different driving record data sets can be retained for each of the trip meters (TRIP A and TRIP B).
- When the data storage location (history frame) specified in Step 3 is already occupied by data, this data will be replaced with new data once you have confirmed Step 4.
- When the driving record data has been successfully retained in a history frame, the history frame's heading will change from a number to the date of the data retention.
- Data retention is cancelled if you select **NO** in the "Select data **NO**" box.

## ■ Erasing driving record data while viewing a retained driving record data list

Use the following procedure if you want to erase retained driving record data while viewing a driving record data list.

Press the **INFO** button and then select .



Select **TABLE** for the trip meter (TRIP A or TRIP B) about which you wish to erase the driving record data.



Select **RESET**.

3



Select the history frame (data storage location) where the data to be erased are retained.

4

**YES** will appear, requesting you to confirm your selection. Select it.

5

Select .

This completes the procedure.

### NOTE

- There is no way to restore erased driving record data. Please use this procedure with caution so as not to accidentally erase any important data.
- Data erasure is cancelled if you select **NO** in the “Select data **NO**” box.

## Displaying three meters

Use the following procedure to display the three meters showing the average fuel consumption rate, current fuel consumption rate and throttle opening percentage.

Press the **INFO** button.

1



Select **999**.

The three meters will be displayed on the screen.

This completes the procedure.

### NOTE

- The average fuel consumption rate, current fuel consumption rate and throttle opening percentage indications are based on data retrieved from the relevant vehicle systems. For this reason, the status represented by meter readings may lag behind the current status.
- If data cannot be properly retrieved from the relevant vehicle systems, there will be no readings displayed on the meters.

## Maintenance schedule

### ■ Programming maintenance schedule

You can program your maintenance schedule into the monitor system for any of the following items, in terms of period and distance intervals.

- Maintenance
- Fluids check
- Tire pressure
- Engine oil

Use the following procedure:

Press the **INFO** button.

**1**

Select .

The maintenance information screen will be displayed.

**2**



Select the item (maintenance, fluids check, tire pressure, or engine oil) for which you wish to program the schedule.



3



Select **▼▲** to enter the maintenance schedule date.

4

Select **SET**.

5

**YES** will appear on the screen. Select it if the date is correct.

6

Select **NEXT ▶**.

7



Select **▼▲** to enter the maintenance schedule distance.

8

Select **SET**.

9

**YES** will appear on the screen. Select it if the distance is correct.



# 10

Select .

This completes the procedure.

### When a vehicle maintenance schedule is programmed

When a maintenance date alone is programmed, the monitor will remind you of the date by a message on the screen one month before, one week before, and on the day maintenance is due. When maintenance distance alone is programmed, a reminder message will be displayed 500 mile before, 100 mile before, and upon expiration of the distance. When both maintenance date and distance are programmed, the first message will be displayed upon reaching either the first date or distance, whichever comes earlier. This also applies to the second and third reminder times.

- If you want to dismiss the reminder message, select  in the reminder message box.  
The reminder message will not be displayed until reaching either the next date or distance, whichever comes first.
- If you want to display the reminder message later, select  in the reminder message box.  
The reminder message will not be displayed until the engine is restarted.



### NOTE

- You may program in either the date first (Steps 3 through 5) or distance (Steps 6 through 9). You may also program in a date or a distance only.
- Do not fail to select **SET** whenever a date or distance has been entered, otherwise the entry will not be enabled.
- The date or distance entry can be cancelled by selecting **RESET** in Step 3 or 7.
- The programmed date and/or distance will be displayed in the maintenance information screen.
- The icon(s) in the reminder messages for expired date and/or distance will be displayed in red.
- The date or distance entry can not be changed by selecting **LATER**.
- An example of the reminder message is shown below.

When maintenance distance is programmed

- 500 miles or 100 miles before  
Service reminder.
- Upon expiration of maintenance distance  
Warning! Permitted service distance exceeded.

When a maintenace date is programmed

- One month or one week before  
Service reminder.
- On the programmed day  
Final service reminder.
- After the programmed day  
Warning! Permitted service time exceeded.

### Programming vehicle system functions

#### ■ Programming display and answerback beep

You can program the monitor system for certain display items (see below) and answerback beep using the following procedure:

Press the **INFO** button and then select **SET**.

1



Select . The display and beep programming screen will appear.

Select or set any of the following items.

#### BEEP

Selecting or deselecting this turns the beeps on or off in response to specific operations performed.

#### OUT TEMP

Selecting or deselecting this turns the outside air temperature displayed in the upper right corner of the map screen on or off.

#### AUDIO DISP


On display screens other than AUDIO-only, it is possible to display the AUDIO as a subtitle on the screen. The time display can be set to OFF (no display), 5 sec., 10 sec., or CONT. ON (continuous display). Please select the display time according to your preference. The initialized setting is 10 sec.

#### DISP TIME

Choose the display time for low fuel and other automatic alarms from 10, 20, and 30 seconds.

This completes the procedure.

### NOTE

- Default settings for the above items vary depending on the vehicle model, version and grade.
- All selections and settings become effective as soon as they are made.
- The monitor system returns to the vehicle information screen when you select .
- Beep selection is enabled only when a genuine SUBARU audio system is connected.
- Display time can be set for the following three automatic alarm items:
  - Vehicle information
  - Fuel remaining
  - Messages on restrictions during driving (“prohibited while driving” etc.)

### ■ Touch panel sensing position adjustment

You can adjust the touch panel's sensing positions by using the following procedure:

Press the **INFO** button and then select **SET**.

**1**

Select .

**2**



Touch the center of the lower-left crossmark .

**3**



Touch the center of the upper-right crossmark .

# 4



Select **YES** if you want to save the changes.

Select **NO** if you do not want to save the changes.

The monitor system will return to the vehicle information screen.

This completes the procedure.

### NOTE

- If **RESET** is selected after Step 2 or 3, following screen is displayed.



If **YES** is selected, the touch panel's sensing positions will revert to the default positions.

If **NO** is selected, the touch panel's sensing positions will revert to the original positions.

- If you select **↶** after Step 2 or 3, you can return to the previous screen.
- The adjustment performed becomes effective as soon as you make it.
- At the time of delivery of the vehicle to the first user, the touch sensing positions are adjusted correctly. Use the above procedure if you feel that they have deviated from the correct positions.

### ■ Keyless entry system programming

You can program certain items related to the keyless entry system using the following procedure:

Press the **INFO** button and then select **SET**.

1



Select .

Select or set the following items.

#### LOCK SIGNAL


The keyless entry system has an answerback signaling function, which notifies the driver by electronic chirp and the turn signal lights when locking or unlocking operation performed. Please select or deselect the activation or deactivation of the electronic chirp and turn signal lights. The electronic chirp can be selected using the “BEEP” icon, and the turn signal lights using the “LIGHT” icon.

#### RESET

Select this button to revert all settings performed on this screen to the default settings.

This completes the procedure.

#### NOTE

- Each setting becomes effective as soon as you make it.
- The monitor system returns to the vehicle information screen when you select .
- The answerback signaling setting is only enabled when your vehicle has that function.
- For detailed information on how to operate the keyless entry system, refer to your vehicle owner's manual.



## ■ Programming other vehicle system functions

You can program the vehicle system functions described below by using the following procedure:

Press the **INFO** button and then select **SET**.

1



### Select .

Select or set the following items.

#### KEY ALERT

Select or deselect this key to enable or disable the key lock-in prevention function. Please see the vehicle owner's manual for details of the key lock-in prevention function.

#### ROOMLAMP (interior light)

You can choose the delay time before extinction of the interior light when the doors are unlocked using the keyless entry system transmitter, or when the doors are closed.

#### DEFOGGER

You can program the rear window defogger for two operation modes: continuous and 15-minute. When the continuous operation mode is programmed, the rear window defogger will operate for 15 minutes, stop for two minutes, and again operate for 15 minutes and so on. Even in under continuous operation mode, the defogger shuts off if certain conditions are met. (Refer to the vehicle owner's manual for these conditions.) In the 15-minute mode, the defogger will automatically shut off after about 15 minutes. You can shut it off before that time if you push the rear window defogger switch.

### DEICER


You can program the windshield wiper deicer for two operation modes: continuous and 15-minute. When the continuous operation mode is programmed, pressing the windshield wiper deicer switch means that the deicer will continue to function. It will, however, stop operating automatically if certain conditions are met. (Refer to the vehicle owner's manual for these conditions.) In the 15-minute mode, the windshield wiper deicer will automatically shut off after about 15 minutes. You can shut it off before that time if you push the switch.

### RESET

Select this key to revert all the three settings you performed on this screen to the default settings.

This completes the procedure.

### NOTE

- All selections and settings become effective as soon as they are made.
- The monitor system returns to the vehicle information screen when you select .
- Setting the windshield wiper deicer is only enabled when your vehicle has the windshield wiper deicer function.
- Interior light extinction delay time can be programmed as follows:

	<b>After unlocking doors with keyless entry transmitter</b>	<b>After closing doors</b>
0 SEC	0 second	0 second
SHORT	35 seconds	12 seconds
NORMAL	35 seconds	22 seconds
LONG	35 seconds	32 seconds

### ■ Alarm system and shock sensor

You can activate or deactivate the alarm system and the dealer optional shock sensor. Also, you can select the monitoring start delay time and the sensitivity level for detection of impact to the vehicle.

Press the **INFO** button and then select **SET**.

1



### Select .

Select or set the following items.


#### ALARM

Set the alarm system ON or OFF.

#### DELAY

Set the monitoring start delay time (after closure of doors).

#### SHOCK SENSOR


Use the  icon to select operation or non-operation. Select the sensitivity using the "SENSITIVITY" icon. Sensitivity can be selected from MIN to MAX, in a total of 11 gradations.

### NOTE

- The settings for shock sensor can only be performed on a vehicle equipped with the dealer optional shock sensor.
- It takes around 5 seconds for the sensitivity level to be adjusted. During this time, the security indicator light will flash to indicate the adjustment is being performed.
- If the sensitivity adjustment has not been performed correctly, the buzzer (beeping sound) will sound four times. If the buzzer continues to sound frequently, please have the system inspected by a SUBARU dealer.

### The calculator functions

A calculator with an 8-digit display is available. The calculator also performs unit conversions between miles and kilometers, pounds and kilograms, etc.

Press the **INFO** button and then select .



To perform a unit conversion, enter a number, then select the key for the unit you wish to convert from, then the key for the unit you wish to convert to.

Example: Convert 100 miles into kilometers: 100 → [mile] → [km] = 160.9.. km

Below is a description of each key and what it does.

Key	Description	Action
0-9	Numbers	The numbers 0 to 9
.	Decimal point	Begin entering numbers below the decimal point
=	Equals sign	Display the results of the calculation
+	Addition operator	Perform addition
-	Subtraction operator	Perform subtraction

## Displaying Vehicle Information and Programming Vehicle System Functions

Key	Description	Action
÷	Division operator	Perform division
x	Multiplication operator	Perform multiplication
MR	Memory recall	Retrieve a number from memory, and overwriting the current display
M+	Memory add	Add the currently displayed number to the memory
C	Clear	Clear the currently displayed number. If you have entered a number after pressing an operator, pressing this button returns the calculator to the state of having pressed the operator
AC	All clear	Return to the initial state (clear the current display, operator state, memory number, etc.)
°F	Fahrenheit	Convert the entered number from Celsius to Fahrenheit*
°C	Celsius	Convert the entered number from Fahrenheit to Celsius*
gal	Gallons	Convert the entered number from liters to gallons*
L	Liters	Convert the entered number from gallons to liters*
lb	Pounds	Convert the entered number from kilograms to pounds*
kg	Kilograms	Convert the entered number from pounds to kilograms*
mile	Miles	Convert the entered number from kilometers to miles*
km	Kilometers	Convert the entered number from miles to kilometers*
ft	Feet	Convert the entered number from meters to feet*
m	Meters	Convert the entered number from feet to meters*
in	Inches	Convert the entered number from centimeters to inches*
cm	Centimeters	Convert the entered number from inches to centimeters*
acre	Acres	Convert the entered number from square meters to acres*
m <sup>2</sup>	Square meters	Convert the entered number from acres to square meters*
psi	Pounds per square inch	Convert the entered number from kilopascals to pounds per square inch*
kPa	Kilopascals	Convert the entered number from pounds per square inch to kilopascals*

\* Results of unit conversions may include rounding errors.

## The calendar functions

A calendar feature is available.

### ■ Displaying calendar

Press the  button.

1



Select .

The calendar will appear.

A mark will appear on today's date.




### NOTE

Use the arrow buttons ( ) to display the previous and following months.

## ■ Adding a memo

You can add up to 20 memos to the calendar.

Press the  button and then select **CALENDAR**.

1

Select **LIST**.

2

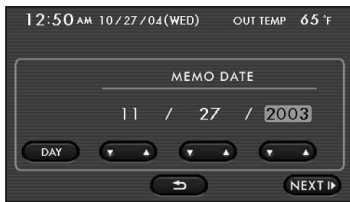


Select the slot you wish to add a memo to (1 to 20), then select **SET**.

### NOTE

Use the up and down arrows ( ) to show items 6 to 20.

3



### Set the date for the memo.

**DAY**: Enter a date in DD/MM/YYYY format.

Example: 01/05/2005 "1 May 2005" will appear in the memo.

[YEAR]: Enter a date in DD/MM format.

Example: 01/05/---- "1 May every year" will appear in the memo.

[MONTH]: Enter a day in DD format.

Example: 01/--/---- "01 of every month" will appear in the memo.

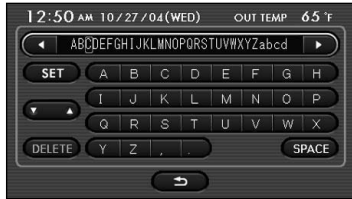
[WEEK]: Enter a day of the week.

Example: (MON) "Monday of every week" will appear in the memo.

4

Select **NEXT ▶**.

5



Enter the text of the memo, and select **SET**.



**YES** will appear on screen. Select it if the date is correct.  
Select **YES**.


6

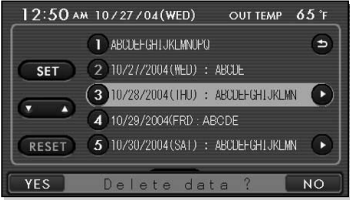



Select **↩**.  
The **M** memo icon will appear on the calendar.



## ■ Deleting a memo

Press the  button and then select **CALENDAR**.

- 1** Select **LIST**.
- 2** Select a memo to delete from the list, then select **RESET**.
- 3** 

Select **YES**.
- 4** Select .

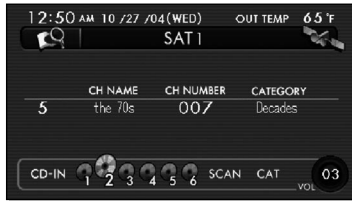
# Displaying Satellite Radio Source

You can display the satellite radio source when the audio unit is in the satellite radio source mode.

## NOTE

- Satellite radio can only be operated with the audio unit.
- For detailed instructions on the operation of the audio unit, see the owner's manual furnished with the vehicle.

1



The screen displays a convenient mode as the initial setting.

2

Select .

3



The screen displays a source mode.

4

Select **INFO**.

5



The screen displays another source mode.

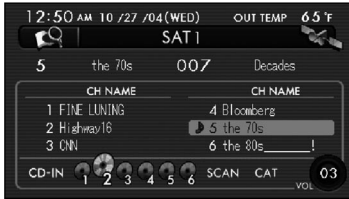
6

Select **↩** to return the screen of step 3.

7

Select .

8



The screen displays the satellite radio channel preset list screen.

9

Select  to return the screen of step 1.

# Adjusting Brightness/Contrast

---

## Adjusting brightness/contrast

---

Use the following procedure to adjust the brightness/contrast of the image on each screen:

**1**

Press the  button.

**2**



**Adjust the image contrast/brightness as follows:**

Select  and then  or  to adjust the brightness.

Select  and then  or  to adjust the contrast.

**3**

Select .

The previous screen will be displayed.

This completes the procedure.

### NOTE

- All adjustments take effect as soon as you make them and can be visually confirmed.
- The system saves the adjustments for individual screens (vehicle information screen and navigation screen) as well as for a situation with and without illumination from headlights or parking lights.

## ▲ CAUTION

Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

In compliance with Federal Regulations, following are reproductions of labels on, or inside the product relating to laser product safety.

<b>KENWOOD</b> FGZ001UF2	
TELEVISION	
12V.D.C. Ⓢ GROUND	
Kenwood Corporation Y31-2560-11	MADE IN JAPAN
No. 22222221	<b>X</b>
86281XA05A	
<small>THIS DEVICE COMPLIES WITH PART 15 OF THE FCC RULES. OPERATION IS SUBJECT TO THE FOLLOWING CONDITIONS: (1) THIS DEVICE MAY NOT CAUSE HARMFUL INTERFERENCE, AND (2) THIS DEVICE MUST ACCEPT ANY INTERFERENCE RECEIVED, INCLUDING INTERFERENCE THAT MAY CAUSE UNDESIRABLE OPERATION.</small>	

Location : Monitor top surface

## FCC WARNING

This equipment may generate or use radio frequency energy. Changes or modifications to this equipment may cause harmful interference unless the modifications are expressly approved in the instruction manual. The user could lose the authority to operate this equipment if an unauthorized change or modification is made.

## NOTE

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment may cause harmful interference to radio communications, if it is not installed and used in accordance with the instructions. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

## NOTE

This Class B digital apparatus complies with Canadian ICES-003.

This supplement contains a detailed description of the Navigation System and instructions for proper operation. Please read this supplement carefully before using your navigation system. Please keep this supplement with your Owner's Manual and leave it in the vehicle at the time of resale. The next owner will need the information it contains.

FUJI HEAVY INDUSTRIES LTD., TOKYO, JAPAN



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# Safety Warnings

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You will find a number of **WARNINGS**, **CAUTIONS** and **NOTES** in this supplement.

These safety warnings alert you to potential hazards that could result in injury to you or others.

Please read these safety warnings as well as all other portions of this supplement carefully in order to gain a better understanding of how to use your Navigation system safely.

## **WARNING**

A **WARNING** indicates a situation in which serious injury or death could result if the warning is ignored.

## **CAUTION**

A **CAUTION** indicates a situation in which injury or damage to your vehicle including Navigation system, or both, could result if the caution is ignored.

## **NOTE**

A **NOTE** gives information or suggestions how to make better use of your Navigation system.

# Before Use

## **WARNING**

### READ THIS MANUAL FIRST

Read this supplement carefully before using your navigation system. We are not liable for accidents or other problems resulting from failure to follow the instructions in this supplement.

### OBEY LOCAL ROAD SIGNS AND REGULATIONS

Always obey local road signs and regulations while following instructions given by the navigation system. Some of the data on the DVD-ROM disc may be outdated due to changes in local road signs and regulations. Furthermore, the data on the DVD-ROM disc does not take into account variable factors such as the weather, road congestion at different times of the day, temporary road closures due to road construction, and special events. Local road signs and regulations always take precedence over directions given by the system.

Failure to obey them could place you in physical danger or in violation of the law.

### DRIVE SAFELY

- Before following an instruction (for example, in the case of changing direction) given by the system, check that the action would be safe to take in the current traffic conditions. Continue to pay attention to safety while following any instruction.
- Do not be distracted by the navigation screen. Failure to keep your attention on the road could lead to an accident. When you need to look at the screen while driving, do so for the shortest time possible and avoid staring at the screen.
- You must stop the vehicle in a safe place before operating the navigation system. For safety's sake, some of the navigation system's controls and functions cannot be used unless the vehicle is stationary.
- Use this system only in locations where it is legal to do so. Some states/provinces may have laws prohibiting video screens within sight of the driver.

### VOLUME LEVEL

Keep the system's volume level low enough for you to be able to hear outside sounds while driving. To do otherwise may prevent you from reacting appropriately to traffic conditions and could result in an accident.

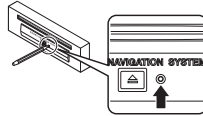
**⚠ CAUTION****FOREIGN OBJECTS**

Do not allow foreign objects to enter the disc insertion slot, including your fingers.

Foreign objects inside the system's main unit could cause an electric shock or a fire. If the main unit emits smoke or an unusual smell, stop using the system immediately and you contact the nearest SUBARU dealer.

**STOP OPERATION IN THE EVENT OF A PROBLEM**

In the event of a problem such as the absence of sound or video, try pressing the reset button. Should the problem persist, stop using the system and you contact the nearest SUBARU dealer.



(The reset button is also used when you need to upgrade the program. Insert an upgrade disc and press the reset button.)

**NEVER DISASSEMBLE OR MODIFY THE SYSTEM**

Any attempt to disassemble or modify any part of the system could lead to an electric shock or a fire, or some other type of accident.

**⚠ CAUTION**

The displays contain mercury. Therefore, the displays must be removed before vehicle disposal. Once the displays have been removed, please reuse, recycle or dispose of them as hazardous waste.

### ■ Points to note before use

#### **Starting the engine before using the system**

The navigation system can be used with the ignition key in either the ON position or the ACC position. To preserve the battery, however, it should be used with the engine running whenever possible. Using the system for a long time with the engine off can cause the battery to run down.

#### **Delay before display of current position**

The system will not immediately display a correct indication of your vehicle's current position after being switched on for the first time or after the battery has been disconnected for a long time. It will display a correct current position indication as soon as it receives Global Positioning System (GPS) signals.

#### **Program reloading after battery disconnection**

The navigation program will be erased from the system's memory if the battery is disconnected. If this happens, load the provided DVD-ROM disc in the system's main unit and turn the ignition switch to the ON or ACC position. The system will automatically reload the program and start operating normally again.

#### **Incorrect operation on rough roads**

The system may operate incorrectly or be unable to read the data on the DVD-ROM disc when subjected to severe vibration caused by driving on rough roads.

#### **Handling the GPS antenna**

Do not paint the antenna. Doing so could impair or prevent signal reception.

#### **Disabled switches**

Some switches are disabled during operation of the system. These switches are displayed in fainter colors and no messages are displayed for them.

#### **Risk of damage to the main unit**

Be mindful of the occupant compartment temperature. Using the system when the occupant compartment temperature is extremely high or low can damage it or cause it to malfunction. Also, note that the system's main unit can be damaged by strong vibration and by any metallic object or water that gets inside.

#### **Condensation**

Condensation can form on the lens inside the main unit when there is a rapid change in occupant compartment temperature (for example, when the heater is switched on in cold weather). Such condensation can cause the system to operate abnormally. If you wait an hour or so for the condensation to disappear, the system should start working normally again. If normal operation is still not restored after several hours, we recommend that you contact the nearest SUBARU dealer.

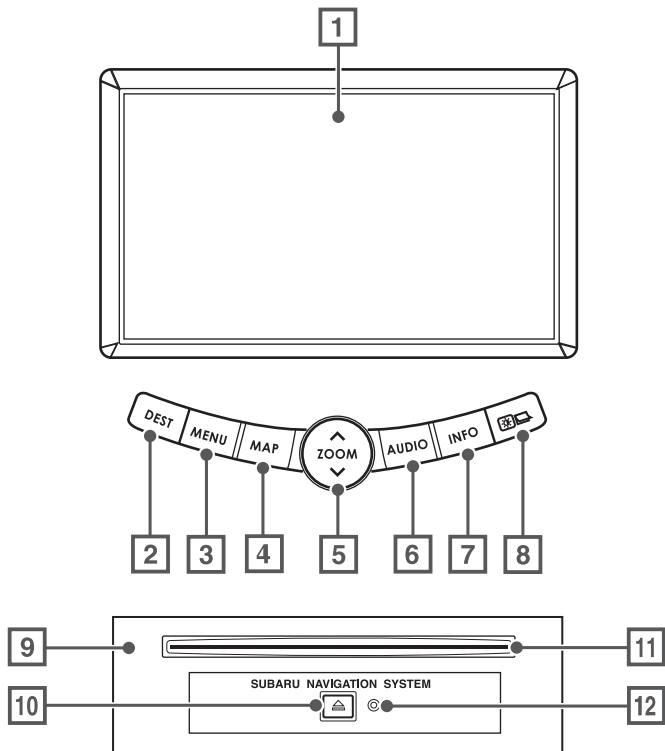
### **Replacing the DVD-ROM disc**

If you need to replace the DVD-ROM disc, make sure the replacement disc is compatible with your system's main unit. Inserting an incompatible disc could damage the unit.

### **■ Handling precautions for DVD-ROM discs**

- Handle DVD-ROM discs carefully. Any DVD-ROM disc with excessive warping or scratches on its surface can cause reading errors.
- Store DVD-ROM discs away from direct sunlight, which can cause warping and render them unusable.
- DVD-ROM discs rotate at high speeds inside the system's main unit. Never use a cracked or badly warped disc; doing so could damage the unit.
- To clean a DVD-ROM disc, lightly wipe it with a soft cloth in straight lines from the center hole toward the outer edge.
- Never clean DVD-ROM discs with benzene, thinner, record spray, antistatic spray, or chemical swabs.
- Do not touch the DVD-ROM disc's data surface (the surface without a printed label). A dirty data surface can cause reading errors. Always hold a DVD-ROM disc by the center hole and at one point on the outer edge, or by two points on the outer edge.
- Do not write anything on DVD-ROM discs or affix anything, such as stickers, to them.

# System Components and Controls



## 1 Monitor

### 2 DEST

This button is used to display the destination entry screen of the navigation system.

### 3 MENU

This button is used to display the menu screen of the navigation system.

### 4 MAP

This button is used to switch to the navigation system's current map screen from any other screen.



### 5

This button is used to zoom out or zoom in the map displayed on the screen.

### 6 AUDIO

This button is used to display the Audio or RSE (Rear Seat Entertainment) screen.

### 7 INFO

This button is used to display the vehicle information screen. Refer to the Owner's Manual Supplement for Monitor System for further details.



This button is used to adjust the brightness and contrast of the screen image as well as to display a calendar. Refer to the Owner's Manual Supplement for Monitor System for further details.

### 9 **Navigation system main unit**

### 10 **Eject button**

Depressing this button ejects the DVD-ROM disc.

### 11 **Disc insertion slot**

Load a DVD-ROM disc into the system's main unit through this slot. Inserting an edge of the disc in the slot causes it to be drawn in automatically.

### 12 **Reset button**

You can use this button in the event of a problem. It is also used when you need to upgrade the program.

## **NOTE**

- The navigation system main unit is located under the driver's seat.
- Before you load a DVD-ROM disc for the first time, press the reset button for more than one second. Use the tip of a pen or similar item for this purpose.
- If a malfunction occurs during operation, try pressing the reset button. The system may recover from the problem.

# Starting Up the Navigation System

---

Use the following procedure to start up the navigation system and display the current map screen.

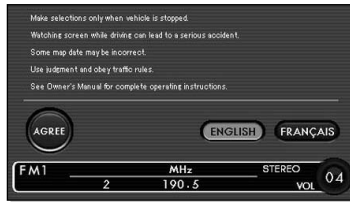
**1**




## **Start the engine.**

The CAUTION screen will appear, followed by the opening screen.






**Carefully read the instructions on the CAUTION screen (cited below), then select .**

### CAUTION

Make selections only when vehicle is stopped.  
Watching screen while driving can lead to a serious accident.  
Some map data may be incorrect.  
Use judgment and obey traffic rules.  
See Owner's Manual for complete operating instructions.

The current map screen will appear.

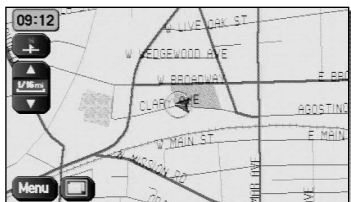
### NOTE

- To make a selection, touch the desired key displayed on the screen.
- The CAUTION screen remains on the display unless you select .
- When you use the navigation system for the first time, Greenwich Mean Time will be displayed. Adjust the system's clock to the right time using the clock setting screen ("SET CLOCK") as described on Page 82.

# Volume

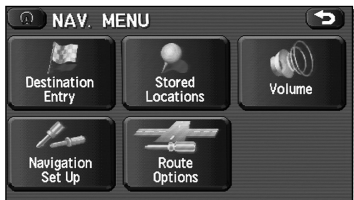
Use this function if you want to change the voice guidance volume setting from the default setting.

1



Press the **MENU** button or select **Menu** on the current map screen.

2



Select **Volume** (Volume).

3



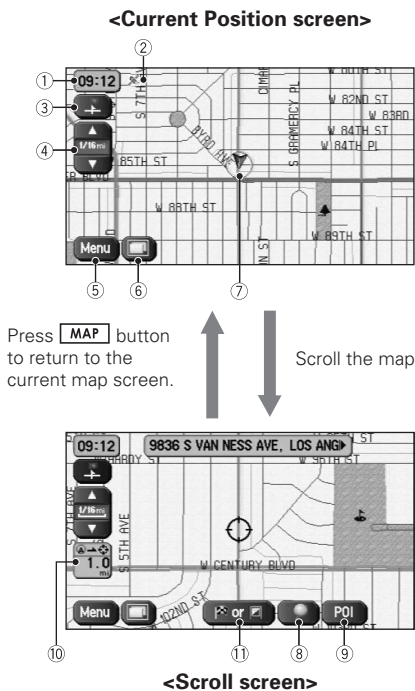
Select the desired key from between **1** (minimum) and **7** (maximum).


**Off** (off): Select this key to mute the sound.

# Markers and Controls Displayed on Maps

## Screens During Route Setting

Touch a point on the map. A crosshair (scroll mark) will appear on the screen. Then touch a desired point on the map. The map will scroll with the selected point at the center.



- ① **Time**  
Indicates the current time.
- ② **GPS marker**  
Shows the status of the signal from GPS satellites. When this marker appears, your navigation system is receiving GPS signals and using them to calculate the position of your vehicle.
- ③ **Map orientation control**  
Used to select either a “north up” display or “heading up” display of the map. (See Page 18.)
- ④ **Zoom-out/zoom-in control and map scale**  
The up-pointing or down-pointing arrow is used to zoom out or zoom in the map. The number indicates the scale of the displayed map. The  button also provides the zooming function.
- ⑤ **Menu control**  
Select this key to display the menu screen. (See Page 16.)
- ⑥ **Screen configuration control**  
Allows you to select a preferred display type for route guidance. (See Page 47.)
- ⑦ **Vehicle marker**  
Indicates the current position and direction of your vehicle.

## Markers and Controls Displayed on Maps

---

⑧ **“Store memory point” key**


Stores markers on the map.

This key appears just for a few seconds after a map screen is selected.


⑨ **Point of interest (POI) key**

Allows you to display the POI selection screen (see Page 108). On the screen, you can program POIs to appear on a map as markers. This key appears just for a few seconds after a map screen is selected.

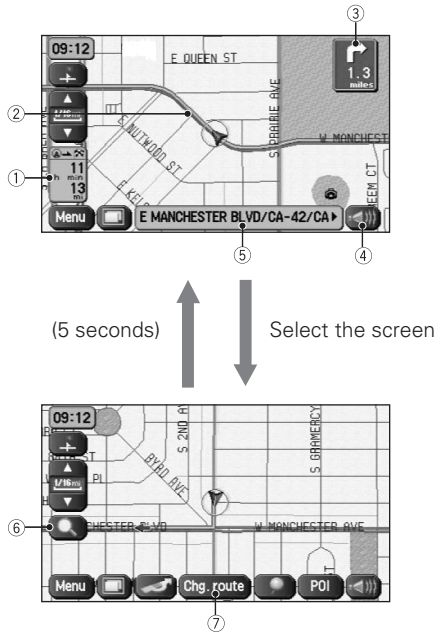
⑩ **Distance from current position**

Indicates the distance from the current position to the position marked by  .

⑪ **Destination/waypoint key**

Used to program a destination or waypoint at the position marked by  on a scroll screen.

## Screens During Route Guidance



- ① **Distance and time to destination**  
Indicates the time (either approximate time required or time of arrival) and the distance to the destination or a waypoint.
- ② **Route**  
A thick green line indicates the route you should follow.
- ③ **Turn guidance arrow**  
Indicates the direction of your turn at the next intersection/junction as well as the distance to the intersection/junction.
- ④ **“Repeat voice” key**  
If this key is selected, the last voice guidance will be repeated.
- ⑤ **Current road name**  
Shows the name of the road you are currently driving on.
- ⑥ **“Display whole route” key**  
If this key is selected, a map containing the entire route will be displayed. (See Page 65.)
- ⑦ **“Change route” key**  
Selecting this key displays the route option menu. Selecting a new route option causes the system to calculate the selected route.

# Menu Screen Keys and Functions

## <Current map screen>



Press **MENU** button or select **Menu** to display the menu screen.








Select **Menu** to return to the current map screen.

## <Menu screen>



The table below shows the keys displayed on the navigation menu (NAV. MENU) screen, the functions accessible by selecting these keys, and the pages of this manual that describe the instructions you should follow when using these functions.

Menu screen key	Function	Reference page
<b>Destination Entry</b> 	Address	page 26
	Point of Interest	page 32
	Select from Map	page 35
	Emergency	page 38
	Memory Point	page 29
	Previous Destination	page 34
	Intersection	page 42
	Freeway Ent/Exit	page 36
	Phone Number	page 44
	Coordinates	page 40
<b>Stored Locations</b> 	Memory Points	page 89
	Avoid Area	page 97
	Dest. & Way Pt.	page 57
	Home	page 100
	Previous Dest.	page 102
	Preset Dests.	page 104
<b>Volume</b> 	Volume	page 12

<b>Navigation Set Up</b> 	User Settings	page 71
	Quick POI Selection	page 74
	Language Selection	page 76
	Navigation Information	page 77
	Calibration	page 79
	Set Clock	page 82
	Restore System Defaults	page 84
<b>Route Options</b> 	Search Condition	page 54
	Detour	page 55
	Route Pref.	page 56
	Dest. & Way Pt.	page 57
	Display Route	page 65
	Route Preview	page 66

# Map Operations

## Selecting Map Orientation

You can select either “heading up” or “north up” display on the current map screen by using the following procedure.

1


<“Heading up” display>




<“North up” display>



Select  or .

If you select  (“heading up” display), the system rotates the map so that the direction in which you are heading is always directly upwards on the screen (the red arrow points to the north).

If you select  (“north up” display), the system rotates the map so that north is always directly upwards on the screen.





## Changing Map Scale

You can increase or decrease the scale of the map using the following procedure:

1



Select  or  to change the map scale.







The  button also allows you to change the map scale.

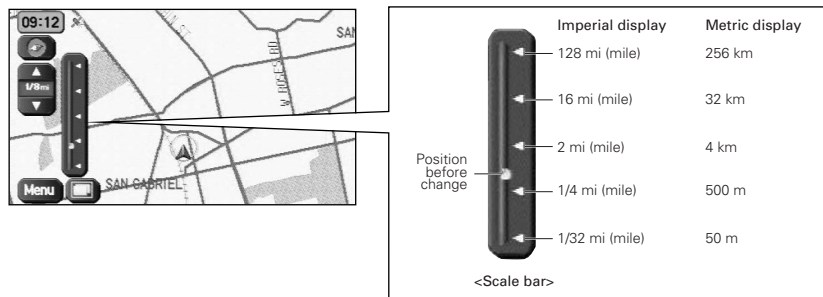


Selecting  or  (or operating the  button) changes the scale as shown to the left.



### NOTE

- You can keep selecting  or  (or operating the  button) to continually change the map scale.
- If you touch an appropriate point on the right side of the scale bar after selecting  or  (operating the  button), you can choose directly from any of the five scales.



- The scale can be displayed in Imperial or metric units. To change the units, see Page 71.



## Setting Route

3

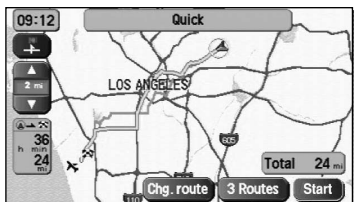


Select **[Road preference]** for setting the destination.

The system will calculate the route and display the entire route to the destination on the map.

Select **[Waypoint]** for a waypoint. The system will program the address of the waypoint on your route (see Page 86). You can set up to 5 waypoints per trip.

4



Select **[Start]** (start).

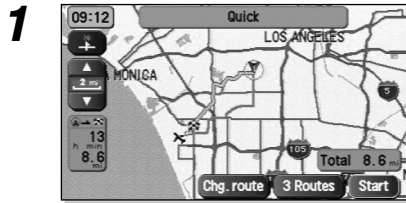
Route guidance will begin along the displayed route.

### NOTE

- If the system cannot find your desired route, select **[Chg. route]** (change route). This will allow you to access the ROUTE OPTIONS screen, from which you can prompt the system to calculate a new route. (See Page 52.)
- Selecting **[Start]** for more than ten seconds will start the demonstration mode operation. Press the **[MAP]** button or select **[Cancel]** to cancel the demonstration mode.

## ■ Selecting route

Upon setting the destination, the system prepares to calculate three types of routes to the destination (Quick, Alt., and Short). You can select from any of the three options as follows:



Select **3 Routes** (**3 routes**).

The system will be ready for calculation of any route you select from the three options, namely, Quick (the fastest route), Alt. (alternative route), and Short (the shortest route).



Select **Info.** (**information**).

The screen will display details (required time, total distance, roads used, etc.) regarding each option.



Select **Quick**, **Alt.**, or **Short** as you desire, and then select **Start** to confirm your selection.

### Setting the destination from the navigation menu

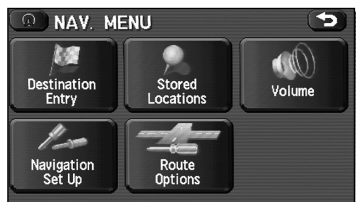
---

You can set your destination using a variety of methods if you start setting from the navigation menu screen. Before you can use any of these methods, perform the following steps:

**1**

Press the **MENU** button or select **Menu**.

**2**



Press the **DEST** button or select **Destination Entry** (destination entry).

## 3



## Select the method you want to use.

	(Address)*	See Page 26.
	(Point of Interest)*	See Page 32.
	(Select from Map)	See Page 35.
	(Emergency)	See Page 38.
	(Memory Point)	See Page 29.
	(Previous Destination)	See Page 34.
	(Intersection)*	See Page 42.
	(Freeway Ent/Exit)	See Page 36.
	(Phone number)	See Page 44.
	(Coordinates)	See Page 40.
	(Home)	See Page 31.

You can switch between screens by selecting (next page) or (previous page).

**NOTE**

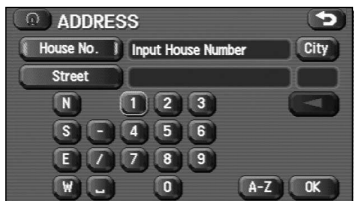
- If the set destination area is different from the one displayed under “Search Area” in the right part of the screen, you must select the (change) key and specify the desired area again.
- For the methods marked with an asterisk ( \* ), you can use the “Change Search Area” function to narrow the area where a destination or waypoint is located by selecting the (change) key (see Page 46).
- Depending on the method used or the status of the map displayed, the located point may differ from where the facility you want to visit actually exists.

### ■ “Address” method

First, choose either of the two procedures below to follow the “address” method.

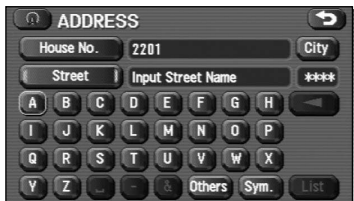
- Press the **MENU** button or select **Menu**, select **Destination Entry** (destination entry), and then select **Address** (address).
- Press the **DEST** button and select **Address** (address).

1



Enter a house number using the keypad on the house number input screen and select **OK**.

2



Enter the street name.

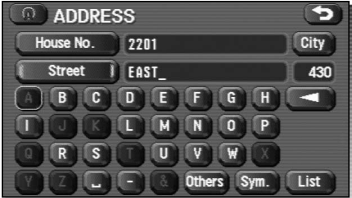
If you enter enough letters to identify a street name and advance to Step 3, a list showing several street names will be displayed. Select the desired street name from the list.

**←** : Use this key to delete the last character entered. Select it repeatedly if you want to delete all the characters entered.

You can switch between keypad screens showing different characters by selecting **Others** (others), **Sym.** (symbols) or **A-Z** (alphabet).



3



Select **List** (list).

4



Select the desired street from the list.

If the same street name exists in more than one city, a list of these cities will be shown.

5



Select the correct city from the list.

**Input Name** : Use this key to input the city name from the keypad.

6



Select **Destination** (destination) to set the address entered in the above steps as your final destination.

The system will calculate the route and display the entire route on the map.

Select **Waypoint** (waypoint) to set the address entered in the above steps as a waypoint on your route.

You can program up to five waypoints per trip.

7

Select **Start** (start).

Route guidance begins along the displayed route.

### NOTE

- If the system cannot find your desired route, select **Chg. route** (change route). This will allow you to access the ROUTE OPTIONS screen, from which you can prompt the system to calculate a new route. (See Page 52.)
- If your DVD-ROM disc does not contain the relevant house number data, an error message will be displayed and a street map will appear, allowing you to set the destination using the map.
- If your destination is not on a road, set a destination point on a main road nearest to your true destination.
- Selecting the **City** will display a screen that searches the destination on a city basis.

**Any City** : Search the destination from all cities.

**5 nearest cities** : Search the destination from the nearby five cities within 20 miles from the current position.

**Input City Name** : Search the destination by inputting the city name.




You can also search the destination from the five cities that you searched in the past.



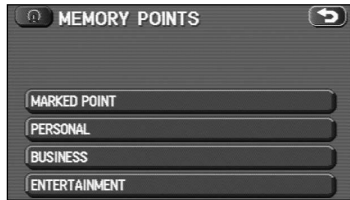
## ■ “Memory Point” method

If you have saved some locations in the system’s memory, you can make use of an appropriate one to set the destination.

First, choose either of the two procedures below to follow the “memory point” method.

- Press the **MENU** button or select **Menu**, select  (destination entry), and then select  (memory point).
- Press the **DEST** button and select  (memory point).

### 1







Select the category to which the address of the desired location (memory point) is classified in the memory.

### 2







Select the address of the desired location (memory point).

-  : Use this key to display up to five previous suggestions.
-  : Use this key to display the previous suggestion.
-  : Use this key to display the next suggestion.
-  : Use this key to display up to five of the next suggestions.

### 3

Select  (destination) or  (waypoint).

#### NOTE

- Select the  (destination),  (icon),  (name), or  (date) key to change the sequence in which memory points are displayed.
- You cannot use the “Memory Point” method unless there are memory points stored. To store memory points, see Page 89.

■ “Home” method or method using stored destinations

If you have stored your home address in the system’s memory, you can use it for your destination or a waypoint. Similarly, if other locations are stored in the memory, they can be conveniently used for quick setting of destination and waypoints.

First, choose either of the two procedures below to follow the “home” method.

- Press the **MENU** button or select **Menu**, select **Destination Entry** (destination entry).
- Press the **DEST** button.



Select **Home** (home) or one of the locations programmed to keys **1** through **5**.

The map including your home location or the selected location will be displayed.

**2** Select **Destination** (destination) or **Waypoint** (waypoint).





**NOTE**

Icon **Home** (home) and keys **1** through **5** are displayed only when you have stored your home location and other locations in the memory. For instructions on how to store your home location and other locations, see Page 100.

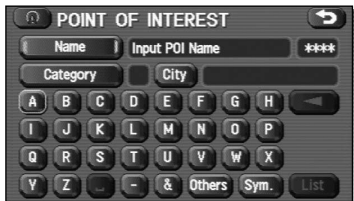
### ■ “Point of Interest” method

You can use a selection from the “Point of Interest” listing as your destination or a waypoint.

First, choose either of the two procedures below to follow the “point of interest” method.

- Press the **MENU** button or select , select  (destination entry), and then select  (point of interest).
- Press the **DEST** button and select  (point of interest).

1







Enter the name of the desired point of interest and select **List**.

2





Select the desired point of interest from the list.

-  : Use this key to display up to five previous suggestions.
-  : Use this key to display the previous suggestion.
-  : Use this key to display the next suggestion.
-  : Use this key to display up to five of the next suggestions.

### 3

Select  (destination) or  (waypoint).

#### NOTE

- If two or more points of interest share the same name, they will both be listed on the screen. Choose an appropriate one from the list.
- If there are two or more points of interest with the same name, select  (category) or  (city) to shorten the list.
- Displayed information about a specific facility might not include recent changes. It is recommended that you check the location or business days/hours of a desired point of interest before departure.

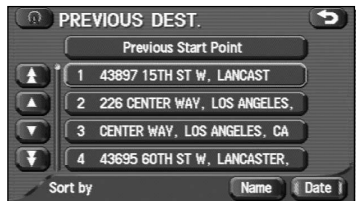
### ■ “Previous Destination” method

This method allows you to choose one of the most recently used 100 destinations or waypoints as your new destination or waypoint.

First, choose either of the two procedures below to follow the “previous destination” method.

- Press the **MENU** button or select **Menu**, select **Destination Entry** (destination entry), and then select **Previous Destination** (previous destination).
- Press the **DEST** button and select **Previous Destination** (previous destination).

1



Select a desired location from the Previous Destination list.

- ▲ : Use this key to display up to five previous suggestions.
- ▲ : Use this key to display the previous suggestion.
- ▼ : Use this key to display the next suggestion.
- ▼ : Use this key to display up to five of the next suggestions.

2

Select **Destination** (destination) or **Waypoint** (waypoint).

#### NOTE

You can select **Name** (name) or **Date** (date) to change the sequence in which previous destinations are displayed.



## ■ “Select from Map” method

You can specify a location on the map that was last displayed and use it for setting the destination or a waypoint.

First, choose either of the two procedures below to follow the “select from map” method.

- Press the **MENU** button or select **Menu**, select **Destination Entry** (destination entry), and then select **Select from Map** (select from map).
- Press the **DEST** button and select **Select from Map** (select from map).

**1**



**Scroll the map until the crosshair  is at the desired destination or waypoint.**

**2**

**Select  (destination) or  (waypoint).**

### ■ “Freeway Entrance/Exit” method

You can use the name of a freeway entrance or exit selected from the “Freeway Entrance/Exit” list for setting your destination or a waypoint.

First, choose either of the two procedures below to follow the “freeway entrance/exit” method.

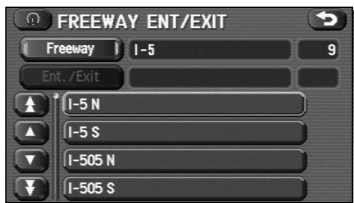
- Press the **MENU** button or select **Menu**, select **Destination Entry** (destination entry), and then select **Freeway Entrance/Exit** (freeway entrance/exit).
- Press the **DEST** button and select **Freeway Entrance/Exit** (freeway entrance/exit).

1



Enter the name of the desired freeway and select **List**.

2



Select the name of the freeway from the list.

- ⬆️ : Use this key to display up to five previous suggestions.
- ⬆️ : Use this key to display the previous suggestion.
- ⬇️ : Use this key to display the next suggestion.
- ⬇️ : Use this key to display up to five of the next suggestions.

3




Select  Entrance (entrance) or  Exit (exit).


4



Select the name of the street from which you will enter the freeway or to which you will go after leaving the freeway.

 : You must select this key before you can enter the street name.

 : Use this key to search through the list by distance.

 : Use this key to search through the list by name (alphabetical search).




5

Select  (destination) or  (waypoint).

### ■ “Emergency” method

This function allows the nearest police station or hospital to be set as the destination.

First, choose either of the two procedures below to follow the “emergency” method.

- Press the **MENU** button or select **Menu**, select  (destination entry), and then select  (emergency).
- Press the **DEST** button and select  (emergency).

1









Select either  **Police station** or  **Hospital**.

The nearest police stations or hospitals will be displayed accordingly.

2



Select the desired institution from the list.

-  : Use this key to display up to five previous suggestions.
-  : Use this key to display the previous suggestion.
-  : Use this key to display the next suggestion.
-  : Use this key to display up to five of the next suggestions.
-  : Sorts the list by distance.
-  : Sorts the list in alphabetical order by name.

**3**

Select  (destination) or  (waypoint).

**NOTE**

Displayed information about each facility might be changed. It is recommended that you check the location or business days/hours before departure.

### ■ “Coordinates” method

You can set destinations or waypoints using their latitudes and longitudes as follows:

First, choose either of the two procedures below to follow the “coordinates” method.

- Press the **MENU** button or select **Menu**, select **Destination Entry** (destination entry), and then select **Coordinates** (coordinates).
- Press the **DEST** button and select **Coordinates** (coordinates).

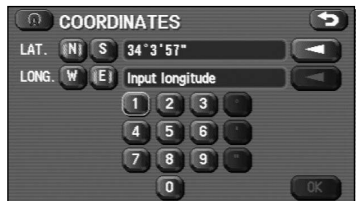
1



#### Enter the latitude of the desired location.

Use the numeric keys together with the [°] (degrees), ['] (minutes), and ["] (seconds) keys.

2



#### Enter the longitude of the location.

- (N)** : Use this key to switch over to the north latitude.
- (S)** : Use this key to switch over to the south latitude.
- (W)** : Use this key to switch over to the west longitude.
- (E)** : Use this key to switch over to the east longitude.
- ←** : Use this key to delete the character last entered. Select it repeatedly if you want to delete all the characters entered.

**3**

Select .





**4**

Select  (destination) or  (waypoint).

### ■ “Intersection” method

You can use an intersection defined by two street names as a location for setting your destination or a waypoint.

First, choose either of the two procedures below to follow the “intersection” method.

- Press the **MENU** button or select , select  (destination entry), and then select  (intersection).
- Press the **DEST** button and select .

1







Enter the name of the first street and then select .

2

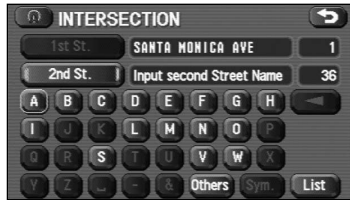


Select the street from the “Intersection” list.

-  : Use this key to display up to five previous suggestions.
-  : Use this key to display the previous suggestion.
-  : Use this key to display the next suggestion.
-  : Use this key to display up to five of the next suggestions.



3



Specify the second street using the same procedure as the first street.

4

Select  (destination) or  (waypoint).

#### NOTE

No intersection is defined if

- the two streets do not cross each other,
- the two streets are a freeway and a highway,
- either street is for right or left turns only,
- both are one-way streets,
- either street is for U-turns,
- the two streets cross on the inside lane,
- either street is an on/off ramp,
- either street is a frontage street, and/or

### ■ “Phone number” method

This function allows buildings and the like to be located using their phone numbers.

First, choose either of the two procedures below to follow the “phone number” method.

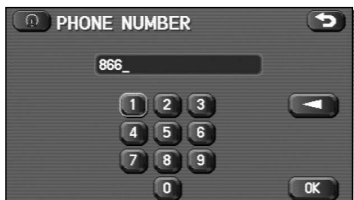
- Press the **MENU** button or select **Menu**, select **Destination Entry** (destination entry), and then select **Phone number** (phone number).
- Press the **DEST** button and select **Phone number** (phone number).

**1**



**Enter the phone number starting with the area code.**

**2**



**Select **OK**.**

### 3

Select  (destination) or  (waypoint).

#### NOTE

If a number of candidates exist as a result of, for example, different area codes, these will be displayed in a list. Your desired destination can then be selected from the list.

### ■ Using “Change Search Area” function

This function designates a general geographical area where the destination or waypoint you want to set is located. This function can be used in the methods marked with an asterisk (\*) on Page 25.

First, choose either of the two procedures below to follow the “change” method.

- Press the **MENU** button or select **Menu**, select **Destination entry** (destination entry), and then select **Change** (change).
- Press the **DEST** button and select **Change** (change).

1



#### Select the desired area.

The DESTINATION ENTRY menu screen will appear.

#### NOTE

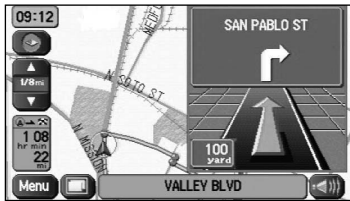
- The SEARCH AREA screen shown above is a sample image. It may be slightly different from the actual screen image.
- The DVD-ROM disc containing map data is split into two discs, containing information regarding East and West U.S. respectively. Both discs cover the Continental U.S. and the District of Columbia, but the POI (points of interest) are split depending on the disc, as follows:  
WEST: US1 ~ US7 and southern Canada  
EAST: US6 ~ US10 and southern Canada  
US6, US7 and southern Canada (CAN) are included in both discs.  
Please note that Alaska, Hawaii, Guam and the other Pacific islands are not covered.

# Route Guidance

## Route Guidance Screen

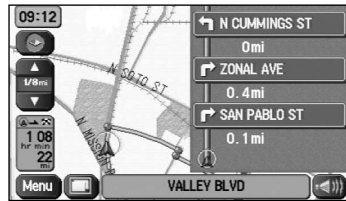
During route guidance, the system can indicate on a second screen the directions in which you must make turns at the next and following intersections in either of two ways: “turn arrow” or “turn list”. Specify your preferred method of indication as follows:

### <Turn arrow>



Turn direction is indicated by an arrow.

### <Turn list>

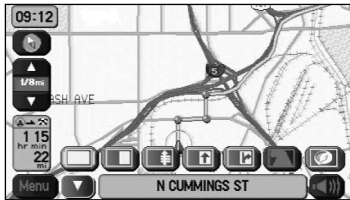


Turn directions are indicated in a list.


1

Select  (screen configuration).

2

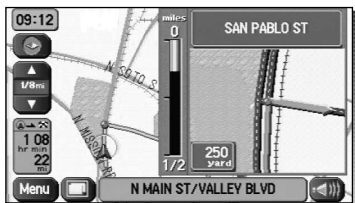


Select  for turn arrow indication or  for turn list indication.

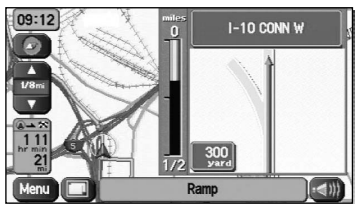
If you need not make any further selection, select . The relevant keys will disappear.

## Zoom-in Map at Intersection

Before you arrive at an intersection, the system will automatically show a zoom-in map of the intersection on a second screen to make the guidance clearer.





As you approach an intersection during route guidance, a zoom-in map of the intersection automatically appears on a second screen. After you drive past the intersection, the zoom-in map disappears.




As you approach a fork on a freeway during route guidance, a zoom-in map of the freeway automatically appears on a second screen, making the route guidance clearer.

### NOTE

Use the following procedure to recall the most recently displayed zoom-in map of an intersection or a freeway fork.

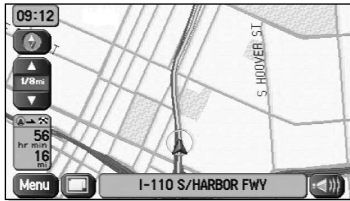
1. Select  (screen configuration).
2. Select  (re-display of intersection/range guidance).

If you need not make any further selection, select . The relevant keys will disappear.

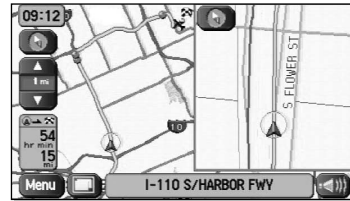
## Dual Map Display

You can configure the screen for a dual map display.

<Single map display>



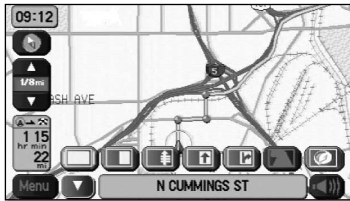
<Dual map display>




1


Select  (screen configuration).

2





Select  (dual map).

If you wish to return to the single map display, select  (single map).

If you need not make any further selection, select . The relevant keys will disappear.

### NOTE

If you wish to modify the display selections that have been made for a second screen, touch the top of the screen. After completing the modification, select .

- See Page 19 for details on scale changes.
- See Page 108 for details on setting with .

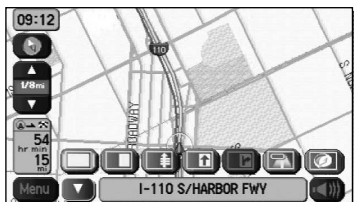
## Freeway Information

A list of buildings and facilities along a freeway can be displayed on the screen.


1

Select  (screen configuration).

2



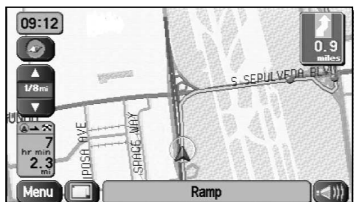
Select  (freeway information).

If you need not make any further selection, select . The relevant keys will disappear.

## Replaying Voice Guidance

If you want to listen to the last voice guidance again during route guidance, use the following procedure:

1



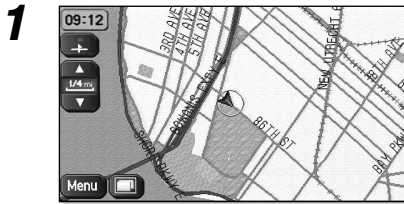
Select .

You can hear the voice guidance again.

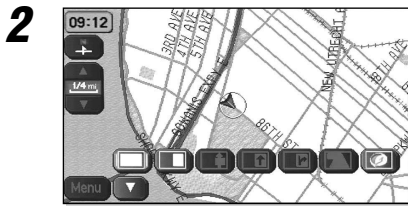


## Compass Mode

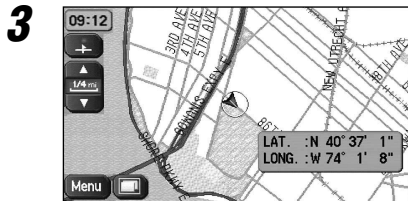
Longitude and latitude of present location can be displayed on the screen.



Select  (screen configuration).



Select  (compass).



Longitude and latitude of present location are displayed at lower right of the screen.

# Route Options

## Setting Route Options

Using the functions available from the Route Options screen, you can change the route options, stop the route guidance or check the route. Use the following procedures:


1



Press the **MENU** button or select **Menu**.

2



Select  (route options).

The Route Options screen will appear. Select any of the following displayed functions as necessary:



(search condition):

This function allows you to specify the way in which the system calculates the route to the destination. (See Page 54.)



(detour):

This function allows you to prompt the system to calculate an alternative route from your current position within a specified distance. (See Page 55.)



(route preferences):

This function allows you to prompt the system to alter the route search conditions and recalculate the route accordingly. (See Page 56.)

**(destination and waypoint):**

This function allows you to modify the destination and waypoints, and prompt the system to recalculate the route accordingly. (See Page 57.)

**(display route):**

This function allows you to confirm the entire route and, if necessary, prompt the system to recalculate the route according to your specification. (See Page 65.)

**(route preview):**

This function allows you to simulate a drive along the system-calculated route before departure. (See Page 66.)

**(calculate):**

Selecting this key prompts the system to recalculate the route.

**(cancel guidance):**

Selecting this key prompts the system to stop route guidance. Note that this erases the destination and waypoints. To prompt the system to start guidance again, select

**(calculate).****NOTE**

A recalculated route will sometimes be the same route as the one displayed before recalculation.

### Search condition

You can specify the way in which the system calculates your route.

Press the **MENU** button or select **Menu**, then select  (route options), and then select  (search condition).

**1**



Select **Quick** (**Quick**), **Alt.** (**Alt.**), or **Short** (**Short**) to specify the way of calculating the route to reach the next waypoint or the destination from the current point.

**Quick** : The system will calculate a route with the shortest driving time required.

**Alt.** : The system will calculate an alternative route.

(You can select **Quick**, **Alt.** or **Short** for the first waypoint. Only **Quick** or **Short** can be specified for the second and subsequent waypoints.)

**Short** : The system will calculate a route with the shortest driving distance.

**2**

Select **Calculate** (**calculate**).

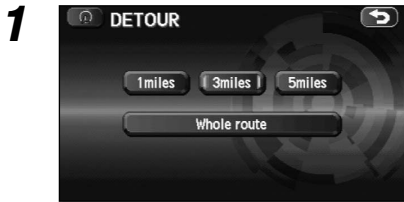
**3**

Select **Start** (**start**).

## Detour

You can specify a detour distance from your current position. The system will calculate an alternative route according to the distance specification, enabling you to take a detour.

Press the **MENU** button or select **Menu**, then select  (route options), and then select  (detour).



Select a detour distance using **1miles**, **3miles**, **5miles**, or **Whole route** (whole route).

The system will then calculate an alternative route that detours from the current location within the specified distance.

**2**

Select **Start** (start).

### NOTE

If you are driving off the route, it is not possible to calculate a detour route.

### Route preferences

Use this function to specify preferred route search conditions. The system will start recalculating the route according to your specified conditions.

Press the  button or select , then select  (route options), and then select  (route preferences).


**1**

#### Specify conditions by selecting keys.


Each time you select a key, it will toggle between “usage” and “non-usage” of the corresponding roads or ferries.

**2**



Select  (calculate).

#### NOTE



- The  (calculate) key can be selected during route guidance.
- The route calculation will not always be able to follow the specified conditions.

## Destination and waypoints

You can change the destination or waypoints for the route calculation by using this function.

### ■ Addition of waypoints

Use the following procedure to add new waypoints to the current route for recalculation.

Press the **MENU** button or select **Menu**, then select  (route options), and then select  (destination and waypoints).

**1**



Select  (add).

**2**



Set a waypoint using any WP method available from the screen.

**3**



**Specify the order in which all the set waypoints are to be visited.**

Choose the location of the waypoint to be added, and then select **Add** (add).

**4**

**Select **Calculate** (calculate).**



### NOTE

- When a new destination is set using **destination** (destination), it will replace the current destination and the route calculation will be carried out again.
- Step 3 must be performed for the second and any subsequent waypoints.
- Repeat Steps 1 to 3 for each waypoint to be set.



## ■ Modifying destination or waypoint positions

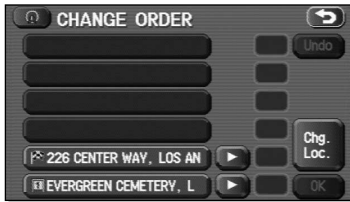
Use this procedure to modify the destination or waypoint positions. The screen will display the calculated route and the positions of the destination or waypoints that you will be able to modify.

Press the **MENU** button or select **Menu**, then select  (route options), and then select  (destination and waypoints).

**1**

Select  (list).

**2**



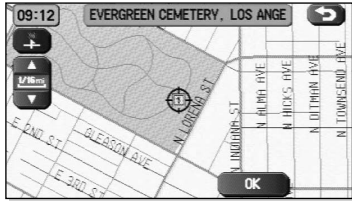
Select  (change location).

**3**

Select the key corresponding to the location that is to be modified.

The map for the area around your current location will be displayed.

**4**



Scroll the map to bring the crosshair  to the location and then select



**OK**.

**5**

Select **Calculate** (calculate).

## ■ Modifying visiting order

You can change the order for visiting your waypoints by using this procedure.

Press the **MENU** button or select **Menu**, then select  (route options), and then select  (destination and waypoints).


**1**

Select  (**list**).

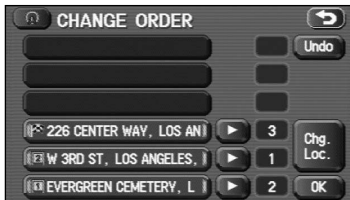
**2**



**Select the waypoint keys according to the order of your visit.**

If you wish to cancel the visiting order number indication, select  (undo).

**3**



**When you complete the sequencing, the visiting order will be updated automatically.**

**4**


Select **OK**.

**5**

Select **Calculate** (calculate).

## ■ Deleting destination or waypoints

Use this procedure when you wish to delete the previously set destination or waypoint.

Press the **MENU** button or select **Menu**, then select  (route options), and then select  (destination and waypoints).

**1**

Select  (delete).

**2**




Select the key corresponding to the destination or waypoint you wish to delete.

**3**



Confirmation message will be displayed. Select  (yes).

Select  (no) to cancel the deletion.

**4**

Select  (calculate).

### ■ Deleting destination and all waypoints

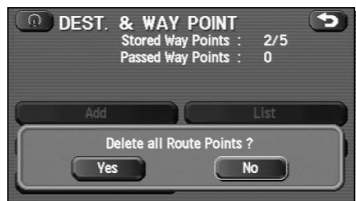
You can delete the destination and all previously set waypoints in a single process.

Press the **MENU** button or select **Menu**, then select  (route options), and then select  (destination and waypoints).


**1**

Select  (delete all).

**2**



**Confirmation message will be displayed. Select  (yes).**

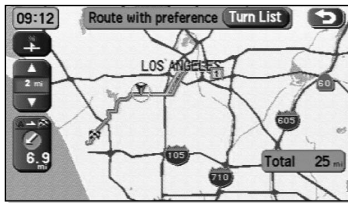
Select  (no) to cancel the deletion.

## Display route

Use this function to display the entire route. You can also specify an area you wish to avoid and prompt the system to recalculate the route accordingly.

Press the **MENU** button or select **Menu**, then select  (route options), and then select  (display route).

1





2

### Select **Turn List** (turn list).

The entire route screen will appear and then it will change to the Turn List screen.

**Avoid** (avoid): Select this key if you wish to specify any areas to avoid from the list of street names.

**Reroute** (recalculate): The system will recalculate the route.

If the data for the route cannot be shown on one screen, scroll the screen using the  and  keys.

### Select **Start** (start).

### Route preview









The system can show you an automated simulation of the calculated route.

Press the **MENU** button or select **Menu**, then select  (route options), and then select  (route preview).

1



**Start the simulation drive according to the calculated route using the keys on the screen as follows:**

- : Move to the start point.
- : The simulation drive will start toward the start point. After the start, this key will be displayed as , and when it is selected, the simulation drive will switch to high-speed driving.
- : The simulation drive will stop.
- : The simulation drive will start toward the destination. After the start, this key will be displayed as , and when it is selected, the simulation drive will switch to high-speed driving.
- : Move to the destination.
- : The EDIT ROUTE PREVIEW screen will be displayed. (See page 67.)

#### NOTE

The visual speed of the simulation vehicle varies with the map scale selected. The speed appears to be faster with a wide-area map than with a zoom-in map.

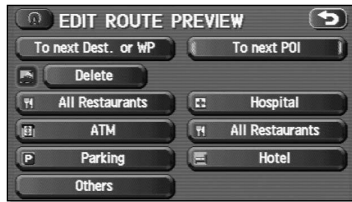


## ■ Setting conditions for simulation drive

You can change the simulation drive conditions using this procedure.

Press the **MENU** button or select **Menu**, then select  (route options), and then select  (route preview).

1



### Select **Edit** (edit).

The EDIT ROUTE PREVIEW screen will appear.

**To next Dest. or WP** (to destination or next waypoint):

The simulation drive will stop at the destination or the next waypoint.

**To next POI** (to next POI):

The simulation drive will stop at a point of interest that has been set up on the route.

**Delete** (delete):

A selected POI will be deleted.

### POI keys:

When you select one of the six POI category keys, the system will retrieve the selected POI from the Quick POI storage and display it on the map. When you select the **Others** key, you can find POIs of other categories. For more details, see Page 74.

## Route Options



If, for example, the **To next POI** (restaurant) category key is selected and a simulation drive is started, your simulation vehicle will then stop at a restaurant on the route.

If you then select **Info.** (information), the system will display information on the restaurant.



### NOTE

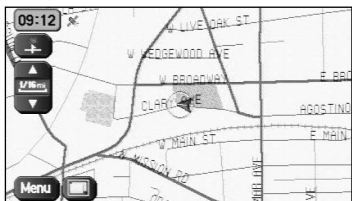
You must finish the simulation drive before you actually start to drive. Although the simulation drive will automatically stop when you actually start to drive, not finishing it properly can lead to an error in the display of your vehicle's current position.

# Navigation Setup

## Setting Your Navigation System

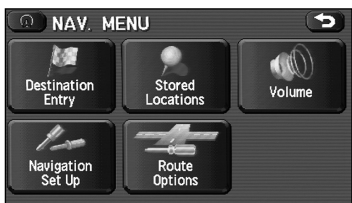
Using the functions available from the Navigation Setup screen, you can change the map display conditions and alter the route guidance conditions.

1



Press the **MENU** button or select **Menu**.

2





Select **Navigation Set Up** (navigation setup).

The NAVIGATION SET UP screen will appear.

## Navigation Setup



Select any of the displayed functions as necessary. This screen consists of two pages. Change the page by using the  or  keys.



### (user settings):

This function allows you to change the screen display and sound settings. (See Page 71.)



### (quick POI selection):

This function allows you to set the point of interest categories that are displayed when you select the menu from the current position screen. (See Page 74.)



### (language selection):

This function allows you to change the language for the menu screens and the voice guidance. (See Page 76.)



### (navigation information):

This function allows you to confirm the vehicle signal, the version of the DVD-ROM disc. (See Page 77.)



### (calibration):

You can use this function to correct display errors in the vehicle's position and direction. (See Page 79.)



### (set clock):

This function allows you to set the time. (See Page 82.)



### (restore system defaults):

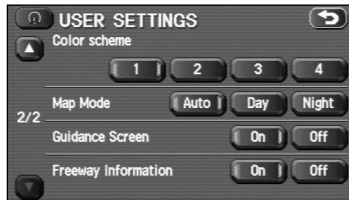
This function allows you to change the system's current settings back to the default settings (factory settings). (See Page 84.)

## User settings



You can change the screen display and sound settings using this procedure.

Press the **MENU** button or select **Menu**, then select  (navigation setup), and then select  (user settings).



1



### Select the setting item you wish to change.

The USER SETTINGS screen consists of three pages. Use the  or  keys to change the screen page when selecting a setting item.



#### Distance:

Units of distance can be selected from  (K/m) and  (miles).



#### Road Restriction Warnings:

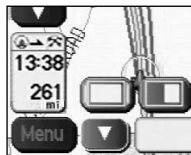
You can select or deselect display of traffic restriction warnings during route guidance.

#### Keyboard layout:

The layout of input keys can be selected from  ("ABC" layout) or  ("QWERTY" layout).

### Arrival Time:

Time of arrival at the destination or a waypoint can be displayed in two different ways: estimated arrival time or remaining driving time. Select  for the estimated arrival time display or  for the remaining time display.



<Estimated arrival time>






<Required remaining time>

### Color scheme:

Select your preferred screen color from four options  to .

### Map Mode:

The map display mode can be set to any of the automatic, daytime, and nighttime modes.

-  **(automatic):** The brightness of the display will automatically change to daytime brightness and nighttime brightness when the headlights are turned off and on, respectively.
-  **(daytime):** The brightness of the display is fixed at the daytime setting regardless of whether the headlights are on or off.
-  **(nighttime):** The brightness of the display is fixed at the nighttime setting regardless of whether the headlights are on or off.

**Guidance Screen:**

This function allows you to select or deselect display of guidance messages on the screen.

**Freeway Information:**

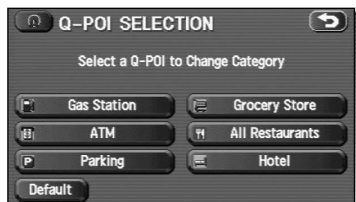
This function allows you to select or deselect display of guidance messages when driving on freeways.

### Quick POI selection

Using this function, you can set the point of interest categories that are displayed when you select the Point of Interest menu key on the current map screen. Set up to six different categories that you use most frequently. (See Page 108 for the method of displaying POI categories on the map and searching for the nearest points of interest.)

Press the **MENU** button or select **Menu**, then select  (navigation setup), and then select  (quick POI selection).

**1**



**Select one of the six category keys you wish to program into the Quick POI storage.**

**Default** (default): Use this key to restore the factory settings.

**2**



**Select a category.**

Once you have selected a category key, subcategories will be displayed.

**All category list** (all category list):  
Subcategories from all individual categories will be displayed together.



**3**

Select the subcategories to be displayed on the map.

**NOTE**

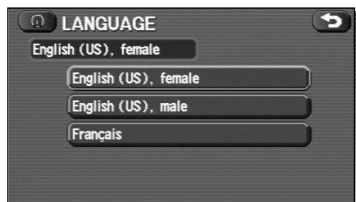
Repeat Steps 1 to 3 to add more POI categories for display on the menu screen.

### Language Selection

Use the following procedure to select your preferred language for the menu screens and the voice guidance.

Press the **MENU** button or select **Menu**, then select  (navigation setup), and then select  (language selection).

**1**





**Select your preferred language from the list.**

## Navigation information

This function allows you to confirm the vehicle signal, the version of the DVD-ROM disc. (See Page 78.)


### ■ Vehicle signal

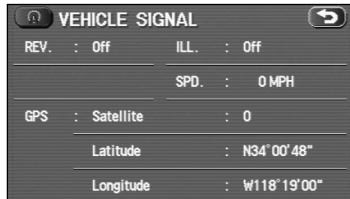
This function allows certain vehicle data and GPS satellite data to be displayed.

Press the **MENU** button or select **Menu**, then select  (navigation setup), and then select  (navigation information).

1



Select  (vehicle signal).



The VEHICLE SIGNAL screen will appear.

### ■ Version

Use this function to check the version of the DVD-ROM disc you are presently using.

Press the **MENU** button or select **Menu**, then select  (navigation setup), and then select  (navigation information).

1



Select  (version).



The version of the DVD-ROM disc will be displayed on the screen.

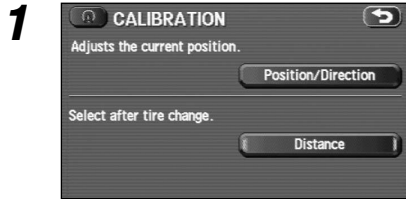
→ Version of the DVD-ROM disc

## Calibration

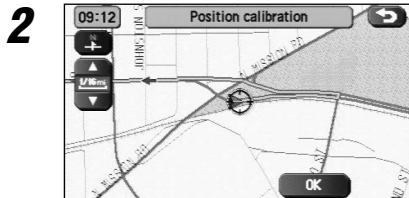
This function allows you to correct any display errors in the position and direction of your vehicle on the map display.

### ■ Adjusting current position and direction

Press the **MENU** button or select **Menu**, then select  (navigation setup), and then select  (calibration).



Select **Position/Direction** (position/direction).



Move the crosshair  to the correct position, and then select **OK**.



**3**



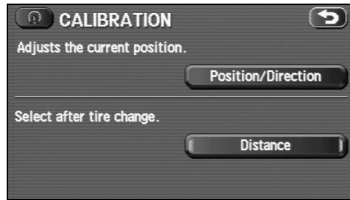
Use  or  to adjust the direction in which you are heading, and then select .

## ■ Distance

When selected, this function automatically corrects an error in the current position display that might occur after tire replacement.

Press the **MENU** button or select **Menu**, then select  (navigation setup), and then select  (calibration).

1



Select .

### NOTE

You will have to drive about 6 miles (10 km) before the distance correction is complete.

### Set clock

Since the adjustments for minutes and seconds are made automatically using the time data provided by GPS satellites, you can set your clock by simply performing a time-zone and daylight saving time adjustment using this function.

Press the **MENU** button or select **Menu**, then select  (navigation setup), and then select  (set clock).

**1**



Select  if you prefer 24-hour display; select  for 12-hour display.

**2**

Select the time-zone by pressing the , ,  or .


#### NOTE

Initial time-zone setting of this navigation unit is Pacific  (west disc) /Eastern  (east disc).

**3**

Select the daylight saving time mode by pressing  or .

#### NOTE

Select  to advance the time by one hour.



**4**

Select **+0.5H** to advance the time by half an hour; select **-0.5H** to push back the time by half an hour.

**NOTE**

When the clock is adjusted by the “Hour Adjust” button, the all of time-zone switch goes off.

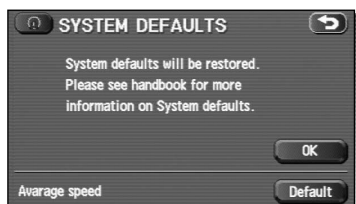
### Restore system defaults

---

Use this function if you want to change all of the system's current settings back to the default settings.

Press the **MENU** button or select **Menu**, then select  (navigation setup), and then select  (restore system default).

**1**



Select **OK** to return all current systems settings to default.  
Select **Default** (default) to return average speed setting to default.

#### NOTE

If you select this function, all your settings will be deleted.

## [Default List]

Item	Initial condition
<b>Map display</b>	
Search Area	US9 (EAST), US2 (WEST)
Display Guidance Language	US English, female
Map Orientation (1 and 2 screen)	North up
Map Display Mode	Single-screen display
Map Display Scale	Single-screen: 10,000 map (1/16 min) (100 m) Dual-screen: 40,000 map (1/4 min) (500 m)
Map Configuration	Arrow Mode
Q-POI Map Display	Off
Show POI Icon Display	Off
Right Screen Setting, POI	On
Passage Point Display/ Current Location, Map Screen (Time Requirement, Time, Direction / Distance)	Next passage point
Passage Point Display/ Full Route, Map Screen (Time Requirement, Time, Direction / Distance)	Destination
Notify Seasonal Restrict	On
Freeway Information	Off
<b>Volume Control</b>	
Volume Preset	4
<b>Navigation Setup Menu</b>	
Distance	Mile
Notify Traffic Restriction	On
Audio Mute	On
Keyboard Layout	ABC
Arrival Time	Required remaining time

Item	Initial condition
Color Scheme	1
Map Mode	Auto
Guidance Screen	On
Q-POI Selection	A : Gas station B : ATM C : Parks D : Grocery store E : All Restaurant F : Hotel
Language Selection	US English, female
<b>Route Options</b>	
Search Condition	Quick
Route Preferences	Allow Toll Road: Off Allow Ferry: Off Allow Major Roads: On Allow Time Restricted Road: Off

# Stored Locations

You can store, edit, or delete any destinations, waypoints, and other marked points using the procedures described in this section.

1

Press the **MENU** button or select **Menu**.

2



Select  (stored locations).

3



Select the desired item.



(Memory Points):

Use this function to place markers on the map. (See Page 89.)



(Avoid Area):

Use this function to store into the system's memory any areas you want to avoid. (See Page 97.)



(Destination and Waypoint):

Use this function to set the destination and waypoints. (See Pages 57 to 64.)



(Home):

You can store the location of your home in the system's memory by using this function. (See page 100.)



**(Previous Destination):**

Use this function to delete previously stored destinations and waypoints. (See page 102.)



**(Preset Destinations):**

You can program a maximum of five destinations to keys for easy retrieval later on. (See page 104.)



**(Display memory point icons):**

Selecting this key allows you to display icons for memory points.



**(Calculate):**

Selecting this key prompts the start of route calculation.

Each of the above six functions has some or all of the following four standard editing functions (see the table below):



**(add):** You can store a new location into memory.



**(list):** You can see a list of the stored locations.





**(delete):** You can delete stored locations.







**(delete all):** You can delete all stored locations.

## Stored Locations

Editing keys displayed for each function are as follows:

 Memory Points (100)	Add
	List
	Delete
	Del. All
	Edit Category
 Home (1)	Add
	List
	Delete

 Avoid Area (10)	Add
	List
	Delete
	Del. All
 Previous Dest. (100)	Delete
	Del. All



 Dest. & Way Pt. (Destination: 1 Way Point: 5)	Add
	List
	Delete
	Del. All
 Preset Dests. (5)	Add
	List
	Delete
	Del. All

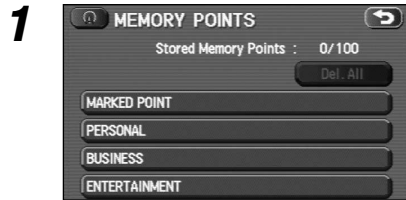
The numbers in parentheses following the function names indicate the maximum locations you can store in the memory.

## Memory points

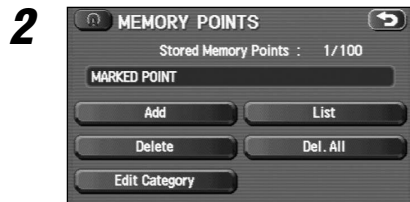
### ■ Storing new memory points

Memory points can be stored into any of the four categories of storage locations.

Press the **MENU** button or select **Menu**, then select  (stored locations), and then select  (memory points).

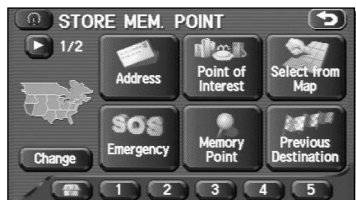


Select the storage location category for the memory point you wish to add.

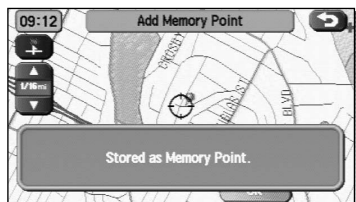


Select  (add).

3



Set the memory point using the preferred method available on the displayed screen.



### NOTE

Up to 100 memory points can be stored. Once that number has been reached, you must delete memory points that you no longer require (see Page 94) before you can store new memory points. The number of memory points you can store is indicated on the screen.

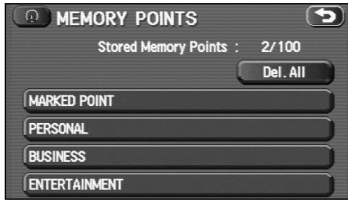


## ■ Reviewing and modifying memory points

Using this function, you can review the stored memory points in the form of a list on the screen and modify names, icons, telephone numbers, and other memory point data.

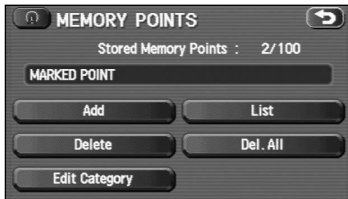
Press the **MENU** button or select **Menu**, then select **Stored Locations** (stored locations), and then select **Memory Points** (memory points).

1



Select the category of the memory point to be modified.

2



Select **List** (list).

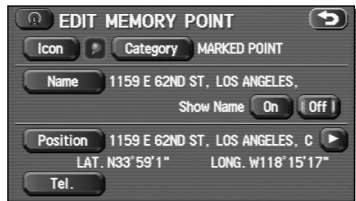
3



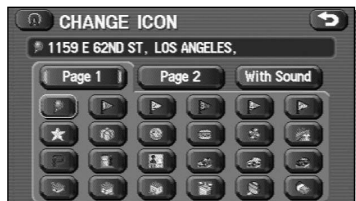
### Select the memory point to be modified.

You can change the sequence in which memory points are listed by selecting **Dist.** (distance), **Icon** (icon), **Name** (name), or **Date** (date).

4



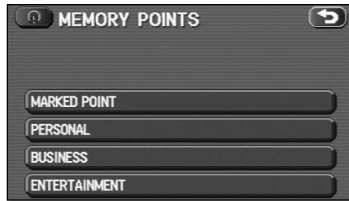
### Select the category key corresponding to the memory point to be modified.



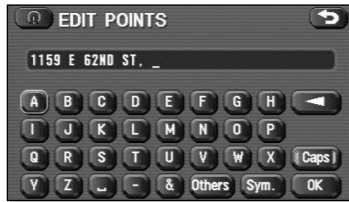
**Icon** (icon): Selecting this key allows you to choose a display icon. **Page 1** and **Page 2** of the CHANGE ICON screen contain standard icons, whereas the "With Sound" (with sound) page contains icons that are accompanied by response sounds. Select **With Sound** (with sound) to listen to these sounds.

### NOTE

The "With direction" (**↖**/**↗**) keys in the "With Sound" page are used to activate response sounds only when you come near the memory point from the specified direction. Select **↖** or **↗** and set the direction using **↓** or **↑**.



**Category** (category): Use this key to change the storage category. After selecting this key, select the key of the new category.



**Name** (name): Select this key to change the name of a memory point. When the change has been completed, select **OK** (OK). Then select **On** (on) if the name is to be displayed on the map, or **Off** (off) if it is not to be displayed.



**Position** (position): Select this key to review the memory points and modify a memory point on the map screen. After checking or modifying it, select **OK** (OK).



**Tel.** (telephone): Select this key to modify a telephone number. When the modification has been completed, select **OK** (OK).

### ■ Deleting memory points

You can delete stored memory points by using this function.

Press the **MENU** button or select **Menu**, then select  (stored locations), and then select  (memory points).

**1**

Select the category of the memory point to be deleted.

**2**

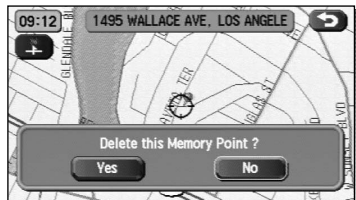
Select  (delete).

**3**



Select the memory point to be deleted.

**4**





Confirmation message will be displayed. Select  (yes).

Select  (no) to cancel the deletion.



## ■ Deleting all memory points

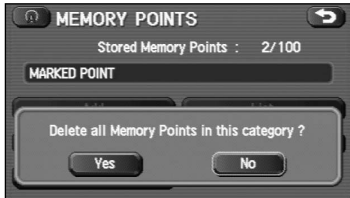
Using this function, you can delete all memory points.

Press the **MENU** button or select **Menu**, then select  (stored locations), and then select  (memory points).

**1** Select the category of the memory points to be deleted.

**2** Select  (delete all).

**3** Confirmation message will be displayed. Select  (yes).  
Select  (no) to cancel the deletion.



### ■ Modifying category names

Use this function if you want to change the category names - **MARKED POINT** (marked point), **PERSONAL** (personal), **BUSINESS** (business), and **ENTERTAINMENT** (entertainment) .

Press the **MENU** button or select **Menu** , then select  (stored locations), and then select  (memory points).

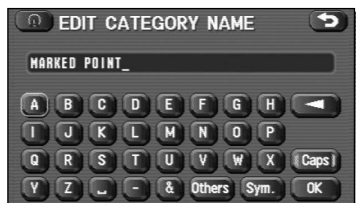
**1**

Select the category for which the name is to be changed.

**2**

Select  (edit category).

**3**



Erase the letters of the category name using  , enter the new letters, and then select  .

## Avoid area

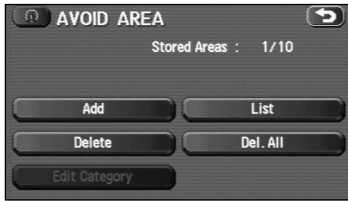
---

### ■ Storing avoid areas

If you use this function to store into the system's memory the areas you want to avoid, the system will avoid the areas when calculating routes.

Press the  button or select , then select  (stored locations), and then select  (avoid area).

**1**



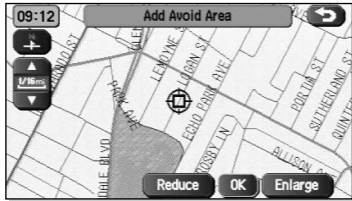
Select  (add).

**2**

**Set an avoid area using your preferred method.**

A map including the specified avoid area will appear.  
The method of setting avoid areas is identical to that of setting destinations.

3



Select **Reduce** (reduce) or **Enlarge** (enlarge).

**Reduce** (reduce): Reduces the size of the avoid area.

**Enlarge** (enlarge): Increases the size of the avoid area.

4

Select **OK** (OK).

### NOTE

- Reduce the scale of the map to specify a larger area.
- Avoid areas can be set only when the scale of the map is 0.6 mile (1 km) or less.



## ■ Reviewing and modifying avoid areas

Using this function, you can review the stored avoid areas in the form of a list and modify them if necessary.

Press the **MENU** button or select **Menu**, then select **Stored Locations** (stored locations), and then select **Avoid Area** (avoid area).

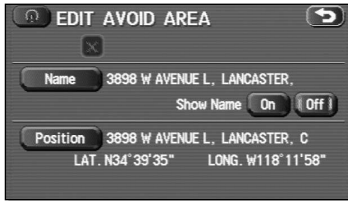
**1**

Select **List** (list).

**2**

Select the avoid area to be modified.

**3**



Select the key corresponding to the item to be modified.

For details regarding the function of each key, refer to “Reviewing and modifying memory points” on Page 91.

### NOTE

The methods for deleting individual and all avoid areas are the same as those described on Page 94 and 95 for memory points.

### Home

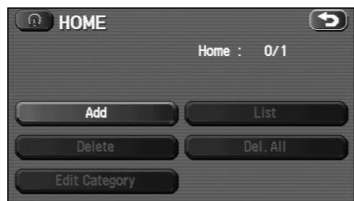
---

#### ■ Storing home

Use this function to store your home location.

Press the **MENU** button or select **Menu**, then select  (stored locations), and then select  (home).

1





Select  (add).

2



Move the crosshair  to the location of your home and then select  (OK).

### NOTE

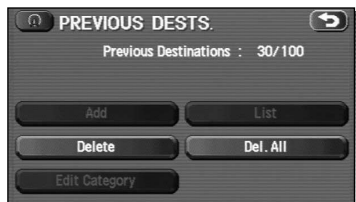
To change your home location, select  (list) and then follow the home location storage procedure described above. Select  (delete) to delete the stored home location. Refer to “Deleting memory points” on Page 94 for further details on the home deletion methods.

### Previous destination (deleting stored locations)

Use this function to delete previously set destinations.

Press the **MENU** button or select **Menu**, then select **Stored Locations** (stored locations), and then select **Previous Dest** (previous destinations).

1



Select **Delete** (**delete**).

If **Del. All** (all delete) is selected, all previously set destinations will be deleted.

2



Select the destination to be deleted.

**▲** : Use this key to display up to five previous destinations.

**▲** : Use this key to display the previous destination.

**▼** : Use this key to display the next destination.

**▼** : Use this key to display up to five of the next destinations.

**Name** (**name**): Use this key to search through the list by name (alphabetical search).

**Date** (**date**): Use this key to search through the list by date.

**3**

**Confirmation message will be displayed. Select  (yes).**



Select  (no) to cancel the deletion.

### Preset destinations

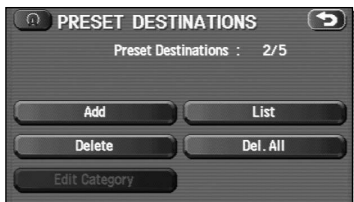
---

#### ■ Storing preset destinations

Using this function, you can program up to five frequently used destinations to keys for single-action retrieval later on.

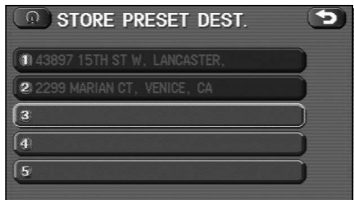
Press the **MENU** button or select **Menu**, then select  (stored locations), and then select  (preset destinations).

**1**



Select  (add).

**2**



Select the desired key from preset keys **1** through **5**.

**3**

**Set the location of a preset destination using your preferred method.**



The method of setting preset destinations is identical to that of setting destinations.

**4**

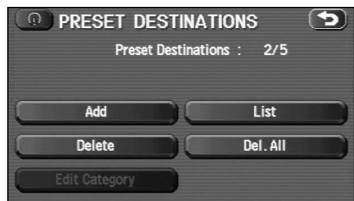
**Select  (OK).**

### ■ Reviewing and modifying preset destinations

Using this function, you can review the preset destinations in the form of a list and modify them if necessary.

Press the **MENU** button or select **Menu**, then select  (stored locations), and then select  (preset destinations).

**1**



Select  (**list**).

**2**



Select any one of keys **1** through **5** according to your modification requirements.



**3**

The screenshot shows a dark-themed interface for editing a preset destination. At the top, it says 'EDIT PRESET DEST.' with a back arrow on the left and a right arrow on the right. Below this, there are several fields: 'Name' with the value '2299 MARIAN CT., VENICE, CA', a 'Show Name' label, and two toggle buttons labeled 'On' and 'Off'. Below that is the 'Position' field with the value '2299 MARIAN CT., VENICE, CA', and two sub-fields for 'LAT. N33° 59' 35"' and 'LONG. W118° 27' 19"'. At the bottom is a 'Tel.' field.

**Select the editing keys appropriate to the item to be modified.**

For details on the function of each key, refer to “Reviewing and modifying memory points” on Page 91.

**NOTE**

The methods for deleting individual and all preset destinations are the same as those described on Page 94 and 95 for memory points.

# Other Functions

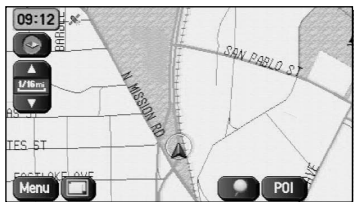
## Displaying POIs on a map

Using this function, you can display POIs on the current map screen.

**1**

**Touch the current map screen.**

**2**



**Select **POI** (points of interest).**

**3**



**Select desired POIs (up to five) using the displayed category keys.**

For selecting POIs of categories other than the six categories on the screen, select **List Categories** (list categories) and select any POIs from the newly displayed categories. **All Local POI's** (all local POIs): Use this key to search for all local points of interest (see below).

Once you have made your selection of POIs, corresponding markers will appear on the current map screen.

To delete the markers for these POIs, see Page 112.

### NOTE

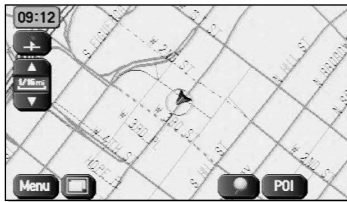
Displayed information about each POI facility might not include recent changes. It is recommended that you check the location or business days/hours before departure.

## Local search

1

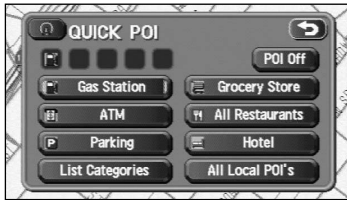
Touch the current map screen.

2



Select **POI** (points of interest).

3



Select **All Local POI's** (all local points of interest).

### 4



### Select the POI you want to find from the list of categories.

- : Use this key to display up to five previous POIs.
- : Use this key to display the previous POI.
- : Use this key to display the next POI.
- : Use this key to display up to five of the next POIs.
- : Use this key to search through the list by distance.
- : Use this key to search through the list by icon type.
- : Use this key to search through the list by name (alphabetical search).

Once you have made your selection of POIs, corresponding markers will appear on the map.

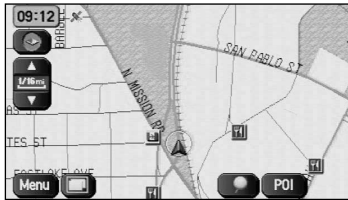
## Displaying POI data


You can display the information on a POI, such as the name, address and telephone number.

**1**

**Display the desired POI markers on the current map screen. (See Pages 74 and 108 for the procedure.)**

**2**



**Select the POI marker for which you want information by moving the crosshair  over it.**

The name of the POI will appear.

If no data is stored for the selected POI, no name is displayed.

**3**



**Select  (information).**

The information on the POI will be displayed.

 : Use this key to store the POI location as a memory point.

## Deleting POI markers

---

Use this function when you want to delete any POI markers on the map.

**1**

**Touch the current map screen.**

**2**

**Select **POI** (point of interest).**

**3**

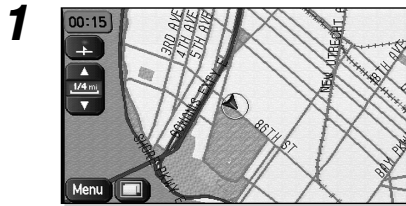


**Select **POI Off** (point of interest off).**

The marker for the POI will disappear from the map.

## Editing Quick POI categories

Use this function when you want to edit the Quick POI categories on this unit.



Select **Menu** (menu).

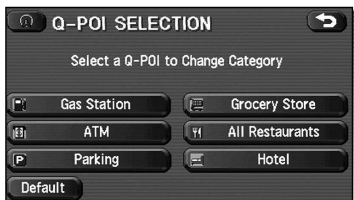


Select **Navigation Set Up** (navigation set up).



Select **Quick POI Selection** (quick POI selection).

4



**Select the item that you want to edit.**

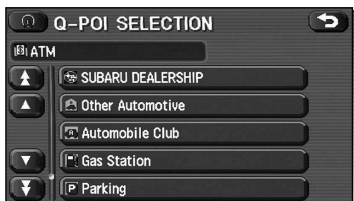
(Following procedure show how to change the category from ATM to SUBARU dealership on Quick POI for example.)


5



**Select  (automotive).**

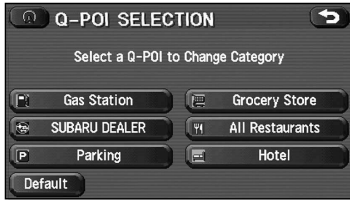
6



**Select  (SUBARU dealership).**



7



**SUBARU dealership bookmarked as  (SUBARU dealer) to Quick POI.**

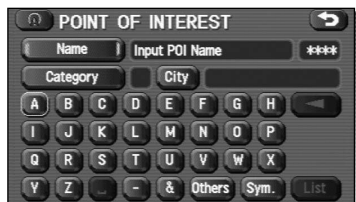
## SUBARU dealership search

### ■ SUBARU dealership search from POI

First, choose either of the two procedures below to follow the “point of interest” method.

- Press the **MENU** button or select **Menu**, select **Destination Entry** (destination entry), and then select **Point of Interest** (point of interest).
- Press the **DEST** button and select **Point of Interest** (point of interest).

1



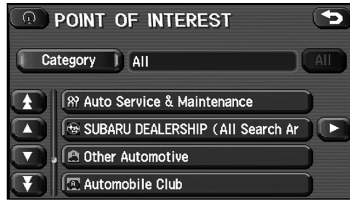
Press the **Category** (category).

2



Press the **Automotive** (automotive).

3

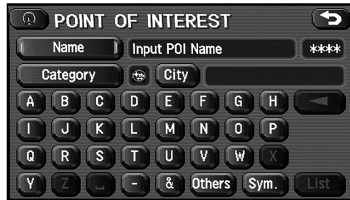


Select **SUBARU DEALERSHIP** (SUBARU dealership) from the list.

#### NOTE

- Displayed information about a specific facility might not include recent changes. It is recommended that you check the location or business days/hours of a desired point of interest before departure.

4



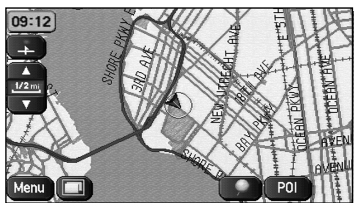
The system refine the destination search only for **SUBARU dealership**.

## ■ Displaying SUBARU dealership on map

1

Touch the current map screen.

2



Select **POI** (points of interest).

3



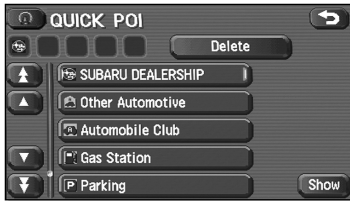
Select **List Categories** (list categories).

4



Select **Automotive** (automotive).

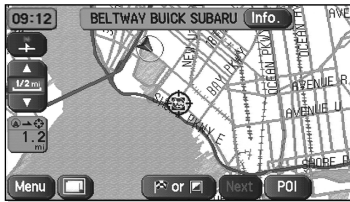
5



Select **SUBARU DEALERSHIP** (SUBARU dealership) and press **Show** (show).

The POI marker of SUBARU dealership will appear.

6



Select the SUBARU dealership marker by moving the cross hair  over it.

7

Select **Info.** (information).

8



The information of SUBARU dealership will be displayed.

# General Information

## ■ Accuracy of vehicle position

### Area in which GPS signals cannot be received

Because the radiowave signals from the GPS satellites travel primarily by line of sight, the navigation system might not be able to receive the signals in the areas described below.

(If the GPS mark does not appear on the map screen, it means that the GPS radiowave signals are not being properly received.)

- (1) Inside a tunnel
  - (2) Inside a building
  - (3) Under a three-dimensional road system such as for high-speed roads
  - (4) On boulevards lined with trees
  - (5) Between buildings
  - (6) Under a cliff or in a cave
- If the GPS antenna or its surroundings are blocked by an obstacle (including cargo), it might not be possible for the system to receive the GPS radiowave signals.
  - If multiple paths are created due to the reflection from buildings, a large measurement error could occur, causing the vehicle's mark to deviate from its actual position.

### Deviation of the vehicle's position mark

The vehicle's position mark could deviate from its actual position when the vehicle is being driven under the conditions listed below or due to conditions of the GPS satellites.

If the vehicle travels on a road whose actual shape differs from that in the map data, the vehicle's mark could deviate from the actual position. The correct position will eventually appear on the screen through the correction function. If the screen does not show the correct position for an excessively long time, correct the current position or make an automatic correction.

- (1) The vehicle's mark could appear on a parallel road.
- (2) When the road splits into a narrow Y, the vehicle's mark could appear on the other fork of the Y.
- (3) When the vehicle makes a right or left turn, the vehicle's mark could appear on one street ahead or behind.
- (4) If the vehicle is transported by means other than the vehicle's own power, such as on a ferryboat, the vehicle's mark will remain in the position it was before the transport until the system can calculate the position through the GPS.
- (5) When the vehicle is driven on a steep incline, the vehicle's mark could deviate from its actual position.
- (6) If there are continuous gradual curves in the same direction, the vehicle's mark could deviate from its actual position.
- (7) If the vehicle is driven in a zigzag pattern, such as through frequent lane changes, the vehicle's mark could deviate from its actual position.
- (8) If the vehicle is placed on a turntable, such as in a parking area, and turned with the ignition OFF, the vehicle's mark could deviate from its actual orientation.

The vehicle's mark could also deviate even after the vehicle has exited the parking area.

- (9) The vehicle's mark could deviate from its actual position if the vehicle is driven using tire chains or snow tires on a snow-covered road or on a mountainous road.
- (10) The vehicle's mark could deviate from its actual position after the tires have been replaced.

## ■ How the vehicle position is detected

### Detecting the vehicle's position through the GPS

GPS stands for "Global Positioning System", which is a system used for detecting an object's position through the use of satellites of the U.S. Department of Defense. Radiowave signals from three or more satellites are received by the navigation system, which utilizes the principle of triangulation to detect the position at which the radiowave signals are received.

When the navigation unit is receiving the GPS radiowave signals, a "GPS" mark will appear on the map screen.

### Detecting the vehicle's position through self-contained navigation

Self-contained navigation is a system that detects the vehicle's position by calculating the vehicle's driven distance and turning angle through the use of various types of sensors that are mounted on the vehicle.

Through the use of self-contained navigation, the vehicle's position can be detected even in an area where the GPS radiowave signals cannot be received.

### Making corrections to the detection of the vehicle's position through map matching

- In map matching, the position information resulting from the detection of the vehicle's position and the locus of the travel of the vehicle up to the present are constantly compared to the shape of the roads on the map in order to correct the vehicle's position mark to the most appropriate road.
- If the vehicle is driven on a road whose actual shape differs from its map data, the vehicle's position mark on the map could deviate from its actual position. Occasionally, the correction of the vehicle's position mark to the actual road on the map can be observed, particularly after the vehicle has turned at an intersection or has exited from a parking area.

### ■ Accuracy of the route guidance

#### **The conditions listed below do not indicate a malfunction.**

- (1) The guidance might prompt the driver to drive straight even though the vehicle is being driven on a straight road.
- (2) The directional guidance could display multiple place names.
- (3) If the vehicle makes a turn at an intersection before the guided route, the wrong type of voice guidance could be outputted.
- (4) The guidance might not be outputted while the vehicle is making a turn at an intersection.
- (5) The system might not be able to search for the proper route.
- (6) If there is no road to the destination or if there is only a narrow road, the route might be indicated up to an area that is short of the destination.
- (7) The repeat search could take a long time while the vehicle is being driven at high speeds.
- (8) While the system is searching again for the route, the route indication might not appear in time for the next right or left turn.
- (9) The route might not change even if a search is made again.
- (10) The system might guide the driver to make a U-turn.
- (11) The system might guide the driver to a road that cannot actually be travelled (such as a road to which entry is prohibited).
- (12) The system might not output guidance even if the vehicle is driven in reverse on the guided route.
- (13) The system might not use a local ferryboat even if the ferry priority is selected.
- (14) If the intersection that you're being guided to is near the end of the route search, the system might not be able to provide guidance.
- (15) The route might not go on a toll road even if the toll-road priority is selected.  
Similarly, a route that uses a toll road could appear on the screen even if the toll-road priority is not selected. (The driver may or may not be able to select "toll-road priority" if both toll and free roads are available.)



## When a Problem Occurs

Confirm whether the problem is due to a minor operational error or a malfunction in the system by referring to the table below before you contact your SUBARU dealer for any repair service.

### The map does not scroll even when the vehicle is moving.

The screen shown might not be the current map screen.

See Page 13 of this manual for instructions on displaying the current map screen.

### The vehicle marker does not appear.

The screen shown might not be the current map screen.

See Page 13 of this manual for instructions on displaying the current map screen.

### The GPS marker is not displayed.

The GPS antenna or your vehicle might be in a position where GPS signals cannot be received.

Try moving the GPS antenna or your vehicle to a position where there are no obstacles around.

### There is no voice guidance.

- Route guidance might be suspended.
- The guidance volume might be too low.

• See "Volume" on Page 12.

### **Small spots or bright flashes appear on the screen display.**

This is probably due to the natural characteristics of the liquid crystal display (LCD).

There is nothing wrong with the display and no need for concern.

### **The DVD-ROM disc cannot be ejected.**

The disc might be incompatible or might have been inserted incorrectly.

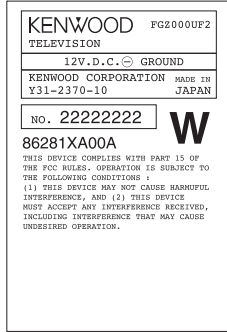
## ⚠ CAUTION

Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

In compliance with Federal Regulations, following are reproductions of labels on, or inside the product relating to laser product safety.



Location : Bottom Unit



Location : Monitor top surface

## NOTE

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment may cause harmful interference to radio communications, if it is not installed and used in accordance with the instructions. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

## NOTE

This Class B digital apparatus complies with Canadian ICES-003.

## FCC WARNING

This equipment may generate or use radio frequency energy. Changes or modifications to this equipment may cause harmful interference unless the modifications are expressly approved in the instruction manual. The user could lose the authority to operate this equipment if an unauthorized change or modification is made.